JOHASAM

JOURNAL OF HEALTH, APPLIED SCIENCES AND MANAGEMENT

Volume 7, Issue 1, November, 2023

Editor
Dr Iheanyi Osondu Obisike

© 2023 Rivers State College of Health Science & Management Technology

ISSN: 1597-7085
ISSN (Online): 2756-5343
www.rschst.edu.ng
at AJOL: https://www.ajol.info/index.php/johasam/index

Published by
RIVERS STATE COLLEGE OF HEALTH
SCIENCE & MANAGEMENT TECHNOLOGY
ORO-OWO, RUMUEME
PORT HARCOURT, NIGERIA

In Collaboration with
AFRICAN JOURNALS ONLINE
Makhanda, Republic of South Africa

JOHASAM: Journal of Health, Applied Sciences and Management
ISSN: 1597-7085 ISSN (Online): 2756-5343 www.rschst.edu.ng
Homepage at AJOL: https://www.ajol.info/index.php/johasam/index
License: Creative Commons Attribution 4.0 International

Editor
Dr Iheanyi Osondu Obisike

Associate Editors
Dr Mandy Daye C. George
Dr. Unwobuesor Richard Iloma
Dr. John Hemenachi S. Nwogu
Dr. Ibiene Kalio
Dr. Rachael I. Ibulobo
Dr. Veronica Eke

ADVISORY BOARD

1. Prof. Franklin Nlerum (Provost, Rivers State College of Health Science & Management Technology, Port Harcourt. frankezi@yahoo.com)
2. Prof. David Ogbonna (Rivers State University, ogbonna.david@ust.edu.ng)
3. Prof. Goodluck Azuonwu (University of Port Harcourt, goodator2002@yahoo.com)
4. Dr. Okidim Iboh Andrew (Rivers State University, iboh.okidim@yahoo.com)
5. Prof. Uzoma Jonah Nwogu (University of Port Harcourt, nwoguzoazis@yahoo.com)
6. Dr. Peter Cookey (IHE Delft Institute for Water Education, Netherlands, +31613905030)
7. Prof. Eucharia Nchedo Aye (University of Nigeria, Nsukka, eucharia.aye@unn.edu.ng)
8. Dr. John Ordu (University of Port Harcourt, ordujohnik@yahoo.com)
9. Dr. Chukukere C. Nyeche (Ministry of Health, Port Harcourt, nyechechux5@gmail.com)
10. Dr. Clement Nyenke (Rivers State College of Health Science & Management Technology, clemyenke@yahoo.com)
11. Dr. William Iyama ((Rivers State College of Health Science & Management Technology, willy4a@yahoo.com)

Journal of Health, Applied Sciences and Management (JOHASAM) is a high quality peer-reviewed research journal which provides a platform for researchers, academics, health professionals and management experts to share universal knowledge on health science, technology and management in order to produce efficient, self-reliant and enterprising manpower that would meet the challenges of contemporary health care delivery services and management. As a multidisciplinary journal, we welcome quality manuscripts on these areas: Community Health, Public Health, Environmental Health, Medical Imaging, Laboratory Science, Pharmacy, Dispensing Opticianry, Dentistry, General Medicine, Anatomy, Health Education, Medical Social Work, Medical Sociology, Language and Society, Rural Sociology, Social Sciences and Education, Biomedical Engineering, Physics, Biology, Chemistry, Physiology, Psychology, Entrepreneurship, Hospital Management, among others.

MANUSCRIPT SUBMISSION GUIDELINES

1. Manuscript should be submitted to the Editor using this email: editorjohasam@yahoo.com or johasam@rschst.edu.ng
2. Manuscript must be double spaced and must not exceed 15 pages including abstract and references page.
3. The abstract must not exceed 250 words.
4. Details of reference to each work cited must be given.
5. For purposes of referencing description, JOHASAM adopts APA referencing style.
6. Full name of author(s) must be given in this order: first name, middle name and surname.
7. All correspondences should be addressed to the Editor, Journal of Health, Applied Sciences and Management, Rivers State College of Health Science and Management Technology Rumueme, Port Harcourt, Nigeria, 07062527544

Contents

pp. 5-12 https://dx.doi.org/10.4314/johasam.v7i1.1

Comparative Studies of the Mycoflora of Dry and Fresh Maize (*Zea mays*) Rhizosphere

[1]Esther Bethel Aalonee
albethluvnath@gmail.com
[2]Wisdom Ndagborme Barade
wisdombarade@gmail.com
[3]Nakara Michael Timothy
tnakaramichael@yahoo.com
[4]Chinwe Goodness Uchendu
chinwegreat@yahoo.com
.
[1,3,4]Rivers State College of Health Science and Management Technology,
Oro-Owo, Rumueme, Port Harcourt
[2]Department of Science Laboratory Technology, School of Applied Sciences,
Ken Saro-Wiwa Polytechnic, Bori, Rivers State

Abstract

Comparative studies of the mycoflora of dry and fresh maize rhizosphere was evaluated in the laboratory. Rhizosphere and soil sample were taken during rainy season from two different maize farms in Bori, Khana Local Government Area, Ogoni, Rivers State. The maize stumps were collected by the use of pre-sterilized hand trowel. Collected maize stump with rhizosphere soil was carefully placed in polythene bag and the open end tied. Stock solutions were prepared and diluted serially for plate count and fungal isolation using pour plate method. Sabouraud dextrose agar was the preferred media. Discrete colonies were sub-cultured for precise identification of fungi. Total fungal count and the isolation frequency of each identified genera were determined. Analysis of the samples revealed the presence of four mould genera *Aspergillus, Fusarium, Penicillium, Trichoderma* and yeast. The frequency of occurrence was *Aspergillus* 16%, *Fusarium 2*%, *Penicillium* 68%, *Trichoderma* 9% and Yeast 5% in dry maize rhizosphere. The frequency of occurrence in fresh maize rhizosphere was *Aspergillus* 27%, *Fusarium* 0.0%, *Penicillium* 14%, *Trichoderma 4*7% and Yeast 12%. The results showed that *Penicillium* population within the rhizosphere of dry maize plant was very high compared to that in fresh maize plant rhizosphere. Some of these fungi genera are known to be pathogenic to both plants and animals; such as ear rot in maize plant, hematologic disorder in humans, among others, hence it was recommended that farmers should perform soil analysis for fungi before cultivating maize for maximal production.

Keywords: maize, mycoflora, rhizosphere, soil, comparative

Introduction

Maize (*Zea mays*) is the second most abundantly produced cereal in the world exceeded only by rice. It is a tall annual plant belonging to the grass family and is one of the most diverse species of plants. It is monoecious with terminal male inflorescence and auxiliary female inflorescences (lobs). The flowers are unisex, incomplete and zygomorphic. They reproduce by both cross-pollination and self-pollination (Ramalingan, 2019).

Cultivation

Maize is best grown in warm, tropical and subtropical regions as it requires warm soils to develop optimally. One of the most important requirements for growing maize is a high quality soil which is deep, fertile and well draining with pH between 6.0 and 6.9. Maize plants are very heavy feeders and even the most fertile of soils may need to be supplemented with nutrients as the plants develop, particularly nitrogen. Maize also requires plenty of space as it grows and is pollinated by the wind. It should be planted where it will receive full sunlight for most of the day and with ample moisture (Roney, 2009). Typical maize plants develop 18 to 22 total leaves. Silk appears about 55days after emergence and mature in around 125 days after emergence (Willy, 2010).

The maize kernel is the reproductive seed of the maize plant therefore, its structure and composition exist for the purpose of reproduction rather than processing. The kernel is composed of four main part expressed as a dry weight percentage of the whole kernel, and they include: germ, endosperm (horny and floury), pericarp and tip. Each of these sections has distinct compositional features that are important for the maize kernel (Chodosh, 2021; Tulin & Askun, 2006).

Storage

It is easier to dry, store and transport maize and these have made it a major source of energy for animal food and a stable raw material for the production of starch and starch -based industrial products. Maize is also a primary food source of many areas of the world, including South America, Central America and Africa where it is converted directly into food products via grinding, alkali processing, boiling/cooking, or fermentation (Karl, 2012; Sreenivasa et al., 2011).

Uses (Benefits)

Many parts of the maize plant are used in industry and several types of maize are grown primarily for their industrial applications. Maize (corn) is used to produce ethanol for industrial and local use. Maize is rich in Vitamin C, an antioxidant that helps protect cells from damage and wards of diseases like cancer and heart disease. Yellow corn is a good source of the carotenoids, which are good for eye health and prevent the lens damage that leads to cataracts (Bressani, 2011).

Corn has a high source of fibre which keeps the digestive system healthy and can also improve cholesterol and blood sugar levels. Corn also provides a high amount of carbohydrate which is the body's main source of energy. Carbohydrate helps to fuel the brain, kidneys, heart muscles and central nervous system. Corn is gluten free, which means that it helps reduce chronic inflammation, boosts energy and promotes weight loss. It is also rich in Manganese which plays a role in bone formation, blood clotting, and reducing inflammation (Kataki et al., 2007).

Corn has high amounts of Vitamin B constituents, thiamine and niacin, which are good for facilitating growth. Thiamine helps the body improve nerve health and cognitive functions while niacin can prevent a series of problems like dementia and dermatitis. Corn is also known for having high amounts of folic acid and is therefore good for pregnant women. Since corn is rich in Vitamin E, which is a natural source of antioxidant, it protects the body from various illnesses, helping you grow without the hindrance of disease (Nuss et al., 2011). It can help with various digestive problems like constipation and haemorrhoids, and can also protect one from getting colon cancer. Fiber is also good for your bowel movement because it backs up your stool and facilitates its movement down the digestive tracts. As a result, it is also good for diarrhoea and irritable bowel syndrome (Osborne & Voogt, 2008).

The maize plant root receives between 30-60% of net photosynthesized carbon. Of this, an estimated 40-90% enters the soil as a wide variety of materials including alcohols, ethylene, sugars, amino and organic acids, vitamins, nucleotides, polysaccharide and enzymes (Taylor et al., 2007). These materials create a unique environment of soil microorganisms called the rhizosphere. The rhizosphere is the narrow zone or region of soil that is directly influenced by root secretions and associated soil microorganisms (Raven et al., 2005). The plant root surface, termed the rhizoplane, also provides a unique environment for microorganisms. As these gaseous, soluble and particulate materials move from the plant to the soil, rhizosphere and rhizoplane microorganisms increase in number and when these newly available substrates become available, their compositions and functions also change (Taylor et al., 2007). In addition, rhizosphere and rhizoplane micro-organisms create a soil microbial loop, thereby playing critical roles in organic matter synthesis and degradation. A wide range of microbes in the rhizosphere can promote plant growth. They include certain chemicals such as auxins, gibberellins, glycolipids and cytokinins. A critical process that occurs on the surface of the plants and particularly in the root zone is associating nitrogen fixation, in which nitrogen-fixing microorganisms are on the surface of the plant root (Berea et al., 2005).

A fungus is a member of a large group of eukaryotic organisms that include microorganisms such as yeast, molds, and much familiar mush rooms (Moore et al., 1998; Willey et al., 2008). Fungi grow best in dark, moist habitats where there is little danger of desiccation, but they are found wherever organic material is available (Willey et al., 2008). Therefore, they are important

economically at the root of plant (maize) responsible for the majority of plant diseases. For example in maize, fungi cause leaf blight (*Helminthosporium turcicum pass*), smut of maize (*Ustiligo maydis*), head smut of maize (*Sphacelotheca reliana*), Rust of maize (*Puccinia sorghi*) and brown spot of maize (*Physodermazeae-maydis shaw*).

Paszkowski (2006) reported that fungi are highly beneficial in agriculture, horticulture and forestry. Fungi activity in farm lands contributes to the growth of plants by about 70%. (Chandler, 2017) reported also that fungi are animal pathogens. Thus they help in controlling the population of pests. Some fungi do not infect plants and animals and an example is *Beauveliabassana* which is used as pesticide to control the spread of emerald ash borer (Deshpande, 1999). Fomina et al. (2017) reported that fungi are also used in agricultural research. Some species of fungi are used in the detection of certain elements such as Uranium and Arsenic in soil and in the production of enzymes.

Zhuo and Fan (2021) reported that certain fungi in particular white roof fungi can degrade insecticide, herbicide and heavy fuels and convert them into carbon dioxide, water and basic elements.

Materials and Methods

The following materials were required and used for adequate analysis in determining the mycoflora of dry harnessed maize and fresh maize stand: oven, incubator, petri dishes (20), test tubes (40), pipette (60), Sabouraud dextrose agar, chloramphenicol, dry and fresh maize stands, hand trowel, polythene bags, electronic balance, distilled water, spreader, 95% alcohol, lactic acid, light microscope, hand lens, fungal identification manual.

Sample Collection

The maize stumps were collected by the use of pre – sterilized hand trowel. The hand trowel was washed and wiped thoroughly with 95% alcohol after each use. Collected maize stump with rhizosphere soil was carefully placed in polythene bag and the open end tied.

Preparation of Media

Petri dishes, test tubes, pipettes, flasks and beakers were all washed and sterilized by placing them upside down in an oven at the temperature of 160^{o}c for 1hr. Sample preparation was done in accordance with the manufacturer's recommendation. With the aid of an electronic balance 16.25g of Sabouraud dextrose agar was weighed into 500ml conical flask and prepared for sterilization by addition of 250ml distilled water. The preparation was plugged with cotton wool and wrapped with aluminium foil before autoclaving for 121^{o}c for 15 minutes.

It was allowed to cool to some degree, lactic acid and a capsule of 250mg of chloramphenicol was dissolved in it to inhibit the growth of both gram positive and gram negative bacteria. Aseptically, the autoclaved Sabouraud dextrose agar was carefully poured in to 20 petri dishes (10 petri dishes each for dry and fresh maize samples), was allowed to set and then inverted to avoid condensed water settling back on the already set medium.

The samples from the rhizosphere of dry and fresh maize were prepared by weighing 1g of soil into test tubes and diluted with 9ml distilled water to form the stock. The stock was used to prepare aliquot of dilutions of 10^{-1}, 10^{-2}, and 10^{-3} to 10^{-10}. 1ml of various dilutions were transferred to the agar plates and incubated at ambient temperature for 5 days. Then these cultures were inverted and incubated at ambient temperature (30± 2^{o}c) for up to 120hrs.

Data Collection

Data collected were the average plate count for each sample of both dry and fresh maize rhizosphere, population (cfu/g), as well as their isolates. All data were subjected to analysis of variance and significant means were separated using LSD at 5% level of probability.

Results

Table 1 shows the cultural characteristics of fungal genera of rhizosphere on dry and fresh maize cultures. Each organism; A*spergillus, Fusarium, Trichoderma, Penicillium,* and yeast shows their different characteristics on its cultural plates. With the aid of the fungal identification manual, their various characteristics were reached and identified.

Table 1: Cultural characteristics of fungal genera of rhizosphere on dry and fresh maize

Organisms	**Cultural Characteristics**
Aspergillus	Colonies spread, rapidly, mycelium initially white then turning black.
Fusarium	Colonies spread, woolly, cottony and flat, colour varying.
Trichoderma	Colonies spread rapidly, forming a some-what thin mycelia layer with irregular shaped parches of verdigris green.
Penicillium	Colonies form a tough flat with surface slightly floccose or ropy, radially furrows (line in between), pale grey-green or greenish grey, reverse reddish, to purple.
Yeast	Colonies forming a flat creamy surface with thin mycelia layer and irregular shape.

The result of plate count for each sample is shown in table 2. It was observed that the total plate count in fresh maize was higher when compared to the dry maize which was 14.6×10^2 and 12.2×10^2 respectively. The result also shows that on fresh maize samples, the number on each plate count out numbered that of the dry maize samples except plate 3 and 7. Meanwhile, plate 4 on both fresh and dry are the least.

Table 2: Plate count for each sample (cfu/g)

Sample	**Fungal count on Fresh maize(cfu/g)**	**Fungal count on Dry maize (cfu/g)**
1	1.1×10^1	1.0×10^1
2	0.7×10^0	0.3×10^0
3	1.5×10^1	2.0×10^1
4	0.4×10^0	0.2×10^0
5	0.9×10^0	0.4×10^0
6	1.2×10^1	0.8×10^0
7	1.5×10^1	2.5×10^1
8	3.0×10^1	1.7×10^1
9	2.8×10^1	2.1×10^1
10	1.5×10^1	1.2×10^1
Total	$\mathbf{14.6}\times10^2$	$\mathbf{12.2}\times10^2$

Table 3 shows the populations of fungal genera on fresh maize culture. The result indicated that plate 8 has the highest isolates followed by plate 3 and the least were plate 2, 6 and 7 while plate 8 has the highest population (cfu/g) followed by plate 9 and 3, with the least was plate 4. Remarkably, the fungi *Fusarium* was not isolated from fresh maize rhizosphere.

Table 3: Population of fungal genera on fresh maize culture

Fresh sample	Isolates	Population (cfu/g)	Total
1	*Trichoderma*	8	11
	Penicillium	3	
2	Yeast	7	7
3	*Aspergillus*	3	
	Trichoderma	8	15
	Pencillium	4	
4	*Penicillium*	1	4
	Yeast	3	
5	*Trichoderma*	6	9
	Aspergillus	3	
6	*Trichoderma*	12	12
7	*Trichoderma*	15	15
8	*Trichoderma*	10	
	Aspergillus	8	30
	Yeast	7	
	Penicillium	5	
9	*Aspergillus*	20	28
	Pencillium	8	
10	*Aspergillus*	6	15
	Trichoderma	9	

Fungal genera on dry maize cultures were identified as shown in table4. As clearly shown, plate 8 has the highest isolates, while plate 7 has the highest population (cfu/g) followed by plates 9 and 3. The least plate is 4.

Table 4: Identified fungal genera on dry maize cultures

Dry sample	Isolates	Population (cfu/g)	Total
1	*Penicillium*	10	**10**
2	*Penicillium*	3	**3**
3	*Aspergillus*	12	**20**
	Penicillium	8	
4	*Trichoderma*	4	**2**
5	*Trichoderma*	8	**4**
6	*Penicillium*	2	**8**
7	Yeast	2	**25**
	Penicillium	23	
8	*Penicillium*	11	
	Yeast	4	**17**
	Fusarium	2	
9	*Trichoderma*	1	**21**
	Penicillium	20	
10	*Aspergillus*	8	**12**
	Trichoderma	4	

Table 5 shows the total population of each organism on all cultures of fresh and dry samples. The table further shows the comparative analysis of the total organisms. *Trichoderma* is the led organism on the fresh maize sample followed by *Aspergillus*, while on the dry maize sample, *Penicillium* is the most populated organism followed by *Aspergillus* as well. *Fusarium* was the least populated organism on both fresh and dry maize samples.

Table 5: Total population of each organism on all cultures of fresh and dry samples

Organisms	Samples	
	Fresh maize	**Dry maize**
Penicillium	21	83
Trichoderma	68	11
Aspergillus	40	20
Yeast	17	6
Fusarium	0	2
Total	**146**	**122**

Comparison of the total number of each organism in percentages on all cultures of dry and fresh sample can be seen on fig. 1, 2 and 3. Just as in table 5, *Penicillium* took the lead on dry maize sample while *Trichoderma* on fresh maize sample. *Fusarium* was also the least in percentages on both fresh and dry maize samples.

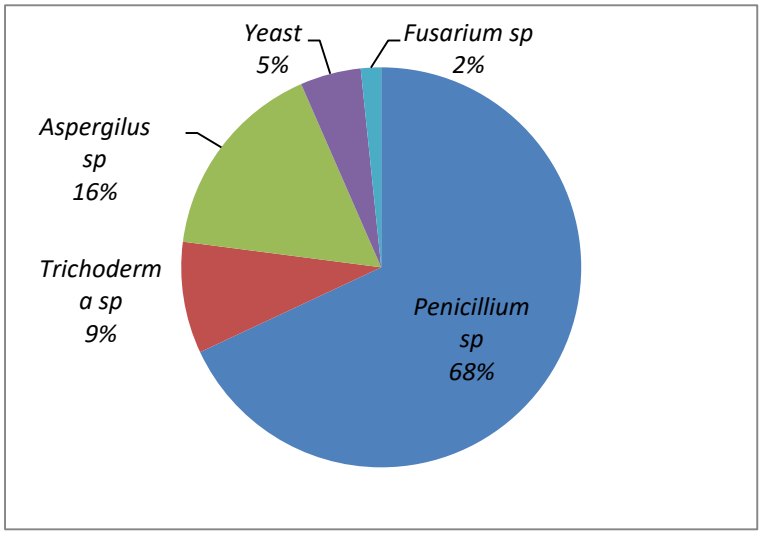


Fig .1: Isolation Frequency in Dry maize Rhizosphere

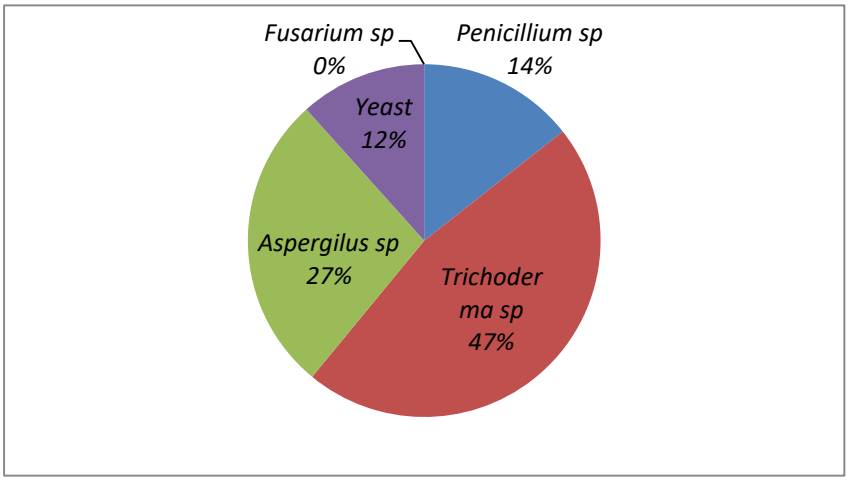


Fig.2: Isolation Frequency in Fresh maize Rhizosphere

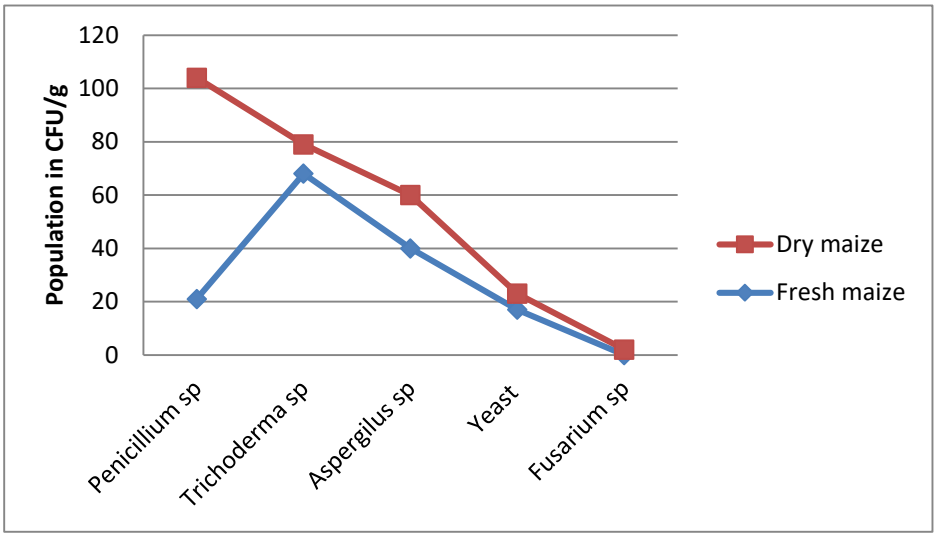


Fig.3: Isolation Frequencies of Mycoflora from Dry and Fresh Maize Rhizosphere

Discussion

Mycoflora of dry and fresh maize rhizosphere has been widely reported (Lim, 1969; Roney, 2009; Sreenivasa et al., 2011; Tulin & Askun, 2006). The findings of the present study is in agreement with this since about five different species of mycoflora were isolated from fresh maize and dry harvested stands as shown in table 1. Berea et al. (2005) also reported that a critical process that occur on the surface of the plants and particularly in the root zone is as a result of certain microorganism such as the fungi, the present study also attests to that fact because these mycoflora were isolated from the root zone which is the rhizosphere. Fungi grow best in dark, moist habitats where there is little danger of desiccation, but they are found wherever organic materials are available (Willey et al., 2008). The above findings are true and that can be attested to in tables2,3, 4 and 5. The total population of mycoflora as seen in fresh maize sample is higher when compared with the dry maize sample. Pandey (2009) shows that fungi are responsible for the majority of plant diseases, no wonder they are found at the rhizosphere as the present study shows.

Table 5 shows a total of 146 organisms as against 122 organisms, indicating that rhizosphere of maize when fresh is conducive in comparism to the rhizosphere of maize when it is dried. Fajard and Martinez (2008) reported that fungi at high concentrations act as chemical defense against competition with other microorganisms in species-rich environments, such as the rhizosphere. The finding of the present study agrees with that as seen in table 3. Previous studies involving the mycoflora of maize rhizosphere were associated with those that are found at the rhizosphere and not necessarily determining the comparison that exist between the population of mycoflora at dry harvested and fresh maize stands. The present study determines the comparative analysis between these developmental stages as well as comparing the mycoflora of dry harvested and fresh maize stands as shown in tables 1 and 4. It also enlists those mycoflora of dry and fresh maize rhizosphere. The present study also went further in comparing their percentages as shown in fig, 1, 2 and 3. From the statistical data, tables 4, and5, it was evidently clear that the population of *Trichoderma* was higher than other organisms, in fresh maize sample while on dry sample, *Penicillium* was the most populated organism. *Fusarium* was found only on dry maize sample.

Conclusion

Certain mycoflora are found at the rhizosphere of maize and they include: *Fusarium*, *Penicillium*, *Aspergilus*, *Trichoderma* and Yeast. From the study above, we can conclude that mycoflora of maize can be seen in their numbers especially at the root of fresh maize rhizosphere. Another positive effect is that it helps in recycling nutrients. They also affect maize in a negative way in that they cause both plant and animal diseases.

References

Berea, J. M., Pozo, M. J., & Azeon, R. C. (2005). Microbial co-operation in the rhizosphere. *Journal of Experiment Botany*, 56,1761-1778.

Bressani, R. (2011). Chemistry technology and nutritive value of maize tortillas. *Food Review International*, 6, 225-264.

Chandler, D. (2017). *Basic and applied research on entomopathogenic fungi microbial control of insect and mite pests*. Academic.

Chodosh, S. (2021). *The bizarre botany that makes corn a fruit, a grain and also a vegetable popular science*.

Desphande, M. V. (1999). Mycopesticide production by fermentation: Potential and challenge. *Critical Reviews in Microbiology, 25*(3), 229-243.

Fajard, A. & Martinez, J. L. (2008). Antibiotics as signals that trigger specific bacterial responses. *Current Opinion in Microbiology*, *11*(2), 161-167.

Fomina, M., Charnock, J. M, Millier, S, Alvarez, R., & Gadd, G. M. (2007). Fungal transportations of uranium oxides. *Environmental Microbiology, 9*(7), 1696-1710.

Karl, J. R. (2010). The maximum leaf number of the maize subspecies the maize. *The Maize Genetics Cooperation Newsletter*, *86*(4).

Kataki, P. K. & Babu, S. C. (2007). *Food systems for improved human nutrition linking agriculture, nutrition and productivity*. Haworth.

Lim, G. (1969). Some observation on soil and root surface mycoflora. *Plant Soil*. *31*, 143-148.

Moore, R., Clark, W. D., & Vodopich, D. S. (1998). *Botany (2nd ed.).* MacGraw-Hill.

Nuss, E. T. & Tanumihardjo, S. A. (2011). Quality protein maize for Africa: closing the protein inadequacy gap in vulnerable population. *Adv. Nutr 2*, 217-224.

Osborne, D. & Voogt, P. (2008). *The analysis of nutrients in foods*. Academic.

Pandey, B. P. (2008). *Plant pathology, pathogen and plant disease (11th ed.).* Chands.

Paszkowaszi U. (2006). Mutualism: The tin and tank of plant symbiosis. *Current Opinion in Plant Biology, 9*, 364-370

Ramalingam, S. T. (2009). *Modern biology (3rd ed.).* Africana

Raven, P. H., Evert, R. F., & Eichorm, E. S. (2005). *Biology of plants (7th ed.)*. Freeman, W. H.

Roney, J. (2009). The beginnings of maize agriculture. *Archeology Southwest*, *23*(1).

Sreeniva, M. T., Dass, R. S., ChairthRaj, A. P., & Janardhana, G. R. (2011). Mycological evaluation of maize grains produced in Karnataka (India) for the post harvest fungal contamination. *World App. Sci. J. 13*(4).

Taylor, D. J., Green, N. P. O., & Stout, G. W. (2007). *Biological science (7th ed.).* Cambridge. Tulin,

J. M. & Askun, D. I. (2006). Investigation of fungal species diversity of maize kernels. *J. Biol Sci.6*(2), 275-281.

Willey, J. M., Sherwood, L. M., & Woolwerton, C. J. (2008). *Prescott, Harley and Klein's microbiology (7th ed.).* McGrow-Hull

Willy, H. V. (2010). Growth and Production of maize: Traditional low-input cultivation. *Soils, Plant Growth and Crop Production*.

Zhuo, R. & Fan, F. (2021). A comprehensive insight into the application of white rot fungi and their lingo cellulolytic enzymes in the removal of organic pollutants. *Science of the Total Environmental*. *778*, 146132.

pp. 13-24 https://dx.doi.org/10.4314/johasam.v7i1.2

Spatial and Seasonal Distribution of Microorganisms in Water Bodies, Port Harcourt, Nigeria

[1]Alaye A. S. Bibiye, [2]Oroma G. Eddeh- Adjugah, [3]Jonathan Tamunoibiteim & [4]Ebbi Robison
[1,3]Rivers State College of Health Science and Management Technology, Oro-Owo, Rumueme, Port Harcourt, Rivers State, Nigeria
[2]Rivers State Primary Healthcare Management Board, Port Harcourt, Nigeria
[4]Rivers State University Teaching Hospital, Port Harcourt
alayebibi@yahoo.com; eddehadjugah@gmail.com; tamunoibiteim69@gmail.com; robinsonebbi@gmail.com

Abstract

Microorganisms are ubiquitous in nature and play significant roles in human culture and health. They are often distributed in water bodies. Thus, the spatial and seasonal distribution of microorganisms in water bodies (ground, surface and well water) in Port Harcourt, South-south Nigeria was investigated during the rainy and dry season of 2022. Three (3) sample locations were identified (Abuloma, Borikiri and Eagle Island) and different sources *vis-à-vis* ground (borehole), surface water (river) and hand dug well-water were collected from the locations. Samples were collected in 10mL sterile container, placed in an ice-packed cooler and were transported to the laboratory for microbial analysis. Morphologically isolated colonies obtained from different plates marked on nutrient agar, MacConkey agar, m-HPC agar plate, Thiosulphate Citrate Bile Salts Agar (TCBS), and Erosin Methyl Blue (EMB) agar to purify was effectively carried out. Result among others revealed increase in total heterotrophic bacteria (THB) in ground water exercised an explicit relationship with the increase in surface water except that of the hand-dug wells across sample locations during the dry and wet seasons. These increases could possibly give rise to more harmful organisms in the water bodies. More so, there could be possible Salmonellosis infection among vulnerable children who are unavoidably disposed to consuming such salmonella-contaminated water resources accidentally due to its increased concentration. Dysentery, diarrhea, nausea, abdominal cramp among others may be common among water utilizers from the study area because of the presence of shigella that causes shigellosis. The bioavailability of various microorganisms like vibrio, shigella and salmonella and their increases in concentration could possibly be linked with poor water sanitation, sewage and solid waste management. This may becatalyzed by derelict regulation enforcement agency or dearth of officers to put to practice the needed regulation, and in addition the paucity of education and awareness campaign on the citizenry as it relates to their actions and inactions (activities) on water bodies. Thus, all consumable water should be treated before ingestion is facilitated and relevant agencies should step up action plan to ameliorate these deficiencies within the study zone in a bid to ensure and maintain water safety and therefore, good health.

Keyword: water bodies, spatial, seasonal, distribution, microorganisms.

INTRODUCTION

Microorganisms are organisms of microscopic sizes that could exist as single cell forms or as a colony of cells. They could be bacteria, fungi, archaea or protists (Singh, 2008; Kelly, 2017) However, prions (abnormal pathogenic agents that are transmissible) (Belay & Schonberger, 2005) and viruses do not belong to this group of organisms (Kelly, 2017; William et al, 2017). In human culture and health, microorganisms play significant roles which are not limited to sewage treatment phenomena, food fermentation, fuel production, enzymatic activities, production of bioactive compounds, among others. Nevertheless, in modern society, varied forms of microorganisms have been used for biological warfare and bioterrorism. More so, they are key components of productive soil and they make up the human microbiota including the indispensable gut flora and the epidemiologically known infectious diseases. Also, they produce oxygen, decompose organic material, provide nutrients for plants and at these processes, greenhouse gases are released to the atmosphere at the same time. They therefore play a crucial role in relation to climate and climate change (Jacobsen & Johansen, 2023), and maintaining human health, albeit some can be morbific in plants and humans (American Society

for Microbiology, 2022; Libre Texts Library, 2023). They are easily adapted to different habitats (such as extreme cold or very hot conditions, high pressure or high radiation environment like Deinococcusradiodurans (Kelly, 2017, William et al, 2017). Microorganisms sum up a larger part of the planet's living material and thus play a major role in maintaining the earth's ecosystem. They can be divided into seven major typologies according to (Libre Texts Library, 2023) to include fungi, bacteria, viruses, algae, protozoa, archaea and multicellular animal parasite (helminths). Each typology has a distinctive means of location, production, cellular composition and morphology.

Water is one of the free gifts of nature. It is a compound that has an element of hydrogen and oxygen in the ration of 2:1 (Bibiye et al, 2022). Water comes from diverse sources such as streams, hand dug wells, lakes, sea, ocean, spring, lagoon. It is an indispensable nutrient at every age, consequently optimal hydration is a crucial component for good health. Water accounts for about 60% of an adult's body weight (Hooper et al, 2016; Chan, 2023). In human health, water helps to restore fluids lost through metabolism, breathing, sweating, and the removal of waste. It helps to keep one from overheating, lubricates the joints and tissues, maintains healthy skin, and is necessary for proper digestion according to (Chan, 2023). It's the perfect zero-calorie beverage for quenching thirst and rehydrating your body (Millard-Stafford, 2012; The National Academy of Sciences, 2019). The National Academy of Medicine (Millard-Stafford, 2012) and (The National Academy of Sciences, 2019) suggest an adequate intake of daily fluids of about 13 cups and 9 cups for healthy men and women, respectively, with 1 cup equaling 8 ounces. The National Academy of Medicine maintained that water is highly needed by all ages (Table 1) aside water-rich foods.

Table 1: Daily water intake based on age

Age	Daily Adequate Intake
1-3 years	4 cups, or 32 ounces
4-8 years	5 cups, or 40 ounces
9-13 years	7-8 cups, or 56-64 ounces
14-18 years	8-11 cups, or 64-88 ounces
men, 19 and older	13 cups, or 104 ounces
women, 19 and older	9 cups, or 72 ounces
pregnant women	10 cups, or 80 ounces
breastfeeding women	13 cups, or 104 ounces

Source: https://www.hsph.harvard.edu/nutritionsource/water/

Furthermore, the need to have quality water for human consumption at all levels of life has become a teething problem in most developing countries due to poverty, poor technological know-how and paucity of political will. This could promote microbial contamination since most of the inhabitants lack water hygiene, sanitation and safety, and such could accentuate the public health status of the citizen in a general sense noting that water is a vehicle for the transportation of diseases to man. Diseases such as cholera, typhoid, dracontiasis, diarrhea, dysentery, among others are water-based or water-related diseases that affect human health due to microbial interaction with water bodies (Achalu, 2008; Bibiye, 2023). A good example is the presence of *Escherichia coli,* as a water-based indicator of microbial contaminants, which simply defines the presence of water-borne pathogens (Okafor, 1985; Okpokwasili & Akojubi, 1996; Chukwura, 2001; Venter, 2001). Also, Feachem (2001) observed that the major health threat posed by drinking unsafe water is infectious diseases. Lack of municipal water supply has led to great water and sanitation crises in most developing countries. Many people fall back to different water sources and many of these contain dangerous and harmful contaminants (Onyenekenwa, 2011). Therefore, this study is aimed at assessing the occurrence and seasonal distribution of microorganism in well, surface and groundwater bodies in Port Harcourt as there is paucity of data.

METHODOLOGY

Study Area

Port Harcourt is a cosmopolitan city with a geographical coordinate that lies between latitude 4º49/27.0012//N and longitude 7º2/0.9996//E respectively. It is 9 meters above sea level and has a tropical climate with significant rainfall pattern in most months of the year. The average annual temperature is 26.4ºC or 79.5ºF. It has precipitation of about 2708 mm or 106.6 inches per annum. Most precipitation occurs in September with an average of 141 mm or 16.3 inches. The driest month is January with 36 mm or 1.4inch rainfall. Temperature varies by 2.4 ºC or 36.3 ºF throughout the year. More so, the warmest month of the year occurs in February with an average temperature of 26.70 ºC or 81.7/F while August serves as the coldest month, with an average temperature of 25.2ºC or 77.4ºF.

Collection of Water Samples

Groundwater (Boreholes), surface water (River) and well water (Hand dug wells) samples were collected from Abuloma, Borikiri and Eagle Island respectively. Samples were collected for microorganism analyses in clean containers after rinsing the containers with the sample to be collected. Water samples for microbial analyses were collected separately in one (1 Ltre) sterile container. The sampling containers were filled to the brim to expel oxygen which could trigger reactions and falsify results. Water samples were preserved in ice chests to inhibit the activity of microbes.

Microbiological Analysis

This method enhances the analyses of water by way of estimating the number of bacteria present and to allow the recovery of microorganisms in order to identify them. Different water sources were processed for the isolation of bacteria as described elsewhere (Ruangpan &Tendencia, 2004; Malisha et al., 2011; Sandle, 2016). The plate count examination was employed and it relies on bacteria growing a colony on a nutrient medium, so that the colony becomes visible to the naked eye, and the number of colonies on a plate were counted. A nonselective medium is used to obtain a total enumeration of the sample (i.e., a heterotrophic plate count). When it is required to obtain a specific bacterial species, a selective medium was used. Membrane filtration was used for the detection of E. coli and total coliform counts). For the detection of total coliform, the membrane filter was placed on M-Endo agar LES (Hi-Media) and the bacterial colonies developed were counted by a colony counter (Cole-Parmer, India). For the detection of E. coli, membrane filters were cultured on Rapid Hi-chrome Agar (Hi-media, M1465). All plates were incubated at 35 ± 2◦C for 24 hours (APHA, 2017). However, the bacteria isolates were identified on the basis of standard culture, morphological and biochemical characteristics (Malisha et al, 2011; Ogbonna et al., 2019; Cheesebrough, 2006; Reyes, 2018; Holt et al., 1994). Microbiological quality control and assurance were considered using WHO standard guidelines from 2008 and APHA 1999 (Standard method for examination of water and waste water) in a bid to ensure the reliability of laboratory results.

RESULT

Microbial counts during the dry season

Total Heterotrophic Bacteria (THB) for groundwater varied slightly across sample locations. In Abuloma, THB recorded $0.65x10^6$cfu/ml while Borikiri recorded $0.60x10^6$cfu/ml and Eagle Island recorded $10.00x10^6$cfu/ml respectively. In the surface water, highest THB of $2.9x10^6$ cfu/ml was recorded in Abuloma while the least $4.20x10^6$cfu/ml was recorded in Borikiri. At the well water, highest THB of $9.40x10^6$cfu/ml was recorded in Eagle Island and the least 1.15x106 cfu/ml was recorded in Borikiri (Table 2). Total Coliform Count (TCC) for groundwater revealed high variation across sampling locations. Highest TCC $8.25x10^6$cfu/ml was recorded in Eagle Island while the least $0.00x10^6$ cfu/ml was recorded in Borikiri. Highest TCC $4.10x10^6$cfu/ml for surface water was recorded in Borikiri while the least 0.20x106 cfu/ml was recorded in Eagle Island. However, TCC for

well water recorded $0.00x10^6$ cfu/ml across sampling locations (Table 2). The highest Faecal Coliform Count (FCC) for groundwater $3.40x10^6$cfu/ml occurred in Eagle Island whereas the least $0.00x10^6$cfu/ml occurred in Borikiri. Surface water had highest value of $3.20x10^6$ cfu/ml and was recorded in Borikiri while the least $2.50x10^6$cfu/ml was recorded Abuloma. There was $0.00x10^6$ cfu/ml for well water across sampling locations (Table 2).

Table 2: Microbial Counts of Water Samples across Sampling Stations

Sampling Stations	Seasons	Water sources	THB ($x10^6$)	TCC ($x10^6$)	FCC ($x10^6$)
Abuloma	Dry Season	GW	$0.65x10^6$	$5.35x10^6$	$1.55x10^6$
		SW	$21.95x10^6$	$4.10x10^6$	$2.50x10^6$
		WW	$4.65x10^6$	$0.00x10^6$	$0.00x10^6$
Borikiri	Dry season	GW	$0.60x10^6$	$0.00x10^6$	$0.00x10^6$
		SW	$4.20x10^6$	$3.60x10^6$	$3.20x10^6$
		WW	$1.15x10^6$	$0.00x10^6$	$0.00x10^6$
Eagle Island	Dry season	GW	$10.00x10^6$	$8.25x10^6$	3.40x106
		SW	$7.20x10^6$	$0.20x10^6$	Nil
		WW	$9.40x10^6$	$0.00x10^6$	$0.00x10^6$

THB=Total Heterotrophic Bacteria, TCC=Total Coliform Count, Faecal Coliform Count.

Microbial counts during the wet season

During the wet season, there was significant variation of microbial load for groundwater across sampling locations. The THB value for groundwater varied from $1.80x10^6$ cfu/ml Abuloma to $1.55x10^6$cfu/ml Borikiri and $11.00x10^6$cfu/ml Eagle Island respectively. Surface water for THB varied significantly from $23.95x10^6$cfu/ml in Abuloma, $5.70x10^6$cfu/ml in Borikiri and $8.20x10^6$cfu/ml for Eagle Island congruently while well water also varied meaningfully from $4.65x10^6$cfu/ml in Borikiri, $1.65x10^6$cfu/ml and $10.25x10^6$cfu/ml in Eagle Island (Table 3). Abuloma, Borikiri and Eagle Island TCC for groundwater had a corresponding value of $7.25x\ 10^6$cfu/ml, $0.30x10^6$cfu/ml and $0.49x10^6$ cfu/ml respectively whereas surface water had 4.40x106 cfu/ml (Abuloma), 5.10x106 cfu/ml (Borikiri) and 0.40x106 cfu/ml (Eagle Island).Well-water had $2.27x10^6$cfu/ml in Abuloma, $0.00x10^6$cfu/mlinBorikiri and $4.70x10^6$cfu/ml in Eagle Island (Table 3). The Faecal Coliform Count (FCC) for groundwater revealed that Abuloma, Borikiri and Eagle Island had a corresponding microbial load of $2.25x10^6$cfu/ml, $0.00x10^6$cfu/ml and $3.20x10^6$cfu/ml while in surface water, Abuloma had $2.80x10^6$cfu/ml, Borikiri ($3.30x10^6$cfu/ml) and Eagle Island had $0.00x10^6$ cfu/ml respectively, and in well water, Abuloma, Borikiri and Eagle Island had $0.70\ x10^6$ cfu/ml, $0.00x10^6$cfu/ml and $0.90x10^6$cfu/ml respectively (Table 3).

Table 3: Microbial Counts of Water Samples across Sampling Stations

Sampling Stations	Seasons	Water sources	THB ($x10^6$)	TCC ($x10^6$)	FCC ($x10^6$)
Abuloma	Wet Season	GW	$1.80x10^6$	$7.25x10^6$	$2.55x10^6$
		SW	$23.95x10^6$	$4.40x10^6$	$2.80x10^6$
		WW	$4.65x10^6$	$2.70x10^6$	$0.70x10^6$
Borikiri	Wet season	GW	$1.55x10^6$	$0.30x10^6$	$0.00x10^6$
		SW	$5.70x10^6$	$5.10x10^6$	$3.30x10^6$
		WW	$1.65x10^6$	$0.00x10^6$	$0.00x10^6$
Eagle Island	Wet season	GW	$11.00x10^6$	$0.49x10^6$	$3.20x10^6$
		SW	$8.20x10^6$	$0.40x10^6$	$0.00x10^6$
		WW	$10.25x10^6$	$4.70x10^6$	$0.90x10^6$

THB=Total Heterotrophic Bacteria, TCC=Total Coliform Count, Fecal Coliform Count.

Trends of Microorganism Presence During the Dry and Wet Season

During the dry season, the highest Vibrio occurrence for groundwater was located in Eagle Island ($6.00x10^6$cfu/ml) while the least was recorded in Borikiri ($0.00x10^6$cfu/ml). In the surface water, highest occurrence of $9.60x10^6$ cfu/ml was recorded in Abuloma while the least $1.30x10^6$ cfu/ml was

recorded in Eagle Island and there were $0.00x10^6$cfu/ml occurrences of Vibrio for well water across Abuloma, Borikiri and Eagle Island respectively (Table 4). For the Staphylococcus in groundwater, highest value of $6.25x10^6$cfu/ml was recorded in Eagle Island while the least $0.00x10^6$ cfu/ml was recorded in Borikiri. More so, surface water had $6.10x10^6$cfu/ml as the highest value recorded in Abuloma with least value of $2.50x10^6$cfu/ml recorded in Borikiri whereas the well water in Abuloma and Borikiri had $0.00x10^6$cfu/ml, and Eagle Island had $7.25x10^6$cfu/ml for Staphylococcus respectively (Table 4). Borikiri and Eagle Island had $0.00x10^6$cfu/ml of Salmonella for groundwater with Abuloma recording $0.70x10^6$cfu/ml while in surface water, AbulomaBorikiri and Eagle Island recorded $1.10x10^6$ cfu/ml, $0.80x10^6$ cfu/ml and $5.00x10^6$cfu/ml correspondingly. For well water, Borikiri and Eagle Island recorded $0.00x10^6$cfu/ml of Salmonella while Abuloma recorded $0.60x10^6$cfu/ml (Table 4). Shigella in Abuloma had $1.00x10^6$cfu/ml while Borikiri and Eagle Island had a corresponding value of $0.00x10^6$cfu/ml for groundwater. Surface water in Abuloma and Eagle Island for Shigella had $1.10x10^6$cfu/ml respectively whereas Borikiri had $2.10x10^6$ cfu/ml. The well water for Shigella revealed that Abuloma recorded $1.40x10^6$cfu/ml while Borikiri and Eagle Island recorded $0.00x10^6$cfu/ml (Table 4).

Table 4: Bacteria Counts of Water Samples across Sampling Stations during the Dry Season

Sampling Stations	Seasons	Water sources	***Vibro* (DS) ($x10^6$)**	***Staph.* (DS) ($x10^6$)**	**Salmo. (DS) ($x10^6$)**	***shigella* (DS)**
Abuloma	Dry Season	GW	$0.85x10^4$	$5.50x10^4$	$0.70x10^4$	$1.00x10^2$
		SW	$9.60x10^4$	$6.10x10^4$	$1.10x10^4$	$1.00x10^2$
		WW	$0.00x10^6$	$0.00x10^4$	$0.60x10^4$	$1.40x10^2$
Borikiri	Dry season	GW	$0.00x10^6$	$0.00x10^6$	$0.00x10^6$	$0.00x10^4$
		SW	$2.20x10^4$	$2.50x10^6$	$0.80x10^6$	$2.10x10^4$
		WW	$0.00x10^6$	$0.00x10^6$	$0.00x10^6$	$0.00x10^4$
Eagle Island	Dry season	GW	$6.00x10^4$	$6.25x10^6$	$0.00x10^6$	$0.00x10^4$
		SW	$1.30x10^4$	$3.25x10^6$	$5.00x10^6$	$1.10x10^4$
		WW	$0.00x10^4$	$7.25x10^6$	$0.00x10^6$	$0.00x10^4$

DS=Dry season, Staph. = Staphylococcus, Salmo. = Salmonella.

During the wet season, Vibrio recorded $0.00x10^6$cfu/ml in Borikiri and Eagle Island respectively while Abuloma recorded $1.25x10^4$ cfu/ml for groundwater. Abuloma, Borikiri and Eagle Island had values of $9.80x10^4$ cfu/ml, $3.20x10^4$cfu/ml and $2.30x10^6$ cfu/ml for surface water with a corresponding well water value of $1.70x10^6$ cfu/ml, $0.00x10^6$cfu/ml and $2.70x10^6$ cfu/ml (Table 5). Staphylococcus for groundwater recorded 7.00x104 in Abuloma, 0.05x106 cfu/ml (Borikiri) and 5.70x106 cfcu/ml (Eagle Island) while surface water recorded 7.10x104 cfu/ml (Abuloma), 3.70x106 cfu/ml (Borikiri) and 4.25x106 cfu/ml (Eagle Island) and well water recorded 2.70x104 cfu/ml (Abuloma), 0.00x106 cfu/ml Borikiri and 7.25x106 cfu/ml Eagle Island respectively (Table 5). Salmonella varied from location to location. Abuloma recorded $0.80x10^4$cfu/ml while Borikiri and Eagle Island recorded $0.00x10^6$ respectively for groundwater. The surface water bacteria analysis revealed that Abuloma recorded $1.30x10^4$ cfu/ml, Borikiri ($0.90x10^6$cfu/ml) and Eagle Island had $7.00x10^6$cfu/ml while in the well water, Abuloma, Borikiri and Eagle Island recorded $0.60x10^4$cfu/ml, $0.00x10^6$cfu/ml and $0.80x10^6$ respectively (Table 5). In the same vein, Shigella in Abuloma recorded $1.00x10^2$cfu/ml, Borikiri and Eagle Island recorded $0.00x10^4$ cfu/ml congruently for groundwater while surface water recorded $1.70x10^4$cfu/ml (Abuloma), $2.50x10^4$cfu/ml (Borikiri) and $1.70x10^4$cfu/ml (Eagle Island). Well water showed $1.40x10^2$cfu/ml in Abuloma, $0.00x10^4$ cfu/ml in Borikiri and $1.80x10^4$ cfu/ml in Eagle Island correspondingly (Table 5).

Table 5: Bacteria Counts of Water Samples across Sampling Stations during the Wet season

Sampling Stations	Seasons	Water sources	***Vibro* (WS) ($x10^6$)**	***Staph.* (WS) ($x10^6$)**	**Salmo. (WS) ($x10^6$)**	***Shigella* (WS)**
Abuloma	Wet Season	GW	$1.25x10^4$	$7.00x10^4$	$0.80x10^4$	$1.00x10^2$
		SW	$9.80x10^4$	$7.10x10^4$	$1.30x10^4$	$1.70x10^2$
		WW	$1.70x10^4$	$2.70x10^4$	$0.60x10^4$	$1.40x10^2$
Borikiri	Wet season	GW	$0.00x10^6$	$0.05x10^6$	$0.00x10^6$	$0.00x10^4$
		SW	$3.20x10^6$	$3.70x10^6$	$0.90x10^6$	$2.50x10^4$
		WW	$0.00x10^6$	$0.00x10^6$	$0.00x10^6$	$0.00x10^4$
Eagle Island	Wet season	GW	$0.00x10^6$	$5.70x10^6$	$0.00x10^6$	$0.00x10^4$
		SW	$2.30x10^6$	$4.25x10^6$	$7.00x10^6$	$1.70x10^4$
		WW	$2.70x10^6$	$7.25x10^6$	$0.80x10^6$	$1.80x10^4$

WS=Wet season, Staph. = Staphylococcus, Salmo. = Salmonella.

DISCUSSION

A heterotroph is an organism that cannot produce its own food, but takes nutrient from other sources or organic carbon, principally from animal or plant material. In the food chain, heterotrophs are not producers rather they are consumers (primary, secondary and tertiary consumers) (Hogg, 2013; Biology Dictionary, 2016; Amanvdaz et al., 2015). Thus, heterotrophic bacteria are those bacteria that need organic substrates to get their chemical energy for growth and development, and they are groups of microorganisms that utilizes carbon as food. They are the most ubiquitous bacteria in nature and are found in every type of water (Amanvdaz et al., 2015; Bibiye et al, 2022a; CT, 2023). Heterotrophic bacteria naturally are residents of the human body and animal. Various typologies such as Gram-negatives (Proteus, Enterobacter, Aeromonas, Citrobacter, Pseudomonas, Klebsiella, Flavo bacterium, Sratya, Moraxella, Alcaligenese and Acinetobacter), and gram-positives: (Bacillus and Micrococcus) exists according to Bartram et al. (2003). The National Primary Drinking Water Regulations (NPDWR) established by the U.S. EPA states that lower concentrations of heterotrophic bacteria in the drinking water is linked to a better maintenance of the treatment and distribution systems. The total heterotrophic bacteria (THB) highest concentration ($21.95x10^6$cfu/ml) dry season and $23.95x10^6$cfu/ml wet season across different water bodies in this study was found in surface water at Abuloma sampling location whereas the least concentration of $0.65x10^6$cfu/ml groundwater during the dry season and $1.55x10^6$ cfu/ml groundwater during the wet season occurred in Borikiri. This indicates high concentration of THB across water bodies. Heterotrophic bacteria present in water poses no health risks to humans but a high heterotrophic plate count (HPC) is an indicator for ideal conditions for the growth of bacteria. This can enhance breeding ground for more dangerous bacteria like Legionella or Escherichia Coli, and could cause foul-tasting water, lead to corrosion or slime growth in pipes (CT, 2023). Water bodies that exceed THB count of >500 cfu/ml i.e., $5.00x10^2$cfu/ml are considered very high and are not ideal for consumption (Centers for Disease Control and Prevention, 2015; Dobaradaran, 2006). The high concentration of THB in groundwater, surface water and the well water in this study possibly could be due to seepages, run-off, and poor environmental sanitation.

Coliforms are bacteria that are always present in the digestive tracts of animals, including humans, and are found in their wastes. They are also found in plant and soil material. However, the most basic test for bacterial contamination of a water supply is the test for total coliform bacteria. Total coliform counts (TCC) give a wide-ranging indication of the sanitary condition of a water supply (New York State Department of Health, 2023). TCC in water body is an indicator bacterium (i.e., it signals contamination in drinking water during testing) (FAQs, 2022, PSE, 2022). The health effects of drinking water that contains indicator bacteria can range from no physical impact to severe illness; e.g., gastrointestinal illness (GI), with symptoms starting within a few hours, days or weeks after consuming the water. GI symptoms can include some or all of the following: nausea, vomiting, cramps, diarrhea, muscle aches, headache and low-grade fever (FAQs, 2022). In the current study,

during the dry season, groundwater for Eagle Island had the highest concentration of $8.60x10^6$cfu/ml followed by groundwater ($5.35x10^6$cfu/ml) and surface water ($4.10x10^6$cfu/ml) in Abuloma, 3.6x106 cfcu/ml for surface water in Borikiri respectively. These values and that obtained during the wet season for all dissimilar water bodies are higher when compared with that obtained by (PSE, 2022, Rygala et al, 2020). Total coliform bacteria are target bacteria in drinking water quality analyses. Their presence in ground, surface and well water in this study could be due to waste management deficiency. Total Coliforms are not likely to cause illness, but their presence specifies that water supply may have been contaminated by more harmful microorganisms or may be a sign of bacterial regrowth. This is in line with (U.S. Environmental Protection Agency, 2008). who also maintained the presence of Total coliform bacteria in water body could trigger the growth of harmful bacteria, a condition inimical to public health.

Furthermore, faecal coliforms are facultatively anaerobic, rod-shaped, gram-negative, non-sporulating bacteria. They belong to the group of total coliforms that are considered to be present in such specific areas in the gut and faeces of warm-blooded animals, and are considered more accurate indication of human and animal waste (Doyle & Erickson, 2008, Water Quality Monitoring, 1996). The presence of fecal coliform in a drinking water sample often indicates recent fecal contamination, meaning that there is a greater risk that pathogens are present than if only total coliform bacteria is detected (Washington State Department of Health, n.d.). During the dry season, Eagle Island recorded $3.4x10^6$cfu/ml for groundwater while Borikiri recorded $3.2x10^6$cfu/ml for surface water respectively. The high concentration of FCC as indicated in this study could be as a result of leakages of septic tank interaction with groundwater aquifer super imposed by soil voidance capacity while at Borikiri, it could be due to discharges of waste of human and animal nature into the surface water body. More so, at the wet season, the high values of $2.55x10^6$cfu groundwater and $2.80x10^6$ for surface water in Abuloma including that of surface at Borikiri ($3.30x10^6$ cfu/ml) could be due to run-off and seepages. Poor waste management and environmental sanitation could enhance the possible cause and spread of fecal coliform in water bodies. This corroborate with the views of (FCDPH, 2009) that poor hygiene status, environmental sanitation, sewage management among others are responsible for the increases and spread of fecal coliform in water bodies.

Vibrios are microbiologically characterized as gram-negative. They are highly capable of moving spontaneously and are facultative anaerobes (not requiring oxygen), with one to three whiplike flagella at one end (Britannica, n.d.). Vibrio Infections are gastrointestinal illnesses which are caused by an ingestion of Vibrio bacteria, that are found in contaminated water and food (Weekes &Kotra, 2007). Three species of vibrio are of significance to humans: V. cholerae is the cause of cholera, and V. parahaemolyticus and V. vulnificus both act as agents of acute enteritis, or bacterial diarrhea (Britannica, n.d., Eyisi et al, 2013). High Levels of Vibrio ($6.00x10^4$) in surface water in Abuloma and that of groundwater in Eagle Island ($6.00x10^4$) during the dry season were recorded when compared with the works of Eyisi et al., (2013) at Akwa Ibom, South-south Nigeria. During the wet season at Abuloma, surface ($9.80x10^4$cfu/ml), well (1.70x106 cfu/ml) and groundwater ($1.25x10^4$cfu/ml) vibrio count was high. At Borikiri, surface ($3.20x10^6$cfu/ml) for vibrio count was also high including surface ($2.3x10^6$cfu/ml) and well water ($2.70x10^6$cfu/ml) in Eagle Island. This high level of vibrio could possibly enhance the spread of cholera among end-users of these water sources within the study period. Furthermore, open defecation and sewage disposal at sea may have contributed to the increases in surface and groundwater Vibrio concentration in this study.

Staphylococcus is a Gram-positive bacterium that appear spherical (cocci) and form a grape-like cluster when viewed under a microscope. Staphylococcus species are facultative organisms that have the propensity to grow in both aerobic and anaerobic environments. Staphylococcus is capable of causing several diseases to man and animal (Lidell et al, 1940; Medical Consumer's Advocate, 2001; Stevens et al, 2014; Online Etymology Dictionary, 2018). Due to their ability to penetrate or produce toxin, they can cause a variety of diseases in humans and animals. They cause food-poisoning, break down leucine into isovaleric acid which is the main cause of food odour (Stevens et al, 2014). Staphylococcus appeared to be high in groundwater ($5.50x10^6$cfu/ml) and surface water $6.10x10^6$cfu/ml in Abuloma, 6.25x106 cfu/ml for groundwater, 3.25x106 cfu/ml for surface water and 7.250x106 cfu/ml for well water in Eagle Island respectively during the dry season. The high concentration of Staphylococcus species in the well water at Eagle Island could be due to poor

environmental and water sanitation condition. However, during the wet season, Abuloma (ground, surface and well water) recorded a corresponding value of $7.00x10^4$cfu/ml, $7.10x10^4$cfu/ml and $2.70x10^4$ cfu/ml/ml. These values are high and indicate contamination of water bodies. More so, at Eagle Island, the values for ground, surface and well water values (5.70x106 cfu/ml, 4.25x106 and 7.25x106 cfu/ml) respectively presents the heavy contamination of water sources with staphylococcus. This portends a public health issue that demands attention by all and sundry in a bid to control its perceived impact on consumers of these sources of water.

Salmonella is a genus of rod-shaped gram-negative bacteria of the family Enterobacteriaceae. It lives in the intestinal tracts of animals and birds and is transmitted to man via the eating of food contaminated with animal faeces. Contaminated foods are frequently animal in origin. They include beef, poultry, seafood, milk, or eggs. Salmonella infection is caused by a group of bacteria called Salmonella. The bacteria are passed from faeces of people or animals to other people or animals. However, all foods, including some unwashed fruits and vegetables can become contaminated (JHM, 2023). In humans, Salmonella typhi occur due to contamination of food or water, and can precipitate to a life-threatening infection called typhoid fever. During the dry season, high presence of Salmonella in Abuloma ($1.10x10^4$cfu/ml) and Eagle Island ($5.00x10^6$cfu/ml) for surface water was recorded. Indiscriminate disposal of commingled waste body catalyzed by poor environmental sanitation may have been responsible for these high values of salmonella in the surface water body. Values were also high ($1.30x10^4$cfu/ml in Abuloma and $7.00x10^6$cfu/ml in Eagle Island) during the wet season for surface water. Surface run-off, water sanitation deficiency and poor waste management could be responsible among others for these high values.

Shigella is a group of bacteria that causes an acute intestinal illness called Shigellosis. It has four species namely Shigella sonnei (S. sonnei or "Type D"), S. flexneri (or "Type B"), S. boydii and S. dysenteriae (Safe Drinking Water Foundation, 2023). There are 40 different serotypes within the four Shigella species. One type of S. dysenteriae, called S. dysenteriae type 1, is responsible for many of the severe or fatal cases of shigellosis. Throughout the world, S. flexneri is the most common species of Shigella (Safe Drinking Water Foundation, 2023). According to the (New York State Department of Health, 2023) report, Shigellosis occurrence is common among people due to ingestion of contaminated food or water with the bacteria. There was presence of Shigella species in ground ($1.00x10^2$cfu/ml), surface water ($1.00x10^2$cfu/ml) and well $1.4x10^2$ for Abuloma, $2.1x10^4$cfu/ml surface water in Borikiri and surface water $1.1x10^4$cfu/ml for Eagle Island during the dry season. Albeit, $1.00x10^2$, $1.70x10^2$ and $1040x10^2$cfu/ml was found in ground, surface and well water in Abuloma, $2.50x10^4$cfu/ml in surface water in Borikiri; $1.70x10^4$ and $1.8x10^4$ cfu/ml in Eagle Island also indicated the high presence of shigella during the wet season. This signifies that users of ground and well water for human consumption within the study zone could possibly suffer from Shigellosis whenever there is paucity of water sanitation and treatment.

SUMARRY OF FINDINGS

1. The high concentration of total heterotrophic bacteria count (THB) in the various water bodies during the dry and wet season within the study period is likely to precipitate to the growth of harmful microorganisms that could affect the health of humans directly or indirectly.
2. Total heterotrophic bacteria concentration differs significantly with that of Fecal coliform bacteria mostly in the well water across season.
3. Heterotrophic bacteria count greater than five hundred (>500) in consumable water body is regarded as high concentration.
4. In the instance of increased staphylococcus species as observed in this study, there could be possible impact of staphylococcus infection on the health of the inhabitants who often utilized these water bodies inadvertently.
5. There could be possible Salmonellosis infection among vulnerable children who are unavoidably disposed to consuming such salmonella-contaminated water resources accidentally due to its increased concentration.
6. Dysentery, diarrhea, nausea, abdominal cramp among others may be common among water utilizers from the study area because of the presence of shigella that causes shigellosis.

IMPLICATIONS OF THE STUDY

1. Lack of effective water and environmental sanitation activities may have possibly enhanced and promoted the increase of fecal coliform (FCC) in various water bodies as revealed in this study.
2. The presence of various microorganisms like vibrio, staphylococcus, shigella and salmonella in this study could be as a result of poor sewage and solid waste management catalyzed by derelict regulation enforcement agency or officers within the study zone.
3. There is paucity of water (groundwater- borehole and well water) resource treatment before consumption was enhanced.
4. Most of the end-users of the water are unaware of the public heath implication of the presence of these microorganisms in the water bodies hence do not reason water treatment as a significant curbing measure.

CONTRIBUTION TO KNOWLEDGE

The study found out that there was a momentous correlation between water sources and micro-organisms distribution as there were higher concentration of THB, TCC and FCC respectively across seasons. The findings also revealed the presence of vibrio, salmonella, shigella and staphylococcus in water bodies seasonally, and thus could accentuate the health of end-users. These findings are original and contribute to the literature on the spatial and seasonal distribution of microorganisms in water bodies providing insights that can inform policies and practice for the improvement of water quality for human consumption and recreational activities Port Harcourt, Rivers State.

CONCLUSION

Water pollution due to the contamination from total heterotrophic and coliform bacteria has become a thoughtful problem because of their potentials for contracting diseases from pathogens. However, coliform bacteria are often denoted as "indicator organisms" for the reason that they point to the potential presence of disease-causing bacteria in water. The existence of coliform bacteria in water does not give the assurance that drinking the water will cause an illness but their presence indicates that a contamination alleyway exists between a source of bacteria conceivably surface water, septic system, animal waste, among others and the water supply. Users of these water resources could suffer from diarrhea, stomach cramp, nausea among others due to the presence of organisms such as shigella, salmonella and vibrio. Therefore, effective and efficient water purification phenomenon should be carried out before such water bodies are utilized for public or private consumption or recreational activities in a bid to reduce the associated health risk.

RECOMMENDATIONS

1. Water from the various resources should undergo treatment either by boiling or mechanical wise before consumption is enhanced by the public.
2. End-users of water resources should be sensitized and possibly educated on the implication of the presence of microorganisms in water bodies.
3. Agencies in-charge of enforcing water sanitation and waste management should be encouraged to be dutiful at all levels of their operation and where there is paucity, government should do the needful to employ fresh agencies to cushion the impact.
4. All boreholes should be treated periodically before dispensing for use.
5. All hand dug wells should be guided with parapet walls, precast concrete and must have a lid to prevent run-off, undue encroachment by animals and other vectors.
6. All consumable water should be treated before ingestion is facilitated and relevant agencies should step up action plan to ameliorate these deficiencies.

COMPETING INTEREST

Authors have declared that no competing interests exist

References

Achalu, E. I. (2008). *Handbook of communicable disease and non-communicable diseases: Prevention and control*. Pam Unique.

Amanidaz, N., Zafarzadeh, A., & Mahvii, A. H. (2015). The interaction between heterotrophic bacteria and coliform, fecal coliform, fecal streptococci bacteria in the water supply networks, *Irian J Public Health*, 44(12), 1685–1692.

American Public Health Association (2017). *Standard Methods for the Examination of Water and Wastewater (21st ed.).* American Public Health Association, American Water Works Association, and Water Environment Federation: Washington, DC, USA.

American Society for Microbiology (2022). *What microbes can teach us about adapting to climate change*. https://American Society for Microbiology .org/Articles/2022/April/What-Microbes-Can-Teach-Us-About-Adapting-to-Climate

Bartram, J., Cotruvo, J., Exner, M., Fricker, C., & GlAmerican Society for Microbiology acher, A. (2003). *Heterotrophic plate counts and drinking-water safety: The significance of HPCs for water quality and human health*. IWA.

Belay, E. D. & Schonberger, L. B. (2005). *The public health impact of prion diseases*. https://doi.org/10.1146/annurev.publhealth.26.021304.144536.

Bibiye, A. A. S., Eddeh-Adjugah, O. G., & Ogbuagu, H. D. (2022). Occurrence and distribution of bacteria isolate in water bodies and its public health implication in Port Harcourt Metropolis. *Journal of Health, Applied Science and Management, 6*(1), 54-62.

Bibiye, A. A. S. (2023). *Principles and practice of public and environmental health in developing nations*. Obisco. ISBN:978-978-790-731-5.

Bibiye, A. A. S., Eddeh-Adjugah, O. G., & Ogbuagu, H. D. (2022). Trends and dimension of heavy metal interaction with microbial load in water bodies in Port Harcourt and its environs. *Journal of Health, Applied Science and Management*, 6(1), 31- 40.

Biology Dictionary (2016). *Heterotroph definition*. https://biologydictionary.net/heterotroph

Britannica (n.d.). *Vibrio.* https://www.britannica.com/science/vibrio.

Centers for Disease Control and Prevention (2015). *Global water, sanitation and hygiene (WASH).* http://www.Centers for Disease Control and Prevention .gov/healthywater/global/

Chan, H.T.H. (2023). *Water: The nutrition source*. https://www.hsph.harvard.edu/nutritionsource/water/.

Cheesbrough, M. (2006). *District laboratory practice in tropical countries*. Cambridge University

Chukwura, E. I. (2001). *Aquatic microbiology*. Otoba.

Collegedunia Team (n.d.). *Heterotrophic bacteria: Types, characteristics and examples*. https://collegedunia.com/exams/heterotrophic-bacteria-types-characteristics-and-examples.

Dobaradaran, S., Bina, B., & Isfahani, B.N. (2006). The effect of some physical and chemical parameters on regrowth of aeromonas bacterium and heterotrophic bacteria in Isfahan drinking water system. *Water & Wastewater, 2–3*.

Doyle, M. P. & M. C. Erickson (2006). Closing the door on the fecal coliform assay. *Microbe 1, 162-163*.

Eyisi, O. A. L., Nwodo, U. U., & Iroegbucorresponding, C. U. (2013). Distribution of vibrio species in shellfish and water samples collected from the Atlantic Coastline of South-East Nigeria. *J Health Popul Nutr. 31*(3), 314–320.

Feachem, R.G. (2001). *Drinking water quality, environmental health engineering in tropics (2nd ed.).* University Press.

Frequently Asked Questions (2022). *Drinking water indicator bacteria and their significance: Information for private well owners.* https://www.publichealthontario

Fresno County Department of Public Health (2009). *E. coli or fecal coliform bacteria contamination in your water supply*. Fresno, CA.

Hogg, S. (2013). *Essential microbiology (2nd ed.).* Wiley-Blackwell.

Holt, G.J., Krieg, N.R., Sneath, P.H.A., Stanley, J.T., & Williams, S.T. (1994). *Bergey's manual of determinative bacteriology (9th ed.)* Baltimore md, Williams and Winkins. https://architreecture.com/what-are-some-of-the-uses-of-water-in-school/

Hooper, L., Abdelhamid, A., Attreed, N. J., Campbell, W.W., & Channell, A.M. (2015). *Clinical symptoms, signs and tests for identification of impending and current water-loss dehydration in older people.* https://doi.org/10.1016/j.jhydrol.2020.125707.

Jacobsen, C.S. & Johansen, A. (2023). *The functions of microorganisms*, AARHUS University. https://envs.au.dk/en/researchareas/microorganisms-in-the-environment/the-functions-of-microorganisms.

Johns Hopskins Medicine (n.d.). *Salmonella infections.* https://www.hopkinsmedicine.org/health/conditions-and-diseases/salmonella-infections.

Kelly, T. (2017). *Oldest fossils ever found show life on earth began before 3.5 billion years ago*. University of Wisconsin–Madison. https://en.wikipedia.org/wiki/Microorganism.

Libre Texts Library (2023). *Types of microorganisms*. https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_(Boundless)/01%253A_Introduction_to_Microbiology/1.02%253A_Microbes_and_the_World/1.2.01%253A_1.2A_Types_of_Microorganism.

Liddell, H. G. & Scott, R. (1940). *A Greek–English lexicon (rev).* Clarendon.

Malisha, D., Shyamapada, M. & Nishith, K. P. (2011). Antibiotic resistance, prevalence and pattern in environmental bacterial isolates. *The Open Antimicrobial Agent Journal, 1*(3), 45-52.

Medical Consumer's Advocate (2001). *Sialoadenitis: Inflammation of the salivary glands.*

Millard-Stafford, M., Wendland, D.M., O'Dea, N.K. & Norman, T.L. (2012). Thirst and hydration status in everyday life. *Suppl 2,* S147-51.

New York State Department of Health (n.d.). *Coliform bacteria in drinking water supplies*. https://www.health.ny.gov/environmental/water/drinking/coliform_bacteria.htm.

New-York State Department of Health (2023). *What is shigellosis?* https://www.health.ny.gov/diseases/communicable/shigellosis/fact_sheet.htm.

Ogbonna, D. N., Ogbuku, J. O., & Kpormon, L. C. (2019). Influence of anthropogenic activities on the physico-chemical characteristics of open drainage channels in Port Harcourt. *Asian Journal of Advanced Research and Reports*,*3*(1),1-10.

Okafor, N. (1985). *Aquatic and water microbiology*. Fourth Dimension.

Okonkwo, I.O., Soleye, F.A., Amusan, T.A., Ogun, A.A, Ogunnusi, T.A., Babalola, T.A., Ejembi, J., (2009). Incidence of Multi-Drug Resistance (MDR) Organisms in Abeokuta, Southwestern Nigeria. Global J. Pharma. 3(2):69-80.

Okpokwasili, G.C. & T.C. Akojubi (1996). Bacteriological indicators of tropical water quality, *Environmental Toxicol Water Qual. 11*, 77-82.

Online Etymology Dictionary (2018). *Staphylococcus: Origin and meaning of staphylococcus*, www.etymonline.com.

Onyenekenwa, C.E. (2011). Effect of water and sanitation crisis on infants and under-five children in Africa. *J. Enviro. Sci Tech. 4*(2),103-111.

Penn State Extension (2022). *Coliform bacteria*. https://extension.psu.edu/coliform-bacteria.

Reyes, A. T. (2018). Morpho-biochemical aided identification of bacterial isolates from Philippine native pig. *Advances in Pharmacology and Clinical Trials*,*3*(5). DOI: 10.23880/apct-16000148.

Ruangpan, L. & Tendencia, E.A. (2004). Bacteria isolate, identification and storage. In *laboratory manual of standardized methods for antimicrobial sensitivity test for bacterial isolated from aquatic animals and environment*.

Rygala, A., Berlowska, J. & Kregiel, D. (2020). Heterotrophic plate count for bottled water safety management. *MDPI*, *8*(6), 739; https://doi.org/10.3390/pr8060739.

Safe Drinking Water Foundation (n.d.). *What is shigellosis*? https://www.safewater.org/fact-sheets-1/2017/1/23/shigella.

Sandle, T. (2016). Microbiology laboratory techniques. *Pharmaceutical Microbiology, Science Direct*, 63-80. https://doi.org/10.1016/B978-0-08-100022-9.00006-2.

Singh U. (2008). *A history of ancient and early medieval India: From the stone age to the 12th century*. Pearson Education.

Stevens, D., Cornmell, R., Taylor, D., Grimshaw, S.G., Riazanskaia, S., Arnold, D.S., Fernstad, S.J., Smith, A.M., Heaney L.M., Reynolds, J.C., Thomas, C.L., & Harker, M. (2014). Spatial variations in the microbial community structure and diversity of the human foot are associated with the production of odorous volatiles. *FEMS Microbiol Ecol. 91*(1), 1-11. doi: 10.1093/femsec/fiu018.

The National Academy of Sciences (2019). *Dietary references intakes for water, potassium, sodium, chloride, and sulfate.* https://www.nap.edu/read/10925/chapter/6#102.

U.S. Environmental Protection Agency (2008). *Analytical methods approved for drinking water compliance monitoring under the total coliform rule*. Washington, DC.

Venter, S.N (2001). Microbial water quality in the 21st century. *SA Water Bull, 27*, 16-17.

Washington State Department of Health (n.d.). Coliform Bacteria in Drinking Water. https://doh.wa.gov/community-and-environment/drinking-water/contaminants/coliform.

Water Quality Monitoring (1996). *A Practical Guide to the design and implementation of freshwater quality studies and monitoring programmes*. United Nations Environment Programme and the World Health Organization.

Weekes, C. & Kotra, L. P. (2007). *Vibrio infection, xPharm: The Comprehensive pharmacology*, , https://doi.org/10.1016/B978-008055232-3.60884-0, 3-11. http://repository.seadec.org.ph.

William, S. J.; Kouki, K., Spicuzza, M. J.; Kudryavtsev, A. B., & Valley, J. W. (2017). SIMS analyses of the oldest known assemblage of microfossils document their taxon-correlated carbon isotope compositions. *PNAS, 115* (1), 53–58. doi:10.1073/pnas.1718063115.

pp. 25-34 https://dx.doi.org/10.4314/johasam.v7i1.3

Healthcare Service-Related Predictors of Male Partner Involvement in Maternal and Child Health Care in Rivers East Senatorial District of Rivers State

[1]Opirite Boma Peter-Kio
opirite.peter-kio@iaue.edu.ng
&
[2]Mary Henjieru Obisike
maryobisike2018@gmail.com
[1&2]Department of Human Kinetics, Health and Safety Education. Ignatius Ajuru University of Education, Port Harcourt
Correspondence: maryobisike2018@gmail.com

Abstract

Male partner involvement is critical in the effective management of maternal and child health services targeted at reducing threatening figures of maternal and child mortalities in Nigeria. This study, therefore, investigated the determinants of male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State. The descriptive correlational research design was adopted with a population consisting of 109,235 married men in Rivers East Senatorial District. A sample size of 1,197 was selected using the multi-stage sampling procedure. Data were collected using questionnaire with a reliability coefficient of 0.84, and analyzed using mean and linear regression model at 0.05 alpha level. The result showed that a high negative relationship was found between male involvement in MCH and variables such as distance to healthcare facility (r = -0.95), waiting time (r = -0.97), and cost of care (r = -0.96), while positive relationship was found for attitude of healthcare workers (r = 0.98). The tested hypotheses revealed that, statistically significant relationship was found between male involvement and all the factors listed above both the ones with positive and negative relationship ($p<0.05$). It was concluded that, male involvement in maternal and child healthcare is determined by multiple factors. It was recommended among others that, health care providers should give priority attention to clients who attend clinic with their male partners and also make the environment comfortable for male partners to relax while waiting for their wives, thereby encouraging male partner involvement.

Keywords: healthcare, male partner, maternal and child, predictors

Introduction

Maternal and child health focuses on improving the well-being of mothers and their children and ultimately determines the health of the society. Maternal and child health care constitutes services provided for women in the course of pregnancy, delivery and postnatal stage. Therefore, MCH refers to services which include promotive, preventive, curative and rehabilitative health care of mothers and children (Chinelo, 2012). The importance of MCH is found in its ability to predict future public health challenges for both families and communities and the overall health care system (Healthy People, 2020). As at 2017, under-five mortality rate in Rivers State was 58 per 1000 live births (National Bureau of Statistics & United Nations Children's Fund, 2018). Going by the Sustainable Development Goal 3.2 which projects a reduction of child mortality to 25 per 1000 live births by the year 2030, Rivers State has not gone out of the danger zone. Still on the multiple indicator cluster survey 2016 – 2017 by NBS and UNICEF (2018), the under-five mortality rates were higher in rural areas than in urban areas (77 per 1000 live births in rural and 53 per 1000 live births in urban). Reduction of maternal and child mortality rate requires multifaceted approaches involving government, caregivers and society. Male involvement comes in under the auspices of society to increase visits to health facilities by families, thereby increasing the uptake of maternal and child health services in the health facilities. Consequently, there will be early detection of complications and diseases that might affect mother and child, resulting in the reduction of maternal and child mortalities. For example, in 2017, the WHO stated that Nigeria was one of the countries with "very high alert" index for maternal mortality rate, an indication of the fact that their lifetime risk of death due to pregnancy was high, including Rivers State.

The number of deaths associated with MCH which are reported by United Nations and World Health Organization is a source of concern and problem. It is more worrisome to note that infectious diseases such as pneumonia, diarrhea and malaria alongside with preterm birth and intrapartum-related complications accounting for under-five deaths could be prevented through active participation of couples in MCH services and interventions. In a nutshell, any nation that overlooks the health of mother and child has already planned to live in poverty as such nation would continually be burdened by morbidity and its consequences on the nation's economy. The morbidity burdens include injuries and depression from male partner violence, hypertension and heart disease, diabetes, anaemia, pneumonia, unhealthy weight, diarrhoea and genetic conditions. Again, the maxim: "a healthy woman is a wealthy nation" further confirms the importance of MCH in actualizing a sustainable health care system. In order to ensure healthy birth outcomes, there should be access to quality MCH which demands male partner's involvement. However, several factors predict male partner involvement in maternal and child healthcare including distance to facility, waiting time at facility, cost of care, and attitude of health workers, (Chizu, 2021; Kumbeni et al., 2019).

Attitude is the tendency to think, feel or act positively or negatively towards another person or an object in an environment. A person's attitude determines their action and preferences. Attitude of health workers as used in the current study refers to harsh, critical behaviour language use by health workers to patients and their families. Byamugisha et al. (2011), for example, revealed that the attitude of health workers is a barrier to male participation in MCH. Craymah et al. (2017), in their study, also found out that attitude of health workers influenced low participation of men in maternal and child health services.

There are instances especially in communities where women attending antenatal clinic received harsh and abusive language from health workers. As complaints of such treatments go round the community, men may be dissuaded to participate in MCH services. This can be further complicated when the men themselves are victims of abusive language or cold reception by health workers. Generally, men feel proud and would not like to be humiliated in the presence of their wives. To avoid being embarrassed, male partners would send their wives and children to health facilities unaccompanied. Consequence of this situation is enormous on the health of mother and child as mothers may decide to go to churches or unskilled birth attendants for delivery and other health challenges, compounding the already existing high index profile of maternal and child mortality in rural and urban communities.

Waiting time at facility is another determinant of male partner involvement in maternal and child health. Waiting time refers to hours spent by men and their partners before accessing services at a facility. Many studies have shown that some facilities have rigorous procedures before services are rendered in the midst of unconducive environment. According to Gibore et al. (2019) and Olajubu et al. (2021) waiting time affects men's sensibilities towards participating actively in MCH services. Generally, men are not patient to wait for long hours in a facility because they seem to be very busy in search of daily upkeep of their families.

Also, cost of care could be a determinant of male partner involvement in maternal and child health. Cost of care here refers to the totality of expenses made to access health services in a facility by patients and their families. High charges for services by facilities can impact negatively on MCH uptake and male participation. This is obvious particularly in rural areas where low income earners dominate the population. It is also obvious in urban facilities owned by government where health workers, in their bid to meet up their own needs in the midst of harsh economic situations/poor salaries, exploit patients financially especially when workers see men who have accompanied their partners to the facility. Out of ego, a man pays whatever amount of money the worker asks him to pay without argument, but only gets back home to take a critical analysis of expenditures made at the facility. The man's conclusion of the cost of treatment may not be palatable, hence may affect his decision to accompany his partner to a facility. According to Guspianoto et al. (2022) and Abiiro et al. (2022), the wherewithal to meet up the financial implications of health care services is a barrier to male partner involvement in MCH. It is possible that this assertion may not be true in all facilities. Therefore, the current study would ascertain the influence of cost of care on men's involvement in MCH in Rivers East Senatorial District which comprises rural and urban communities.

Related to high charges made by facilities as a factor for lack of men's involvement in MCH is the issue of distance to facilities. This study considers any health facility which is more than 5 km away as far from a patient and may affect men's decision to attend such facility. This factor was implicated by Morgan et al. (2017) and Craymah et al. (2017) when they stated that the transport means to access health facilities is a barrier to male involvement in health care programmes. Men may be discouraged to accompany their wives to facilities that are far from their homes because of a number of issues such as high transport fare, condition of road and non-availability of commuter buses for convenience. A facility located in a town where the only means of accessibility is motorcycle (known in popular parlance as "Okada") may not attract the interest of a man whose wife is pregnant.

The foregoing discourse brings to mind the issue of the tripod: affordability, accessibility and acceptability by patients. The quality of service rendered by a facility can be a reason for bypassing nearby facilities (Escamilla et al. (2018). We cannot bar the issue of fees charged in this regard. It has been noted that quality of service and free-fee charge can make poor women bypass nearby facilities without considering the effect on their husbands. It is important to state here that the Sustainable Development Goals (SDGs) canvass for universal health care which is predicated on availability and accessibility (United Nations, 2015). No wonder, Escamilla et al. (2018) state that critical to achieving the target of SDGs is the examination of service quality and availability in public facilities with decreased or free charges, and if it attracts uninterrupted care where men and their partners could visit a facility for various health services reducing the burden of travelling. This argument underscores the main thrust of the current study.

Rivers East Senatorial District of Rivers State is patriarchal, men dominate over the women, and decide on their own what they do without much consideration of the woman's opinion so, it becomes difficult for the women to secure their male partner's involvement in maternal healthcare, which is tagged as 'women's affair'. This is not proper given that the time of pregnancy, childbirth and child illness is when a woman needs the support of the male partner to be able to cope adequately and to meet both the emotional, physical, and health demand. Yet, observation shows that males are not fully involved, this is evidence in their absence in the maternity clinics. Certainly several factors might be implicated for this but, there is inattentiveness to such factors both by scholarly research and governmental efforts which are mainly focused on women. This necessitates a study of this sort, for educational diagnosis of such factors in order to provide a clear evidence of what factors to be tackled. Therefore, this study investigated the healthcare service-related predictors of male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State. The study provided answers to the following questions:

1. What is the relationship between distance to functional health facility and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State*?*
2. What is the relationship between waiting time at facility and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State*?*
3. What is the relationship between attitude of health workers and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State*?*
4. What is the relationship between cost of care at facility and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State*?*

Hypotheses

The following hypotheses postulated were tested at 0.05 level of significance:

1. There is no significant relationship between distance to functional health facility and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State.
2. There is no significant relationship between waiting time at facility and male partner involvement in maternal and child health care in Rivers East *S*enatorial District of Rivers State.
3. There is no significant relationship between attitude of health workers and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State.

4. There is no significant relationship between cost of care at facility and male partner involvement in maternal and child health care in Rivers East Senatorial District of Rivers State.

Methodology

The descriptive correlational research design was adopted with a population consisting of 109,235 married men in Rivers East Senatorial District, based on the data from the National Social Safety (Nets Coordinating Office, 2021). A sample size of 1,197 was selected using the multi-stage sampling procedure which included three stages. The first stage involved the use of the simple random sampling technique to select three local government areas in Rivers East Senatorial District (from three clusters representing the three language blocs) through balloting. Stage two involved Simple random sampling technique was used to select two communities from each of the three Local Government Areas selected in stage one through balloting. At the final stage, the systematic sampling technique was used to select married men from the households in each selected community, applying inclusive and exclusive criteria of having a female partner who is pregnant or nursing a baby or had delivery, at most, three years before the study.

Data were collected using questionnaire with a reliability coefficient of 0.88. The questionnaire was titled "Healthcare service-related predictors of Male Partner Involvement in Maternal and Child Health Questionnaire" (HSPIMPCHQ). The questionnaire was structured by the researcher based on the research questions. The questionnaire consisted of five sections A–E. Section "A" elicited information on male partner involvement in main components of maternal and child health care with 19-item with response option on a modified four point Likert scale of "very high extent" – 4 points, "high extent" – 3 points, "low extent"– 2 points and "very low extent" – 1 point. Sections "B" – "E" consisted of statements based on Likert scale ranging from strongly disagreed as = 1 to strongly agreed as = 4. Specifically, Section "B" focused on distance to functional health facility, section "C" on waiting time at health facility, "D" on attitude of health of health workers, and "E" on cost of care at facility. Data was collected by a face-to-face delivery of the questionnaire to the respondents and analysis was done with the aid of the Statistical Product and Service Solution (SPSS V-23) using linear regression model at 0.05 alpha level.

Results

The results of the study are shown below:

Table 1: Regression analysis on relationship between distance to functional health facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Decision
1	-.95	.92	.92	.98	**Very High relationship**

Table 1 illustrated the relationship between distance to functional health facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District. The result of the study indicated that there was a very high negative relationship between distance to healthcare facility and male involvement (r = -0.95). The result further showed that distance to functional healthcare facility contributed 92.0% of the variance in male involvement (R^2 = 0.920). Therefore, the relationship between distance to functional health facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District was very high.

Table 2: Regression analysis on relationship between waiting time at facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Decision
1	-.97	.95	.95	.73	**Very High relationship**

Table 2 illustrated the relationship between waiting time at facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District. The result of the study indicated that there was a very high negative relationship between waiting time at facility and male involvement (r = -0.97). The result further showed that waiting time at facility contributed 95.6% of the variance in male involvement (R^2 = 0.956). Therefore, the relationship between waiting time at facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District was very high.

Table 3: Regression analysis on relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Decision
1	.98	.95	.95	.73	**Very High relationship**

Table 3 illustrated the relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare in Rivers East Senatorial District. The result of the study indicated that there was a very high positive relationship between attitude of healthcare workers and male involvement (r = 0.98). The result further showed that attitude of healthcare workers contributed 95.3% of the variance in male involvement (R^2 = 0.953). Therefore, the relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare in Rivers East Senatorial District was very high.

Table 4: Regression analysis on relationship between cost of care and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Decision
1	-.96	.91	.91	.99	**Very High relationship**

Table 4 illustrated the relationship between cost of care and male partner involvement in maternal and child healthcare in Rivers East Senatorial District. The result of the study indicated that there was a very high negative relationship between cost of care and male involvement (r = -0.96). The result further showed that cost of care contributed 91.8% of the variance in male involvement (R^2 = 0.918). Therefore, the relationship between cost of care and male partner involvement in maternal and child healthcare in Rivers East Senatorial District was very high.

Table 5: Regression analysis on significant relationship between distance to functional health facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	5563.51	1	5563.51	5732.19	.00*	**H_oRejected**
	Residual	485.28	1178	.97			
	Total	6048.80	1179				

***Significant; P<0.05**

Table 5 revealed the regression analysis on the relationship between distance to functional health facility and male partner involvement in maternal and child healthcare. The findings of the study revealed that there was a significant relationship between distance to functional health facility and male partner involvement in maternal and child healthcare [f(1,1178) = 5732.19, p<0.05]. Therefore,

the null hypothesis which stated that there is no significant relationship between distance to functional health facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District, Rivers State was rejected.

Table 6: Regression analysis on significant relationship between waiting time and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model		Sum of Squares	df	Mean Square	F	Sig.	Decision
1	Regression	5781.61	1	5781.61	10819.1	.00*	**H_oRejected**
	Residual	267.19	1178	.53			
	Total	6048.80	1179				

***Significant; P<0.05**

Table 6 revealed the regression analysis on the relationship between waiting time at facility and male partner involvement in maternal and child healthcare. The findings of the study revealed that there was a significant relationship between waiting time at facility and male partner involvement in maternal and child healthcare [f(1,1178) = 10819.1, p<0.05]. Therefore, the null hypothesis which stated that there is no significant relationship between waiting time at facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District, Rivers State was rejected.

Table 7: Regression analysis on significant relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model		Sum of Squares	df	Mean Square	F	Sig.	Decision
1	Regression	5764.11	1	5764.11	1012.32	.00*	**H_oRejected**
	Residual	284.69	1178	.56			
	Total	6048.80	1179				

***Significant; P<0.05**

Table 7 revealed the regression analysis on the relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare. The findings of the study revealed that there was a significant relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare [f(1,1178) = 1012.32, p<0.05]. Therefore, the null hypothesis which stated that there is no significant relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare in Rivers East Senatorial District, Rivers State was rejected.

Table 8: Regression analysis on significant relationship between cost of care at facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	5550.49	1	5550.49	5569.32	.00*	**H_oRejected**
	Residual	498.30	1178	.99			
	Total	6048.80	1179				

***Significant; P<0.05**

Table 8 revealed the regression analysis on the relationship between cost of care at facility and male partner involvement in maternal and child healthcare. The findings of the study revealed that there was a significant relationship between cost of care at facility and male partner involvement in

maternal and child healthcare [f(1,1178) = 5569.32, p<0.05]. Therefore, the null hypothesis which stated that there is no significant relationship between cost of care at facility and male partner involvement in maternal and child healthcare in Rivers East Senatorial District, Rivers State was rejected.

Discussion of Findings

The finding of the study in Table 1 showed that there was a significant relationship between distance to healthcare facility and male involvement (p<0.05) as distance to functional healthcare facility contributed 92.0% of the variance in male involvement (R^2 = 0.920). This relationship found is expected because men are very busy by their nature and position in the family which makes them the head to provide for the family, this takes most of their time used for income generative adventures with little time to spare. By implication, when the distance to the healthcare facility is far away, they may not meet up but if it is close, they can easily accompany their female partners, finish up with what they have to do at the facility and also with their work or activities for the day. The findings of this study is in tandem with that of Kumbeni et al. (2019) whose study on factors influencing male partner involvement in Ghana revealed a statistically significant relationship between distance to healthcare facility and level of male involvement in maternal and child healthcare.

The finding of this study is also in agreement with the result of Jelagat et al. (2021) whose study in Nairobi County of Kenya revealed a significant relationship between distance to healthcare facility and level of male involvement in maternal and child healthcare. The finding of this study is also in keeping with that of Singh et al. (2022) whose study in Nepal revealed distance to functional healthcare facility as a significant predictor of male partner involvement in maternal and child healthcare. This similarity found between the previous studies and the present one might be attributed to the homogeneity of the study respondents as they were both focused on men only. On the contrary, the findings of this study is in dissonance with that of Craymah et al (2017) whose study in Ghana revealed that distance to health facility had no significant relationship with male involvement in maternal and child healthcare. The findings of this study is also at variance with that of Annoon et al. (2020) whose study on the barriers to male involvement in maternal care revealed that distance to healthcare facility had no significant association with male partner involvement. This variation found between the present study and previous ones might be due to the difference in the sample sizes as the sample size used in the present study was much larger than those used in the previous studies which were all carried out in Ghana unlike the present study carried out in Nigeria, these could explain for the variation found in both studies.

The result in Table 2 of this study illustrated a relationship between waiting time at facility and male partner involvement in maternal and child healthcare; which was significant [f(1,1178) = 10819.1, p<0.05], also, waiting time at facility contributed 95.6% of the variance in male involvement (R^2 = 0.956). This finding is not surprising because men are very busy by their nature and lack patience to spend much time at the healthcare facility, which implies that when women are made to wait for a long time before attended to probably due to much crowd or shortage of healthcare workers, more men may decline their involvement. On general note, men are often impatient especially when they are forced to stay at a place waiting for an exercise which ordinarily to them could be carried out with or without their presence such as MCH services. It is therefore important to arrange the waiting room attractive to men in order to assuage their impatience. By implication, when the waiting room is made attractive more men will be involved.

The finding of this study is in line with that of This Gibore et al. (2019) whose study on factors influencing men's involvement in in a low resource setting, Central Tanzania found out that waiting time at facility was one of the factors that significantly influenced male involvement in maternal and child healthcare (p<0.05). The findings of this study is in tandem with that of Kumbeni et al. (2019) whose study on factors influencing male partner involvement in Ghana revealed a statistically significant relationship between waiting time and level of male involvement in maternal and child healthcare. Furthermore, the finding of this study corroborates that of Falade-Fatila and Adebayo (2020) whose study in Ibadan of Nigeria established waiting time as one of the factors that significantly influenced male involvement in maternal and child healthcare. This similarity found between the previous studies and the present one might be attributed to the homogeneity of the study

respondents as they were both focused on men only. On the contrary, the findings of this study is at variance with that of Annoon et al. (2020) whose study on the barriers to male involvement in maternal healthcare revealed that waiting time had no significant association with male partner involvement. This variation found between the present study and previous ones might be due to the difference in the study location and sample sizes as the sample size used in the present study was twice the one used in the previous study.

The finding of this study in Table 3 illustrated that there is a relationship between attitude of healthcare workers and male partner involvement in maternal and child healthcare which is statistically significant [$f(1,1178) = 1012.32$, $p<0.05$]. This finding is also not surprising because unfriendly attitude is a repellant to male involvement and health workers whose disposition towards pregnant women is satisfactory to men, are likely to encourage men to accompany their wives for facility visits. By implication, unkind, critical language by health workers is a barrier to male participation in MCH. In the same vein, harsh treatment of men by health workers may not allow men to come back to ANC facilities. The finding of this study is in agreement with Craymah et al. (2017) whose study in the Central Region of Ghana revealed a significant relationship between attitude of healthcare workers and male involvement in maternal and child healthcare. The findings of this study is in tandem with that of Kumbeni et al. (2019) whose study on factors influencing male partner involvement in Ghana revealed a significant relationship between attitude of healthcare workers and male involvement in maternal and child healthcare. The finding of this study is also in line with that of Gibore et al. (2019) whose findings on male involvement in Central Tanzania revealed a significant relationship between attitude of healthcare workers and male involvement in maternal and child healthcare. The finding of this study corroborates that of Bagenda et al. (2021) whose study in Ibanda District, Southwestern, Uganda also revealed a significant relationship between attitude of healthcare workers and male involvement in maternal and child healthcare.

The findings of the study in Table 4 illustrated a relationship between cost of care and male partner involvement which was found to be statistically significant [$f(1,1178) = 5569.32$, $p<0.05$]. The result further showed that cost of care contributed 91.8% of the variance in male involvement ($R^2 = 0.918$). This finding is not surprising given to the rising economic challenges in Nigeria. This finding could be explained by the fact that the respondents were drawn from both rural areas where low income earners dominate andin urban facilities owned by government where health workers, in their bid to meet up their own needs in the midst of harsh economic situations/poor salaries, exploit patients financially especially when the workers see men who have accompanied their partners to the facility. These scenarios which are cost related could actually discourage the involvement of males. The finding of this study is in line with the finding Guspianoto et al. (2022) in Indonesia which showed a significant relationship between cost of services and male partner involvement in maternal and child healthcare. The findings of this study is also in keeping with that of Abiiro et al. (2022) which revealed that to meet up the financial implications of health care services is a barrier to male partner involvement in MCH. This consonance found between the present study and the previous ones could be due to the consonance in the study design as they all adopted the descriptive research design.

Conclusion

It was concluded that male partner involvement in maternal and child healthcare is predicted by multiple factors such as distance to healthcare facility, waiting time, cost of care, and attitude of healthcare workers which should all be focused on in any effort geared towards the promotion of maternal and child healthcare.

Recommendations

Based on the findings of the study the following recommendations were put forward.

1. Government should build more functional health facilities to increase access to health care and improved male partner involvement in maternal and child health.
2. Health care providers should give priority attention to clients who attend clinic with their male partners and also make the environment comfortable for male partners to relax while waiting for their wives, thereby encouraging male partner involvement.

3. Health care managers and their partners should sustain and encourage good health workers' attitude by constantly organizing workshops/seminars for health workers on better ways of rendering services with friendly attitude, thereby increasing staff-client relationship.
4. Policy makers should monitor and re-evaluate the implementation of cost-free maternal and child health care services. Consumables that are not cost-free in facilities should be subsidized to encourage male partner involvement in maternal and child health care.

References

Abiiro, G. A., Gyan, E. K., Alatinga, K. A., & Atinga, R. A. (2022). Trends and correlates of male participation in maternal health care in a rural district in Ghana. *Scientific African*, 16(e01180). https://doi.org/10.1016/j.sciaf.2022.e01180

Annoon, Y., Hormenu, T., Ahinkorah, B. O., Seidu, A., Ameyaw, E. K., & Sambah, F. (2020). Perception of pregnant women on barriers to male involvement in antenatal care in Sekondi, Ghana. *Heliyon, 6*(e04434). https://www.cell.com/heliyon/pdf/S2405-8440(20)31278-0.pdf

Bagenda, F., Batwala, V., Orach, C. G., Nabiwemba, E., & Atuyambe, L. (2021). Benefits of and barriers to male involvement in maternal health care in Ibanda District, Southwestern, Uganda. *Open Journal of Preventive Medicine, 11*(12), 411 - 424. doi: 10.4236/ojpm.2021.1112032

Byamugisha, R., Astrom, A. N., Ndeezi, G., Karamaji, C. A., Tylleskar, T., & Tumuine, J. K. (2011). Male partner antenatal attendance and HIV testing in eastern Mganda: A randomized facility-based intervention trial. *Journal of International AIDS Society, 14(1), 43.* doi: 10.1186/1758-2652-14-43

Chinelo, C. N. V. (2012). *Community health care practice in developing countries.* Springfield.

Chizu, A. (2021). *Factors influencing male involvement in maternal child health care (MCH) in Solwezi District*. http://155.0.3.194:8080/jspui/bitstream/123456789/704/1/ANNIE

Craymah, J. P., Oppong, R. K., & Tuoyire, D. A. (2017). Male involvement in maternal health care at Anomabo, Central Region, Ghana. *International Journal of Reproductive Medicine*, Article ID 2929013. https://doi.org/10.1155/2017/2929013

Escamilla, V., Calhoun, L., Winston, J., & Speizer, I. S. (2018). The role of distance and quality on facility selection for maternal and child health services in urban Kenya. *Journal of Urban Health, 95*(1), 1 – 12.

Gibore, N. S., Bali, T. A. L., & Kibusi, S. M. (2019). Factors influencing men's involvement in antenatal care services: a cross-sectional study in a low resource setting, Central Tanzania. *Reproductive Health, 6*(52). https://doi.org/10.1186/s12978-019-0721-x.

Guspianoto, G., Ibnu, I. N. & Asyary, A. (2022). Associated factors of male participation in antenatal care in Muaro Jambi District, Indonesia. *Journal of Pregnancy*. https://doi.org/10.1155/2022/6842278

Healthy People (2020). *Maternal, infant and child health.* https://www.healthypeople.gov/2020 /topics-objectives/topic/maternal-infant-and-child-health

Jelagat, K. N., Nyanchoka, K. M., & Musili, F. (2021). An assessment of health facility factors influencing male participation in utilization of antenatal care services among spouses in selected manufacturing industries in Nairobi County, Kenya. *International Journal of Community Medicine and Public Health, 8*(11). http://dx.doi.org/10.18203/2394-6040.ijcmph20214254

Kumbeni, M. T., Ziba, F. A., Alem, J. N., & Nborah, S. A. (2019). Factors influencing male involvement in antenatal care in the Kassena Nankana Municipal in the Upper East Region, Ghana. *European Scientific Journal, 15*(21), 1 - 10 https://doi.org/10.19044/esj.2019.v15n21p1

Morgan, R., Tetui, M., Muhumuza, K. R., Ekirapa-Kiracho, E., & George, A. S. (2017). Gender dynamics affecting maternal health and health care access and use in Uganda. *Health Policy Plan, 32*(5), 13 – 21.

National Bureau of Statistics (2018). *2017 demographic statistics bulletin.* https://nigerianstat.gov.ng/download/775.

National Bureau of Statistics & United Nations Children's Fund (2018). *2018 Multiple Indicator Cluster Survey 2016-17, Final Report.* National Bureau of Statistics and United Nations Children's Fund

Olajubu, A. O., Ayamolowo, S. J., Okiti, O. A., Olajubu, T., Adeyeye, O., & Olowokere, A. E. (2021). Determinants of male involvement in maternal health care services in Southwest Nigeria. *African Journal of Midwifery and Women's Health, 15*(1). https://doi.org/10.12968/ajmw.2020.0017.

Singh, S., Powwattana, A., Munsawaengsub, C., & Siri, S. (2022). Factors influencing husband's involvement during antenatal care in Lalitpur district of Nepal. *Thai Journal of Public Health, 52*(1). https://he02.tci-thaijo.org/index.php/jph/issue/archive

UNICEF (2019). *Maternal mortality*. https://data.unicef.org/topic/maternal-health/maternal-mortality

UNICEF (2021). *Under-five mortality.*https://data.unicef.org/topic/child-survival/under-five-mortality/

United Nations (2015). *Sustainable development goals*. http://www.un.org/sustainabledevelopment/sustainable-development-goals

United Nations (2022). *World population prospects 2022*. https://population.un.org/wpp/

pp. 35-51 https://dx.doi.org/10.4314/johasam.v7i1.4

Service Marketing, Financial Support and Performance of Universities: Conceptual, Theoretical and Empirical Reviews

Julius K. A. M. Attipoe
(Correspondent Author)
Al-Madinah International University,
Kuala Lumpur, Malaysia
Email: juliusattipoe@hotmail.com

Lawrence Wahua
Unicaf University Cyprus
Admiralty University of Nigeria
Euclid University Banjul, Gambia
Email: l.wahua@unicaf.org

Abstract

Educational service marketing which covers programmes, people, price, premiums, prospectus, promotion, and prominence has become very competitive, time consuming and financially draining. This study adopted review approach, covering conceptual, theoretical, and empirical dimensions; and aimed at identifying salient missing gaps in literature in relation to education service marketing, education financial support, and performance of universities. Economic and attribution theories add relevance to the significance of the study. It was observed that financial support (the discounts offered by universities, flexibility of payment arrangements of tuition fees, educational loans, flexibility of campus payment, reducing costs on a competitive basis, increasing financial facilities and students' loans, setting payment schedules for scholarships and welfare costs, and offering discount on fees and proving educational loans and facilities to outstanding students) is a strong catalyst for the selection of universities by students and parents. Finally, the performance of universities (number of programmemes, tertiary education institutions' staffing, graduate output, student-staff ratio, among others) was zeroed down to student enrolment. This is because all key performance indicators of universities rest on available of students: no students, no universities.

Keywords: attribution and economic theories, educational service marketing, educational financial supports, recruitment and enrolment, university performance

1. Introduction

The skyrocketing number of higher educational institutions in the world has significantly elevated universities' cost of recruiting and retaining students; and put both students and parents in tougher positions of choosing a particular higher institution (Okyireh et al., 2020). Technically, universities adopt different marketing concepts to identify the needs of their targeted prospective students in order to compete more favorable in the crowded academic market (Dei & Anane-Donkor, 2021). With the cost of higher education at an all-time high; and competition from foreign universities on the increase, higher education marketing departments in emerging countries are more pressed than ever. Finding the right higher educational marketing mix can mean the difference between success and failure for many stakeholders like: higher educational institutions, agencies that create and plan education marketing campaign, software companies that manage education social media efforts, and research companies that specialize in the higher education market (Mahajan & Golahit, 2019). Over the years in Sub-Saharan Africa (SSA), print media, electronic media, walls in cities and every available space have been besieged by higher educational institutions' advertisements of all kinds, mostly private tertiary institutions (Okyireh et al., 2020). Sarath et al. (2021) observed that marketing is essential to the growth and development of higher educational institutions, and colleges and schools (regardless of size, prestige or location) make effort to attract and retain the best and most suitable candidates; and successful enrollment starts with good marketing strategies. They added that higher educational marketing helps to establish a specific brand identity which allows the right students to identify and

connect with the right school in order to increase students' enrolment and graduation within record time.

Student recruitment has become competitive; forcing higher educational institutions to find efficient, fast and effective means of providing prospective students with information while they are in the process of deciding their school (Vasquez et al., 2021). Vasquez et al. added that higher educational institutions in general and universities in particular are undergoing unprecedented changes as they confront multiple students' recruitment and enrollment challenges brought about by wide and complex processes of globalization, liberalization, and technological advancements. Ali (2021) believes that a well-executed direct educational advertising campaign can offer a positive return on investment through increased student enrolment. Direct educational advertising communicates the product offers, service, or event; and explains how to get the offered product, service, or event (Ali, 2021).

Ashfaq et al. (2019) are of the strong opinion that marketing of educational services has dramatically advanced from the previous ten years thereby forcing owners and operators of higher educational institutions to identify good educational promotional activities that can enhance their institutions' reputations and increase students' recruitment and enrollment. But the question is: which promotional activities can be used to promote quality-oriented education in the society? This question becomes even more pertinent when the major proportion of the schooling system of a country is in the hands of the private sector.

Donkor and Kyei (2020) believe that modern day higher education institutions are facing new challenges; and the introduction of accreditation system has caused the need for marketing activities among faculties and universities. Tetteh and Afful (2020) explored a variety of trends that have developed within higher education marketing, enrollment, branding, recruitment, and technology and established the following: institutions are dedicating far more attention to these functions than in previous years; the largest area of innovation and growth in higher education marketing and branding (as well as in recruitment) is in the online and digital space; effective and intuitive website (the ultimate brand statement for institutions) is among the most important tools for social and online marketing; the most effective marketing strategies for universities are nevertheless events based and involve direct interaction with potential students; recruitment strategies in higher education increasingly focus on international students and non-traditional and adult learners; few top tier universities now use robust online education offering outside of continuing education programmes and MOOC courses; and newer methods of online and technology enhanced course delivery are showing promising student outcomes. The marketing of educational institutions and programmes to students and parents is as difficult as students and parents accepting a particular higher educational institution; and this is because students want assurance of a job at the end of academic in order to live a better life (Chen et al., 2020).

Universities are beset with multiple problems: declining enrolment and high recruitment cost, increased competition, overburdened staff, multiple degree paths, appetite for foreign degrees from first class economies, poor facilities, and host of others (Shamsudin et al., 2019). Some factors have been linked to the continuous decrease in enrolment into universities: high cost of studying in universities; employers' preference to giving foreign universities' graduates priority during job recruitment exercises; and poor infrastructural facilities in many universities (Ali, 2021). Very few works factored in the Ivy's 7Ps of service marketing in investigating students' enrolment into universities; and very few again are grounded in theoretical terms. Sultan and Wong (2019), and Yasa et al. (2020) observed that majority of the reviewed literature see service educational marketing as more or less promotional strategies towards recruiting and enrolling students without paying quality attention to some other key issues like quality and number of teaching and non-teaching personnel (people); tuition and other fees paid by students (price); number and level of accredited courses (programmes); accommodation size, facilities (like digital library, sporting and recreational activities, medical centres, cafeteria, religious worship centres) class sizes (premium); and brochures for the dissemination of information about the universities via hard copies and online (prospectus). The critical aim of this review is to establish gaps in existing literature on the subject matter; and x-ray the need to close out the observed gaps in literature. Wahua et al. (2023), and Mkombo and Wahua (2023) equally adopted review approach.

2. Conceptual Review

Academic research is a continuation of existing works, and review of individual concepts or variables helps in extending the frontal of knowledge in a specific topic. The basic concepts of this study are service marketing, financial support, and university performance. Service marketing has seven measures (otherwise known as the 7Ps of marketing): people, price, programmes, premium, prospectus, promotion, and prominence.

2.1 Service Marketing

Service marketing is a set of strategies aimed at meeting consumer's need for an intangible product; and creating maximum value for them from their purchase with service marketing has three essential elements (company, employees and consumers) with three interconnected dimensions (internal marketing, external marketing, and interactive marketing) all aimed at meeting consumers' requirements and satisfying their needs (Prachi, 2019). Service marketing has seven controllable tactics which are subject to company's internal and external environments; and the optimum combination of these 7 marketing tactics for efficient promotion of customer's satisfaction if technically known as tactical marketing mix (Venaik & Midgley, 2019). In educational marketing (a subset of service marketing), these seven tactics of marketing are specifically known as the 7Ps of service marketing; and they are people, price, programmes, premium, prospectus, promotion, and prominence (Lim et al., 2020).

2.1.1 People

Writing on 7P's of education industry, Bulbule (2019) stated that 'people' means teaching and non-teaching community (example Professors, Guest Lecturer, Laboratory Assistant, Librarian, Security Guard, among others) that are associated with the services rendered to the students; and that the satisfaction and retention of the students are primarily dependent on how teachers are in a position to deliver their best services to students. The People element of service marketing in higher educational institution include all staff (academic and non-academic) that interact with the students from application and admission to graduation and convocation (Lim et al., 2020). Professors teaching the programme are an important marketing asset since their academic activity gets them involved with publishing, consulting and generally creating a reputation for their academic quality.

In a scientific study carried out by Ivy (2008) as cited by Lim et al. (2020), it was established that People element of service marketing in tertiary institutions was dominated by provision of face-to-face tuition where students live (loading = 0:806), personal contact with graduates (loading = 0:485), and open days and information evenings (loading = 0:413). Critically, provision of face-to-face tuition, and organisations of open days and information evenings are more of Place and Promotion proxies respectively. Chawla (2013) as cited by Chawla and Joshi (2019) identified the 'people' element of service marketing in educational sector to include persons involved directly or indirectly in education services or administrative staff as well as school head, lecturers; and it covers: the qualifications of teaching and non-teaching staff of universities; the recruitment and selection procedure of teaching and non-teaching staff of universities; the training and rewards of teaching and non-teaching staff of universities; the number of students, their background and interest and aptitude for the course in which he is studying; and the education of the students about their role and responsibility and communicating the cultural values with the students.

However, other administrative and supporting staff are also important since people in the admissions, student services and other relevant departments will come in contact with students creating a perception about the school, positive or negative (Bulbule, 2019). The 'people' element of 7Ps of marketing of educational institution encompasses the following (among others): the number of professors in the institution (full-time and part-time); the total number of PhD holders in the institutions (full-time and part-time); the total number of lecturers (full-time and part-time); the total number of teaching assistants (full-time and part-time); the total number of non-academic staff; the highest qualification of the CEO; the highest qualification of the Deputy CEO; the highest qualification of the registrar; the highest qualification of the deputy registrars; the highest qualification of the bursar; the highest qualification of the deputy bursars; the highest qualification of

admissions officer; the number of staff in admissions department; the highest qualification of the marketing officer; and number of staff in marketing department.

2.1.2 Price (Cost of Programmes)

Bulbule (2019) stated that price simply reflects the quality of educational services rendered by educational providers to the students; and that the price charged by educational institutions is a function of multiple variables: competition, educational institution's reputation, service quality of educational institution, location and facilities provided by the educational institution, ownership structure of the institution (private or public or private-public-partnership), placement, infrastructure, mode of learning/teaching (online, distance, on-campus, and blended), brand name of the higher educational institution, among others. The price of programme in institutions of higher learning is dominated by the tuition fees and other related costs charged students on each course of student. It is a widely held perception that price is a mark of quality placed on an academic course of study: higher prices signal higher academic quality, and lower prices signal lower academic quality (Lim et al., 2020). Price is always an important consideration but not the only one, since it is associated with financial aid options as well as employability rates and salary levels upon graduation. Students are willing to get to a more expensive programme as these two factors increase (Bulbule, 2019).

An empirical work carried out by Ivy (2008) as cited by Lim et al. (2020) established that price element of service marketing in higher institution is dominated by three factors: flexibility of the payment of tuition fees (loading = 0:737), the tuition fees of the programme (0.725), the flexibility of the tuition approach (0.564). Rhoades et al. (2019) is of the strong opinion that 'price' element of education marketing affects student enrolment most; and the following topical issues were identified: target market versus price point, quality versus price, value versus price, facilities versus price, and discounts – budget driven scholarships. Education managers should be sensitive to students' perception to cost of education (it includes admission and term fees structure, fee concessions and exemptions, college affiliation fee, examinations fees, among others) and the importance of price in selection institutions because price is an important factor students and sponsors factor-in in selecting a higher education institution (Rhoades et al., 2019). As such, administrators of universities should: know the cost of producing the service, know the price of competitors, identify pricing factors that are relevant to pricing decisions; and decide on a pricing strategy that will attract enough students.

Moorthy et al. (2019) assert that "price refers to the amount of money required to exchange for products or services"; and in pure service usage such as legal services, education services, or medical services, price is a critical consideration for the customers to make choice among different competing service providers. The price or tuition fee that is perceived as favourable or worth it is more likely to attract more students' enrolment; and this is supported by the works of Arifin et al. (2020) among many other numerous studies. The critical cost elements to be considered when evaluating price of programmes should include the following: the average total fees of certificate courses; the average total fees of diploma courses; the average total fees of bachelor courses; the average total fees of master courses; and the average total fees of doctorate courses.

2.1.3 Programmes

Writing on 7P's of education industry, Bulbule (2019) stated that programmes are technically the 'products' being sold by educational institutions to their customers (students). In technical terms, programmes of educational institutions are intangibles (knowledge, skills, and experience) which are concretized and issued to candidates as tangibles (certificates) after completion of courses of studies. The National Accreditation Board (2018) lists different programmes ran by higher educational institutions in Ghana: Diploma, Undergraduate, Postgraduate Diploma, Masters (Non Research), Masters (Research), and Doctoral. The Programme element of service marketing in universities and other institutions of higher learning encompass the various degrees or courses ran by an institution of learning for the benefit of students; and it is a complex bundle of benefits that satisfy customer's needs (Lim et al., 2020). Institutions of higher learning should develop programmes that would appeal to their targeted students; and they should equally find the student population that a given programme would be appealing: a mix of both is advocated for improved students' enrolment (Moorthy et al. 2019). Lim et al. (2020) established that two variables dominate programmes element of service

marketing: (i) the range of electives in the degree (loading = 0:811). Students and families are prone to choosing a course with relevant electives that would boost the knowledge base of the students at the end of the programme; (ii) the choice of majors (loading = 0:791). Major courses with strong appeal to students and families attract large enrolment figures.

Beery et al. (2020) described educational programmes as intangible products or services that the institutions are selling; and educational programmes encompasses curriculum, Spiritual values, Courses and degrees offered, and values (moral, social, ethical, practical). Higher education institutions' most fundamental decision is the design of quality programmes and services that will be appealing to members of its target markets as well as its current students, alumni, and donors. This is because an educational institution's programme is a strategic offering that goes to identify the institution, position the institution, and sell the institution to students and families. The quality, features, quantity and benefits of educational institutions' programmes go a long way in influencing student enrolment; and universities' programmes covers degrees awarded and their syllabi, paper exemptions, brand name of their degrees and its history, placement facility, lateral entries, grading system, and recognition (Beery, et al. 2020). In technical terms, the more programmes an educational higher institution has, the more students it would most probably attract.

2.1.4 Premium (Physical Structures and Processes)

Premium of educational service marketing encompasses physical evidences as well as processes of educational institutions aimed at satisfying the education needs of their customers; and it means the manner education institutions render services to their students; and it (service) plays important role in giving higher educational institutions competitive advantages over their rivals (Bulbule, 2019). Educational institutions' service process (teaching process, practical learning process, placement process, among others) should be straight forward, understandable, student-friendly, simple, and technologically-based in order to serve their ideal purposes (Bulbule, 2019). Educational institutions across the globe are facing emerging process-oriented trends in order to meet the yearnings and aspirations of their active and prospective customers (advanced video-based teaching and learning technology, interaction of parents and faculty members via advanced information communication technology, availability of free online start-to-finish courses, among others). Bulbule (2019) added that the physical dimension of 'premium tactics' allows students to appraise if they have access (enjoy) adequate facilities from their institutions of higher learning; and such facilities include (among others): teaching aids that meet present learning culture, digital and shelf-packed reading materials, students' cafeteria and accommodations, learning-friendly classrooms and laboratories, state-of-the-art sporting (including parks), and transportation facilities.

The Premium part of service marketing in higher educational institutions includes the physical evidences (the tangible component of the service offering) and processes (the administrative and bureaucratic functions of the university) available in an institution of higher learning (Lau, 2020)). Handling of enquiries, course registration, course evaluation, conducting of examinations, dissemination of results, and graduation and convocation are some examples of higher educational institutions processes. On the other hand, physical evidences are seen as tangibles, and they include elements like teaching materials, appearance of the buildings, and lecture facilities (among others). The location of the campus, the facilities offered, quality of accommodation, academic infrastructure, these are all premium to the programme itself and add to the student decision (Lim, et al., 2020). The premium of an educational institution equally covers the place where it is located. Some educational institutions are located in different places in order to deliver its services (programmes) closer to the people or closer to other facilities that would help students get value for money spent on acquiring certificates of higher educational institutions. It is not gainsaying therefore that educational institutions located in metro cities are judged to be more economically competitive than those located in rural areas (all other things being equal). This is because the location of an educational institution affects its price and promotional activities (Bulbule, 2019). Some of the critical factors that qualify as premium in educational marketing include the following: the total number of lecture halls, the total number of laboratories, the total capacity of student hostel, the availability of religious worship centres, the availability of clinic/hospital, the availability of water, the availability of electricity, the availability of a standard football field, the availability of gymnastic centre, the availability of a digital

library, the capacity of the traditional library, the campus is well fenced round and gated, and the campus is located in a city.

2.1.5 Prospectus

Students need to be fully informed on details before they decide where to study (Lim, et al., 2020); and the Prospectus segment of service marketing in higher educational institutions includes: admission prospectuses (hard copies and online copies), matriculation and convocation brochures (hard copies and online copies), and number of magazines printed and distributed to prospective students, and other informational materials which are unique to educational institutions. In a seminar paper entitled "a new higher education marketing mix: the 7Ps for MBA marketing", Ivy (2008) as cited by Lau (2020) revealed that universities' prospectuses are important since university education is a high involvement sector; and he added that academic Prospectuses are dominated by: that of the prospectus related mails (loading = 0.734), direct mail from the university (loading = 0.606), and the duration of the course (loading = 0.469). The typical Prospectus of the National Institute of Marketing of Nigeria (n.d) entitled "prospectus and syllabus of professional programmes for students in tertiary institutions" contains the following salient information to prospective students: the background history about the institute; vision statement of the institute; mission statement of the institute; principal objectives of the institute; structure of administration of the institute; membership of the institute; benefits of membership of the institute; professional programmes of the institute; exemptions from the examinations of the institute; dates of examination of the institute; examination entry dates of the institute; deferment of examinations of the institute; examination results of the institute; fee structure of the institute, and detailed examination syllabus of the institute.

An institutional Prospectus should be detailed enough to provide critical pieces of information to prospective students and their sponsors. Moore (2021) asserts that parents hunting for good schools for their children find prospectuses invaluable. The best prospectuses are very good indeed, doing justice to what schools have to offer with a beguiling mix of words and pictures. It usually contains information about the school and the available courses, including advice on how to apply and the benefits of accepting a place.

Moore (2021) gave some important points to consider when compiling content for your prospectuses: (i) Photography: when it is done well, photography can demonstrate how great your school is. Images of your students working, taking part in extracurricular activities, and their work is a great place to start; (ii) Great content: your prospectus is essentially one big advert for your school. Some points to consider are the type of writing style you want to adopt, and how much content is required. Creation of the content and copy writing should be carefully considered; and (iii) Quality Print: deciding what print style and finish are next. There is a huge difference in finish depending on the paperweight, type, and special finishes desired, this also directly affects the price. Finally, determine the quantity required for Open days, Enrolment Packs and Promotion, remember the difference in price between 500 and 1000 printed copies is minimal.

2.1.6 Promotion

Promotion of educational institutions involves positive word-of-mouth; outdoor advertising in form of print media like hoarding and banners (among others); use of digital marketing techniques such as SMS, e-mails, social media, etcetera (Bulbule, 2019). Lau (2020) stated that the Promotion element of service marketing in universities and other institutions of higher learning covers things aimed at influencing prospective students' choice of higher education: open days, international higher education exhibitions, conventions, direct mail, press advertisement, publicity, public relations, sales promotional efforts, and electronic marketing. Awareness is important as there are extremely many choices for students to make and decide where to study. Promotional strategies vary from word of mouth/alumni relations to participation in student recruitment fairs and the more extensive below or above the line advertising campaigns (Lau, 2020). A study by Ivy (2008) as cited by Lau (2020) revealed that universities' promotion of academic programmes is dominated by: traditional press advertising (loading = 0:805) which indicates that traditional press advertising in television and radio stations account for circa 80% of enrolment in education higher institutions, and publicity (loading =

0:657) and electronic media (loading = 0:497) which shows that non-radio and non-television dissemination of information about universities account for about 50% of enrolment.

A good product sells itself and universities (and other educational institutions) market or promote their programmes and services through advertising and publicity (public relations, sales promotion, sponsorship, websites, e-mails, newspapers, television, internet, word-of-mouth, overt, radio, personal selling, advertising, direct marketing, job fairs, and natural promotion). The promotion of an educational higher institution revolves around every deliberate and conscious efforts aimed at making the institution known to prospective students, enrolling them in the institution, and retaining them till their completion of studies in the institution. Organised promotional activities of universities and other educational institutions include one or more of the following (among others):the number of registered recruitment agents; the number of alumni chapters around the world; the number of campuses/study centres; the availability of a functional website; the ability of applicants to apply online; the ability of applicants to upload admission documents online; the ability of applicants to track their applications online; the availability of admission requirements are online; the availability of programmes' fees are online; the curriculum vitae of lecturers are online; the curriculum vitae of management team are online; the contact emails of principal officers are online; and the contact phone numbers of principal officers are online.

Universities and other educational institutions make themselves known (promote themselves) to prospective students via numerous mechanisms or windows. The primary reason for this high level of promotional activities is that 'if you do not say here I am, nobody will know where you are', and this is so true for younger generation educational institutions than with older generation educational institutions. Older universities are more established and known over time while the new ones are very much unknown. Also, the cost of promoting educational institutions and their programmes is higher for newer institutions and lesser with older institutions.

2.1.7 Prominence

The prominence of a university in the comity of other universities nationally, regionally, and globally is of vital importance to universities, governments, students, parents, and other stakeholders. The prominence of a university is a golden stamp that attaches much importance to the value and reputation and integrity of the university. The three longest established and most influential global rankings are those produced by Quacquarelli Symonds (QS), Times Higher Education (THE), and the Academic Ranking of World Universities (ARWU). The Academic Ranking of World Universities is based on academic performance, quality of faculty, research output, and general quality of education with the following supporting indicators number of Nobel laureates, Fields medalists, and other prominent inventors from a university (Shanghai Ranking Consultancy, 2021). The prominence of a university according to the QS World University Ranking (2021) is based on six-legged performance indicators (student-to-faculty ratio, international student ratio, academic reputation, citations per faculty, international faculty ratio, and employer reputation) of universities from four different but interconnected dimensions (research, employability, teaching, and internationalization). The Times Higher Education (2021) world university ranking has 13 prominence-induced indicators classified into five distinct areas: teaching (reputation survey, staff-to-student ratio, doctorate-to-bachelor's ratio, doctorates-awarded to-academic-staff ratio, and institutional income); research (reputation survey, research income, research productivity); citations (research influence); international outlook (staff, students and research), and industry income (knowledge transfer).

The Prominence proxy of service marketing in institutions of higher learning encompasses league tables, academic staff reputation, and online information by Ivy (2008) as cited by Lau (2020). Universities are often assessed for their qualities in different areas by rankings and other evaluation bodies, such as accreditation or validation. All these develop a reputation that can be used for promotion and students' recruitment (OCAK, 2021). A study by Ivy (2008) as cited by Lau (2020) revealed that the prominence factor is dominated by the reputation of the academic staff (loading = 0:758), university's ranking through league tables or press reviews (loading = 0:711), and the institution's web site (loading = 0:566). Zha et al. (2019) add that there are three global rankings of universities supported by numerous others at the global level: Center for World University Rankings,

Leiden Ranking, Eduniversal, G-factor, Global University Ranking, HEEACT-Ranking of Scientific Papers, Human Resources & Labor Review, High Impact Universities: Research Performance Index, Nature Index, Newsweek, Professional Ranking of World Universities, Reuters World's Top 100 Innovative Universities, Round University Ranking, SCImago Institutions Rankings, U-Multirank, University Ranking by Academic Performance, U.S. News & World Report's Best Global Universities Rankings, Webometrics, and Wuhan University. UniRank (n.d) tries to establish the most popular universities in Africa (a measure of prominence) based on being chartered, licensed and/or accredited by the appropriate higher education-related organization in each country; offering at least four-year undergraduate degrees (bachelor degrees) or postgraduate degrees (master or doctoral degrees); and delivering courses predominantly in a traditional, face-to-face, non-distance education format (https://www.4icu.org/top-universities-africa/). UniRank provides "a non-academic League Table of the top Universities in Africa based on valid, unbiased and non-influenceable web metrics provided by independent web intelligence sources rather than data submitted by the Universities themselves" (UniRank, n.d.).

Universities' prominence is also being measured using research outputs and break-through inventions. The strategic positioning of universities nationally and internationally is an indispensable measure of its prominence among other universities. According to Queen's University Canada (strengthening our research prominence, n.d.), a university that strives for prominence should increase its research intensity and national position via: increasing research monetary/faculty ratio by identifying sustainable funding sources for research and increasing faculty external grant applications; improving intra-and-inter-faculty and cross-university collaborations to support university research pillars nationally and internationally; improving faculty support services to enhance faculty and staff productivity, research and retention; integrating research to enable active learning and innovation; developing new award programmes to recognize faculty for outstanding research; and focusing on increasing and improving our impact through high peer-reviewed publications, recognized scholarly books and creative activities, and knowledge translation and innovation. It is important to add that the prominence of a university should be a balanced one: a balanced university excels student experience, research output, and discovery and inventions (Queen's University Canada, n.d.). Pietrucha (2018) as cited by Kayacan and Anavatan (2022) on country-specific determinants of world university rankings established that the prominence of a university is a function of multiple country-factors and specific university-factors such as country's economic power (strong gross domestic product, stable monetary and fiscal policies, good standard of living, among others), sustainable political stability of the country (such as freedom from coups, free of foreign occupation, absence of war and major political crises), the effectiveness of country-university governance structures, respect for rule of law and constitutionalism, investment in research, and other institutional variables like strong socio-cultural institution, strong educational institutions, and viable international relations (among others).

2.2 Financial Support

Financial supports to students are economic stimuli that could influence a student's choice of higher institution to enroll into. Momunalieva, et al. (2020) established that student's choice of a particular university could be influences by factors like scholarship, part-time job offer by the university, external paid internship opportunities sourced by the university, installment tuition fee payment option, and tuition fee or other fees waiver. Moorthy, et al. (2019) listed financial supports as opportunities open to students to enroll in a particular educational higher institution; and they went ahead to state the types of financial supports that aid students in their choice of higher educational institution: the discounts offered by the university, the flexibility of payment arrangements of tuition fees, educational loans, the flexibility of campus payment, reducing costs on a competitive basis (especially within the country), increasing financial facilities and students' loans, setting payment schedules for scholarships and welfare costs, and offering discount on fees and proving educational loans and facilities to outstanding students. A financial support as economic stimuli has the potential of increasing enrolment in universities in general and specific programmes (or universities) that are considered expensive in comparison with others. Discounts in fees payable to universities by students are economic stimuli; flexibility of tuition fees payments is an economic stimulus to students; and

educational loan is an economic stimulus more especially when the interest element is very friendly. In general terms, middle class students and families downwards would give financial supports a critical consideration when selecting a university for enrolment. This is because money is very dear to them; and they have multiple things to put their scarce monetary resources to.

Rodriguez et al. (2020) revealed that student financial support (aid): increased four-year graduation rates by 8% points; increased persistence rates over four years; increase in cumulative earned credits; increase in academic performance; and aid programmes targeting low-income, high-ability students are most successful when they couple grant aid with strong non-financial supports. Herbaut and Geven (2020) cited Bettinger (2015) in an article entitled "need-based aid and college persistence: the effects of the Ohio college opportunity grant" established that based on an $800 increase in grant aid: Student's dropout rates fell by 2% as a result of the programme; Increased likelihood that students attend 4-year campuses; and Increase in first-year grade point averages. Nora (financial aid, n.d.) investigated the effect of government financial support on student performance in terms of access to education, persistence to education, and graduation from school. The study exposed a lot of fundamental issues as it established that: finance is a key challenge to college access and completion for minorities and low-income students; college education affordability landscape is dramatically different for minorities and low-income students; and minorities and low-income students are priced out of college for the following reasons: financial illiteracy; high levels of unmet financial need; high rates of poverty; high risk of accruing unmanageable debt; and limited financial, academic, and social capital. Nora (financial aid, n.d.) added that financial aid has both tangible (receipt of aid to offset college costs) and intangible (reduction of stress and development of positive academic and social attitudes) outcomes to students and the society. The study also stated that financial aid is associated with college persistence, academic performance, degree attainment and transfer. According to Hou et al. (2022) financial aid has great effect on persistence and academic performance of students. The different classifications of financial aid covered in this study are: grants only (9.9%), scholarships only (15%) loans only (16.2%), work-study only (4.1%) grants and loans (2.8%), scholarships and loans (2.8%), work-study and loans (1.2%), grants and work-study (0.4%), scholarships and work-study (1.0%), and loans and other scholarships (4.1%). Nguyen et al. (2019) established that financial supports increases the chances of student persistence and degree completion between 2 - 3% points; and that an additional $1,000 of financial support increases persistence and attainment by 1.5 – 2% points.

2.3 University Performance

The Centre for Measuring University Performance (MUP, 2021) advised that discussions on measuring the performance of universities have to be extremely cautious as there are multiple university performance indicators in defining the best universities across the globe. As a matter of fact, "no single indicator or composite number accurately represents what an individual institution has done, can do, or will do" (MUP, 2021). The MUP Centre went ahead to add that the sustainability of private and public universities depends on their revenue base: highly strong universities in financial terms are better performing than those weak in financial terms. This is because good researches are cost intensive as much as quality faculty members, quality laboratories, and other service marketing indicators of higher educational institutions.

Alomary (2020) cited the work of Luneva (2015) who conducted an analysis of key performance indicators considered in Russian educational system; and established the following indicators: position in leading world rankings of universities (position in QS ranking); number of publications in Web of Science and Scopus by each faculty member (publications per faculty member); average citation index of faculty member in data bases of Web of Science and Scopus (citation per faculty member); percent of foreign professors, teachers and researchers including local citizens who have PhD degree of foreign universities (foreign faculty); percent of foreign students studying basic educational programmes of the university (foreign Students); percent of revenue from non-budget sources in university revenue structure (external revenue); percent of holders of master's degree and postgraduates in the given student body; volume of scientific researches for a researching teacher; percent of revenue from scientific researches and R&D revenue in total amount of university income; and percent of scientific and teaching employees who finished prolonged trainings at the

leading scientific and educational centres. Writing on 'the best practices for building university scorecards and measuring various aspect of the performance with Key Performance Indicators (KPIs)", Savkin (2020) identified the key performance indicators (KPIs) that appear on most universities' scorecards: participation rate (the percentage representation of unique class of persons among students' population); retention rate (the percentage of students that stayed in study from course to course); graduation rate (the percentage of students with satisfactory completion of course requirements); and employment rate (the percentage of graduates that gain employment). Enrolment rate is a critical frontal indicator for assessing the performance of universities (as most other factors depend on it). Also, it is necessary to add that student enrolment is the hallmark of university education: no student, no university! Other factors considered by Savkin (2020) in assessing the performance of universities are: number of academic FTE (full-time equivalent), percent of foreigners among faculty members, percent of foreign students, research student number, percent of revenue from different sources, research income per academic FTE (full-time equivalent), staff cost as % of total cost, and dollars allocated per FTE enrollment.

It is important to also buttress that the number of full-time faculty members, the percentage of foreigners among faculty members, the percentage of foreign students, the number of research students, the percentage of revenue from different sources, the research income per full-time academic, and ratio of dollar allocated to full-time enrollment are all dependent on students' enrollment into a university (Alomary, 2020). Students' enrolment means the matriculation of students (the process of initiating attendance to a school); and enrolment relates to admission, enlistment, recruitment, entrance, acceptance, engagement, accession, record, matriculation, conscription, reception, entry, rally, induction, response, influx, subscription, and listing (Hayes, 2020)). Bhargav (2023) in an essay entitled "increase student enrolment with these 10 practical tips" advised admission teams and recruitment agents to adopt the following mechanisms in their drive to up student enrolment: harnessing student motivation, storytelling as a tool, online properties: websites and social media, reducing response time through automation, dynamic engagement strategies, leverage on technology, mobile application process, do more with analytics, improve your visibility through search engine optimization (seo); and hype your graduates. Enrolling students has never been tougher. And the reality is that it will continue to be tough. Hence, the need to move on from traditional means of enrollment, which ultimately slow down the whole process of admissions. The simple solution to this lies in the automation of enrollment process viz-a-viz technology; especially when it is readily available to your team for an ultimate turnaround in student enrollment

Hayes (2020) cited Terkla (2011) who investigated the performance indicators used by most universities in the United States. The study analysed the performance dashboards of sixty-six (66) universities. the most popular (found on more than 50% of the dashboards) areas of measurement were: endowment and expenses data, admissions scores, enrollment figures and special populations, faculty fte, and percentage of faculty with terminal degree, graduation rates, and retention rates, student engagement, and student/faculty contact. Stewart (2019) cited the work of Burke and Minassians (2002) who reviewed performance reports of different universities and found 158 distinct performance indicators with eight (8) of the 158 indicators been shared by more than 50% of studied universities: Graduation, Enrollment, Sponsored research, Student transfers, Tuition, Financial aid, Degrees awarded, and Licensure test scores. The National Accreditation Board (NAB) Ghana assesses the performance of Ghanaian higher educational institutions using multiple indicators; such as: level of programmes and mode of delivery, students' enrolment by programme, tertiary education institutions' staffing (qualifications and number), student staff ratio, and graduate output statistics by programme. Therefore, students' enrolment is a good indicator for measuring the performance of universities; hence, it appears on all performance metrics of universities.

3. Theoretical Review

Sipos et al. (2021) identified different theoretical models for explaining choice of higher educational institutions by students and parents: econometric model, status-attainment model, information-processing model, the Jackson three-phase model, the chapman model, and the Hanson and Litten model. Dhaliwal et al. (2019) look into the rationale behind students' choice of a particular higher educational institution; and they identified the following theoretical underpins: economic model,

status-attainment model, and combined models (The Jackson model, The Chapman model, and The Hanson and Litten model). This review focused only on economic and attribution theories.

3.1 Economic Theory

Ikaba and Enyindah (2020) stated that the fundamental notion underlying economic theory for explaining choice of higher educational institution is that students maximise utility (satisfaction) by applying cost-benefit analysis. The economic theory assumes that students may carry out cost-benefits analysis of college and the social and educational outcome related to the investment in college by the individual (El Nemar et al. 2020). This means that the models follow a cost-benefit framework that assumes that students of higher education are rational and are completely informed about the potential costs and benefits of both education and non-education to arrive at a decision regarding choice of higher education (Andoh et al., 2020). The justification for the use of the economic theory in this study is that the theory primes on rationality of prospective students which are considered in the service marketing activities of the universities with the objective of attracting students and promoting customer loyalty (Andoh et al., 2020). This is supported by Anabila et al. (2020) who indicated that the schools in the quest to remain competitive and survive embrace the economic theory of rationality to attract the suitable candidates and also maximise profit. The focus of rationality is entails carrying out a cost-benefit analysis: how much was spent in marketing and recruiting students and how much did the university receive from enrolled students? Thus, the ability of a marketing manager to quantitatively answer this question puts him on top of his/her job.

Student rationality in terms of cost-benefit analysis can be incorporated into service marketing components such as people, programme cost, programme quality, premium, prospectus, promotion, and prominence. This is because other colleges are competing for the same students, and hence the decision to join will be based on these considerations, as long as the student benefits and the cost is less. Promotional activities are thus crucial in swaying the reasonable minds of such students. On the other hand, when students make sensible choices, they examine the availability of financial aid in the form of educational loans, tuition discounts, school fee payment flexibility, and other costs that institutions would consider as part of their competitive cost-cutting strategy. As a result, financial assistance will be incorporated into the conceptual framework of this study as an intervening variable. Cost benefit analysis (rationality) focuses on variables that aid in making informed decisions, such as the people, the cost of the programme, the programme's quality, the premium, the prospectus, promotion, and prominence.

3.2 Attribution theory

The attribution theory on choice of higher educational institution is a marketing theory with strong leaning on customer satisfaction based on perceived service quality; and it examines what information is gathered and how it is combined to form a causal judgment. The hallmark of service marketing is service quality; and discussions around attribution theory are better commenced with these puzzles: What would be the reaction of a rational student who did not receive expected satisfaction from a private university's service quality? Would the student continue to remain with the private university if he has alternative rational choices to make? Would the student recommend the private university to his family members and friends? Prayag et al. (2018) asserted that attribution theory has been mostly used in dissatisfaction/complaining behaviour models, and that consumers are rational processors of information who seek out reasons to explain why a purchase outcome, for example dissatisfaction, has occurred. This model argues that when the delivery of a service does not match customers' prior expectations or other standards, customers engage in an attribution process in order to make sense of what has occurred (Srivastava & Gosain, 2020). According to Prayag et al. (2018) some researchers suggest the Attribution theory as an alternative model to explain customer satisfaction. Attribution theory holds that dissatisfied customer would bad-mouth an organisation while a satisfied customer would be a strong advocate in spreading good news about an organisation. Cabeliza (2021) established 'word of mouth' as one of the most important factors that influenced their students' choice of university. This is because marketing strategies are not enough in recruiting students and getting them enrolled; but, driving up student satisfaction and investing in the student body is a much more assured way of building student recruitment numbers (Elahinia & Karami, 2019). This is primarily

because a good marketing strategy determines that placing more emphasis on student satisfaction in all areas of university life is the best way of attracting prospective students. Valentini et al. (2020) stated that student satisfaction influences not only how much a student enjoys their time at university, but also how well they do because it is the most significant factors in student recruitment.

3.3 Economic-Attribution Joint Theoretical Framework

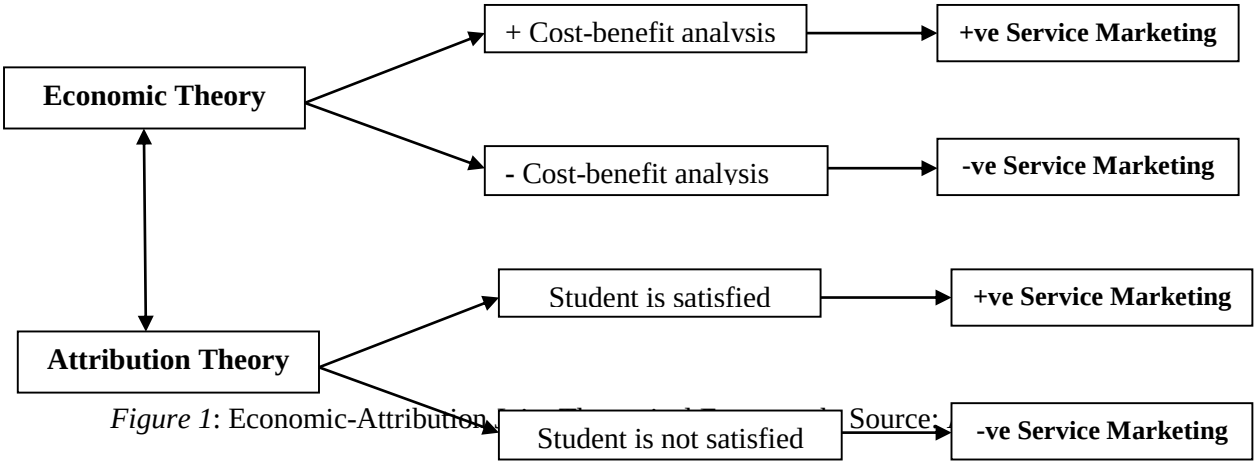


Figure 1: Economic-Attribution [illegible] Source:

Figure 1 is a diagrammatical illustration of a joint theoretical framework covering economic and attribution theories. Based on economic theory, positive cost-benefit analysis (+ Cost-benefit analysis) depicts a scenario where income earned from enrolled students in a given year is greater than the cost of marketing and recruiting the students; and negative cost-benefit analysis (- Cost-benefit analysis) depicts a scenario where income earned from enrolled students in a given year is lesser than the cost of marketing and recruiting the students. Based on attribution theory, satisfied student remains with the university and helps other students to enroll in the university via positive recommendation; and a non-satisfied student would endeavour to leave the university if possible and he would discourage other prospective students from enrolling in his university via negative words-of-mouth. Positive cost-benefit analysis signals successful service marketing campaign; and negative cost-benefit analysis signals unsuccessful service marketing campaign. Also, satisfied student signals successful service marketing campaign, and non-satisfied student signals unsuccessful service marketing campaign.

4. Empirical Review

Mbawuni and Nimako (2015) explored the factors underlying students' choices in accessing higher educational institution in Ghana. The study was not based on any specific theory; but, its findings revealed that cost of education, student support quality from a university, attachment to institution, lecturers and staff recommendation, failure to gain alternative admissions, location benefits, and personal intention. The study was a quantitative one; and they suggested that further studies should include more than one university and establish cause and effect (regression analysis) between observed factors and students' enrolment.

A similar study by Atarah and Peprah (2014) investigated the important factors that influence students' choice of university in Ghana and adopted quantitative approach. The study established that courses offered, high caliber lecturers, well stock library and internet, flexible lecture timetable and recognition of qualification by employers were the top important factors that influence students' choice of university in Ghana. They recommended that further studies should be conducted in only public universities, only private universities and mix of all kinds of higher education. Atarah and Peprah (2014) sought to establish if advertising (one of the service marketing medium) had an influence on students' enrolment decision in private tertiary institutions in Ghana using descriptive statistics approach. The study established that advertising and other factors influenced the enrolment

decision of some students in Ghana; the authors are of the opinion that further studies should cover more than two universities and extend into other service marketing strategies.

Omboi and Mutali (2015) investigated the effect of selected marketing communication tools on enhancing students' enrolment in private universities in Kenya based on communication theory. The study adopted quantitative approach and established that public relations, advertising, personal selling and direct marketing have significant effect on student enrollment in private universities in Kenya. Uchendu et al. (2015) studied the marketing strategies that enhance students' enrolment in private schools in Calabar Municipality in Nigeria; and established that quality programmes, social media/website, infrastructural development, face to face talk, media adverts, and price significantly enhance student enrolment in private schools.

Khan and Qureshi (2010) explore the variables that have strong impact on students' enrollment in private universities in Pakistan and found out that school appearance, public relations, publicity, and advertisement (print and electronic media) influence students' enrollment in Pakistani private universities. Their study was a qualitative one; as such, they advised that further study should adopt quantitative approach in order to establish cause and effect in relation to educational promotion and students' enrollment. Kavakas (2013) examined the factors that influence destination choices for US students for the facilitation of marketing choices based on Ivy's 7Ps of service marketing and revealed that programme, price, premium, promotion, people, prospectus and prominence influence US students' choice of foreign university.

Hanover Research (2014) explored a variety of trends that have developed within higher education branding, marketing, recruiting, enrollment, and technology in USA. Secondary data and descriptive statistics; established that the largest area of innovation and growth in higher education marketing and branding, as well as in recruitment is in the online and digital space. Blackboard Incorporated (2014) sought to identify the leading marketing and recruiting strategies for students' recruitment growth in USA using exploratory research and secondary data analysis. The investigation revealed that market research; understanding students' profile, customized communication strategy and nurturing prospective students are four leading strategies to enhance students' recruitment and enrollment in USA.

Nor et al. (2015) examined the Role of telemarketing as a promotional tool for students' enrollment in a Malaysian private university. They applied exploratory research approach and gathered data using interview and observation techniques. They established that telemarketing is a good and cost-efficient service marketing tool; and promotes students' enrollment in Malaysia. Lukić and Lukić (2016) sought to establish which marketing mix instrument has the greatest impact on the student decision to enroll at a particular faculty at the University of Novi Sad in Serbia using non-standardized survey questionnaire and quantitative research. They found out that people, physical evidence, promotion, image, resources and extra services, location and price have significant impact on students' enrollment into different faculties of the university.

3.3 Identified Gaps in Literature

All the reviewed works did not incorporate economic theory of service marketing in their studies; thereby not establishing the nexus between money spent on students' recruitment campaigns and their enrolment into universities. The dearth of empirically-leaned cost-benefit research has been identified in literature; and the need to close this gap based on Ivy's 7Ps of service marketing (programme, price, premium, promotion, people, prospectus and prominence) cannot be downgraded.

Another identified gap is scholars' perception of education marketing as more or less promotional strategies aimed at recruiting and enrolling students without incorporating the 7Ps of Ivy League of schools: quality and number of teaching and non-teaching personnel (people); tuition and other fees paid by students (price); number and level of accredited courses (programmes); accommodation size, facilities (like digital library, sporting and recreational activities, medical centres, cafeteria, religious worship centres) class sizes (premium); and brochures for the dissemination of information about the universities via hard copies and online (prospectus).

The moderating role of financial support on the relationship between service marketing and universities' performance is also lacking in literature. To bridge this observed gap in literature, there

is need to empirically measure how financial supports to students moderate the nexus between service marketing and performance of universities.

3.4 Summary

This study is anchored on economic theory. This theory is lacking in the empirical studies reviewed. The study's reviewed education under three different dimensions (global, Africa, and Ghana). Recent related studies to this one were reviewed and gaps in literature were documented. The conceptual framework was developed in line with economic theoretical framework. Overview of the variables (independent, moderating, and dependent) encapsulated in the conceptual framework were given.

In specific terms, the place of educational service marketing (which covers programmes, people, price, premiums, prospectus, promotion, and prominence) was explored in detail. Also, the strategic role of financial support (the discounts offered by the university, the flexibility of payment arrangements of tuition fees, educational loans, the flexibility of campus payment, reducing costs on a competitive basis (especially within the country), increasing financial facilities and students' loans, setting payment schedules for scholarships and welfare costs, and offering discount on fees and proving educational loans and facilities to outstanding students) in educational pursuits was discussed in detail. Finally, the performance of universities (number of programmes, tertiary education institutions' staffing, graduate output, student-staff ratio, and etcetera) was zeroed down to student enrolment. This is because all other salient performance indicators of universities rest on available of students: no students, no universities.

3.5 Research Ethics and Conflict of Interests

The study is free of any known and deliberate unethical practice; and there is no conflict of interests in the work.

3.6 Acknowledgement

The Authors funded this publication. There is no external funding from any source.

References

Ali, B. J. (2021). Assessing (the impact) of advertisement on customer decision making: Evidence from an educational institution. *Afak for Science Journal*, 6(1), 267–280.

Alomary, F. O. (2020). Evaluation of scientific research based on key performance indicators (KPIs): A case study in Al-Imam Mohammad Ibn Saud Islamic University. *Computer and Information Science*, 13(1), 1-34.

Anabila, P., Ameyibor, L. E. A., Allan, M. M., & Alomenu, C. (2021). Service quality and customer loyalty in Ghana's hotel industry: The mediation effects of satisfaction and delight. *Journal of Quality Assurance in Hospitality & Tourism*, *23*(3), 748-770.

Andoh, R., Appiah, R., & Agyei, P. (2020). Postgraduate distance education in university of Cape Coast, Ghana: Students' perspectives. *International Review of Research in Open and Distributed Learning, 21*(2), 118–135. .

Arifin, Z. A. L. S, Sumarwan, U. & Najib, M. (2020). The influence of marketing mix on brand image, motivation and students decision to choose graduate studies of IPB University. *Journal of Consumer Sciences*, 5(2), 139-156.

Ashfaq, A., Ijaz, S., & Shami, S. (2019). Drawing the foreign rivalry: depiction of Indo-Pak relations in political cartoons of mainstream Pakistani and Indian English newspapers (2014-2017). *Global Regional Review, Humanity Only*, 4(1), 8-20

Atarah, B. A. & Peprah, A. A. (2014). Assessing the influence of advertising on student enrolment in private tertiary institutions in Ghana. *International Journal of Businessand Social Research (IJBSR)*, 4(3), 55-65.

Beery, T., Chawla, L., & Levin, P. (2020). Being and becoming in nature: Defining and measuring connection to nature in young children. *International. Journal of Early Childhood Environmental Education*, 7(3), 3-22

Bhargav, J. (2023). *Increase student enrollment with these 10 practical tips*. https://www.leadsquared.com/industries/education/how-to increase-student-enrollment/

Bulbule, I. (2019). *7 P's of education industry*. https://www.slideshare.net/IshwarBulbule/7-ps-of-education-industry

Cabeliza, S.M. (2021). Ensuring student enrollment and retention toward sustainability of universities. *International Journal of Management and Education in Human Development*, *1*(04), 187–196.

Centre for Measuring University Performance (2021). *Measuring university performance*. https://mup.umass.edu/content/about

Chawla, D., & Joshi, H. (2019). Consumer attitude and intention to adopt mobile wallet in India–An empirical study. *International Journal of Bank Marketing*, 37(7), 1590-1618. https://doi.org/10.1108/IJBM-09-2018-0256

Chen, J. C., Dobinson, T. J. & Kent, S. (2020). Lecturers' perceptions and experiences of blackboard collaborate as a distance learning and teaching tool via Open Universities Australia. *Open Learning*, *35*(3),222-235

Dei, D.-G. J., & Anane-Donkor, L. (2021). Marketing mix and students' enrolment in institutions of higher learning. *Journal of Management and Business Education*, 4(2),150–164. https://doi.org/10.35564/jmbe.2021.0009

Dhaliwal, M. S., Mittal, A., Aggarwal, A. & Chand, P. K. (2019). Determining the factors affecting the selection of private universities and colleges in Indian context: A structural equation modeling approach. *Journal of Advanced Research in Dynamical & Control Systems*, *11*(8), 2579-2590.

Donkor, E. S., & Kyei, K. A. (2020). Contribution to Higher Education in Ghana: Improving Student Enrolment through Application of the 7Ps of Marketing. *The International Journal of Business & Management,* 8(9), 1-9.

Elahinia, N. & Karami, M. (2019). The influence of service quality on Iranian students' satisfaction, loyalty and WOM: A case study of north Cyprus. *Journal of Management, Marketing and Logistics (JMML)*, 6(1), 21-34.

ElNemar, S., Vrontis, D., & Thrassou, A. (2020). An innovative stakeholder framework for the student-choice decision making process. *Journal of Business Research*, 119(1), 339-353.

Hanover Research (2014). *Trends in higher education marketing, recruitment, and technology*. Washington, DC 20006

Hou, A. Y. C., Hill, C., Hu, Z., & Lin, L. (2022). What is driving Taiwan government for policy change in higher education after the year of 2016–in search of egalitarianism or pursuit of academic excellence? *Studies in Higher Education*, 47(2), 338-351.

Hayes, S. L. (2020). The influence of organizational culture on the performance of small, private nonprofit colleges and universities: An explanatory sequential mixed methods study (*Doctoral Dissertation, Caldwell University).*

Herbaut, E. & Geven, K. (2020). What works to reduce inequalities in higher education? Asystematic review of the (quasi-) experimental literature on outreach and financial aid. *Research in Social Stratification and Mobility*, 65, 100442.

Ikaba, Y. & Enyindah, C. (2020). Evaluative Criteria for Selection of Higher Education Institutions in Nigeria. In E. Mogaji, F. Maringe, R. Ebo Hinson (Eds). *Higher education marketing in Africa*. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-39379-3_7

Kayacan, E. Y., & Anavatan, A. (2022). Investigation of the country-specific factors for URAP. In *Advances in econometrics, operational research, data science and actuarial studies* (221-234). Springer.

Kavakas, D. (2013). *Students as consumers: Identifying study abroad destination choice influence for marketing purposes*. www.aieaworld.org/assets/docs/Listserv_Summaries/studentsasconsumers.pdf

Khan, S.N. & Qureshi, I. M. (2010). Impact of promotion on students' enrollment: a case of private schools in Pakistan. *International Journal of Marketing Studies, 2*(2), 267 274

Lau, M. Y. M. (2020). Effects of marketing mix on students' selection of transnational top up degrees in Hong Kong. *International Review of Management and Marketing*, 10(5), 27-34.

Lim, W. M., Jee, T. W., & De Run, E. C. (2020). Strategic brand management for higher education institutions with graduate degree programmes: Empirical insights from the higher

education marketing mix. *Journal of Strategic Marketing*, 28(3), 225-245

Lukić, V.R. & Lukić, N. (2016). Application of marketing mix concept in student recruitment strategies: Evidence from University of Novi Sad, Serbia. *Megatrend Revija Revija*, 13(3), 183-202. DOI:10.5937/MegRev1603183R

Mahajan, P. & Golahit, S. (2019). Service marketing mix as input and output of higher and technical education: A measurement model based on students' perceived experience. *Journal of Applied Research in Higher Education,* 12(2), 151-193

Mbawuni, J. & Nimako, G.N. (2015). Critical factors underlying students' choice of institution for graduate programmes: Empirical evidence from Ghana. *International Journal of Higher Education*, 4(1), 120-135

Mkombo, A.L. & Wahua, L. (2023). Review of behavioural intention to use mobile financial services. *International Journal of Research and Innovation in Social Science* .

Momunalieva, A., Urdaletova, A., Ismailova, R., & Abdykeev, E. (2020). The quality of higher education in Kyrgyzstan through the eyes of students. *Quality in Higher Education,* 26(3), 337-354.

Moore, N. (2021). *The value of a prospectus*. https://wemarketschools.com.au/the-value-of-a-prospectus/

Moorthy, K., Johanthan, S., Hung, C. C., Han, K. C., Zheng, N. Z., Cheng, W. Y., & Yuan, W. H. (2019). Factors affecting students' choice of higher education institution: A Malaysian perspective. *World Journal of Vocational Education and Training*, 1(2), 59-74.

National Accreditation Board (2018). *Tertiary education statistics report: composite statistical report on all categories of tertiary education institutions in Ghana for the 2016/2017 academic year.*

National Institute of Marketing of Nigeria (n.d.). *Prospectus and syllabus of professional programmes for students in tertiary institutions.* https://nimn.com.ng/prospectus-and-syllabus-for -professional-tertiary programmes.pdf

Nguyen, T.D, Kramer, J.W. & Evans, B.J. (2019). The effects of grant aid on student persistence and degree attainment: a systematic review and meta-analysis of the causal evidence. *Review of Educational Research*, 89(6), 831-874

Nor, F. M. M., Roslan, S., Rahman, K., & Alaudeen, M. S. S. (2015). A role of telemarketing as a promotional tools for student enrolment. *International Journal of Business, Economics and Law*, 8(2), 31-35

Nora, A. (n.d.). *The impact of a state grants programme on student outcomes: Access, persistence, and graduation.*www.uhd.edu/president/Documents/texas-grant-symposium-presentation.pdf

OCAK, A. (2021). Universities in a competitive global marketplace: Digital marketing versus traditional marketing1. *Reflections of Economic Development*, 75-120.

Okyireh, R. O., Okyireh, M. A. A. & Adu, I. N. (2020). Determinants of students' choice of higher education in a private university, Ghana. *British Journal of Marketing Studies, 8*(2), 37-53.

Omboi, B. M. & Mutali, J. N. (2011). Effect of selected marketing communication tools on studentenrolment in private universities in Kenya. *European Journal of Business and Management, 3*(3), 172-205.

Pietrucha, J. (2018). Country-specific determinants of world university rankings. *Scientometrics*, 114 (2), 1129–1139.

Prachi, M. (2019). *Service marketing.* https://theinvestorsbook.com/service.marketing.html

Prayag, H., Hassibi, S. & Nunkoo, R. (2018): A systematic review of consumer satisfaction studies in hospitality journals: Conceptual development, research approaches and future prospects. *Journal of Hospitality Marketing & Management, 28*(1), 51-80. http://dx.doi.org/10.1080/19368623.2018.1504367

Queen's University Canada (n.d.). *Strengthening our research prominence*. https://www.queensu.ca/strategicplanning/framework/research

QS World University Ranking (2021). *The QS world university rankings methodology*. https://www.topuniversities.com/qs world-university-rankings/methodology.

Rodriguez, N., Staklis, S. & Boyette, J. (2020). The effectiveness of student coaching in community colleges. *Community College Journal of Research and Practice*, 44(8), 549-

562.

Nair G. Sarath, A. M. Shackira, Hamed A. El-Serehy, Daniel Ingo Hefft, Jos T. Puthur, Phytostabilization of arsenic and associated physio-anatomical changes in Acanthus ilicifolius L, *Environmental Pollution, 298*

Sarath, N. G., Sruthi, P., Shackira, A. M. & Puthur, J. T. (2021). Heavy metal remediation in wetlands: mangroves as potential candidates. In: M. N. Grigore &, A. Cojocariu (Eds.). *Handbook of halophytes: from molecules to ecosystems towards biosaline agriculture*. Springer, 1–27.

Savkin, A. (2020). *An example of university scorecard with specific KPIs*. https://bscdesigner.com/university-kpis.htm

Shamsudin, M. F., Ali, A. M., Nadzri, F. H., & Wahid, R. (2019). Influence of academic programme, tuition fees and location on students' decisions to enroll at universiti: A study of Kuala Lumpur business school campus. *Humanities & Social Sciences Reviews*, 7(1), 108-112.

Shanghai Ranking Consultancy (2021). *Shanghai ranking's academic ranking of world universities 2021 press release.* https://www.shanghairanking.com/news/arwu/2021

Sipos, N., Kuráth, G., Bányai, E. & Jarjabka, A. (2021). Applicants' institution selection criteria in the higher education: An empirical study in Hungarian higher education management. *Management in Education, 37*(4), 178-189

Srivastava, M., & Gosain, A. (2020). Impact of service failure attributions on dissatisfaction: Revisiting attribution theory. *Journal of Management Research*, 20(2), 99-112.

Stewart, J. L. (2019). Productivity and efficiency in community colleges: The use of cost effectiveness analysis to increase student success (Doctoral dissertation).

Sultan, P. & Wong, H. (2010). Performance-based service quality model: an empirical study on Japanese universities. *Quality Assurance in Education*, 18(2), 126-143.

Tetteh, G. & Afful, J. B. A. (2020). Marketisation of Ghanaian higher academic institutions: a hypermodal analysis of universities' homepages. *International Journal ofMarketing Semiotics & Discourse Studies*, 8(1), 1-24.

Times Higher Education Ranking (2021). *World university rankings 2016–2017 methodology*. https://www.timeshighereducation.com/world-university rankings/methodology-world university-rankings-2016-2017.

Uchendu, C. C., Nwafor, I. A. & Nwaneri, M. G. (2015). Marketing strategies and students' enrolment in private secondary schools in Calabar Municipality, Cross River State, Nigeria. *International Journal of Education and Practice*, 3(5), 212-223

UniRank (n.d.). *Top 200 universities in Africa.* https://www.4icu.org/top-universities-africa/

Valentini, S., Orsingher, C., & Polyakova, A. (2020). Customers' emotions in service failure and recovery: A meta-analysis. *Marketing Letters: A Journal of Research in Marketing, 31*(2-3), 199–216. https://doi.org/10.1007/s11002-020-09517-9

Vasquez, A.A., Mohiddin, O., Li. Z., Bonnici, B.L., Gurdziel, K. & Ram, J.L (2021). Molecular diet studies of water mites reveal prey biodiversity. *PLoS ONE 16*(7):e0254598.

Venaik, S., & Midgley, D. F. (2019). Archetypes of marketing mix standardization adaptation in MNC subsidiaries: Fit and equifinality as complementary explanations of performance. *European Journal of Marketing*, 2(1), 366-399

Wahua, L., Kwode, I. E., Chukwuma, I. R. & Attipoe, J. K. A. M. (2023). Review of contemporary best practices in tax revenue mobilization from underground economies. *International Journal of Latest Technology in Engineering, Management & Applied Science*, 12(2), 38-48. DOI: 10.51583/IJLTEMAS

Yasa, N. K., Adnyani, I. D. & Rahmayanti, P. D. (2020). The influence of social media usage on the perceived business value and its impact on business performance of Silver Craft SMEs in Celuk Village, Gianyar-Bali. *Academy of Strategic Management Journal*, 19(1), 1-10.

Zha, Q., Wu, H. & Hayho, R. (2019). Why Chinese universities embrace internationalization: An exploration with two case studies. *The International Journal of Higher Education Research,* 78(4), 1-24. DOI 10.1007/s10734-019-00364-w

pp. 52-62 https://dx.doi.org/10.4314/johasam.v7i1.5

Impact of Corruption on the Investment Volume of Public-Private Partnership in Abia State

Udochukwu Precious Nwakodo & Charity N. Alum
Department of Public Administration
Abia State Polytechnic, Aba, Abia State
Email: preshy1973@gmail.com

Abstract

The study examined "Impact of Corruption on the Investment Volume of Public-Private Partnership in Abia State". To accomplish the research objectives, the study adopted a survey research design, and the Taro Yamane sample size determination formula was used to select 379 respondents as the sample size for the study. The study employed two research questions and one hypothesis. The questionnaire schedule was used to generate data while simple percentages and Pearson product correlation analyses was used. The study revealed that there is no significant relationship between corruption and the profitability level of public-private enterprises. The study also revealed that high costs of doing business, increased prices of products and the enhancement of monopolies are the effects of trade restrictions on the investment volume of public-private enterprises. The study revealed that managing conflicts of interest, systems of rewards and incentives, and codes of conduct are ways of curtailing corruption and enhancing public-private partnerships. This study recommended that Abia State Government should establish a corruption prevention mechanism that prohibits certain types of conduct and also includes codes of conduct and ethics for public officials.

Keywords: investment, corruption, public private partnership, political instability

Introduction

According to Frewen and Campbell (2018), corruption refers to the use of governmental authority for personal gain. This encompasses several forms of unethical behaviour, such as bribery, extortion, fraud, abuse of authority, embezzlement, conflicts of interest, and nepotism. The existence of corruption has detrimental implications for the economy and market dynamics, particularly with regard to corporate investments, since it leads to increased operational expenses.

While corruption is typically associated with negative consequences, certain theories and empirical studies suggest that these unethical behaviours can have positive outcomes. For instance, there are instances where companies choose to invest and expand their operations in areas with high levels of corruption, indicating that corruption may not necessarily hinder investment under specific circumstances (Asiedu & Freeman, 2019). Hence, although it is often believed that corruption has a detrimental effect on the economy, available researches about its influence on business operations reveal a complex interplay of both bad and good outcomes. This complexity poses a challenge for comprehending the precise impact of corruption on individual management actions.

The examination of the influence of corruption on the magnitude of investment in public-private partnerships might prove particularly intriguing. Corruption, being inherently linked to the exercise of public authority, may significantly impact public-private partnerships, particularly due to the involvement of a public entity as one of the partners in such collaborations. Furthermore, discussions surrounding public-private partnerships often exhibit a significant scope. Consequently, those with heightened sensitivity to unethical practices are more susceptible to their occurrence due to the inherent challenges associated with conducting comprehensive audits. In recent decades, there has been a significant proliferation of third-party public-private partnerships across several sectors of economic activity (World Bank, 2023). Public-private partnerships (PPPs) and their associated frameworks provide an ideal setting for examining the impact of corruption on economically significant activities.

Corruption has the capacity to have an influence on the investment volume of both private and state companies, yielding either favourable or unfavourable outcomes. Corruption within both commercial and public companies includes much unethical behaviour such as dishonesty, lack of discipline, nepotism, favouritism or discrimination, and biased decision-making or resource allocation. Corruption may be seen as a manifestation of societal decay, characterised by deviating

from established norms and exhibiting behaviour that is detrimental to the social fabric. Numerous companies try to develop ethical considerations and strategic plans in order to mitigate the prevalence of corruption inside their organisations. A public-private partnership process characterised by corruption may lead to suboptimal investment returns due to a significant portion of cash being redirected towards the bribery of public officials. This research aims to evaluate the impact of corruption on the investment volume of firms, with the objective of mitigating or eliminating corruption in public-private partnerships' investment activities.

Research Questions

- What is the impact of corruption on the profitability level of public-private enterprises?
- What is the impact of trade restrictions on the investment volume of public-private enterprises in Abia State?

Hypothesis

There is no significant effect of the impact of corruption on the investment volume of public-private partnerships in Abia State.

LITERATURE REVIEW

Concept and meaning of corruption

Corruption is a complex social phenomenon that presents challenges in terms of its conceptualization and lacks a consistently agreed-upon description. The definition of the notion differs based on the perspective of the researcher and their interpretation of it. Corruption may be defined as the deliberate pursuit of personal riches or influence by illicit methods, resulting in a detriment to the public interest, or as the improper use of public authority for personal advantage. According to the United Nations Global Programme Against Corruption (GPAC), corruption is defined as the use of authority for personal benefit. Similarly, corruption may be described as the exploitation of delegated authority for personal benefit.

According to Waziri (2010), corruption may be defined as the deviation or alteration of established legal or regulatory norms for personal gain. Azelama (2022) defines corruption as the commission or omission of actions by an individual inside an organisation that contravene the established rules, laws, norms, and ethical standards of the institution. The primary objective of such actions is to fulfil the personal interests of the individual, thereby causing harm to the organisation. According to the World Bank Independent Evaluation Group (2016), corruption is defined as the exploitation of one's position of authority for personal benefits. The misuse of public office for personal benefit occurs when a government employee willingly accepts, actively seeks, or coerces the provision of a bribe. According to Agbu (2023), the occurrence of public office is deemed impossible. This suggests that corruption may be characterised by practices such as patronage, biased contract awards, fraudulent procurement activities, tribalism, and nepotism in hiring and promotion, as well as unjust disciplinary measures and penalties imposed on personnel inside organisations. In essence, corruption or organisational corruption refers to any behaviour that contravenes the regulations of a company or the established norms.

Causes of corruption in public-private partnerships

Numerous elements have an effect on the operational dynamics of public-private partnerships and their associated services, thereby affecting the presence and pervasiveness of corruption inside these collaborative ventures. The aforementioned items include the following: the issue of low salaries and its subsequent impact on public-private partnerships (Tanzi 2018), the absence of the rule of law is a significant factor at the governmental level that contributes to corruption in public-private partnerships. According to Treisman (2023), the likelihood of corruption may be heightened in cases where the legal framework fails to impose penalties on authorities involved in corrupt practices.

The nature of bureaucracy is such that government participation in the economy and the presence of government bureaucracy may lead to corruption in public-private partnerships, as stated by Nelson (2023). The presence of rules and authorizations confers a kind of monopolistic power on the

authorities responsible for granting approval or conducting inspections of the respective activities. Furthermore, the author emphasises the significance of the bureaucracy's quality as a key determinant of corruption.

Political instability is a factor that is closely linked to the prevalence of corruption in public-private organisations. Research conducted by Lederman, Loayza, and Soares (2015) suggests that in politically unstable circumstances, there is a greater likelihood of corruption occurring. The absence of stability throughout the process of transitioning to a newly elected administration is closely linked to instances of corruption within public-private partnerships. Insufficient remuneration and unfavourable working environments, coupled with limited provisions for recognising and rewarding productivity and effectiveness, serve as significant catalysts for corruption within public-private partnerships. Additional causes include the diminished efficacy of work due to a sluggish strategic vision and inadequate monitoring procedures, which contribute to the proliferation of corrupt practices within public-private partnerships.

Specific factors affecting investment levels

Based on the principal-agent theory, partners involved in a project exhibit opportunistic conduct that is influenced by the unique conditions of the managerial environment (Fleta-Asin, 2023). According to Bahoo (2023), some partners have the ability to identify elements that serve as catalysts for investments and expose the precise extent of corruption present inside a community. Investing in less developed nations may be advantageous for many reasons, including the potential for future market expansion, the increased potential rewards of engaging in bribery, and a higher level of tolerance towards corrupt practices (Sandholtz & Koetzle, 2023). In a similar vein, significant markets have the potential to stimulate investment since the substantial demand they generate offsets the additional expenses associated with bribery. According to Rock and Bonnett (2018), the presence of political stability enables firms to more effectively forecast the expenses associated with corruption. Certain experts have proposed that the consequences of corruption vary depending on the specific nation and location. The susceptibility of practices to corruption may be influenced by the distinctive characteristics of the environment and the investment timeline, since the stance of corporations towards corruption may undergo changes over time.

However, it is important to note that the qualities of a firm have the potential to influence opportunistic behaviour, which in turn might impact the level of investment. Companies that engage in substantial investments often engage in a higher volume of operations involving a larger number of economic entities. Moreover, these companies possess better resources, enabling them to more effectively manage the costs associated with corruption.

The manner in which public-private partnerships are bid upon may ultimately impact the extent of investment and the occurrence of corrupt practices. Public-private partnerships (PPPs) that entail public ownership of shares allow more participation and supervision from the public sector, resulting in improved alignment between the practices of the involved agents and the government's objectives. Moreover, the inclination towards using public processes as opposed to closed or negotiated ones might facilitate the involvement of a larger pool of competing agents. These agents can serve as supervisors, intervening in cases of abuse or harbouring concerns prior to the allocation of prizes.

Impact of corruption on the profitability level of public-private enterprises

Corruption undermines the confidence that societies place in the capacity of public-private firms to behave in the best interest of society, thereby impacting the profitability of public-private partnerships. Additionally, it results in the misallocation of public funds that were designated for significant community initiatives. According to transaction cost theory, corporations choose to conduct their operations inside their organisational borders when the associated costs are comparatively lower than those incurred while operating in external markets. Corruption engenders a state of uncertainty, hence giving rise to an augmented transactional expense during the establishment of economic relationships. This is achieved by the distortion of the pricing of items from their marginal costs and the consequent disruption of market efficiency in which enterprises participate (Habib & Zurawicki, 2021). The higher the amount of bribes that investors are required to pay, the

longer the duration spent engaging in negotiations with government officials, resulting in a negative impact on the whole process. This is due to the anticipation of bigger and bigger bribes, which subsequently leads to delays at each level. Hence, corporations will refrain from doing business in regions where corrupt practices incur prohibitively elevated expenses.

Nevertheless, corruption exerts various impacts on the profitability of public-private partnerships. These effects include financial losses, heightened uncertainty (Locatelli, 2017), reduced efficiency, escalated direct costs (Fleta-Asin & Munoz, 2023), diminished employee morale, tarnished organisational reputation, diversion of organisational focus and resources from core business and community service delivery, as well as intensified scrutiny, oversight, and regulation.

Trade Restriction on Investment Volume of Public-Private Enterprise

According to Slaughter (2018), trade restriction is an artificial restriction on the trade of goods and/or services between two or more countries. It is the byproduct of protectionism. However, the term is controversial because what one part may see as a trade restriction, another may see as a way to protect consumers from interior, harmful, and dangerous products. Trade restrictions are put in place by the government to protect domestic producers from foreign competition. However, different types of trade restrictions have an effect on the investment volume of public-private partnerships, including the following:

- Tariffs are excess taxes on imports and may be used for revenue purposes. Tariffs can affect the investment volume of public-private enterprises in the following ways:
- When a tariff is imposed, domestic consumption declines due to higher prices (Hoekman & Nicita, 2015).
- The cost of doing business will increase, and domestic production will rise because of the higher price.
- Trade restrictions due to traffic enhance the monopoly of income from consumers to the government.

Tariffs also tend to be anti-poor, with low rates for raw commodities and high rates for labour-intensive processed goods.

Import quotas: These specify the maximum amounts of imports allowed in a certain period of time. Low import quotas may be a more effective protective device than tariffs, which do not limit the number of goods entering a country.

Non-tariff barriers: This refers to licencing requirements, unreasonable standards, or bureaucratic red tape in customer procedures.

Unethical behaviour and corruption are government problems in public-private partnerships

According to Bello and Ali (2018), unethical behaviour in business refers to actions that do not conform to the acceptable standards of business operations, failing to do what is right in every situation, a lack of professional ethics, and deficient laws regulating corruption as a criminal offence. The prosecution and sanctioning of corruption are government problems in public-private partnerships. A great influence also comes from the ineffective sanctioning of corruption, which only increases the possibility of continuing the corruptive actions of those involved. Another problem is the exploitation of workers. Some public-private partnerships choose to increase profits for the owners at the expense of their workers. This is exploitation; some of the ways that they do this are arguably unethical, and some are blatantly illegal. They may pay their workers low wages, encouraging them to subsidise their income with food stamps and welfare at the tax payer's expense.

Management implications and limitations of corruption in public-private partnerships

The impact of corruption levels on investment volumes has significant consequences for managerial decision-making. The detection, prevention, and penalization of corrupt practices are vital from a societal standpoint since they damage the overall well-being of the community. In order to achieve this objective, the formulation of contractual norms that integrate effective public-private partnership practices and oversee the various phases of implementation might mitigate the advantages enjoyed by

corrupt individuals. During the procurement stage, corruption has the potential to have an effect on both the adjudication and acceleration of administrative procedures (Lui, 2017). Therefore, it is strongly advised that measures be taken to enhance transparency in these areas. Once the task has been allocated, the challenge of overseeing payments arises owing to the intricate nature and high standard of the activity (Locatelli, 2017). Additionally, the criteria put on investors may be subsequently eased as a result of limited verifiability or the incomplete character of the agreements (Fleta-Asin & Munoz, 2017). In order to mitigate corrupt practices, it may be beneficial to implement a series of measures at this juncture. These measures include imposing fines for unwarranted budgetary deviations, providing bonuses for enhanced performance, conducting external audits with incentives to uncover fraudulent activities, and extending the duration of claim processing by the administration.

Moreover, it is imperative to implement additional regulatory measures and enhance sanctions. This is due to the fact that the correlation between high levels of corruption and investment volume is more pronounced in comparison to other markets. Consequently, the detrimental impact of corruption on societal well-being becomes increasingly significant. Simultaneously, it is essential for public-private firms to strengthen their regulatory frameworks in order to mitigate the allure of expediting operations via bribery.

Companies face distinct implications based on the level of corruption, which in turn affects the amount of investment. However, regions characterised by low corruption levels may paradoxically result in reduced investment volume, leading to increased costs and potential shareholder distrust in the absence of transparency regarding corrupt practices.

Preventing corruption in public-private partnerships

According to Mona (2016), the core principles associated with the prevention of corruption in the public-private partnership are the rule of law, codes of conduct, systems of rewards and incentives, human resources management, managing conflicts of interest, a compliance-friendly environment, and accountability and scrutiny (the four-eye principles).

1. **Rule of law: The rule** of law is an important government-level contributor to reducing corruption in public-private partnerships. Where the legal system is able to provide sanctions for officials that engage in corruption, there is always a decrease in corruption levels.
2. **Codes of Conduct:** Corruption prevention mechanisms often start with rules that prohibit certain types of conduct, including legal prohibitions against corruption and criminal and civil penalties directed at both the public and private sectors (William-Elegbe, 2012), but also include codes of conduct and ethics for public officials.
3. **Systems of rewards and incentives:** At a basic level, all countries should establish a system that rewards appropriate behaviour and penalises corrupt behaviour in public-private enterprises. The system should include extrinsic motivations such as a decent salary and merit-based appointments and promotions.
4. **Human resources management:** The rules and procedures for hiring, rotation, promotion, professionalisation, and training of staff also play a role in combating corruption in public-private partnerships. For example, staff rotation in jobs that are vulnerable to corruption is expected to assist in preventing corrupt relationships from forming and disrupting established corrupt relationships.
5. **Managing conflict of interest:** Conflict of interest could lead to corruption; therefore, such conflicts need to be disclosed and addressed in a manner that will prevent a descent into corruption. In general, conflicts of interest are addressed through financial and asset disclosure requirements, codes of conduct, and other regulations, such as prohibiting public officials from working in a public-private partnership for a certain period of time after they leave the public service. The purpose of these measures is to require public officials to rescue themselves from decisions where an actual or potential conflict may arise (Mattarella, 2018).
6. **Compliance-friendly environment and accountability:** In relation to ensuring compliance with anti-corruption rules and norms in the public-private sector, nudges and training programmes are common ways of creating an environment for compliance. Nudge theory was popularised by Thaler and Sunstein (2018), who defined it as any aspect of the choice

architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy to implement and cost-effective. Nudge theory presumes that when faced with a choice, people are more likely to go for the default option, so presenting simple alternatives at the moment of decision-making can alter behaviour without heavy-handed enforcement.

In the corruption context, the concept of ambient accountability takes nudge theory a little further and uses physical space and the built environment to empower people, help them understand or assert their rights, and stop corruption right where it matters: ideas, inspiration, and evidence from stickers, murals, and billboards to feedback interfaces, urban screens, and architectural interventions. Anti-corruption and ethics training are common in the public-private sector and in specialised areas like public procurement, the idea being to sensitise officials to the rules, to areas of risk, and to measures to take when faced with ethical dilemmas.

1. **Accountability and Scrutiny (The Four Eye Principles):** The Four Eye Principles refer to the requirement that some public-private sector activities or decisions must be approved by at least two people. The four-eyes principle is a tool for monitoring and increased accountability and operates on the basis that it is harder to corrupt two people than one (Bodenschatz & Irlenbusch, 2019), although this might not be the case in systematically corrupt organisations.

THEORETICAL FRAMEWORK

The principle-agent theory of corruption

The principal-agent model assumes that agents (public officials) serve to protect the interests of the principal (whether the public, parliament, or supervisors). However, in reality, the interests of the agent often diverge from the interests of the principal, and while the former can prescribe the pay-off rules in the principal-agent relationship, there is an international asymmetry to the advantage of the agent, which could be used by him or her for personal benefits (Groenendisk, 1997). In this context, an agency problem occurs when the agents choose to engage in a corrupt transaction. In furtherance of their own interests and to the detriment of the interest of the principal to limit the agency problem, the principal can design incentives and schemes (e.g., monitoring, bonding, and oversight) to curb the agent's potential abuses.

EMPIRICAL STUDIES

This study examined the implications and ramifications of public sector corruption in Enugu, Nigeria, focusing on the exertion of effort and subsequent outcomes. According to Ezinwa (2010), The objective of this study endeavour was to examine the impacts and ramifications of corruption within the public sector of Nigeria. The study's population consisted of 34,356 individuals, from whom the researcher used a simple random sampling approach to choose a sample size of 200 respondents from the Enugu city. The data gathering process included the use of a questionnaire as the primary instrument. The questionnaire forms that had been filled out were collected and subjected to analysis using basic percentages and frequency tables. The statistical analysis method used for hypothesis testing was the chi-square data analysis approach. The study's results revealed several constraints associated with anti-corruption endeavours. Nevertheless, it is essential to continue combating corruption. In order to address the significant governance aim of combating corruption, it is imperative for the public sector to include it into a comprehensive framework that encompasses larger, more ambitious, flexible, and politically productive policy objectives.

In their research, Rano and Akanni (2009) conducted an investigation on the influence of corruption on the economic development of Nigeria over the period spanning from 1986 to 2007. A growth model of the Barro-type was used to assess the correlation between government and overall employment. The study's population consisted of 140,431,790 individuals, obtained from the 2006 national population census conducted in Nigeria. The research used a non-probability sampling methodology to ascertain a sample size of 500 participants. The data gathering process used a structured questionnaire as the primary instrument. The researcher used ordinary least squares (OLS) methodologies to assess the correlation between corruption and economic development in Nigeria. The findings of the research indicate that corruption has a detrimental impact on economic

development, since around 20% of the government's rise in capital spending is diverted towards personal gains. Nevertheless, the research also discovered that corruption had a positive impact on capital expenditure. In this study, it is shown that corruption has detrimental impacts on economic development in investments and financial markets for a sample of twenty-two (22) developing nations throughout the time span from 1976 to 2003. These effects are seen both directly and indirectly.

The study conducted by Rivera-Batiz (2001) examines the relationship between capital account liberalisation and the long-term economic development of a developing nation. The present research aims to analyse the impact of capital account liberalisation on the sustained economic development of a developing nation. This study employs the general equilibrium framework and develops an endogenous growth model that incorporates corruption as an inherent component of the country's governing structure. The study's population consisted of 38,572 individuals, from whom the researcher used a non-probability sampling approach to pick a sample size of 250 respondents. The data gathering process used a questionnaire as the primary tool. The questionnaires that had been filled out were gathered and subjected to analysis via the use of basic percentages and frequency tables. The findings of the research indicate that a decline in economic development occurs when the extent of corruption reaches a threshold that leads to a decrease in local rates of return on capital prior to liberalisation, causing them to fall below global rates. Conversely, in cases when corruption levels are sufficiently minimal, the implementation of capital account liberalisation might act as a catalyst for enhancing a nation's technological advancements and overall economic development.

METHODOLOGY

Research Design

The research design adopted for the study was the survey research design. The design was considered appropriate because it enabled the researcher to seek the opinion of the staff of public-private enterprises on the effect of corruption on the investment volume of public-private partnerships in Abia State. This method was selected on the basis of the sample size and focus of the study.

Population of the study

The population of the study comprised all the staff and management of Abia State Housing and Property Development Corporation, totaling one thousand one hundred sixty-seven (1167).

Sampling techniques and sampling size

The researcher adopted a non-probability technique known as the convenience sampling technique to select the sample size for the study. The sample size of 379 respondents was statistically determined using the Taro Yamane sample size determination formula.

Instrumentation

The researchers used a questionnaire to gather data for the study. The questionnaire was designed by the researcher to cover all the variables identified in the study. The questionnaire was divided into two parts, A and B. Part A called for personal data from the respondents, while Part B elicited unbiased responses from the respondents on the subject of the research.

Method of analysis

This study was analysed using simple percentage and person-product correlation analyses.

RESULTS

Research question 1: What is the impact of corruption on the profitability level of public-private enterprises?

Table 1: Percentage analysis of corruption effect on profitability level of public-private partnership

S/N	profitability level of public-private partnership	SA(%)	A(%)	U(%)	D(%)	SD(%)	Total
1	Corruption increases project costs and reduces profitability in PPPs.	105	88	67	60	59	379
		(27.70)	(23.2)	(17.6)	(15.8)	(15.56)	(100)
2	Collaborative efforts between public and private sectors can mitigate the impact of corruption on PPP profitability.	103	88	72	61	55	1379
		(27.17)	(23.2)	(18.9)	(16.0)	(14.51)	(100)
3	Strong anti-corruption measures can enhance the profitability of PPP initiatives.	102	83	70	68	56	379
		(26.91)	(21.8)	(18.4)	(17.9)	(14.77)	(100)
4	Corruption compromises the quality of PPP projects, impacting their long-term profitability.	104	83	73	67	52	379
		(27.44)	(21.8)	(19.2)	(17.6)	(13.72)	(100)
5	Corruption in PPPs undermines investor confidence, affecting project profitability.	103	80	77	62	57	379
		(27.17)	(21.1)	(20.3)	(16.3)	(15.03)	(100)
	Aggregate	517	422	359	318	279	1895
		(27.28)	(22.2)	(18.9)	16.78)	(14.73)	(100)
	Proportional Ratio	103.4	84.44	71.8	63.6	55.8	**379**

Source: Researcher's Computation (2023).

Analysis of responses of respondents on the corruption affects the profitability level of public-private partnership reveals that the respondents Strongly Agreed (SA) responses had an aggregate of 517 representing 27.28% and a proportional ratio of 103.4. This was followed by aggregate of 422 representing 22.27 and a proportional ration of 84.44 who opted for agreed option, Undecided had an aggregate of 359 representing 18.94 and a proportional ratio of 71.8, Disagree option had an aggregate of 318 representing 16.78 and a proportional ratio of 63.6, Strongly Disagree option had an aggregate of 279 representing 14.73 and a proportional ratio of 55.8. Therefore, based on the above analysis, relationship between corruption on the profitability level of public-private partnership.

Research question 2: What is the effect of trade restrictions on the investment volume of public-private enterprises in Abia State?

Table 2:
Percentage analysis of trade restrictions affects the investment volume of public-private enterprises in Abia State.

SN	investment volume of public-private enterprises in Abia State	SA(%)	A(%)	U(%)	D(%)	SD(%)	Total
1	Trade restrictions have a negative impact on the investment decisions of public-private enterprises.	106 (27.96)	96 (25.32)	78 (20.58)	55 (14.51)	44 (11.60)	379
2	Trade restrictions lead to reduced collaboration and joint ventures between public and private sectors.	103 (27.17)	97 (25.59)	73 (19.26)	1 (16.09)	46 (12.13)	379
3	The uncertainty caused by trade restrictions discourages public-private enterprises from making long-term investment plans.	109 (28.75)	95 (25.06)	80 (21.10)	50 (13.19)	45 (11.87)	379
4	Trade restrictions can result in higher costs for importing necessary raw materials and components, affecting the investment capacity of public-private enterprises.	105 (27,70)	90 (23.74)	72 (18.99)	60 (15.83)	52 (13.72)	379
5	Trade restrictions promote the development of domestic industries, leading to increased investment in local production	108 (28.49)	96 (25.32)	80 (21.10)	50 (13.19)	45 (11.87)	379
	Aggregate	**531**	**474**	**383**	**276**	**231**	**1895**
		(27.72)	**(25.39)**	**(20.29)**	**(14.36)**	**(12.24)**	**(100)**
	Proportional Ratio	**105.1**	**94.9**	**76.9**	**55.8**	**46.3**	**379**

Source: Researcher's Computation (2023).

Analysis of response of respondents on effects of trade restrictions on the investment volume of public-private enterprises in Abia State reveals that the respondents Strongly Agreed (SA) responses had an aggregate of 531 representing 27.72% and a proportional ratio of 105.1. This was followed by aggregate of 474 representing 25.39 and a proportional ration of 94.9 who opted for agreed option, Undecided had an aggregate of 383 representing 20.29 and a proportional ratio of 76.9, Disagree option had an aggregate of 276 representing 14.36 and a proportional ratio of 55.8, Strongly Disagree option had an aggregate of 231 representing 12.24 and a proportional ratio of 46.3. Therefore, based on the above data analysis, trade restrictions affect the investment volume of public-private enterprises in Abia State

Hypothesis
There is no significant joint effect of impact of corruption on the investment volume of public-private partnership in Abia State.

Table 3:
Model Summary of effect of menace of corruption on the investment volume of public-private partnership in Abia State

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.872[a]	.761	.760	.917	.761	1193.777	1	375	.000	2.225

Source: Researcher's Computation (2023).

The analysis of the Table 3 reveals that calculated R-value .87 was greater than the table R-value of .76 at 0.000 alpha level with 2.22 Durbin Watson Value. The R-square value .76 predicts 76% of effect of menace of corruption on the investment volume of public-private partnership in Abia State, Nigeria. This rate of percentage is highly positive and therefore implies that there is significant effect of menace of corruption on the investment volume of public-private partnership in Abia State. It was pertinent to find out if there is significant difference in the influence exerted by each independent variable (see Table 4).

Table 4:
Analysis of variance of the difference in the influence exerted by each independent variable

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1003.608	2	1003.608	1193.777	.000[b]
	Residual	315.262	377	.841		
	Total	1318.870	379			

Source: Researcher's Computation (2023).

The Table 4 shows that the calculated F-value as (1193.777) as the computer critical F-value (0.000 [a]) is below the probability level of 0.000 with 2 and 377 degree of freedom. The result therefore means that there is a significant effect of menace of corruption on the investment volume of public-private partnership in Abia State. To test for the contribution of the independent variables, coefficient analysis was performed (see Table 5).

Table 5: Coefficient analysis of the influence of each of independent variable on the dependent variable.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.834	.342		14.133	.000
	Corruption	3.900	.257	.811	23.776	.438
	Trade restrictions	3.164	.353	.677	19.299	.001

Source: Researcher's Computation (2023).
The analysis of the Table 5, it was observed that the most positively influencing EO variable was corruption (t: 23.77, B: 3.90). This was seconded by Trade restrictions (t: 20.76, B: 3.12).

Conclusion

The study revealed a lot of negative effects of corruption on the investment volume of public-private partnerships. The study revealed that the presence of corruption can negatively affect the economics and functioning of the market, especially companies' investments, because of the higher cost of operations. It was concluded that financial loss, increased uncertainty, and less efficiency are the effects of corruption on the profitability level of public-private partnerships in Abia State.

Recommendations

The following recommendations were made based on the findings of the study:

- The Government should establish corruption prevention mechanisms that prohibit certain types of conduct and also include codes of conduct and ethics for public officials.
- The government should establish a system that rewards appropriate behaviour and penalises corrupt behaviour. The system should include extrinsic motivations such as decent wages and merit-based appointments and promotions.
- The government should provide sanctions for officials that engage in corruption in public-private partnerships.
- Conflicts of interest should be addressed through financial and asset disclosure requirements, a code of conduct, and other regulations.

References

Agbu, O. (2023). Corruption on human trafficking: The Nigerian case. *West African Review, 2* (4), 1-13.

Asiedu, E. & Freeman, J. (2019). The effect of corruption on investment growth. *Review of Development Economics, 13*(2), 200-214.

Azelama, J. U. (2022). Public enterprises management in Nigeria: Benin-City Nigeria, Ambik.

Bahoo, S. (2023). Corruption in banks: A bibliometric review and agenda. *Finance Research Letters, 3* (5), 10-11.

Bello, A. & Ali, A. (2018). *Unethical business practices in Nigeria: Causes, consequences and control*.

Cuervo-Cazurra, A. (2016). Corruption in international business: *Journal of World Business, 51* (1), 35-49.

Fleta-Asin, J. (2023). How does risk transference to private partner impact on public-private partnerships, success? Empirical evidence from developing economics. *Journal of Socio-Economic Planning and Sciences, 7* (2), 11-15.

Fleta-Asin, J. & Munoz, F. (2017). Determinants of contract duration in outsourced services in the defense sector. *Applied Economic Letters, 24* (19), 1408-1411.

Locatelli, G. (2017). Corruption in public projects and mega projects: There is an elephant in the room. *International Journal of Project Management, 35*(3), 252-268.

Lui, C. (2017). The impact of public officials' corruption on the size and allocation of U.S state spending. *Public Administration Review, 74*(3), 346-359.

Mona, H., Jean-Francois, R., & Etienne, B. (2016). *Determinants of public-private partnerships in infrastructure prepared.*

Rose-Ackerman, S. (2023). Grand corruption and the ethics of global business. *Journal of Banking & Finance, 26* (9), 1889-1918.

Sandholtz, W. & Koetzle, W. (2023). Accounting for corruption: Economic structure, democracy, and trade. *International Studies Quarterly, 44* (1), 31-50.

Tanzi, V. (2018). Corruption, arm length relationship and market. In Forientian and S. Peltsman (Eds.). *The economics of organized crime*. Cambridge University Press.

Wie, S. J. (2023). Corruption in economic transition and development. *Journal of Social Science, 4* (3), 25-27.

Williams-Elegbe, O. (2012). How taxing is corruption on international investors? *Review of Economic and Statistics, 83* (1), 1-11.

World Bank Independent Evaluation Group (2006). *The anti-corruption in transition: A contribution to the policy debate*. World Bank.

Williams-Elegbe, O. (2012). How taxing is corruption on international investors? *Review of Economic and Statistics, 83*(1), 1-11.

pp. 63-66 https://dx.doi.org/10.4314/johasam.v7i1.6

Health Insurance for National Youth Service Corps Members: A Step in the Right Direction for Nigeria, from Policy to Practice

Oluwaseun Ebenezer Daramola[1], Nyemike Simeon Awunor[2]

[1]Aiico Multishield Healthcare HMO, Abuja, Nigeria
[2]Department of Community Medicine, Delta State University, Abraka, Nigeria
Correspondence to:
Email: oluwaseundara@yahoo.com

Abstract

The health insurance programme for corps members in Nigeria, otherwise known as the Group, Individual and Family Social Health Insurance Programme-n (GIFSHIP-n) stands as a commendable stride, reflecting the Federal Government's commitment towards ensuring that the health and well-being of corps members undergoing the mandatory one-year National Youth Service Corps (NYSC) programme in Nigeria are catered for. The programme, flagged off on 11th February, 2022 is funded by the Nigerian Government, and managed by the National Health Insurance Authority (NHIA) in conjunction with NYSC, with the engagement of some Health Maintenance Organizations (HMOs) which manage the provision of healthcare through accredited healthcare facilities across the nation. GIFSHIP-n provides services that are within NHIA scope of coverage; and unlike the NHIA Formal Sector Programme, corps members are not required to make co-payment for drugs. Hence, it is free health care service, except for services on the exclusion list. One of the major challenges of the scheme includes the unavailability of accredited healthcare facilities in rural localities across many Local Government Areas (LGAs), making corps members to travel to far locations to access care. However, all the challenges are surmountable towards the sustainability of this laudable programme. Further research is recommended to establish the role and coordination with the State and LGA administration on the GIFSHIP-n. There will also be a need to get deeper and a more comprehensive evaluation of the programme including impact studies, quality of care, satisfaction of corps members and data on other relevant key performance indicators.

Keywords: corps members, health insurance, GIFSHIP-n, Nigeria

Introduction

Many parents are often overwhelmed with a mixture of joy and anxiety when their children are drafted for the National Youth Service Corps (NYSC) scheme. Joyful because the youths have reached a significant milestone in life, but also anxious (among other things), due to the concerns about how they will be cared for if they fall sick in a far-off land.

The Health Insurance Programme for corps members in Nigeria, otherwise known as the Group, Individual and Family Social Health Insurance Programme-n (GIFSHIP-n) stands as a commendable stride, reflecting the Federal Government's commitment towards ensuring that the health and well-being of youth corps members undergoing the mandatory one-year NYSC programme in Nigeria are catered for (NHIA, GIFSHIP-n 2022), and is a promising endeavour which addresses the healthcare needs of these young graduates, and plays a pivotal role in bridging healthcare gaps during this transitional phase of life (NYSC, 2022)

Funding, Administration and Implementation

GIFSHIP-n is funded by the Nigerian Government, and established within the framework of the Federal Ministry of Finance, Budget and National Planning, NYSC and the National Health Insurance Authority (NHIA). The NHIA, which is the leading agency committed to achieving financial access to quality healthcare for all Nigerians, with the input of other relevant stakeholders designed the GIFSHIP-n, specifically tailored for corps members to address the peculiarities of the NYSC Scheme (NHIS, Operational Guidelines. 2012; NHIA, GIFSHIP-n 2022). The programme is managed by the NHIA in conjunction with NYSC, with the engagement of Health Maintenance Organizations

(HMOs) which manage the provision of healthcare through the accredited healthcare facilities all across the nation.

Historical Background

The NYSC National Directorate had previously launched a Corps Members Health Insurance Scheme in conjunction with some HMOs in October 2010. However, the programme came to a halt in 2012 after about two years of implementation, with the main factor responsible for the termination of the scheme being funding amongst other challenges (Multishield, 2012).

Having seen the immense impact of the laudable initiative on the health and welfare of corps members during the coverage period, there have been plans since then to ensure that the programme is redesigned and revived.

In 2016, there was a presidential directive by the former President Mohammadu Buhari, for the enrolment of corps members in the National Health Insurance Programme as a result of the unfortunate death of some serving corps members in Bayelsa, Zamfara and Kano States respectively. This led to a series of meetings between the NHIA and the NYSC which culminated in the signing of a Memorandum of Understanding (MoU) on the 7th September, 2021, between NHIS and NYSC, the official Flag-off ceremony on 11th February, 2022 and commencement of access to health services on 1st March, 2022. (NYSC, 2022)

The NYSC scheme was established by the Nigerian Government in 1973 after the Nigerian Civil war, as an avenue for the reconstruction, reconciliation and rebuilding the country (NYSC, 2022). The purpose of the scheme is primarily to inculcate in Nigerian youths the spirit of selfless service to the community, and to emphasize the spirit of oneness and brotherhood of all Nigerians, irrespective of cultural or social background, towards the promotion of national unity. It is a mandatory one-year programme, where graduates of universities and polytechnics are mobilized and posted to states other than their state of origin, where they are expected to mix with people from different ethnic groups, social and family backgrounds, learn the culture of the of the indigenes in the location they are posted to, and serve the community (Marenin. 1990; NYSC 2022)

Objectives of GIFSHIP-n

i. Ensure every mobilized and serving corps member has access to good health care services and in the process prevent avoidable deaths;
ii. Protect corps members from financial hardship of huge medical bills;
iii. Reduce huge medical bills being incurred by the NYSC on health care services for corps members;
iv. Maintain high standards of health care delivery services;
v. Contribute to achievement of national goals and target on all citizens' enrollment into NHIA.(NYSC, 2022)

Eligibility and Coverage:

GIFSHIP-nis for mobilized and serving corps members from the pre – orientation period (between collection of call-up letter to the day of reporting to orientation camp), Orientation camp period (3-week period when corps members are in the Orientation Camp), after orientation camp period (when corps members serve at their places of primary assignments) and the Terminal Leave Period (the three weeks' period after official passing out exercise or parade). It is worth noting that GIFSHIP-n coverage is all across the nation, and corps members are covered even if get redeployed to other state (NYSC, 2022). Hence, the programme has taken care of the concerns of many parents/guardians about the healthcare needs of their children and wards.

The Benefit package

GIFSHIP-n provides the services that are within NHIS scope of coverage; and unlike the NHIA formal sector programme, corps members are not required to make co-payment for drugs. Hence, it is free health care service to all corps members, except for services on the exclusion list. Coverage is on individual basis only (NHIS, 2012).

The services provided include:

1. Out-patient care, including consumables as in NHIS Standard Treatment Guidelines and Referral Protocol
2. Prescribed drugs, pharmaceutical care and diagnostic tests as contained in the NHIS Drugs List and NHIS Diagnostic Test Lists
3. Maternity (ante-natal, delivery and post-natal) care for one pregnancy;
4. For any child delivered within the service year, all preterm/premature babies shall be covered for 12 weeks within the service year;
5. Preventive care, including immunization, as it applies in the National programme on Immunization, health and family planning education;
6. Consultation with required Specialist for secondary and tertiary care.
7. Hospital care in a standard ward for a stay limited to a cumulative twenty-one (21) days per year following referral;
8. Eye examination and care, the provision of low-priced spectacles but excluding contact lenses;
9. A range of prostheses (limited to prosthesis produced in Nigeria);
10. Dental care
11. Other Benefits include
    - Surgical procedures requiring specialist care;
    - Medical and psychiatric cases requiring specialist care;
    - Management of obstetrics and gynecological conditions,
    - Treatment of opportunistic infections;
    - Pediatric cases requiring specialist care.

Partial Exclusions

i. For high technology investigation e.g. CT scan, MRI, etc, the NHIS would pay 50% of cost;
ii. Dialysis for renal failure (max 6 sessions)
iii. Management of obstetrics and gynecological conditions.

Total Exclusions

i. Occupational/industrial injuries to the extent covered under the Workmen Compensation Act.
ii. Injuries resulting from:
    - Natural disasters, e.g. earthquakes, landslides;
    - Conflicts, social unrest, riots, wars;
    - Extreme sports, e.g. car racing, horse racing, polo, mountaineering, boxing, wrestling, etc.
iii. Epidemics;
iv. Family planning commodities, including condoms;
v. Drug abuse/addiction;
vi. Domiciliary visit;
vii. Surgery – Mammoplasty;
viii. Ophthalmology – Provision of contact lens;
ix. Medicine – Anti-tuberculosis drugs;
x. Pediatrics – Treatment of congenital abnormalities requiring advanced surgical procedures e.g. TOF, ASD, VSD
xi. Obstetrics & Gynecology – Artificial inseminations, including IVF and ICSI
xii. Dental Care – Crowns and bridges, Bleaching and Implants;
xiii. Pathology - Post Mortem examination.

Impact

GIFSHIP-n is a laudable scheme and is making significant impact on the health and the well-being of the corps members. From anecdotal observations and presentations from GIFSHIP-N implementation meetings, it is believed that GIFSHIP-n is fulfilling its objectives to a large extent, as several corps

members have accessed care on the scheme, though there are still ample rooms for improvements due to some challenges still being faced.

Challenges

One of the major challenges of the scheme include the unavailability of accredited healthcare facilities in some towns and Local Government Areas (LGAs), making corps members to travel to distant locations to access care. Other challenges include; utilization abuse by some corps members and healthcare facilities, lack of willingness to participate in the programme and non-adherence to the guidelines. One other potential challenge may include the continued and sustainable funding of the scheme. The scheme will need the buy-in of respective State and Local Government Authority under which secondary and primary care is largely domiciled. The respective Primary Health Care Development Agency (PHCDA) of various States should also be carried along especially in the implementation of the GIFSHIP-n in view of their role in tactical and operational planning, and the provision of quality services.

Conclusion and Recommendations

Nigeria, like many other nations, faces the challenge of bridging the gap between policy formulation and practical implementation. Transitioning from policy to practice involves navigating and surmounting all the hurdles such as funding shortages and other implementation challenges; including galvanising political will and effective leadership at all (Federal, State and Local government) levels, investing in health infrastructures not only in urban but also rural areas, community engagement and public awareness, collaboration, capacity building, regular monitoring and evaluation, and quality assurance towards bridging all gaps.

GIFSHIP-n is making an impact, and its implementation is laudable and should be sustained by all means as several corps members have benefitted from the scheme. It is strongly believed that many of the corps members having being enrolled and benefited the health insurance system during their service year, will after their NYSC program become advocates of the advancement of the frontiers of health insurance and the move towards universal health coverage in Nigeria.

Further research is recommended to establish the role and coordination with the State and LGA administration on the GIFSHIP-n. There will also be a need to get deeper and a more comprehensive evaluation of the programme including impact studies, quality of care, satisfaction of corps members and data on other relevant key performance indicators.

References

Marenin, O. (1990). Implementing deployment policies in the national youth service corps of Nigeria: Goals and constraints. *Comparative Political Studies*, *22*(4), 397–436.

Multishield Limited (2012). *Report of national youths service corps social health insurance scheme.*

National Health Insurance Authority (2022). *GIFSHIP-n … Leaving no one behind. Sensitisation for healthcare facilities participating in GIFSHIP-n.*

National Health Insurance Scheme (2020). *Operational guidelines. Operations of the group, individual and family social health insurance programme*. https://www.nhis.gov.ng/

National Health Insurance Scheme (2012). *Operational guidelines*. https://www.nhis.gov.ng/file/repository/NHIS_OPERATIONAL_GUIDELINES.pdf

National Youth Service Corps (2022). *About the scheme*. https://www.nysc.gov.ng/aboutscheme.html

National Youth Service Corps (2022). *Enrollment of corps members into NHIS –NYSC group individual family health finance programme (GIFSHIP-n).* https://www.nysc.gov.ng/nhis2.html

National Youth Service Corps (2022). *Objectives of the scheme.* https://www.nysc.gov.ng/objectives.html

National Youth Service Corps (2022). *The national youth service year: An overview*. https://www.nysc.gov.ng/serviceyear.html

pp. 67-75 https://dx.doi.org/10.4314/johasam.v7i1.7

Critical Examination of Health Impacts of Healthcare Waste Storage and Segregation in Ghana: A Study of the Ho Municipality

[1]Austin Dickson Amoako, [2]Seth Yaw Ahiabor, [3]Felix Amofa & [4]John Tisimbo Machator

1. PhD Environmental Science Year IV Candidate – University of Ghana Graduate School – IESS. E-Mail: aaustinwash@gmail.com Tel: +233244751673 / +233277370172
2. Lecturer – Fred N. Binka School of Public Health - University of Health & Allied Sciences – Ghana. E-Mail: sahiabor@uhas.edu.gh Tel: 0244154406
3. Senior Sanitation Specialist – USAID – En - WASH Project
   Global Communities – Ghana. P.O. Box CT 1762,
   TEL: +233244515781 / 0509528462, Email: famofa@globalcommunities.org
4. Senior WASH Officer
   Global Communities Ghana – USAID En - WASH Project.
   Email: machatorjohn@gmail.com Tel: +233248480892

Abstract

The management of clinical waste generates several environmental and health challenges in most countries, particularly, developing countries including Ghana. Despite the possible health implications associated with clinical waste, much attention has not been given to its proper management. The study sought to evaluate clinical waste management and disposal system in the Ho Municipality. The study involved six (6) healthcare facilities in the Ho Municipality. A total of 165 respondents comprising doctors, nurses, waste collectors, EPA, Municipal assembly formed the sample of the study. Site visits, interviews and survey questionnaires were employed to collect information on the methods, process, environmental and public health impact, adherence to clinical waste management code of practice as well as challenges faced in clinical waste management. Purposive sampling method was adopted in selecting respondents for the study. Results from the study showed that segregation of clinical waste was poorly done in most of the healthcare facilities studied. Additionally, waste handlers only use industrial gloves without full personal protection equipment when working on clinical waste and non-availability of waste management facilities. The findings also revealed that clinical waste have negative impact on public health and the environment. The study recommends among other things that training should be intensified on proper waste management practices in the healthcare facilities. Management of the various healthcare facilities should endeavor to provide modern clinical waste management facilities.

Keywords: healthcare facilities, clinical waste, hospital, waste management, incinerator

1.0 INTRODUCTION

In Ghana, Engineered Clinical Waste Management Facility (CWMF) is used by few health facilities which are mostly the referral or teaching hospitals. The district, municipal and other community health centres do not benefit from CWMF as the concentration and priority is given solely to referral and teaching Hospitals in the country.

In Ghana enormous quantities of infectious and hazardous wastes are generated in health care facilities which eventually find their ways into waste containers of municipal waste bin and waste bins provided by private waste management companies like Zoomlion Ghana 'thus, posing public and environmental health threat. Asante et al. (2014) observed that medical wastes are still handled and disposed together domestic wastes, posing a great danger to municipal workers, the public and the environment. They further stated that most hazardous and toxic wastes are placed on dumping sites and with no or few safeguards to protect nearby inhabitants and water sources from contamination. Again, most healthcare facilities in Ghana have no engineered clinical waste management system to help hygienically manage waste generated from these facilities on WHO Healthcare Waste Management guidelines hence making clinical waste management very difficult and unhygienic (Asante et al., 2014).

1.2 Objective of Study

To examine healthcare waste storage and segregationand itshealth impacts in the Ho Municipality.

2.0 LITERATURE REVIEW

When population grows more peopleseek healthcare hence the drastic increase in waste generation. The result of this is that questions such as who is affected by this waste, who handles it and how well prepared are the waste handlers (Mbongwe et al., 2008). A study done in Ghana discovered that all the clinical laboratories indicated that their liquid waste was poured down the drain through the sink (Williams, 2013).

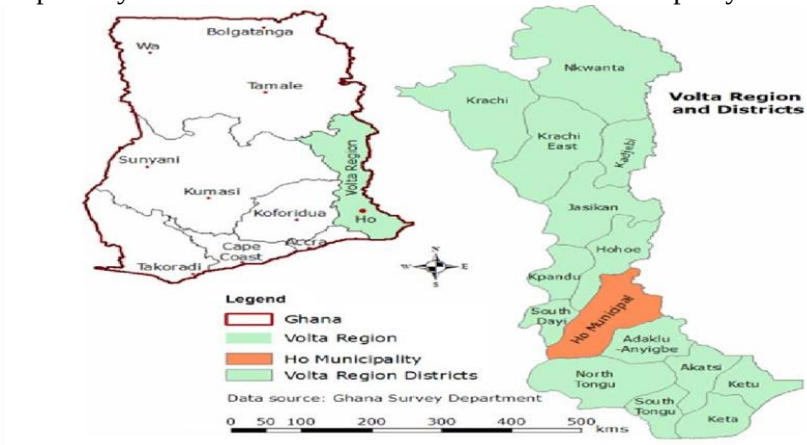
Although everyone who is exposed to hazardous waste is potentially at risk, it is the group of people who directly belong to medical profession, as well as waste workers, scavengers, patients, and their visitors in the hospital who are highly at risk. Different researchers illustrate that there are numerous diseases which can be transmitted among the group of people who are highly at risk, but most significant diseases are Hepatitis B and C, as well as AIDs (Acquired Immunodeficiency Syndrome) (Nwachukwu et al., 2013; Kumari et al., 2013). According to WHO (2010), the unscientific management of healthcare waste can have direct impact on public health and the natural environment.

It is argued that, if the infectious component gets mixed with the general non-infectious waste, the entire mass becomes potentially infectious. It is the responsibility of hospitals and other healthcare institutions to ensure that there are no adverse health and environmental consequences as a result of their waste handling, treatment and disposal activities (Patil & Pokhrel, 2005).

Contaminated sharps and syringes as the major harmful components of clinical waste pose untold health risks due to potentials for direct exposure to pathogens in blood and other fluid from patients through percutaneous injuries (PI), abrasion and a cut in the skin. Pruss-Ustun et al. (2005) estimated that more than three million HCWs experience the stressful event of a PI with a contaminated sharp object each year.

3.0 METHODOLOGY

The study employed descriptive survey research design to examine healthcare waste management and disposal systems in the healthcare facilities in Ho Municipality of Ghana.



3.1 Sample and sampling technique

The study sampled six (6) health facilities from the total population of 45 health facilities using purposive sampling method. The researchers depended on their own judgment to select sample group members.

Table1: Number of respondents in surveyed healthcare facilities

Name of healthcare facility	No of health workers	Number of health workers sampled
Volta Regional Hospital	386	77
Ho Municipal Hospital	189	38
Ho Polyclinic	96	19
Royal Hospital	44	9
Miracle Clinic	29	6
Matse Clinic	26	5
Total	**770**	**154**

Source: Surveyed healthcare facilities, 2022

$$sample\ size = 0.2 * population\ size$$

3.2 Data Analysis

Data was analyzed using SPSS version 22. Data collected from the field was first edited to check for errors and omissions and inconsistencies that might be recorded. Data was then coded and entered into the SPSS for analysis. Descriptive tools of data analysis were employed. Results were presented using tables and graphs. Discussions on the findings were presented after each table and graph.

4.0 RESULTS AND DISCUSSIONS

4.1 Types of Medical Waste Generated in the Healthcare Facilities Surveyed

The results of analysis revealed that the healthcare facilities under study generated non-infectious waste, sharps, pathological waste, chemical waste, and pharmaceutical waste in varying quantities on daily basis. The finding was in line with the study results of Asante et al. (2014).

4.2 Sources of Clinical Waste in the Surveyed Healthcare Facilities

Medical waste generated in the healthcare facilities were mainly from the surgical theatre, delivery room, various wards, laboratory, pharmacy of the healthcare facilities.

4.3 Segregation of Clinical Waste Generated in the Healthcare Facilities

Respondents who handle waste generated directly or indirectly were asked whether they undertake segregation of clinical waste in their healthcare facilities. 73.6% of the respondents said they do segregation of clinical waste in their facility whiles the rest 26.4% responded no, saying they do not segregate clinical waste generated in their healthcare facility. These findings contradict the findings of Akum (2014) who pointed out that, majority of health workers interviewed representing 86.67% indicated that waste is not separated prior to disposal to the larger storage containers in the hospitals in Ghana. The results above showed that workers of the health facilities surveyed were doing well to follow proper waste handling practices which will go a long way to prevent infections. This view was supported by Assemu (2020) who stated that segregation at point of production breaks the chain of disease transmission, determines disposal method, injury to the persons who handle waste and lesser amount of waste to be managed and is critical to ensuring safe management of healthcare waste.

Table 2 responses on clinical Waste Segregation by Healthcare Facilities

Response	No. of Respondents	Percentage (%)
Yes	81	73.6
No	29	26.4
Total	**110**	**100**

4.4 Ratings on Waste Segregation

The respondents were asked to rate how the clinical waste segregation was done in the various facilities on a four-point scale: poor, good, very good and excellent. The result showed that 63.6% rated the segregation process as poor, 30.0% said the segregation was good and only 6.4% of the respondents rated very good (Figure 4.1). From the analysis, it was abundantly clear that majority of the respondents considered the process of segregation of clinical waste in their various facilities as not being carried out in accordance with best practices. According to Adjokatse et al. (2021), poor segregation practices defeat the principle of waste minimization, resulting with all types of waste being disposed together. This exposes scavengers as well as healthcare staff and those living around the landfill sites to health hazards. The facilities were not adopting good segregation practices leading to the exposure of healthcare staff to risk of infection.

Figure 1 Rating on Waste Segregation by Healthcare Facilities

Plate 1: Infectious waste mixed with general waste in the healthcare facility. Source: Field Visit 2021.

4.5 Storage of clinical waste

Majority of respondents made it known that waste generated in the healthcare facilities are temporarily stored in the open space awaiting collection. This represents 60.2% of the respondents. 7.8% of the respondents said the wastes were temporarily stored in the garage of the hospital. 24.3% confirmed that the health facilities have special rooms where wastes were kept momentarily awaiting

collection and 7.8% of the respondents said they kept it at other places like corridor, changing room etc (Table 1).

Table 2. Place of storing waste temporary awaiting transportation

Place of Storage	No. of Respondents	Percentage (%)
Open space	62	60.2
Garage	8	7.8
Special room	25	24.3
Others	8	7.8
Total	**103**	**100**

4.6 The way clinical waste is stored awaiting transportation to the incinerator.

The respondents indicated that waste temporarily stored awaiting incineration were not stored securely. 70.9% of the respondents confirmed that clinical waste awaiting incineration were stored insecurely. They were just left in the open in bin without covering it. Only 29.1% said theirs were secured (Plate1).

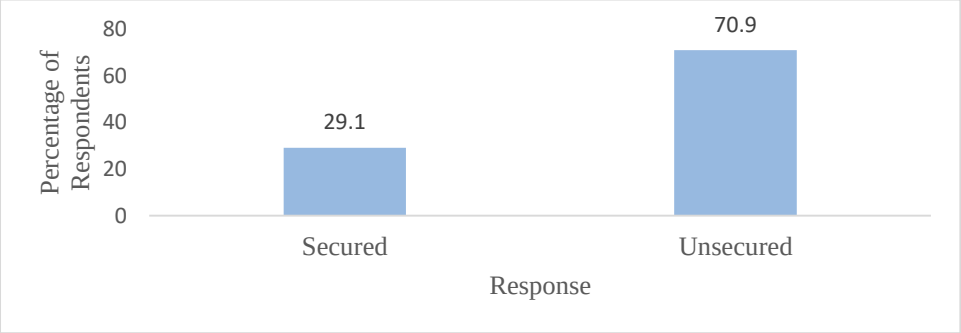


Figure 3: Showing the way clinical waste is stored awaiting transportation to incinerator.

Pictures of clinical waste stored in the open awaiting transport to the incineration that were observed at some facilities under study. Observed (Plate 2).

Plate 2: Unsecured clinical wastes temporarily stored. Source: Field Visit 2021

4.7 Handling of Clinical Waste in the Healthcare Facilities

The study showed how clinical wastes were handled in the various health facilities under study. The collection of the clinical waste was mostly done by laborers as confirmed by majority of respondents representing 90.5%. The collection was also done by cleaners in some of the health facilities constituting only 7.8% of those identified to be collecting the wastes. Only 0.9% of the respondents said that nurses and others such as waste collecting companies did collect the waste in their facility (Table 3).

On the use of personal protective equipment (PPE) before handling clinical waste, 86.2% responded that the waste collectors used personal protective clothing before handling clinical waste. It came to light through field visits and observation that workers who were using PPE only wore industrial gloves without sturdy shoes, goggles, overalls and mask. 13.8% said waste collectors do not use any PPE for clinical waste management (Table 4.4). Korkut (2018) noted that to practice good health safety thereby preventing injuries from sharps, pointers and other operatives were to wear overalls, heavy duty or industrial gloves and sturdy shoes including goggles and mask for clinical waste management. These protective clothing are to be worn to observe good safety practices hence transmission preventions when handling, transporting or incinerating medical waste.

Those who said they did not use PPE before handling clinical were asked to assigned reasons why they do not use it. 12.5% assigned lack of fund to purchase the equipment as a reason for no using it, 50.0% said the equipment were in short supply forcing them not to use it and the remaining 37.5% could not state any reason for not using it (Table 5).

Table 3: Handling of clinical waste in the healthcare facilities

Waste Collector	No. of Respondents	Percentage (%)
Nurse	1	0.9
Labourer	105	90.5
Cleaner	9	7.8
Others	1	0.9
Total	**116**	**100**

Table 4: Use of Personal Protective Equipment by waste Collectors

Response	No. of Respondents	Percentage (%)
Yes	100	86.2
No	16	13.8
Total	**116**	**100**

Reasons for No Protective Equipment	No. of Respondents	Percentage (%)
Lack of fund	2	12.5
Shortage	8	50.0
No idea	6	37.5
Total	**16**	**100**

Plate 3: Use of PPE. Source: Field Visit 2021
A worker wearing only industrial glove without other equipment whiles incinerating clinical waste at the healthcare facility.

4.8 Environmental and Public Health Impacts of Clinical Waste Management and Disposal
The results of the study revealed that clinical wastes have impact on public health. Eleven (11) out of the 110 respondents representing 10% confirmed that they had injuries from handling clinical waste in the past 6 months. This was quite worrying as this could result in serious infection of the injured person and people around him/her. However, 99 out of 110 respondents constituting 90% did not suffer injuries in the past 6 months in handling clinical waste (Table 5).
Majority of the respondents were aware of the health risk of improper clinical waste handling and disposal. This is shown by most of them agreeing to the statement that there is health risk of improper disposal of clinical waste.

On scavengers or outsiders coming to pick some materials from the waste bin in the healthcare facilities understudy, 74.1% responded 'no' and 25.9% responded 'yes'. This showed that scavengers and outsiders picking from the waste bin were prone to infections from the infected materials pick from the waste bin. This exposes these people to serious health hazards thereby posing public health problems.

Table 5: Frequency distribution of health impacts of clinical waste management and disposal

Ever sustained any injury during the handling of clinical waste in the past 6 months		
Response	**No. of Respondents**	**Percentage (%)**
Yes	11	10
No	99	90
Total	**110**	**100**

Are there risks of improper clinical waste to human health		
Response	**No. of Respondents**	**Percentage (%)**
Yes	90	77.6
No	26	22.4
Total	**116**	**100**

Do scavengers or outsiders come to pick some materials from the waste bin in your facility?		
Response	**No. of Respondents**	**Percentage (%)**
Yes	30	25.9
No	86	74.1
Total	**116**	**100**

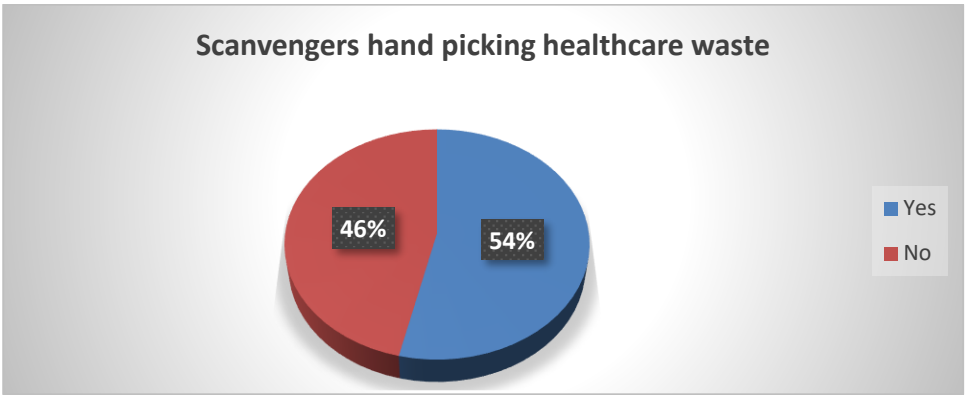


Figure 4: Scavengers or outsiders come to pick some materials from the waste bin.

4.9 Hepatitis B vaccination of healthcare worker who encounter clinical waste in accordance with Clinical Waste Management Code of Practice.

Out of 103 respondents who responded to the question of being given hepatitis B vaccination when encounters clinical waste in accordance with Clinical Waste Management Code of Practice, 61 responded positively whiles 42 said no representing 59.2% and 40.8% respectively. Hospital staff and all other personnel involved in handling clinical waste were to be vaccinated with Hepatitis B to prevent infection. Health and safety officers in healthcare facilities are to ensure that healthcare workers and contractors for handling wastes are protected Korkut (2018). From the study, majority of the respondents representing 67.3% rated the management of clinical waste in their various facilities in accordance with WHO clinical waste management code practices as average. In addition, 3.6% said it was excellently managed, while 29.1% of the respondents were of the view that the management was poorly done according to the laid down guidelines of WHO (Table 6).

Again, effective health care waste management system requires that all wastes contaminated with blood or bloodstained body fluids are considered potentially hazardous and managed with caution that should not thwart wastes progress along the disposal process. Effective segregation at source and the correct use of waste containers provides the most effective safeguards. The incidence of sharps injury in healthcare workers as well as scavengers is well described and much attention is given to prevention through education and training, product design and changes to clinical practice. However, a significant risk of sharps injury to waste handlers responsible for the onward disposal of healthcare wastes may have been overlooked which is evidential in this study (Figure 4) where the respondents attested to the fact that, scavengers come periodically to handpick healthcare waste in the dumping site and containers.

Table 6 Rating of clinical waste management in accordance with the Clinical Waste Management Code/guidelines?

Rating	No. of Respondents	Percentage (%)
Poorly	32	29.1
Averagely	74	67.3
Excellently	4	3.6
Total	**110**	**100**

5.0 CONCLUSION AND RECOMMENDATIONS

The study concluded that people handling clinical waste in the various healthcare facilities were not well protected as they only wear industrial gloves without other PPE for protection while some did not wear any PPE at all when handling clinical waste. Furthermore, the study concluded that clinical waste management facilities were present in some of the hospitals and clinics however, most of them were not in good conditions and were therefore, not being used for the purpose for which they were

acquired**.** Those who did not have any facility, dump the infectious waste in open pit and on the municipal waste dump without treating them.

The managers of the various healthcare facilities should endeavor to provide complete PPE for waste handlers so that they can be fully protected against infection. The study also recommended that modern clinical waste management facilities should be installed in the various healthcare centers to assist in proper, hygienic and scientific management of clinical waste.

References

Adjokatse, I. T., Adjibolosoo, S. V. K. & Miine, L. K. (2021). Assessment of medical waste management at Cape Coast Teaching Hospital - Ghana. *Assessment, 11*(10).

Akum, F. A. (2014). An assessment of medical waste management in Bawku Presbyterian hospital of the upper east region of Ghana. *Merit Research Journal of Environmental Science and Toxicology*, *2*(2), 27-38.

Asante, B., Ernest Y. & Benjamin, Y. (2014). Healthcare waste management; its impact: A case study of the Greater Accra Region, Ghana. *International Journal of Scientific & Technology Research*, *3*(3).

Assemu, D. M., Tafere, T. E., Gelaw, Y. M. & Bantie, G. M. (2020). Healthcare waste management practice and associated factors among private and public hospitals of Bahir Dar City administration. *Journal of Environmental and Public Health.* https://doi.org/10.1155/2020/7837564

Korkut, E. N. (2018). Estimations and analysis of medical waste amounts in the city of Istanbul and proposing a new approach for the estimation of future medical waste amounts. *Waste Management*, *81*, 168-176.

Kumari, A., Maurya, N. S. & Tiwari, B. (2020). Hospital wastewater treatment scenario around the globe. In *Current developments in Biotechnology and Bioengineering*, 549-570. Elsevier.

Mbongwe, B., Baagi, T. M. & Andrew, M. (2008). Healthcare waste management: current practices in selected healthcare facilities, Botswana. *Waste Management*, *28*(1), 226-233.

Nwachukwu, N. C., Frank, A. O. & Ositadinma, C. U. (2013). Health care waste management–public health benefits, and the need for effective environmental regulatory surveillance in federal Republic of Nigeria. *Current Topics in Public Health*, 2, 149-178.

Patil, G. V. & Pokhrel, K. (2005). Biomedical solid waste management in an Indian hospital: a case study. *Waste Management*, *25*(6), 592-599.

Williams, G. L. (2013). Medical waste disposal practices in some hospitals and clinical laboratories in the Accra Metropolis (Ghana). *Journal of Civil and Environmental Research.* 3, 90-98.

pp. 76-84 https://dx.doi.org/10.4314/johasam.v7i1.8

Effect of Professional Malpractice on Health Information Management Practice by Health Information Management Personnel in Selected Hospitals in Rivers State

***Prince Casmir Ifejirika**
ifejirikacasmir@gmail.com

***Okidim Imaitor**
okidim1973@gmail.com

***Obah Beatrice**
obahbeatrice@yahoo.com
*Department of Health Information Management, Rivers State College of Health Science and Management Technology, Port Harcourt, Nigeria

Abstract

Efficient health records and information management is a fulcrum upon which quality healthcare delivery revolves for sustainable development. Professional malpractice is a dangerous catalyst bedeviling medical profession. The frequency of patient's right violations associated with breach of patient's privacy, confidentiality, assault and battery, mutilations, theft and unauthorized disclosure of patient's medical information has become a source of concern. Thus, this study sought to examine the effect of professional malpractice on health information management practice by health information management personnel in selected hospitals in Rivers State. The descriptive survey design was used for the study. The population of the study was made up of 108 health information management personnel in the two selected hospitals. The total enumeration technique was adopted due to the manageable size of the population. The questionnaire was the instrument for data collection. The result showed that effects of professional malpractice on Health Information Management practice were poor turnover of patients and generation of fund, litigation against hospitals and loss of confidence. Furthermore, the constituents of professional malpractice included breach of patient rights, rapid deterioration of patient records and patient long waiting time. Finally, the factors responsible for professional malpractice were inadequate working tools, employment of quacks, poor leadership style and lack of training. It is necessary that hospital management should employ only licensed and skillful Health Information Officers and re-training the existing ones.

Keywords: professional malpractice, health information management practice, and health information management personnel

Introduction

Professional malpractice in health information management is a pertinent and devastating challenge in health care service delivery. Health information management constitutes the swivel on which professionalism in information dissemination and exchange as well as successful attainment of patient quality health care goals revolve (Abioye & Ifejirika, 2018). Health information management is a hub on which other departments in the hospital hinge on to carry out routine functions. The medical record is a large and ubiquitous physical and intellectual property of the hospital, which is no doubt the citadel of health information storage, dissemination and exchange among the healthcare providers of the hospital system. Patient medical records constitute corporate memory of the hospitals' asset which required coherent and efficient management for quick access for attainment of patient's diagnosis and continuation of treatment, referral, effective planning, and decision making by the attending physicians and other paramedical staff in the hospital (Ifejirika & Adias, 2020).

Professionalism in health records management can be deduced from the degree to which patient medical records are proficient of accomplishing the medical information needs of the attending physicians, paramedical personnel, Government and its agencies and other partners in health industry without any breach of patient bill of rights visa-vise patient privacy and confidentiality, which are tantamount to litigations in the hospital. Indeed, medical records management practices have evolved from the ancient world (traditional) to modern times (electronic health records management)

(Skirbekk, 2003; Goebel & Zwick, 2009). Unethical practices in health information management are seen as professional malpractice that falls outside what is considered morally right for a member of health information management profession. It occurs when a healthcare provider neglects to provide appropriate treatment or omits to an appropriate action or gives substandard treatment that causes harm, injury or deaths to a patient. This malpractice or negligence usually involves a medical error, unauthorized access to patient medical information, breach of privacy and confidentiality, mutilation of records, information theft and wanton destruction of patient's medical records. Medical mal-practice is an unethical behaviour that is contrary to societal norms and values (Akussah, 2002).

Professional malpractice is synonymous to wrong doing, dereliction of duty, professional misconduct, breach of ethics, unprofessional behaviour, unprofessionalism, unethical behaviour, negligence, carelessness, and incompetence. Health care delivery system is a complex system with different professions coming together to work as a team towards providing a holistic care to the patients. Among these professions comes health information management, defined as practice of acquiring, analyzing and protecting digital and traditional medical information vital to providing quality patient care (American Health Information Management Association, 2018). It is a practice of controlling the patient health records from the creation to the final disposal. It supplies much needed information to users such as attending physician, other health care providers, Health care Administrators, Insurance Companies, Healthcare Agencies for planning and decision making in the hospital (Popoola, 2006). Kanzi (2010) stressed that health information management professionals plays a critical role in ensuring proper documentation of patient's data, protecting and preserving them from deterioration to ensure speedy availability and access to the authorized users for planning, research, monitoring and evaluation, high-quality assurance, statistics gathering and management decision making.

Professional mal-practice occurs mostly in healthcare institution due to poor workforce planning, and development and monitoring and evaluation. Health workforce planning and development is a dynamic process where the right staff with the right skills are in the right place at the right time (Katuu, 2009). Malpractice is associated with poor health workforce planning. It is seen as a major issue recently due to workforce disparities. This provides an obstacle to many health organizations towards achieving their desired objectives. Health information management practice is affected by poor hiring of personnel, saddled with the responsibilities to undertake the task of records management in the hospital. It is known that a skilled HIM workforce is a critical component of a well-functioning healthcare system, and education is a cornerstone in supplying the health care system with qualified and trained health information workforce to provide a high quality data (Cox, 2001). Though, professional mal-practice cut across other professions, perhaps, mostly affects health information management practice in Nigeria as it leads to sub-standard practices and had its effects on the healthcare delivery.

Health information management personnel are the first point of call in the health sector, which determines the performance of the service delivery of such hospital. If at arrival of patients, they were not properly received at the first instance, the services rendered will not be reciprocated by them (the patients). More so, due to this professional mal-practice carried out by health information management personnel in health care delivery, this has resulted to poor recognition by private hospitals as they tend to use administrative staff who are trained on etiquette, ethics and resource management in replacement of medical records officers, for they felt the profession is centered on filing and documentation only. Having been myopic in thinking, the profession is not widely known by most specialist and private hospitals and they feel they can still move on. Some practical examples of these professional mal-practice includes; rudeness of HIM staff to patients, poor documentation, disclosure of patients information to an unauthorized person (third party), quackery, misfiling of patients case-notes, incorrect numbering system, Nepotism, electronic fraud, duplication of folders, bribe, folder fraud (selling and hiding of folders), frequent picking of phone calls on duty, discrimination, separation of folders (executive folders), speaking of jargons etc (Palakurthi & Parks, 2010). The issue of professional malpractice among HIM personnel during discharged of duties is as a result of loosed leadership style beginning from the board to the various head of departments (HOD) and the directors in the health sector. When an enforcing body is not set-up to monitor the practices of

HIM professionals, the spirit of laissez faire takes over and unprofessionalism becomes the talk of the day.

Health Information Management (HIM) is the practices of maintaining the traditional Health records (paper based) and electronic health records which contain clinical, epidemiological, demographic, financial, reference and coded health data suitable for patient care evaluation, planning and decision making. Health information management is a discipline or field of study concerned with creation, storage, and maintenance of patient health records as well as collection, collation, presentation, analysis, dissemination and reporting of data on disease and health relevant events. Health information professional is defined as a person working in a health Information management position and who had undergone a course of training for at least a diploma or graduate degree levels. The individual must acquire relevant graduate degree levels. An individual who has acquired relevant practical course of training and has been certified or licensed by established regulatory authority to practice and manage health Information or records in the country of domicile he/she works in hospital, health departments basic and community health centres, nursing homes, mental health facilities and public health agencies, health insurance companies and other facilities that provide healthcare or maintenance of health records (HRORNBN code of ethics 2014).

Health Information Management profession is at the centre of health care service delivery. It provides a means of communication between the members of healthcare team. HIM professionals play a critical role in completing, protecting and ensuring the availability of high-quality clinical information for patient care reimbursement, quality assurance, research, statistics gathering and management decision making. Professional malpractice is the failure of a professional to act within their profession's standards or a failure to foresee consequences that another professional of the same kind is expected to foresee. The most ethical challenges for health information management practice pertain to patient informed consent, confidentiality, trust and trustworthiness. The development of Genomics has widened the knowledge gap between the different stakeholders and increased the complexity of ethical issues regarding the consent process of data sharing and return of results to donors (Tabor et al., 2014). Challenging conflicts in moral norms have emerged: beneficence Versus harm when providing information, respect for patrons' autonomy Versus their questionable capacity to assimilate information, and a lack of fairness in the access to support or education for interpretation of genomics information. The American Health Information Management Association (AHIMA) was formed to define and oversee the training and educating of Registered Health Information Technicians (RHIT) and Registered Health Information Administration (RHIA) certifications.

According to (Adeleke, 2019), some professional malpractice on health Information Management practice are as follows; Breach of confidentiality and patient privacy, rudeness to patient, unauthorized disclosure and access which results in patient's dissatisfaction contributed to research misconducts, medical errors and dearth of quality health data. Apart from these, there are other practical professional malpractice among health information management personnel., they are; quackery, misfiling of patients records, delay of patient's (patient's waiting time), speaking of foul language, electronic fraud, duplication of folders, unethical dressing, handling of phone calls, Nonchalant attitude etc. Quackery can be described as dishonest practices and claims to have special knowledge and skill in some fields. Adeleke et al. (2008) affirmed that engagement of unqualified personnel in all health care institution including the health information management profession is a particular problem in developing nation such as Nigeria, where this trend has the potential to undermine the quality of healthcare service delivery, the confidentiality of health information and trust between patients and healthcare professionals.

In the context of health information management, Quackery is the promotion of deceitful or ill-informed health information practice. Adeleke (2019) viewed quackery as the promotion of unsubstantiated methods that lack a scientifically plausible rationale. Quackery violates the Act that establishes the health records practice. Quacks are those people that received informal training from untrained personnel or rather jump to learn a job without compliance to the code of ethics of the profession or rather formal certification and licensing.

The following as the causes of quackery; loss of priority on criteria setting in terms of monitoring and evaluation, lack of political will towards the health sector professions, lack of knowledge and awareness about quackery by the victims, cheaper services provided by the quacks

interdisciplinary rivalry leading to compromised standards and socio-economic challenges and low income earners. Quackery is one of the major problem of professional malpractice having the following negative effects on health information management practice; misfiling of patients case note, bad image of the profession, misplacement of patient case notes, documentation errors, breach of confidentiality, patient dissatisfaction, loss of confidence on the departments, duplication of patients records, accreditation issues, roles substitute and poor quality of health data. Other effects include; endangers human well-being, leads to hazard on quality of service, they pretend to have a knowledge they do not possessed, they violate the act that establishes the health information profession, leads to unemployment of qualified HIM personnel, they take advantage of public needs and lack of knowledge on the part of the victims of quackery (Encyclopedia Britannica, 2019).

Some of the roles of health information professionals as enshrined in the code of ethics for health information professionals formulated by Nigeria Health Records Association include:

- Place service before material gain, the honour of the profession before personal advantage, the health and welfare of patient above all personal and financial interest, conduct himself in the practice of the profession as bringing honour to himself, his associates and to the health Information profession.
- Reserve and protect the medical records in his custody and hold inviolate the privilege contents of the records and any other information of a confidential nature obtained in his official capacity, taking due account of applicable status and of regulations and policies of his employers.
- Serve his employer loyally, honourably discharging the duties and responsibilities in giving his employer notice of intent to resign his position.
- Refuse to participate or conceal mythical Practice or procedures.
- Report to the proper authorities but disclose to no one else any evidence of conduct or Practice revealed in the medical records in his custody that indicate possible violation o established rules and regulations of the employer or of professional Practice.
- Preserve the confidential nature of Professional determination made by the staff committee which he serves.
- Accept only those fees that are customary and lawful in the area for services rendered in his official capacity.
- Avoid encroachment on the profession of assuming right to make determination area outside the scope of his assigned responsibilities.
- Strive to advance the knowledge and Practice of medical record science including continual self-improvement in order to contribute to the best possible medical care.
- Participate appropriately in developing and strengthening Professional manpower and in representing the profession to the public.
- Discharge honourably the responsibilities of any association post to which appointed or elected, and preserve the confidentiality of any privilege information made known to him in the official capacity.
- State truthfully and accurately his credentials, Professional education and experience in any official transaction with the Nigeria Health Records Association and with any employer or prospective employer. The above listed roles of health information management practitioners in the hospitals has been jeopardize especially the first in number is at high association in the government hospitals and indirectly practice at ignorant of the patients in the private hospitals.

Furthermore, the effects of malpractice on patient health care, whether or not they are actually involved in a legal suit, can be substantial. News or rumor of malpractice for a medical practice or hospital can be turnoff for potential patients, making them reluctant to seek help. Concerns regarding negligence can make patients nervous and impede a trustworthy and open interaction the cornerstone of doctor-patient relationship. Malpractice also affects the cost of Health. The effects of malpractice

on health professionals is substantial, malpractice leads to questioning of professionals abilities as it affects both psychological and social effects on patients and healthcare providers at every level, It results to loss of vital patient information in the hospital, leads to breach of patient privacy and confidentiality, brings about litigation against the hospital, also lead to delay in accessing patient information, and finally results to doubt and questioning of the profession.

Carrie (2021) states eight common root factors responsible for professional malpractice.

(a) Communication Problem: Poor communication that arises among medical practitioners or patients often results to malpractice.

(b) Inadequate Information: insufficient information can lead to poor coordination of attention which in turns lead to malpractice.

(c) Human Problem: Is another Professional malpractice that occurs when standards of care, policies, processes, or procedures are not followed properly or efficiently. Example includes poor documentation. Knowledge-based malpractice also occurs when individuals do not have adequate knowledge to provide the care that is required at the time it is needed (that is quack in information).

(d) Patient-related issues: These may include inappropriate patient identification, inadequate patient assessment, failure to obtain consent, and insufficient patient education

(e) Lack of organizational transfer of knowledge: These issues can include insufficient in training and inconsistent or inadequate education for those providing care. Transfer of knowledge is critical in most areas specifically where new employees or temporary help is used.

(f) Staffing patterns and workflow: Inadequate staffing alone does not lead to professional malpractice but can put healthcare workers in situation where they are more likely to make a mistake.

(g) Technical failure: This implies electronic fraud in HIM Practice

(h) Inadequate policy: In Health Information Management practice, it emphasizes on poor documentation.

Other factors responsible for health information management malpractice include: lack of trained personnel and re-training, inadequate updated working materials, professional rivalry, lack of professionalism with quackery and incompetence. According to Lord Atkin (1932), case of Donoghue V. Steven that stated that the medical or professional malpractice is hinged on the tortuous principle of negligence. It bestows pride on members of the group and makes them standout in the crowd of occupational groups. It also brings with it a lot of duties, responsibilities and societal expectations which keep the true professional always on their toes, on their guard always ready to fight for and protect the ideas for which the profession is known. Health information management is known to have been the hinges on which other profession relay on as they are the first point of contact in health care delivery.

Research Questions

1. What is the effect of professional malpractice on health information management practice in selected hospitals in Rivers State?
2. What are the factors responsible for professional malpractice by health information management personnel in selected hospitals in Rivers State?

Methodology

The study adopted descriptive research design. The population of the study comprised of 73 health information management personnel (HIMP) in University of Port Harcourt Teaching Hospital (UPTH) and 35 health information management personnel (HIMP) in Rivers State University Teaching Hospital (RSUTH) Port Harcourt giving a total of 108 HIMP in the selected hospitals. Total enumeration of the entire 108 HIMP was undertaken due to the manageable size of the population. The instrument used for data collection was the questionnaire. The expected mean response per item

was 2.50. Data collected were analyzed using descriptive statistics such as percentage frequency table and percentage distribution mean with the aid of SPSS version 20.

Results

Research question 1: What is the effect of professional malpractice on health records management practice in selected hospitals in Rivers State?

Table 2: Effect of professional malpractice on HIM Practice

STATEMENT	SA	A	D	SD	Mean ($\bar{x}$)
Leads to poor outflow of patient and generation of fund in the hospital	94 (90.4%)	10 (9.6%)	0(0%)	0(0%)	4.3
Leads to delay in accessing patient vital information	12 (11.5%)	92 (88.5%)	0 (0%)	0 (0%)	3.2
It can bring about litigation against the healthcare provider and the hospital	80 (96.9%)	24 (23.1%)	0 (0%)	0 (0%)	3.8
It leads to breach of patient privacy and confidentiality	16 (15.4%)	88 (84.6%)	0 (0%)	0 (0%)	3.1
It can lead to difficulty in accessing patient information for decision making	30 (28.8%)	66 (63.5%)	8 (7.7%)	0 (0%)	3.1

Criterion Mean= 2.50
Weighted Mean= 3.0

NB: SD- Strongly disagree, D-Disagree, A-Agree, SA-Strongly Agree, mean **($\bar{x}$)**

Table 2 reveals that the effects of professional malpractice on HIM Practice in selected hospitals in Rivers State are; poor outflow of patient and generation of fund in the hospital (N = 104, x= 4.3), delay in accessing patient vital information (N=104, x = 3.2), litigation against the hospital (N=104, x = 3.8), breach of patient privacy and confidentiality (N= 104 x=3.1) and difficulty in accessing patient medical information. However, the extent to which the professional malpractice affects health records management practice in selected hospitals is high, this was attested by test of criterion validation which shows that the criterion mean 2.50 is less than the values of weighted mean 3.0

Research question 2: What are the factors responsible for professional malpractice by HIM personnel in selected hospitals in Rivers State?

Table 3: Factors responsible for professional malpractice by HIM personnel in selected hospitals

STATEMENT	SA	A	D	SD	Mean ($\bar{x}$)
Employment of unprofessional personnel (quack) in health records department	75 (72.4%)	29 (27.9)	0(0%)	0(0%)	3.7
Lack of training and other motivational incentives	37 (35.6%)	51 (49.0%)	13 (12.50%)	3 (2.9%)	3.2
Poor leadership styles	69 (66.3%)	28 (26.9%)	6 (5.8%)	1 (1%)	3.8
Incompetence, lack of knowledge and innovative skills	33 (31.7%)	53 (51.0%)	0 (0%)	0 (0%)	3.1
Inadequate working tools	24 (23.1%)	36 (34.6%)	30 (28.8%)	14 (13.5%)	3.1
Work load and stress	88 (84.6%)	10 (9.6%)	6 (5.8)	0(0%)	3.8
Financial inducement	37 (35.6%)	51 (49.0%)	13 (12.5%)	3 (2.9%)	3.2

Criterion Mean= 2.50
Weighted Mean= 3.4

Table 3 reveals that the factors responsible for professional malpractice in HIM Practice in the hospitals include; employment of quack (N = 104, $\bar{\mathbf{x}}$ = 3.7), lack of training (N=104, $\bar{\mathbf{x}}$ = 3.18), poor leadership style (N=104, $\bar{\mathbf{x}}$ = 3.6), incompetence and lack of knowledge and innovative skills, (N= 104 x= 3.1), Inadequate working tools (N= 104 x= 2.6) and inadequate working tools (N=104, $\bar{\mathbf{x}}$ = 3.8), work load (N= 104 $\bar{\mathbf{x}}$= 3.8) work and stress (N= 104 x= 3.8) and financial inducement (N= 104 $\bar{\mathbf{x}}$= 3.2

Discussion of Findings

The finding revealed that the effects of professional malpractice on HIM Practice in selected hospitals are; poor outflow of patient and generation of fund in the hospital, delay in accessing patient vital information, litigation against the hospital, breach of patient privacy and confidentiality and difficulty in accessing patient medical information.

The finding is in conformity with the submission of Baicker and Chandra (2004); they posited that the growth of medical malpractice has the potential to affect the delivery of health care. If growth in malpractice payments results in higher malpractice insurance premiums for physicians, these premiums may affect the size and composition of the physician workforce. The growth of potential losses from malpractice liability might also encourage physicians to practice "defensive medicine. Swart et al. (2005) elaborated on training as a means of dealing with skill deficits and performance gaps as a way of improving records management personnel's performance against malpractice

The finding further revealed that the factors responsible for professional malpractice were employment of quack, lack of training, poor leadership style, incompetence and lack of knowledge and innovative skills, inadequate working tools and inadequate working tools, work load and stress and financial inducement. The finding is in conformity with the findings of Wamukoya and Mutula (2005); Mnjama (2005) cited in Mnjama and Wamukoya (2004); identified some challenges such as lack of records management plan, inadequate knowledge about the importance of records

management for organizational efficiency and a lack of accountability. Wamukoya (2007) further stated that bad records management is compounded by a number of factors such as the lack of national policy on records management, lack of records management standards, lack of records management guides/manuals, and lack of trained staff in records management who should provide guidance or assistance to institutions. The finding is also in line with the assertion of Kottewari and Sharief (2014) and Iskandar et al. (2014) that maximum performance from employee can be achieved when an organisation provides the needed tools and the right atmosphere to perform expected tasks.

Conclusion

The style of leadership of hospital administrators is one of the influencing factors that stimulate personnel inherent potentials, knowledge and skills to enhance efficient health records management devoid of malpractice in the hospital. The failure of hospital administrators to adopt appropriate leadership styles that are goal-oriented and anchored on training healthcare providers to avoid professional malpractices in the hospital is a bottleneck to modern health records management practice in both public and private hospitals.

Recommendations

Arising from the conclusion drawn from the findings, the study recommended the following:

1. Hospital administrators must adopt effective styles of management that are goal oriented, and sensitive to the plight of the personnel and capable of ameliorating those factors associated frequent professional malpractices in the hospital.
2. Since efficient records management practice does not occur arbitrarily or in a vacuum, hospital administrators and its leadership should employ trained and qualified health information management personnel as well as train the existing personnel to reposition and curtail the rate of professional malpractice among heath information management personnel in hospitals.
3. Hospital administrators and its leadership should ensure that those barriers or factors that affect smooth implementation of modern records management practice in the hospital, as work should be designed with a commensurate salary packages in a way that is capable of improving personnel's feeling of satisfaction and commitment to their work and by implication, avoid the temptation of involving in any kind of malpractices in the hospital.

References

Abioye, A. A., & Ifejirika, P. C. (2018). Influence of management styles and job stress on job performance of records management personnel in selected ministries in Rivers State civil service. *Ibadan Journal of Education Studies,15(2): 11-19*

Adeleke, I. T. (2019). The Significance of effective physician patient communication to positive treatment outcomes. *Intl Journal of Health Records and Information Management* , 2(1).

Ajewole, B. (2001). *Records and information resource management in the public service: A theoretical and practical framework.* The Administrative Staff College of Nigeria (ASCON).

American Health Information Management Association (2018). *Code of ethics*

Akussah, H. (2002). Records management and preservation in government ministries and departments in Ghana. *African Journal of Library, Archives and Information Science 12.* 2: 155–165.

Health Records Officers Registration Board of Nigeria (2014). *Code of ethics*

Cox, R. J. (2001). *Managing records as evidence and information*. Quorum.

Göbel, C., & Zwick, T. (2009). Age and productivity-evidence from linked employer employee data. ZEW discussion paper 09–024. Mannheim

Ifejirika, P. C., & Adias, S. (2020). Influence of work stress on job performance of health information management personnel in selected hospitals in Rivers State. *Journal of Health, Applied Sciences and Management, 3, 69-75*

Iskandar, M., Ahmad, R., & Martua, R. H. (2014). Factors Influencing Employees' Performance: A Study on the Islamic Banks in Indonesia. *International Journal of Business and Social Science*, 5(2).

Baicker, K., & Chandra, A. (2004). *The effect of malpractice liability on the delivery of health care*. California Center for Population Research

Kanzi, N. (2010). *An investigation of the role of records management with specific reference to Amathole District Municipality*. Master's Thesis, Nelson Mandela Metropolitan University

Katuu, S. (2009). Archives and records management education and training: What can Africa learn from Europe and North America? *Information Development Journal* 25(2), 133-145. http://idv.sagepub.com/content/25/2/133.full.pdf+html

Katuu, S. (2009). Archives and records management education and training: What can Africa learn from Europe and North America? *Information Development Journal* 25(2), 133-145. http://idv.sagepub.com/content/25/2/133.full.pdf+html

Kotteswari, M. & Sharief, S. T. (2014). Job stress and its impact on employees' performance: A study with reference to employee working in BPOS. *Journal of Business Administrative Research Review*, 2 (4), 1-25.

Palakurthi, R. R. & Parks, S. J. (2000). The effect of selected socio-demographic factors on lodging Demandin the USA. *International Journal of Contemporary Hospitality Management*, 12(2), 135-142.

Popoola, S. O. (2000). Records management programmes in Nigeria: A survey of the Osun State Civil Service, *Nigerian Libraries*, 34, 1-38.

Popoola, S. O. (2006). Personal factors affecting organizational commitment of records management personnel in Nigerian State Universities. *Ife Psychologia: An Int. J. Psychol. Afr*, 14 (1),183-197.

Popoola, S. O. & Oluwole, D. A. (2007). Career commitment among records management personnel in a state civil service in Nigeria. *Records Management Journal, 17(2)*.

Skirbekk, V. (2003). *Age and individual productivity: A literature survey*. http://www.demogr.mpg.de

Swart, J., Mann, C., Brown, S. & Price, A. (2005). Human resource development: Strategy and tactics. Elsevier Butterworth-Heinemann.

Wamukoya, J. (2000). *Records and archives as a basis for good government: Implications*.

Wamukoya, J. & Mutula, S. M. (2005). E-records management and governance in East and Southern Africa. *Malaysian Journal of Library and Information Science, 10*(2), 67-83.

Wamukoya, J., & Mutula, S. M. 2005. *Transparency and integrity in government: Building capacity for managing electronic records in the East and Southern African region*. Proposal submitted to the International Records Management Trust, London.

pp. 85-90 https://dx.doi.org/10.4314/johasam.v7i1.9

Language Barriers: An Overview for Efficiency in the Nigeria's Health System

Boma Hayes Diri
School of Foundation Studies
Rivers State College of Health Science and Management Technology, Rumueme
Port Harcourt
bomsie4jesus@gmail.com TEL: 08035536232

Abstract

A healthy nation is a wealthy nation. The healthcare system in Nigeria faces a variety of challenges when it comes to delivering healthcare services to culturally and linguistically diverse population like Nigeria. Language barriers can make communication between healthcare providers and patients difficult and have a significant impact on the quality of care given which sometimes results in grievous consequences. This paper explored language barriers, an overview for efficiency in Nigeria's health system. It examined the difficulties and effects of language barriers and ways of combating them. A qualitative analysis of existing literature was used to identify key themes and support a framework for understanding the complexity of the matter. The findings showed that language barriers can limit access to healthcare, reduce patient satisfaction, and have a negative impact on health outcomes generally. Additionally, the findings indicated that healthcare providers often lack the linguistic and cultural competencies necessary to provide care. The study recommended that the healthcare system must take steps to reduce language barriers in order to improve healthcare access, communication, and quality of care for diverse population in the nation.

Keywords: healthcare, healthcare givers, patients, language, language barrier

INTRODUCTION

There is no gainsaying that for communication to take place between interlocutors, the code used in the exchange must be well understood by them to avoid misunderstanding or misinterpretation. In a health care delivery system, the absence of this understanding could result to grievous consequences; consequently, there is a dire need for the healthcare givers and their patients to understand one another to avoid these consequences. Language barriers have indeed posed a very big challenge in the healthcare system in Nigeria due to the multilingual nature of the society; the inability of the healthcare givers and their patients to understand one another could be frustrating on both sides. Health they say is wealth and also a healthy nation is also a wealthy nation hence, the need to have a healthy population cannot be down played. Government at different levels invest so much in the health sector every year so there is need for the people that enforce government health policies and the healthcare givers to work together to achieve success and there must also be understanding between them. The lack of mutual understanding between health workers and the populace can rubbish government's huge investment in the health sector. This work therefore highlights some of the challenges posed by language barriers in the healthcare system in Nigeria and explores possible methods that can be used to overcome these challenges.

Language

Language has been the basic means of communication through all ages, man's existence as a social being lays on his ability to communicate with his fellow man and his environment. Language has proved to be a major aspect of communication, without which communication would be impossible. Different authorities have defined language using different perimeters: language, according to Ndimele (2008, p.1) is "often said to be a means of communication between individuals who share a common code". He further states that these codes that individuals share are in form of symbols, and the symbols can be oral (sounds) or written (letters).

Language is a system of conventionally spoken or written symbols used by human beings, as members of a social group and participants in its culture to express themselves (David & Robert, 2019). This infers that language is a necessary tool for expression. Language is a means whereby

humans communicate ideas, feelings, emotions, using conventional signs, symbols, sounds, and gestures that have been widely accepted and understood by members of that speech community. Language is a part and parcel of the culture of a people.

Language barriers

Language barriers are those impediments created or caused by differences in language. They hinder communication and mutual understanding, hence, making the objectives of the whole exercise of communication (in healthcare giving) cumbersome. Effective communication (made possible by appropriate language) with patients is critical to the safety and quality of care; and barriers to communication include differences in language, cultural differences, and low health literacy according to Schyve (2007). He opines that evidence-based practices that deplete these barriers must be incorporated into the health care services.

Importance of Language

It is often believed that without language, no social organization can function optimally. So language is a social fact which is prone to change, development and evolution. According to Okoh (2006), any definition of language must first consider it a means of communication, employed by Homo sapiens to convey emotions, ideas, or thoughts.

The role of language in the society cannot be over-emphasized. According to Fromkin et al. (2011) in Ndukauba et al. (2021) state that we live in a world of language because we are always talking and are talked to everywhere, every time even in our dreams. According to them, they believe that the possession of language, perhaps more than any other attribute, distinguishes humans from other animals. Language is the very source of human existence and strength.

Language is part of our culture, it is often said that language and culture cannot be easily separated. It gives us our identity. Ndimele (2015) cited in Ndukauba et al. (2021) says that the culture of a people through the vehicle of language controls our behaviours. According to O'Grady et al. (2011) in Ndukauba et al. (2021), language is at the heart of all things human. It is not just part of us, it defines us.

Through language, we express ourselves, our desires, feelings, needs, fears etc. We use it to inculcate our beliefs, norms and traditions, to generations present and unborn; it is a means of communication with peers, superiors, professional associates, clients etc. Without language, it could be difficult to have much significant social, intellectual or artistic activity taking place. Hence, language offers us the opportunities to excel in life.

Language is central to human existence. Psychologists postulate that language is a cultural tool which makes man distinct from animals. The use of language enables the various fields of man's endeavor, from art to religion to science to business, among others (Evans, 2014) cited in Ndukauba et al. (2021). Human activities such as arts, transportation, healthcare, education are all dependent on language. It is impossible to find any human activity devoid of the use of language since language allows for expression and transmission of complex ideas.

Advantages of bi/multilingualism

The ability to speak more than one language comes with tremendous advantages. Language is indeed a unifying force, speaking more than one language offers one the opportunity to concatenate, build a network, fraternize and open oneself to a world of limitless possibilities; and to the healthcare giver it makes the job a lot easier. It is therefore no brainer to say that learning other languages is beneficial to our social, economic, and mental existence and benefits.

The difficulties and effects of language barriers on healthcare delivery

The true depth of the impact of the language barriers is often not taken seriously by health practitioners, administrators and policy makers. Patients are generally attended to in English language which is Nigeria's official language despite the fact that some may prefer to be consulted with in their own language. The Patients' Rights Charter provides that patients have access to health care and the right to health information that includes the availability of health services and how best to use such services and that such information shall be in the language understood by the patient.

According to Hussey (2021) this sentiment is echoed in the Bill of Rights, which states that "everyone has the right to have access to health services". The language barrier in this context is simply that barrier to the accessing of health care as a result of differences in language according to her. English remains the dominant language used officially and unofficially in healthcare services in Nigeria.

Hussey (2021) asserts that the inability to communicate effectively can be a traumatic and fearful experience, one that eliminates empathy and humanity from the health services provided. Studies have shown that miscommunication caused by the language barrier results in increased patient avoidance behavior (which may result in later presentation of disease) and add to the uncertainty and emotional stress experienced by patients.

Research has shown that language barrier results in many problems for both the healthcare givers and the patients. These problems include preventable medical errors, adherence to treatment and health seeking behaviours, additional cost to the patient, increased length of hospital stays, weak patient- provider therapeutic relationship, social desirability bias, ethical dilemma, reduced patients confidence and boldness, dissatisfaction and anxiety, and added burden on the healthcare givers.

Preventable medical error

The inability to ascertain the main complaint or obtain a coherent past medical history and the inability to identify malingering and psycho-social problem of the patients which may in turn lead to wrong diagnosis and ineffective treatment have been identified as a problem. Difficulties arising from an inability to speak or understand the native tongue of the patient results to a decrease in the ability to be empathetic, kind and approachable and to resolve psycho-social problems. And it may also lead to a decrease in adherence to counselling, treatment, appointment for follow up, health seeking behavior and patient education. This creates a distance between the patent and the caregiver; it can be described as "health care taking place across a barrier".

Additional cost

Another issue associated with language barrier is high cost of treatment (additional cost).Because the care givers could not understand a patient's explanations, they may order for different laboratory tests believing they could find by the lab tests the problem the patient was trying to explain therefore resulting to unnecessary expenditures.

Longer stay at the hospital

Language barrier can increase the time a care giver and patient spends together trying to understand each other. And even when an ad hoc interpreter is called upon to intervene, it is still time consuming because the time the interpreter spends getting information from the care giver to the patient and back again the care giver and verse versa would have been enough to attend to more than one person and the patient may end up not receiving proper treatment. Also when referred to other units of the facility to get one or two things done, for instance the laboratory, the language barrier can hinder them from having quick service because they spend more time explaining themselves, and employing an interpreter adds to more time spent. This factor keeps them longer in the hospital and can cause some sort of discouragement to them.

Weak patient-provider therapeutic relationship

According to Olani et al. (2023) when patients cannot explain their problems because of language barrier, and ad hoc interpreter is used, the direct connection between the patients and the physicians could be loosened, and this may put pressure on the physicians to ignore the patient. A physician should have a friendly relationship with the patient to take best quality patient history. If both the patient and the physician cannot speak the same language or if effective communication is not made due to language barriers, this friendly relation could be affected, and best quality patient history hampered.

Social desirability bias

There could be a disease or health condition which patients may not want their family members to know about; in this case, the patients may intentionally hide their disease history when a family member is assigned as an ad hoc interpreter. According to Olani et al. (2023) when a family member is assigned as an ad hoc interpreter also, they may not properly tell the patient when the medical condition the physician told them is very serious; for instance, terminal disease. The interpreter may also oversimplify the health situation of the patient, and this may make the patient to neglect the precautions ordered by the physician.

Ethical dilemma

Language barriers have serious implications for the healthcare ethics. When ad hoc interpreters are used, for instance, there is a high probability of violating the patient's privacy. They may translate the information in the other languages in the way they understood it, but which could be wrong.

Reduced Patients confidence and boldness

Sometimes when the patients fail to properly communicate their health needs, and when at the same time, they see that other patients are smoothly communicating, they may shift the blame on themselves; and consider themselves weak. It is because of this perceived self-limitation that makes the patients feel ashamed and develop anxiety to communicate with healthcare providers; such feelings could discourage the healthcare seeking behavior of patients. Feeling less confident because of language barrier has the power to desist patients from expressing their pains and needs, even in emergency.

Dissatisfaction, anger and anxiety

Language barriers could affect patient's satisfaction. They may be angered and feel desperate. Miscommunication can result in increased errors (potentially life threatening) both in diagnosis and management. Thus patients experience decreased satisfaction with services and are less inclined to adhere to and comply with treatment and they also receive less health education.

Additional burden on healthcare providers

One group of people who serve as ad hoc interpreters are other healthcare providers, this voluntary service adds more burden on them. Some of them that understand the language of the patient could be called while they are on other duties to provide language interpretation service when language barriers happen although there is no official recognition for such services. This indeed adds to their already heavy work schedule.

Cultural biases

Challenges that arose from cultural differences are also identified as one of the barriers. Language cannot be isolated from culture. Cultural competency by health practitioners is important and facilitates a greater respect from patients. For example, doctors need to understand that not questioning a doctor can be perceived as a sign of respect in some cultures even if the patient has not understood what the doctor has said. Consultations are the point of contact between two people – patient and doctor – who both view the world through different cultural lenses.

These different world views can ultimately affect the quality of consultations. Obtaining informed consent and maintaining patient confidentiality were often unavoidably less practiced because of these differences. Some doctors may feel like a form of "paternalistic medicine" is being practiced at the healthcare facility as a result of the language barrier and patients do not seem to mind this practice as they were mostly silent, never demanding anything and rarely asks questions. This behaviour may be a result of cultural differences but may also be symptomatic of a greater structural disempowerment. The silence also affects the patients' understanding of their disease, consent and treatment adherence.

In summary, the language barriers decreased work efficiency and the provision of holistic treatment; it increased frustration levels, time consuming and decreased empathy and approachability.

Some methods of overcoming the language barriers

One of the measures that can be used to overcome the language barrier is a reliance on non-trained interpreters. The health professionals can rely on interpreters, who can be professional staff, junior or student nurses, family members of the patients and auxiliary staff. It should be noted here that communication barrier can also exist between doctor and interpreter and between interpreter and patient.

The efficiency and quality of communication depends on the competence of the interpreter in this situation. When an interpreter is not proficient in the use of English, the interpreter may fill in gaps with their own knowledge. This illustrates the potential disadvantages of using unprofessional or ad hoc interpreters. Interpreters do, however, serve as cultural mediators and can pick up the semantic subtleties and underlying tones of patient discourse. Interpreters facilitate a greater reflection on culture-specific topics.

Another method of overcoming the language barrier is code switching. Code switching is a linguistic phenomenon where speakers change between two languages in a single sentence or conversation. While this is a drop in the linguistic ocean, it provides some direct communication with the patient that allows for bonding and trust to develop between patient and healthcare giver. It also allows for more rapid communication and is a practical tool for transferring instructions quickly.

Furthermore, care givers may need to change their accents when speaking to patients, use simple English and talk a bit slower in the hope of transferring meaning. An interpreter inevitably becomes an intermediary in the doctor- patient relationship and this can have a negative impact on the communication between the doctor and patient. Interpreting staff may be frequently unavailable or may insert their own values and views into the conversation. In some cases interpreters may make some errors in translating and this affects patient care.

The use of family members, cleaners, administrative staff, other patients or any ad hoc bilingual person as stated before could bridge the gap but not ideal. It may affect patients' confidentiality. These interpreters are unlikely to understand medical terminology, may struggle to break bad news to patients, translate and interpret sensitive issues and may have conflicting agendas or priorities.

The ideal is for the health service providers to employ health professionals who are already culturally and linguistically capable. Health professionals who would be proficient in the language of their patients should be identified and recruited. The already short staffed nature of the health services prevents this but language consideration posting should be looked into.

Conclusion

The Bill of Rights provides that "everyone has the right to have access to health services" and states that the language barrier is simply that barrier to the accessing of health care. Provision of services in a patient's own language is an integral part of the quality of care and getting language right has been shown to result in positive outcomes for all stakeholders – patients, doctors and administrators. However, the problem needs to be prioritized and commitment to implementation strategies must occur.

The answer to overcoming the language barrier in hospitals and health centres in Nigeria may be a combination of all the strategies discussed in this work and some may be more applicable in certain areas than in others. The importance of doctor-patient communication cannot be ignored. The solution to addressing the communication barrier begins with an acknowledgment of its existence and strong political will to address the problem at all levels. In the overhauling of the healthcare system, now is the time to provide a multilingual healthcare system.

Recommendations

1. Language should be considered during posting and transferring of care givers because they can function better in the community they speak their language. Healthcare givers should try and learn to speak the language of the majority of their patients.
2. Given that language is not that easy to learn, greetings and pronunciation of patients' names should be seen as absolute necessities.

3. Healthcare institutions could provide short word lists as a starting point, which may include salutations, names and pictures of parts of the body and medical vocabulary.
4. Professional language interpreter should be hired in order to avoid unethical outcomes.
5. A direct and focused policy needs to be developed that engages with appropriate methods of overcoming the language barrier.
6. Combating the language barrier should be prioritized with strong political will by stakeholders in the government and the health sector.
7. More research should be conducted to develop evidence informed effective solutions.
8. Increased awareness and discourse around the language problem should be cultivated.
9. These solutions or interventions need to be communicated to stakeholders and all involved should understand the need for these interventions.

References

David, C. & Robert, R. H. (2023). Language. *Encyclopedia Britannica*. https://www.britannica.com/topic/language

Hussey, N. (2021). The language barrier: The overlooked challenge to equitable health care. *The Sabinet African Journal,* (1*)*,189-195

Ndimele, O. M. (2008). *Morphology and syntax*. M & J Grand Orbit Communications & Emhai.

Ndimele, R. (2015). *Understanding sociolinguistics*. Whytem.

Ndukauba, K., Ohuoba, A. N., & Nduka, I. (2021).Communication, language and healthcare delivery: a mutually inclusive relationship. *International Journal of Language and Linguistics, 8*(2), 45-53

Okoh, N. (2006). *The challenge of Englishes in Nigeria*. Pearl.

Olani, A.B., Olani, A.B., & Muleta, T.B. (2023). Impacts of language barriers on healthcare access and quality among Afaan Oromoo-speaking patients in Addis Ababa, Ethiopia. *BMC Health Services Research*, *23*(39). https://doi.org/10.1186/s12913-023-09036-z

Schyve, P. M. (2007). Language differences as a barrier to quality and safety in health care: the joint commission perspective. *J Gen Intern Med, 22*(2), 360–361

pp. 91-100 https://dx.doi.org/10.4314/johasam.v7i1.10

Correlation Analysis: A Valuable Tool in Medical Research

Benjamin Chims Ele
Department of Statistics, Ken Saro-Wiwa Polytechnic, Bori, Rivers State
elebenjaminchims1@gmail.com

Okenwe Ideochi
Department of Statistics, Ken Saro-Wiwa Polytechnic, Bori, Rivers State
nwonda@yahoo.com

Tsaroh Neeka Theophilus
Foundation Studies Department, College of Health Science and Management Technology
neetsaroh934@gmail.com

Abstract

Correlation analysis is an important statistical tool used in medical research to understand relationships between different factors and their impact on health. This study explores how correlation analysis is useful in the medical field. We look at previous research to see how it can help us in healthcare. Correlation analysis helps us find relationships between factors. It shows if things like smoking are related to diseases like lung cancer. It also helps us predict how diseases might progress or how well treatments work. We can also use it to check if medical tests are accurate. By looking at past studies, we see the good and not-so-good parts of correlation analysis. We need to think about things like how many people are in the study and if there might be any mistakes. Overall, this study shows that correlation analysis is important in medicine. It helps us find important connections and gives doctors and nurses better information to take care of patients.

Keywords: correlation analysis, correlation coefficient, medical research, relationship, healthcare, Pearson coefficient of correlation

INTRODUCTION

Correlation analysis is a really important tool in medical research. It helps us understand how different things are connected to each other. When scientists study medical issues, they often need to figure out if there are relationships between certain factors. For example, they might want to know if a certain medicine is linked to better outcomes for patients or if a specific condition is related to certain risk factors. Correlation analysis helps them find these connections and gives them useful information for making better decisions in healthcare.

Recent studies by Smith et al. (2022) have shown how crucial correlation analysis is in medical research. It helps doctors and researchers discover important links between different medical factors, which can lead to better ways of diagnosing and treating illnesses. Another study conducted by Johnson and Brown (2023) highlighted that with the ever-growing amount of medical data available, correlation analysis becomes even more valuable. It helps researchers make sense of large and complex datasets, leading to more precise medical knowledge and personalized treatments.

Furthermore, correlation analysis is not just about looking at two things at a time. Researchers, like Lee and Chen (2021), use this technique to study many factors together. This helps them understand how different things work together and affect one another. By doing this, scientists can identify hidden factors that might be influencing a medical condition and consider them in their research.

As medical research continues to advance, the importance of correlation analysis remains crucial. By showing connections between various factors, this powerful tool helps doctors and researchers make better decisions, improve medical knowledge, and provide better care to patients. As we move towards more personalized medicine, correlation analysis will play a key role in understanding complex medical issues and finding effective solutions.

LITERATURE REVIEW

Correlation analysis has been used by researchers in several fields of science especially in medical research. It helps medical researchers understand how different things are connected to each other in medical studies. Many scholars have talked about how useful it is in different medical fields and how it contributes to better healthcare decisions.

Smith et al. (2022) showed how correlation analysis helps find important links between medical factors and patient outcomes. This information can help doctors identify risk factors, predict how patients might respond to treatment, and make better decisions for patient care. As medical data becomes more complex, Johnson and Brown (2023) explain how correlation analysis becomes even more important. With lots of data, it helps researchers figure out patterns and connections that could be hard to see otherwise. This can lead to personalized treatments and better ways to understand diseases.

Correlation analysis is not just about looking at two things together. Researchers like Lee and Chen (2021) use it to study many things at once. This helps them understand how different factors work together and affect each other. In public health studies, Brown and Williams (2022) found that correlation analysis can be helpful. They looked at how social factors are linked to health outcomes in communities. By understanding these connections, better policies and interventions can be made to improve people's health.

In specific medical fields, correlation analysis has been used too. Li et al. (2023) explored the correlation between genetic markers and treatment response in cancer patients. By using correlation analysis, they discovered potential markers that could help personalize cancer treatments for patients.

Overall, the literature review shows that correlation analysis is a powerful tool in medical research. It helps uncover relationships between medical factors; guides better healthcare decisions, and pave the way for personalized medicine. As medical research advances, correlation analysis will remain a crucial tool in improving medical knowledge and ultimately benefiting patients' health.

DEFINITION OF CORRELATION AND CLARIFICATION

Correlation may be defined as a measure of association aimed at indicating the strength of the relationship between two variables (Garson, 2008). That is, it is concern with measuring the degree or strength of relationship between variables. It is a statistical way of understanding how two things are connected. It helps us see if there is a relationship between them and if they tend to change in similar ways. When two things have a positive correlation, it means that when one increases, the other also tends to increase. On the other hand, a negative correlation means that when one thing increases, the other tends to decrease. If the correlation is close to zero, it means there isn't much of a connection between the two things.

Measures of correlation are completely devoid of any cause - effect implications. In other words, because two variables are correlated does not necessarily mean that one variable is causing the other to change. The correlation between Y and X for example can be estimated regardless of whether: i) *X* affects *Y* or *Y* affects *X*, ii) both affect each other, iii) neither affects the other; but they move together because some third variable influences both (Nwaobuokei, 1986). For example, consider a study that finds a negative correlation between exercise frequency and body weight. The data shows that as exercise frequency increases, body weight tends to decrease. However, it would be misleading to conclude that exercise causes weight loss. Other factors, such as diet, genetics, and lifestyle choices, can also influence body weight. It is possible that individuals who exercise more frequently also tend to have healthier eating habits or engage in other weight-reducing activities. Therefore, the observed correlation between exercise frequency and body weight does not necessarily imply a causal relationship.

In essence, correlation is a powerful tool in statistics and data analysis that allows medical researchers to uncover patterns and make informed decisions in various areas, like Disease Epidemiology , Genetic studies , Public Health Intervention, Drug Efficacy and Safety etc. By studying how things are related, researchers in the medical field can better understand the world around them and make more sense of the information they have on health related issues.

LINEAR, NON-LINEAR AND ZERO CORRELATION

Linear Correlation

In a linear correlation, there is a direct relationship between an independent variable, *X* and a dependent variable, Y and this relationship can be represented by a straight line on a graph. The independent variable is the one that we can control or manipulate, while the dependent variable is the one that we observe and measure its response to changes in the independent variable.

Non-linear Correlation

In a non-linear correlation, the relationship between the independent and dependent variables is not adequately represented by a straight line on a graph. Instead, the relationship may follow a curve or another non-linear pattern. The dependent variable's response to changes in the independent variable is not constant, and the relationship is more complex.

Zero Correlation or No correlation

Zero correlation exist when the independent and the dependent variables changes with no connection to each other**.** It indicates that there is no systematic or predictable relationship between the independent and dependent variables. In other words, changes in one variable do not lead to consistent changes in the other variable.

The illustrations of this type of correlation are shown in figures below.

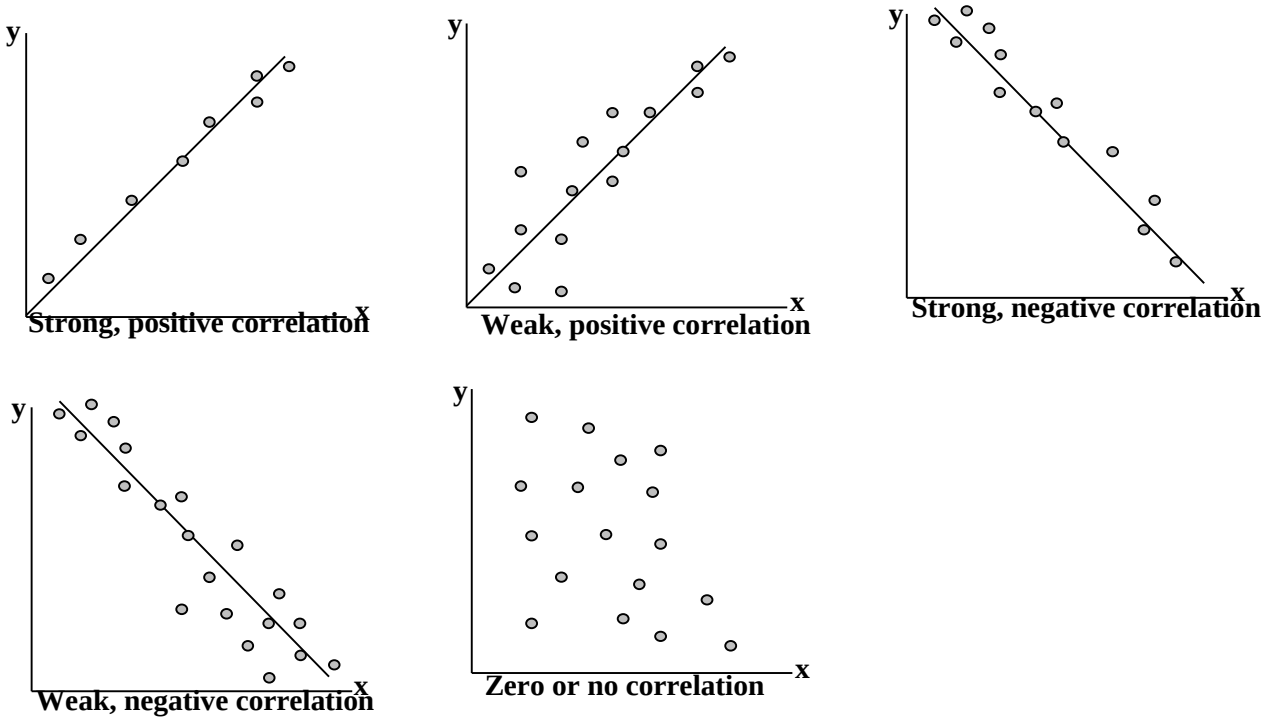


Fig. 1: Different types of correlation

MEASUREMENT OF CORRELATION: CORRELATION COEFFICIENT

Correlation between two variables can be measured. Correlation coefficient is a statistical number that tells us how strongly two variables or things are connected. It quantifies the strength and direction of linear or nonlinear relationship between two variables. The numerical value indicates how closely the two variables are related. The correlation coefficient is denoted by the symbol "r." (sample correlation coefficient) or by "R *or* ρ." (population correlation coefficient (unknown)). It can range from -1 to +1.

The correlation coefficient (r or R) measures the proximity between two variables. However, this paper acknowledges non-linear correlations, it predominantly focuses on linear correlation analysis, which is commonly utilized in the medical field. Specifically, the purpose of conducting

correlation analysis remains nearly identical in quantitative analytical studies, making it valuable for investigating the relationship between independent and dependent variables.

Interpretation of correlation coefficient

The measure of correlation coefficient (r or R) provides information on closeness of two variables. Irrespective of non-linear correlation, this paper mainly considers the linear correlation analysis as it is most likely applied in the medical field. Explicitly, the purpose of carrying out correlation analysis is almost the same in quantitative analytical studies, thus becoming useful to explore the association between independent and dependent variables. This paper, as an extension, attempts additionally to explain the usefulness of linear correlation coefficient between two variables in the medical field. Table 1 shows the different sizes of correlation coefficient and their respective interpretations.

Table1: The different sizes of correlation coefficient and their respective interpretations.

Sizes of correlation coefficient	Interpretations
+1.0	Perfect, positive correlation
+0.5 to +1.0	strong, positive correlation
0 to +0.5	weak , positive correlation
0	zero correlation
- 1.0	perfect , negative correlation
-0.5 to -1.0	strong, negative correlation
-1 .0 to -0.5	weak , negative correlation

For example correlation coefficients of 0.7, - 0.65 , -0.23 ,0.38 and 0.98*etc* are interpreted respectively as follow:

A correlation coefficient of 0.7 indicates a strong positive linear relationship or association between two variables. This means that when one variable increases, the other variable tends to increase as well. The closer the correlation coefficient is to +1, the stronger and more consistent the positive relationship.

On the other hand, **a correlation coefficient of -0.65** indicates a strong negative linear relationship between two variables. In this case, as one variable increases, the other variable tends to decrease. The closer the correlation coefficient is to -1, the stronger and more consistent the negative relationship.

When the **correlation coefficient is -0.23**, it suggests a weak negative linear relationship or association between the two variables. This means there is a negative association, but it's not as strong as in the previous example. The closer the correlation coefficient is to 0 (in this case, -0.23), the weaker the negative relationship.

For **correlation coefficients of 0.38 and 0.98**, they indicate moderate positive correlation and very strong positive correlation, respectively. A coefficient of 0.98 signifies a much stronger and more reliable correlation compared to the coefficient of 0.38.

PRACTICAL USE OF CORRELATION COEFFICIENT IN HEALTH RESEARCH

Studying the Connection between Immunization Rates and Disease Outbreaks
Epidemiologists often investigate the relationship between the percentage of people vaccinated against specific diseases and the occurrence of outbreaks. By calculating the correlation coefficient, they can determine if there is a significant link between lower vaccination rates and an increased risk of disease outbreaks.

Analyzing the Link between Smoking and Lung Function
Health researchers might examine whether smoking is associated with reduced lung function. They measure lung function through spirometer tests and record smoking habits of participants. The correlation coefficient helps assess if there's a connection between smoking and declining lung function.

Evaluating the Connection between Blood Pressure and Body Mass Index (BMI)
Researchers may investigate whether there is a relationship between a person's blood pressure and their BMI. They gather data from a group of individuals and use the correlation coefficient to determine if there is a significant link between these two variables.

Exploring the Relationship between Disease Incidence and Socioeconomic Factors
Epidemiologists frequently examine how socioeconomic factors (such as income, education, and access to healthcare) influence the occurrence of certain diseases in a population. By using the correlation coefficient, researchers can quantify the strength of the association between socioeconomic indicators and disease rates, revealing potential disparities and risk factors linked to specific health conditions.

Studying the Association between Sleep Duration and Stress Levels
Researchers interested in the effects of sleep on stress collect data on sleep duration (in hours) and participants' self-reported stress levels. The correlation coefficient helps determine if there's any relationship between sleep duration and stress.

As**sessing the Link between Alcohol Consumption and Liver Function**
Researchers focusing on liver health may investigate if there's a correlation between alcohol consumption and liver function markers (e.g., liver enzyme levels). The correlation coefficient helps determine if there's a relationship between alcohol intake and liver function.

Exploring the Relationship between Physical Activity and Mental Health
In this case, researchers seek to understand if there is an association between the amount of physical activity people engage in and their mental health scores. By collecting data on both factors and calculating the correlation coefficient, they can explore any potential connection.

Investigating the Relationship between Dietary Habits and Cholesterol Levels
In a study on heart health, researchers collect data on participants' dietary habits (e.g., daily intake of saturated fats) and their cholesterol levels. The correlation coefficient can reveal if certain dietary patterns are linked to higher or lower cholesterol levels.

Exploring the Connection between Socioeconomic Status and Access to Healthcare
In health equity research, investigators explore if there's a correlation between socioeconomic status (e.g., income, education level) and access to healthcare services. The correlation coefficient can reveal if individuals with higher socioeconomic status have better access to healthcare resources.

TYPES OF CORRELATION COEFFICIENT

There are two main types of correlation coefficients: Pearson's product-moment correlation coefficient and Spearman's rank correlation coefficient. The choice of which one to use depends on the nature of the variables being studied. This paper primarily considers the applications of Pearson's product moment Correlation in exploring the relationship between variables.

Pearson's Product-moment Correlation Coefficient

Pearson's product-moment correlation coefficient, symbolized as R for population parameter and r for sample statistic, is employed when both variables under investigation follow a normal distribution. This coefficient is influenced by extreme values, which can either amplify or diminish the strength of the relationship. Consequently, it is not appropriate to use when one or both variables are not normally distributed. To calculate the sample Pearson's correlation coefficient between variables *X* and *Y*, you can use the formula provided below:

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}$$

where,

n= Number of observations

x = Measures of Variable 1

y = Measures of Variable 2

Σxy = Sum of the product of respective variable measures

Σx= Sum of the measures of Variable 1

Σy= Sum of the measures of Variable 2

Σx^2= Sum of squared values of the measures of Variable 1

Σy^2= Sum of squared values of the measures of Variable 2

Based on the direction, the degree of correlative measure can be categorized as Positive, Zero or Negative correlation. Consider an example with data on **blood pressure** and **BMI** for a group of individuals. The data table is shown in Table 2. We want to use the correlation coefficient to determine if there is a significant link between the two variables - blood pressure and Body Mass Index (BMI) for the sample of 10 patients.

Table 2: Calculating Product Moment (r) using the raw data

Person n	Blood Pressure (mmHg) X	BMI (kg/m^2) Y	X^2	Y^2	XY
1	125	21.8	15625	475.24	2,725
2	130	23.5	16,900	552.25	3,055
3	110	19.6	12,100	384.16	2,156
4	135	25.2	18,225	635.04	3,402
5	128	22.8	16,384	519.84	2,918.4
6	120	20.5	14,400	420.25	2,460
7	140	26.3	19,600	691.69	3,682
8	115	18.9	13,225	357.21	2,173.5
9	138	27.0	19,044	729	3,726
10	122	21.2	14,884	449.44	2,586.4
	$\sum X = 1{,}263$	$\sum Y = 226.8$	$\sum X^2 = 160{,}387$	$\sum Y^2 = 5214.12$	$\sum XY = 28888.3$

We now apply the formula to the data in Table 2 as follow

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}$$

Substituting in the above formula, we obtain

$$r = \frac{10 \times 28888.3 - 1{,}263 \times 226.8}{\sqrt{[10 \times 160{,}387 - (1{,}263)^2][10 \times 5214.12 - (226.8)^2]}}$$

$$r = \frac{288883 - 286448.4}{\sqrt{[1{,}603{,}870 - 1{,}595{,}169][52{,}141.2 - 51{,}438.24]}} = \frac{2434.6}{\sqrt{[8{,}701] \times [702.96]}} = \frac{2434.6}{\sqrt{6116454.96}}$$

$$r = \frac{2434.6}{2473.147} = 0.98$$

The correlation coefficient (r) in this example is approximately 0.98 suggesting a strong, positive correlation between blood pressure and BMI. It means that individuals with higher BMIs tend to have higher blood pressure readings, and vice versa.

Let us consider another example with data on sleep duration and stress levels for a group of individuals. The data is tabulated in Table 3:

Table 3: Calculating Product Moment (r) using the raw data

Person	Sleep Duration (In hours)	Stress Levels (out of 10)			
n	X	Y	X^2	Y^2	XY
1	7	3	49	9	21
2	6	6	36	36	36
3	8	2	64	4	16
4	5	8	25	64	40
5	7	4	49	16	28
6	6	7	36	49	42
7	8	1	64	1	8
8	7	5	49	25	35
9	6	6	36	36	36
10	5	9	25	81	45
	$\sum X = 65$	$\sum Y = 51$	$\sum X^2 = 433$	$\sum Y^2 = 321$	$\sum XY = 307$

We apply the formula again to the data in Table 2 as follow

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}$$

Substituting in the above formula, we obtain

$$r = \frac{10 \times 307 - 65 \times 51}{\sqrt{[10 \times 433 - (65)^2][10 \times 321 - (51)^2]}}$$

$$r = \frac{3070 - 3315}{\sqrt{[4330 - 4225][3210 - 2601]}} = \frac{-245}{\sqrt{[105] \times [609]}} = \frac{-245}{\sqrt{63,945}} = \frac{-245}{252.87} = -0.97$$

In this case, the correlation coefficient (r) is approximately -0.97 suggesting a strong negative correlation between sleep duration and stress levels. It means that as the duration of sleep increases, the reported stress levels tend to decrease, and vice versa. The correlation coefficient further explains that individuals who sleep longer tend to report lower stress levels, and those who sleep less tend to report higher stress levels. However, remember that this is a simplified example for illustrative purposes, and in real-world scenarios, various other factors may also influence the relationship between sleep duration and stress levels. The negative correlation between sleep duration and stress levels can provide valuable insights to health professionals and researchers in understanding the potential impact of sleep on stress management and overall well-being. Nevertheless, additional research is necessary to draw definitive conclusions and consider other variables that could be affecting the relationship between sleep and stress.

Lastly, we consider the example with data on smoking habits and lung function for a group of individuals. The data table is tabulated in Table 4

Table 4: Calculating Product Moment correlation using raw data

Person	Number of Cigarettes Per Day	Lung Function (measured as FEV1, in liters)
1	0	3.2
2	10	2.8
3	5	3.0
4	15	2.5
5	20	2.3
6	8	2.9
7	2	3.4
8	12	2.6
9	4	3.1
10	6	3.0

In our example above, the correlation coefficient (r) when computed is approximately -0.932 which suggest that there is a strong negative correlation between the number of cigarettes smoked per day and lung function. It means that as the number of cigarettes smoked per day increases, the lung function tends to decrease, and vice versa .So, in this example, individuals who smoke more cigarettes per day tend to have lower lung function, and those who smoke fewer cigarettes per day tend to have higher lung function. This negative correlation indicates a potential detrimental effect of smoking on lung function.

However, it's essential to remember that this is a simplified example for illustrative purposes, and in real-world scenarios, other factors may also influence lung function. Smoking is a well-known risk factor for various lung diseases, including chronic obstructive pulmonary disease (COPD) and lung cancer. Therefore, this correlation highlights the importance of smoking cessation and preventive measures to maintain better lung health.

CONCLUSION AND RECOMMENDATIONS

It is evident from this study that correlation analysis proves to emerge as a valuable and indispensable tool in medical research. This statistical approach empowers researchers to identify and measure relationships between variables, offering critical insights into the connections among various medical factors. By examining correlations, medical researchers can gain a deeper understanding of potential links between risk factors, symptoms, treatments, and outcomes, ultimately leading to more informed decision-making and enhanced patient care. The true value of correlation analysis lies in its capacity to reveal patterns and trends that may not be immediately evident, thereby assisting in the development of hypotheses for further exploration.

Based on this, the following recommendations were made:

i) Governments should provide increased funding and support for medical research that utilizes correlation analysis. Sufficient financial resources enable researchers to conduct large-scale studies involving diverse populations, leading to more robust and applicable results. Such support can hasten progress in medical knowledge and ultimately contribute to improved public health outcomes.

ii) Medical researchers should employ correlation analysis at the outset. This preliminary approach allows them to gain early insights into potential relationships between different variables. These initial findings can guide the formulation of research hypotheses and steer subsequent analyses in the right direction.

iii) Governments and healthcare organizations should initiate public health awareness campaigns focusing on correlation analysis and its significance in medical research.

Educating the general public about this statistical method will enhance their understanding of how research findings influence healthcare practices. Additionally, encouraging public participation in medical studies and data collection initiatives will be fostered.

References

Brown, D., & Williams, C. (2022). Correlation analysis in public health: Linking social factors to health outcomes. *Public Health Review*, 15(1), 55-68.

Garson, G.D. (2008). *Correlation*. http//facaulty.chass.ncsu.edu/garson/PA765/ correl.htm#concepts

Johnson, B., & Brown, A. (2021). Predictive factors associated with treatment response in rheumatoid arthritis: A correlation analysis. *Journal of Rheumatology Research*, 7(3), 135-150.

Johnson, B., & Brown, D. (2023). Unraveling complex medical data: The significance of correlation analysis. *Medical Data Analysis Journal*, 45(4), 321-335.

Lee, E., & Chen, F. (2021). Exploring multiple factors with correlation analysis in medical studies. *Journal of Health Research*, 28(3), 201-215.

Li, J., Lu, W., Yang, Y., Xiang, R., Ling, Y., Yu, C., & Zhou, Y. (2023). Hybrid nanomaterials for cancer immune therapy. *Advanced Science, 10*(6), 2204932

Nwabuokei, P. O. (1986). *Fundamentals of Statistics*. Koruna Book

Smith, A., Johnson, B., & Williams, C. (2022). The importance of correlation analysis in medical research. *Journal of Medical Science*, 35(2), 123-135.

Smith, A., Johnson, B., & Williams, C. (2022). Correlation between risk factors and cardiovascular disease: A population-based study. *Journal of Cardiology*, 9(4), 210-224.

pp. 101-107 https://dx.doi.org/10.4314/johasam.v7i1.11

Determination of Fungi and Aflatoxins Levels in Unbranded Palm Oil Sold in Port Harcourt Metropolis

[1]Faith Chinasa Ahiakwo
faith_nwabueze@yahoo.com
+234 706 132 4330

[2]Asiton-A Asifamabia Dick
(Corresponding Author)
asiton-a.dick@portharcourtpoly.edu.ng
+234 806 413 1848

[1,2]science Laboratory Technology Department
Captain Elechi Amadi Polytechnic, Rumuola, Port Harcourt

Abstract

Fungi and aflatoxins levels in unbranded palm oils sold in Port Harcourt Metropolitan markets were determined. The samples were obtained from Mile 1 and Mile 3 Markets. The microbial analysis and aflatoxin concentration determination were done employing standard methods. The study revealed that the mean total heterotrophic fungal counts of palm oil obtained from Mile 1 and Mile 3 markets were 3.89 Log_{10}cfu/ml and 3.93 Log_{10}cfu/ml respectively. The fungi isolated and occurrence percentages are *Aspergillus flavus* (75 %); *Aspergillus fumigates* (50 %); *Aspergillus niger* (75 %); *Aspergillus parasiticus* (75 %); *Fusarium* spp. (50 %); *Mucor* spp. (25 %), and *Penicillium* spp. (50 %). The palm oil samples from Mile 1 Market 1 had the highest mean aflatoxin concentration of 4640.5 µg/L and Mile 3 Market 1 lowest mean aflatoxin concentration of 2179.5µg/L The fungal counts and aflatoxin concentrations exceed the permissible limit of 2×10^4 cfu/ml and 20 µg/kg respectively even as the organisms identified are capable of deteriorating oil quality and mycotoxins production. The oil samples investigated are not safe for human consumption based on the potential health risk involved. Regulatory agencies should ensure routine analysis of edible oils; more education and enlightenment of the processors is highly advocated while end users are strongly advised to heat the oil before consumption.

Keywords: Aflatoxin, Aspergillus, fungi, market, unbranded palm oil,

Introduction

Palm oil forms an important diet of most Nigeria homes. It is a good source of energy and vitamins with its unique flavour (Undiandeye & Otaraku, 2017). The quality of palm oil is a function of many factors like weather, soil, harvesting condition, storage and process of extraction (Davie & Vincent, 1980). There are reports that palm oil has become the world's most important edible oil since 2006 (Frank et al., 2013). However, palm oil is subject to deterioration and its consequence is very harmful to health. The quality of palm oil sold in many Nigerian markets has been a source of concern for many years. Olonrunfemi et al. (2014) investigated the quality of palm oil sold in major markets in Ibadan, Oyo State. The results were not pleasant. According to the report, aflatoxin contents exceeded permissible limits, indicating that the quality of palm oil in the sampled markets was poor. The study recommended the promotion of improved processing processes as well as good handling and storage practices. However, in their study to assess the quality of palm oil sold in major markets in Abia State, Udensi and Iroegbu (2007) showed that the quality of palm oil examined had properties that were within the standards recommended by Standard Organisation of Nigeria and Nigerian International Standard.

Unbranded vegetable oil (UVO), according to Chabiri et al. (2009), refers to the locally produced and laboratory extracted edible vegetable oil without branding. Food borne diseases are a critical public health problem and microbial contamination of food such as edible oil is the most common health risk. This problem is repeatedly observed in many edible oil market areas (Tesfaye et al., 2015). The number and type of microbes present on the products are important indicators of their

deterioration. Most commonly isolated genera of fungi include *Aspergillus flavus*, *Aspergillus niger*, *Mucor* spp., *Penicillium* spp. and *Rhizopus* spp. (Onawo & Adamu, 2018). The quality of palm oils may be affected by several factors, from the choice of raw material to the methods of processing, refining, bottling and storage (Shahidi, 2005). Therefore, appropriate control throughout the production chain is important to ensure the quality of vegetable oils delivered to food industries and final consumers. Oil quality and its stability are therefore very important for the consumers and in applications to industries (Wali et al., 2015).

Palm oils are majorly used for cooking, processing in the food industry and meeting dietary demands. Often times they are contaminated by mycotoxins and heavy metals (Ma et al., 2015). According to Yousif et al. (2010), ingestion of these contaminated materials could lead to liver, kidney or nervous system damage, immunosuppressant and carcinogenesis. Since the retailers and consumers in Mile 1 Market and Mile 3 Market are not aware of the existence of aflatoxins in edible oils, this study was undertaken to determine the fungi and aflatoxin levels in unbranded palm oil sold in two major Port Harcourt Metropolitan markets.

Materials and Methods

The study was carried out within Diobu axis of Port Harcourt metropolis where the two major markets are located. The two major and popular markets within Diobu, Mile 1 (Rumuwoji) Market and Mile 3 Market were selected for this study as they are prominent places where edible oil marketing processes takes place. The GPS coordinates of Mile 1 Market is Lattitude 4º471'.287376"N and Longitude 6º59'53.7756"E, while Mile 3 Market had coordinate of Latitude 4'48'8.0604"N and Longitude 6º59'27.3912"E.

Eight samples of the unbranded palm oil each were bought from the vendors in Mile 1 and Mile 3 markets, making a total of sixteen (16) samples. All the samples were collected in already labelled 100ml sterile bottles and transported to the Biology Department Laboratory, Ignatius Ajuru University of Education for microbiological (fungal) and aflatoxin analyses. Potato Dextrose Agar (PDA), prepared according to the manufacturer's instructions was used for the isolation and enumeration of total fungal counts after serial dilution up to 10^{-1} according to methods described by Ogbulie et al. (2001). Pure isolates were identified on the basis of their cultural, morphological and physiological characteristics. Slides of fungi were prepared in lactophenol cotton blue and examined microscopically (x40). Identification to species was done using the taxonomic keys provided by Watanabe (2020).

The Association of Analytical Chemists (AOAC) method (2008) was followed for the purification of aflatoxins from collected samples in brief: 250 ml of methanol-water (55-45) were added for each oil sample (50 g), then 50 mL 0.1 N HCl, were added to the mixture, blended and then centrifuged, then filtered through 24 cm whatman No. 1 filter paper. Fifty milliliters of the filtrates were transferred into a 250 mL separator; 50 mL 10% NaCl solution were added and swirled; 50 ml of hexane were added and gently shaken for 30 seconds. the separated lower aqueous layer phase was drained into another 250 mL separator; then extracted by 3-25 ml dichloromethane and were added to aqueous phase and shook vigorously for 30 seconds. Then the phases separated and the lower dichloromethane layer was drained, collected and evaporated on a boiling water bath to dryness. Derivatization hexane (200 mL) were added to extract and 50 mL Tri-Floro-Acetic acid (TFA) and mixed on a vortex for 30 seconds; allowed to stand for 5 minutes then 1.950 mL water – acetonitrile (9 + 1) was added. Mixed vigorously for 30 seconds and allowed layer to separate for 10 minutes; and lower layer of acetonitrile water phase was taken in vial for HPLC determination. High Pressure Liquid Chromatography (HPLC) aflatoxins were analysed at wavelength of 360 nm as described by Cora *et al*. (2005). The aflatoxin concentrations in the samples extract were determined and quantified by the retention time and peak areas respectively.

Quantification of the actual aflatoxin in µg/kg is based on the following formula:

Aflatoxin content (µg/kg) = S x Y x VW x Z

Where:

S = volume of standard with colour intensity as sample (µl)

Y = concentration of mycotoxin standard used in µg/ml

V = volume of solvent required to dilute sample contained in final extract

W = effective weight of original sample contained in final extract
Z = volume of spotted sample equivalent to standard (µl)
The data obtained from this study were subjected to statistical analysis (Analysis of Variance, ANOVA).

Results
The fungal load in palm oil samples obtained from the investigated markets in Port Harcourt metropolis are presented in Figure 1. The figure shows that palm oil from Mile 3 Market 2 had the highest mean fungal load of 3.99 Log_{10}cfu/ml while Mile 1 Market 1 had the lowest mean fungal load of 3.64 Log_{10}cfu/ml. The analysis of variance (ANOVA) at $p \leq 0.05$ of fungal counts indicates that there was a significant difference between the fungal counts from samples in Mile 1 and Mile 3 Markets.

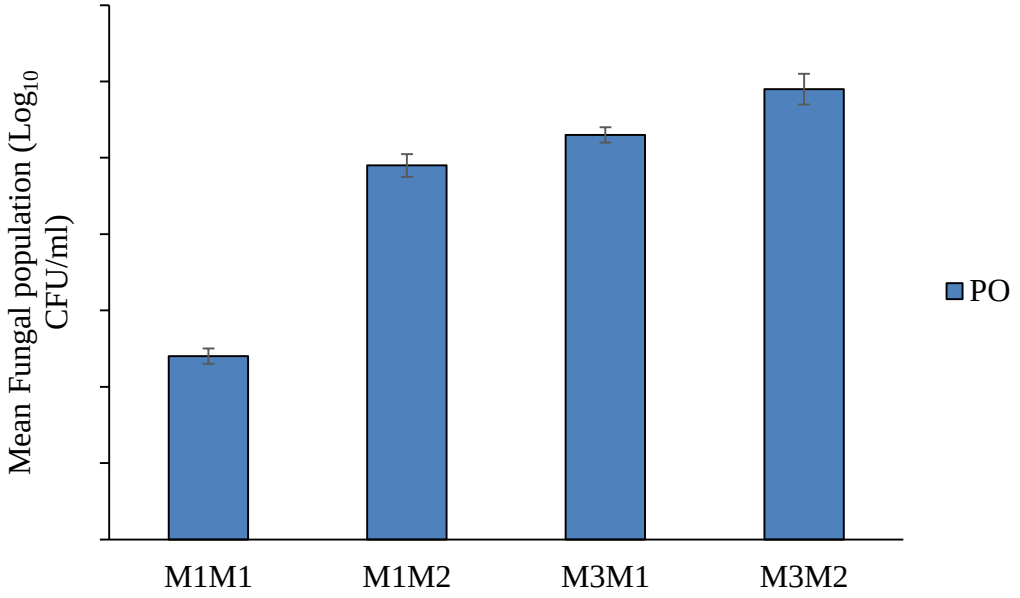


Figure 1 Fungal population in palm oil from investigated markets in Port Harcourt

Key:
PO: Palm oil
M1M1: Mile 1 Market 1 M1M2: Mile 1 Market 2 M3M1: Mile 3 Market 1
M3M2: Mile 3 Market 2

The fungi isolated and identified in the palm oils samples are presented in Table 1. They are *Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus niger*, *Aspergillus parasiticus*, *Fusarium* spp., *Mucor* spp., and *Penicillium* spp.

Table 1 Characterisation and identification of fungi isolated from obtained from Palm Oil Samples

Isolate Number	Colonial Description	Mycelial structure/ microscopic morphology	Spore formation	Organism identified
1.	Greenish mass with white edge, powdery and pin-head structure	Non-septate	Conidiophore	*Aspergillus flavus*
2.	Black velvety with	Septate	Conidiophore	*Aspergillus fumigatus*
3.	Black, powdery, Pin-head structures	Non-septate	Conidiophore	*Aspergillus niger*
4.	Dense Dark greenish	Non-septate	Conidiophore	*Aspergillus*

	mass			*parasitic* spp.
5.	Pinkish-white, fluffy (cottony)	Septate	Conidiophore	*Fusarium*
6.	Black and fluffy colony	Non- septate	Sporangio-phore	*Mucor* spp.
7.	Grayish, velvety, furrowed, brownish reverse (base)	Septate	Conidiophore	*Penicillium* spp.

The occurrence (detection) percentage of fungal isolates for palm oil from investigated markets in Port Harcourt is presented in Table 2. The table shows that the occurrence (detection) percentage for the palm oil samples are as follows: *Aspergillus flavus* (75 %); *Aspergillus fumigates* (50 %); *Aspergillus niger* (75 %); *Aspergillus parasiticus* (75 %); *Fusarium* spp. (50 %); *Mucor* spp. (25 %), and *Penicillium* spp. (50 %).

Table 2Detection of Fungal Isolates and Aflatoxin Concentration Levels in Palm Oil from Mile 1 and Mile 3 Markets in Port Harcourt Metropolis

Isolates	**Markets**				**%**
	M1M1	**M1M2**	**M3M1**	**M3M2**	
Occurrence					
Aspergillus flavus	present	present	ND	present	75
Aspergillus fumigatus	present	ND	ND	present	50
Aspergillus niger	ND	present	present	present	75
Aspergillus parasiticus	present	present	present	ND	75
Fusarium spp.	present	ND	ND	present	50
Mucor spp.	present	ND	ND	ND	25
Penicillium spp.	ND	ND	present	present	50

Key: ND Not Detected % Percentage

Aflatoxin concentrations in palm oil samples from the investigated markets in Port Harcourt metropolis are presented in Table 3. It shows that palm oil samples from Mile 1 Market 1 had the highest aflatoxin concentration of 4,640 µg/L while Mile 3 Market 1 had the lowest concentration of 2179.5 µg/L. The analysis of variance (ANOVA) at $p \leq 0.05$ of aflatoxin concentration indicates that there was significant difference between the aflatoxin concentration from samples in Mile 1 and Mile 3 Markets.

Table 3: Aflatoxin Concentration Levels in Palm Oil Samples from Selected Markets in Port Harcourt

Market	**Aflatoxin Concentration (µg/L)**
	Mean
M1M1	4640.5
M1M2	3395.0
M3M1	2179.5
M3M2	2511.0

Key: M1M1: Mile 1 Market 1 M1M2: Mile 1 Market 2
M3M1: Mile 3 Market 1 M3M2: Mile 3 Market 2

Discussion

One key constraint to optimally consuming edible oil within the sub-tropical region is fungi infestation and resultant mycotoxin contamination (Flora et al., 2018). The focus of this study was to determine the fungi and aflatoxins level in unbranded palm oils sold in two major markets in Diobu Area of Port Harcourt metropolis.

The study reveals that for the palm oil analysis, 3.89 Log_{10}cfu/ml (7.65×10^3cfu/ml) and 3.93 Log_{10}cfu/ml (8.55×10^3cfu/ml) were the highest total heterotrophic fungi count for Mile 1 Market 2 and Mile 3 Market 1 respectively. The counts were generally above the permissible limit of 2×10^4 cfu/ml as recommended by SON (2000) for edible oils. However, Odoh et al. (2017) reported mean mould count ranging from 3.18×10^4 cfu/ml - 4.56×10^4 cfu/ml for palm oil samples analysed. The variation in the fungi count could be attributed to difference in time of sample collection, quality of each sample based on the producers, storage and packaging conditions. Okwelle and Nwabueze (2020) noted that differences in fungi counts of oil samples could be attributed to the fungi species unable to metabolise oil effectively.

The study further revealed that both palm oil samples obtained from Mile 1 and Mile 3 Markets recorded reasonable number of fungi genera. The fungi isolated included *Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus niger*, *Aspergillus parasiticus*, *Fusarium* spp., *Mucor* spp. and *Penicillium* spp. Odoh et al. (2017) had reported *Aspergillus* sp., *Fusarium* sp. and *Mucor* sp. while Tesfaye et al. (2015) isolated *Penicillium chrysogenum*, *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus fumigatus*, *Fusarium* spp. and *Mucor* spp. from locally produced oils. The prevalence of these organisms is a reflection of the poor conditions of the markets and the unhygienic practices adopted by the processors and vendors (Okwelle & Nwabueze, 2020). The specific identification of *Aspergillus* species, especially showing 75 % occurrence in the oils is noteworthy; this is because CDC (2006) has noted that they are known to release Aflatoxin B1, B2, G1 and G2 when involved in studies *in vitro*.

Also, the presence of *Penicillium* and *Fusarium* in oils likely suggests that contamination of several mycotoxin is a possibility (Abdul et al., 2017). Odoh et al. (2017) opined that these fungi (moulds) are believed to facilitate the quick deterioration of edible oil such as palm oil and produce toxin (aflatoxin) that could cause health challenges when eventually taken in by consumers; also, these fungi can remain viable in palm oil as they produce lipase enzyme, form spores which therefore make them resistant to heat, either when cooking or ultra-violet radiation exposure, hence becomes threat to life of the consumers (Ekwenye, 2005; Enemour et al., 2012).

The study confirms that aflatoxins are in some of the samples analysed. Palm oil samples from Mile 1 Market 1 showed the highest mean aflatoxin concentration while Mile 3 Market 1 had the lowest mean aflatoxin. According to Ezekiel et al. (2013), in Nigeria, the regulatory authority, National Agency for Food Drugs Administration and Control (NAFDAC) has set the maximum permissible limit of 20 µg/kg for total aflatoxins in all food that should be consumed by humans, which the aflatoxin values in this study far exceeds.

The aflatoxin concentrations values obtained in this study were also above the 1.23-6.87 ng/g reported by Undiandeye and Otaraku (2017) for palm oils marketed at Oil Mill Market, Port Harcourt. With reference to aflatoxin concentration levels in this study, Salau et al. (2017) stated that due to scanty information about aflatoxins in oils consumed in the country, this verity of the risk to human health as result of the continuous consumption of contaminated oil is unidentified. The high aflatoxin concentration indicates the presence of highly toxic fungi and therefore requires the adoption of appropriate measures during collection of the seeds, processing and good storage practice before and during sales.

Conclusion and Recommendations

The study concluded that the fungi counts obtained were above the permissible limit of 2×10^4 cfu/ml for edible oils. The high counts could result to potential hazards to the final consumers. The fungal species are capable of deteriorating oil quality and the production of mycotoxins which is harmful to human health. The aflatoxin level observed in this study are very high and exceed the maximum permissible limit of 20 µg/kg as recommended by NAFDAC, although, the samples from Mile 1 Market 1 and Mile 3 Market 2 had no aflatoxin. It is feasible to minimise microbial contamination by

adequate education and enlightenment of the producers and marketers of palm oil. Thereafter, there should be application of good manufacturing practice (GMP) and hazards analysis critical control points (HACCP). Regulatory agencies in the country should monitor production as well as dispensing points in these open markets.

References

Abdul, H. A. N., Mutalib, S. A., & Ibrahim, N. A. (2017). Natural occurrence of fungi and aflatoxins of palm kernel cake in Malaysia: A Preliminary Study. *Journal of Food Science and Quality Management*, *3*(5): 554-558.

AOAC (2008). Official Methods of Analysis of Association of Official Analytical Chemists. 19th Edition. Gaithersburg, MD, USA.

CDC (2006). Outbreak of Aflatoxicosis in some parts of Africa". *International Journal of Center for Disease Control, Atlanta Georgia, 7*(5): 346-352.

Chabiri, S. A., Hati, S. S., Dimari, G. A., & Ogugbuaja, V. O. (2009). Comparative Quality Assessment of Branded and Unbranded Edible Vegetable Oils in Nigeria. *The Pacific Journal of Science and Technology*, *10*(2): 927-934.

Cora, I. B., Angre, D., & Ronald, E. M. (2005). *Separation of aflatoxins by HPLC application Agilent Technology Publication 5989-3634EN*. www.agilent.com/chem. downloaded 16/8/2008.

Davie, J., & Vincent, W., (1980). *Extraction of vegetable oil and fats. Chemistry and technology*. Applied Science Publishers.

Ekwenye, U. N. (2005). *Chemical changes in palm oil.* Willey.

Enemuor, S. C., Adegoke, S. A., Haruna, A. O., & Oguntibeju, O. O. (2012). Environmental and fungal contamination of palm oil sold in Anyigba Market, Nigeria. *African Journal of Microbiology Research*, *6*(7), 2740-2747.

Flora, O., Oluyemisi, O. E., Olateju, K. S., Mobolaji, O. A., & Adelodun, K. L. (2018). Extent of microbial contamination of refined and unrefined vegetable oils sold in South West Nigeria. *Turkish Journal of Agriculture, Food Science and Technology*, *6*(4), 390-400.

Frank, N. G., Albert, M. E., & Astride, E. M. (2013). Some quality parameters of crude palm oil from major markets of Douala, Cameroon. *African Journal of Food Sciences*, *7*(2), 473-478.

Mai, F., Wu, R., & Yu, L. (2015). Analytical approaches for measuring pesticides, mycotoxins and heavy metals in vegetable oils: A Review. *European Journal of Lipid Science and Technology*, *18*(3), 339-352.

Odoh, C. K., Amapu, T. Y., Orjiakor, I. P., Martins, P. E., Seibai, B. T., Akpi, U. K., & Ugwu, C. S. (2017). Assessment of mold contamination and physicochemical properties of crude palm oil sold in Jos, Nigeria. *Food Science and Nutrition, 5*(2): 300-316.

Ogbulie, J. N., Uwaezuoke, J. C., & Ogiehor, S. I. (2001). *Introductory Microbiology Practicals* (2nd Edition). Concave Publishers, Owerri, Nigeria. pp108-113.

Okwelle, A. A., & Nwabueze, F. C. (2020). Microbiological Quality Assessment of Unbranded groundnut oil sold in major Markets in Port Harcourt City, Rivers State, Nigeria. *International Journal of Current Microbiology and Applied Science*, *9*(5): 2964-2974.

Olorunfemi, M. F., Oyebanji, A. O., Awoite, T. M., Agboola, A. A., Oyelakin, M. O., Alimi, J. P., & Ikotun, I. O. (2014). Quality assessment of palm oil on sale in major markets of Ibadan, Nigeria. *International Journal of Food Research, 7*(5), 8-15.

Onawo, A. S., & Adamu, M. O. (2018). Microbiological profile and quality assessment of unbranded groundnut oil marketed as a major city in Nigeria, Sub-Saharan Africa. *Invention Journal of Research Technology in Engineering and Management*, *2*(1): 36-43.

Shahidi, F. (2005). Bailey's Industrial Oil and Fat Products. New Jersy: John Wiley Sons.

SON (2000). Standards for edible refined palm oil and its processed form. *Journal of Standard Organization of Nigeria, 6*(6), 2-5.

Tesfaye, L., Sahile, S., & Madhusudhan, A. (2015). Microbial quality and chemical characteristics and evaluation of edible oil sold at Gondar town markets, North West Ethiopia. *International Journal of Modern Chemistry and Applied Science, 2*(4): 238-257.

Udensi, E. A., &Iroegbu F. C (2007). Quality assessment of palm oil sold in major markets in Abia State, Nigeria. *Journal of Agro science, 6*(2), 25-27.

Undiandeye, J. A., & Otaraku, I. J. (2017). Determination of the aflatoxin levels in palm oil sold in oil mill market, Port Harcourt. *International Journal of Innovative Research and Advanced Studies, 4*(3), 29-41.

Watanabe, T. (2002). *Pictorial atlas of soil and seed fungi: Morphologies of cultures fungi and key to species*. CRC Press.

Yousif, M. A., Idrisa, A., & Abdalbasit, A. (2010). Determination of aflatoxin levels in Sudanese. *Chemistry Education Research and Practices, 6*(5), 4-7.

pp. 108-115 https://dx.doi.org/10.4314/johasam.v7i1.12

Health and Environmental Problems Associated with Water Pollution in Gokana Local Government Area of Rivers State

Aduadua Bennett Offor
adusbennett11@gmail.com
Department of Human Kinetics, Health and Safety Studies
Ignatius Ajuru University of Education Port Harcourt
&
Promise Bariaara James
jamesbariaarapromise@gmail.com
Department of Human Kinetics, Health and Safety Studies
Ignatius Ajuru University of Education Port Harcourt

Abstract

This study identifies the health and environmental problems associated with water pollution in Gokana Local Government Area of Rivers State. The area of the study was Gokana which is one the Local Government Areas in Rivers State, Nigeria. A descriptive survey design was adopted for the study with the population of 435,682 persons used for the study. A sample size of 250 individuals was used for the study. A two-stage sampling procedure was adopted to select the sample of this study. The questionnaire was designed by the researcher titled "Health and Environmental Problems Associated with Water Pollution Questionnaire (HEPWPQ)". The reliability of the validated instrument was obtained using Pearson Product Moment Correlation and the coefficient value of 0.78. Collected data was analyze using SPSS version 25. The result showed that physical health problems such as bacteria and viral parasitic were associated with water pollution (X=3.54, SD =0.73) in Gokana Local Government Area of Rivers State. The result also depicted that mental health problems such as brain malfunction, depression, aresenicosis (X=2.97, SD=0.84) were associated with exposure to water pollution in Gokana Local Government Area of Rivers State. The result illustrated that social health problems such as discrimination, self-isolation, sociopathic (X=2.57, SD=0.96) form arsenicosis were associated with water pollution in Gokana Local Government Area of Rivers State. The result also indicated that environmental problems such as burning of toxic waste, indiscriminate dumping of waste, excessive cultivation, flooding, and urbanization (X=3.29, SD=0.83) were associated with water pollution in Gokana Local Government Area of Rivers State. Considering the findings of this study, it was concluded that health and environmental problems are strongly associated with water pollution leading to physical, social and mental health problems. Hence, the need to control indiscriminate disposition of solid waste and other particulates in the water bodies.

Keywords: health, environmental problems, water pollution.

Introduction

The impact of water pollution is one major devastating contributing factor to environmental problems in Nigeria; Rivers State is one of the states in Nigeria that are seriously suffering from the menace of Water pollution on the environment. Many people dump garbage onto streams, lakes, rivers and seas, thus, making water bodies the final resting place of cans, bottle, plastics and other household products. Human infectious diseases are among the most serious effects of water pollution, especially in developing countries, where sanitation may be inadequate or non-existent. Water pollution is as a result of many anthropogenic pollutants that contaminate the water. Water pollution is a chemical, physical or biological change in the quality of water that has a harmful effect on any living thing that drinks or uses or lives in it. Health officials emphasize the importance of drinking water at least eight glasses of drinking water to maintain good health (WHO, 2004). Water borne diseases occur when parasite or other micro-organisms contaminate water particularly from pathogens originating from excreta of human and animal. Some disease conditions that result include typhoid fever, intestine parasite or intestine worm infection, cholera, dysentery, diarrhea which are from bacterial or virus source. The most serious parasite disease caused by water (H_2O) pollution are amoebiasis, giardiasis, ascariasis, hookworm, stomach grape, aches, cholera, hepatitis, raches, pink eyes, dysentery among

others (Ansari & Akhmatov, 2020). The Central Pollution Control Board (CPCB) is the national apex body for assessment, monitoring and control of water pollution. It advises the central government on all matters concerning the prevention and control of water pollution and provides technical services to the ministry of environment for implementing the provision of the environment (protection) Act 1986.

Michael (2010) defined Water pollution as the introduction by man, directly or indirectly, of substances or energy into the marine (Water) environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to Water activities, including fishing, impairment of quality use of water and reduction of amenities.

Water is one of the natural resources that constitute the environment. And according to Eheazu (2016), the natural environment of man on planet earth is segmented into four spheres; namely, the atmosphere (made up of gaseous layers), the hydrosphere (water, including waters and rivers); the lithosphere (soil of the Earth crust, with underlying minerals), and the biosphere (containing living organisms like man, plants and animals). Water (H_2O) is a liquid at standard ambient temperature and pressure, but it often co-exists on earth with its solid state, ice, and gaseous state steam (water pollution). In summary, Eheazu (2016) sees the human environment as consisting of all the external factors and forces with which individuals interact from conception to the grave. This tells us that humans interact greatly with their environment. However, the four systems are in constant change and such changes are affected by human activities (Kumarasany et al., 2004). Human beings are the causes of pollution due to their various activities carried out on the environment. In short, to prevent pollution in the environment particularly Water pollution, it is primarily necessary to educate human beings. Environmental adult education can be used as a powerful tool in this context.

Michael (2010) defined environment as the sum of all living and non-living things that surround an organism or group of organisms. The word environment simply connotes factors and conditions that have some impacts on growth and development of certain organisms. It includes both biotic and abiotic factors that have influence on observed organism. Abiotic factor such as light temperature, water, atmosphere, gases combined with biotic factors (all surrounding species).

One of the major problems in Nigeria today is linked with the environment. Excessive cultivation has resulted in less of soil fertility. The environment is considered unhealthy when it habours those factors that are injurious to human body and over those which the individual has little control of. The burning of toxic waste and urban water pollution are problems in most developed areas. In some cases, heaps of rubbish announce the approaching city with half of the highway ridiculously engage with refuse (Chowdhary et al., 2020). Nigerian cities for example Gokana Local Government Area of Rivers State are getting dirtier everyday and that refuse dumps have become the city trade mark which low sensitization, block drainage system, non-implementation of sanitation law leave dirty surrounding more offensive, terrifying remarkably to our poor appreciation of the importance of basic hygiene.

Pollution has been a fact of life for many centuries, but it becomes a real problem since the start of the industrial revolution. According to Odibo (2005), pollution is the contamination of the physical and biological compound of the earth/atmosphere processes which are adversely affected. Russel (2002) sees pollution as was what takes place when the environment cannot process and neutralize harmful by-products of human activities (for example, poisonous gas emission) in due course without any functional or structured damage to its system. Development of natural sciences led to their better understanding of negative effects produced by pollution in the environment. Environmental pollution is a problem both in developed and developing countries (Bessong et al., 2009).

Factors such as population growth and urbanization invariably place greater demands on the planet and stretch the use of natural resources to the maximum. In this part of the country, Gokana Local Government Area of Rivers State for example, as civilization progresses, the need for clean environment become necessary. Water pollution is of major concern to man because of the effects associated with them. Our environment is faced with a lot of pollution because people never cared about the effects it has on their health.

World Health Organization (2019) defined health as a state of complete physical, mental and social wellbeing and not merely the absence of diseases or infirmities. Water pollution is causing a lot of havoc not only on humans but also animals, driving many animal species to extinction. We should

apply a holistic view of nature, the nature is us, we are an inalienable part of it, and we should care for it in the most appropriate manner.

According to Achalu (2004), pollution is the introduction of contaminant into a natural environment that causes instability, disorder, harm or discomfort to the ecosystem i.e. physical system or living organism - pollution can take the form of chemical substances or energy such as noise, heat, or light pollutants, the elements of pollution can be foreign substances or non-point. A pollutant is a waste that pollutes air, soil, or water. Three factors determine the severity of a pollutant. Its chemical nature, the concentration and the persistence, any use of natural resources at a rate higher than nature's capacity to restore itself can result in pollution of air, water and land (Russel, 2002). Achalu (2004) defined pollution as the introduction of contaminant into a natural environment that causes instability, disorder, harm or discomfort to the ecosystem i.e. physical system or living organism – pollution can take the form of chemical substances or energy such as noise, heat, or light pollutants, the elements of pollution can be foreign substances or non-point. A pollutant is a waste that pollutes air, soil, or water. Three factors determine the severity of a pollutant. Its chemical nature, the concentration and the persistence, any use of natural resources at a rate higher than natures capacity to restore itself can result in pollution of air, water and land. Pollution has a detrimental effect on any living organism in an environment making it virtually impossible to sustain life. It can be asserted that it is essential that environmental health conditions of people be properly safeguard to avoid untimely death. Our environment needs to be kept clean and government should try and create a central dumping site to refuse.

In Gokana Local Government Area of Rivers State, the occupational activities of the adults are mainly fishing and farming. It was observed that most fishermen make use of dynamite which contain chemicals to kill fish for human consumption have contributed to several health problems. Also, water pollution was traceable to oil spillage due to pipeline vandalization and oil theft, indiscriminate dumping of solid waste and sewage disposal constitute physical and environmental problems. The effective role of environmental adult education will help the adults to adopt environmentally friendly methods to mitigate the menace of water pollution and bring about sustainable fishing practices as well as sustainable development. Therefore, the researcher deemed it necessary to investigate health and environmental problems associated with water pollution in Gokana Local Government Area of Rivers State.

Research Questions

1. What are the physical health problems associated with water pollution in Gokana Local Government Area of Rivers State?
2. What are the mental health problems associated with water pollution in Gokana Local Government Area of Rivers State?
3. What are the social health problems associated with water pollution in Gokana Local Government Area of Rivers State?
4. What are the environmental problems associated with water pollution in Gokana Local Government Area of Rivers State?

Methodology

Study setting: The area of this study is Gokana Local Government Area of Rivers State which comprised 17 communities and 17 political wards.

Study design: Cross sectional survey design was adopted.

Population of the study: The Local Government has an estimated population of about 435,682 persons (National Population Commission, 2016 projection of 2021).

Sample and Sampling Techniques: A sample size of 250 individuals was used for the study. The stratified and simple random sampling technique was used. The first stage was the use of stratified random sampling technique to select ten communities in Gokana Local Government Area of Rivers State. The second stage involves using simple random sampling technique to select 25 respondents from each of the communities selected for the study.

Instrument for Data Collection: The questionnaire was designed by the researcher titled Health and Environmental Problems Associated with Water Pollution Questionnaire (HEPWPQ). **Reliability of the Instrument**

In other to ascertain the reliability co-efficient of the instrument, the instruments retrieved from the field testing were sorted and tested for reliability of instrument. The test-re-test approach was carried out in Khana Local Government Area of Rivers State. The research instrument was administered to 20 respondents, they earnestly responded to the instrument and after two weeks, the research instruments were re-administered to the same respondents. Khana Local Government Area was chosen by the researchers because they have similar characteristics like (culture, occupation, language etc) with Gokana Local Government Area. The reliability of the instrument was obtained using Pearson Product Moment Correlation and the coefficient value of 0.78.

Method of Data analysis

Collected data were coded and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Percentage was used to analyzed socio-demographic data while mean and standard deviation with the criterion mean value of 2.5 for research questions.

Results

Research Question 1: What are the physical health problems associated with water pollution in Gokana Local Government Area of Rivers State?

Table 1: Descriptive Analysis of physical health problems associated with water pollution in Gokana Local Government Area of Rivers State.

S/N	ITEMS	SA	A	D	SD	Mean	St. D.
	Physical health problems associated with water pollution						
1.	Bacterial Diseases is a Physical Health Problems.	164	60	6	20	3.47	0.88
2.	Viral Diseases is one of the Physical Health Problems.	125	110	7	8	3.87	0.66
3.	Parasitic Diseases is a Physical Health Problems.	130	107	13	0	3.45	0.59
4.	Swimming in polluted water result to health problem like cancer, reproductive problems, typhoid and stomach sickness in humans.	139	91	17	3	3.46	0.67
5.	Oil spill in the water causes water animals to die when encountered it.	154	66	17	13	3.44	0.84
Grand Mean						**3.54**	**0.73**

Table 1 describes the descriptive analysis of physical health problems associated with water pollution in Gokana Local Government Area of Rivers State. From the table above, item 7 (viral Diseases is one of the Physical Health Problems) has the highest mean (3.87) and standard deviation (0.66). The item with the least mean (3.45) and standard deviation (0.59) was item 8 (Parasitic Diseases is a Physical Health Problems). Since the grand mean (3.54) and standard deviation (0.73) is greater than the critical value of 2.50, then we agree that the physical health problems such bacteria, viral parasitic and oil spilled are associated with water pollution in Gokana Local Government Area of Rivers State.

Research Question 2: What are the mental health problems associated with water pollution in Gokana Local Government Area of Rivers State?

Table 2: Descriptive Analysis of mental health problems associated with water pollution in Gokana Local Government Area of Rivers State.

S/N	ITEMS	SA	A	D	SD	Mean	St. D.
	Mental health problems associated with water pollution						
1.	Malfunction of the brain is one of the Mental Health problems.	199	199	12	0	3.43	0.58
2.	Drinking arsenic contaminated water directly affect the probability of depression.	47	112	82	9	2.78	0.78
3.	Arsenicosis is a mental health sickness.	68	97	34	51	2.72	1.07
4.	A person affected by arsenicosis do fall sick.	60	99	62	29	2.70	0.95
5.	Having a symptom of arsenicosis can make one worry about his/her health.	112	94	35	9	3.24	0.82
Grand Mean						**2.97**	**0.84**

Table 2 portrays the descriptive analysis of mental health problems associated with water pollution in Gokana Local Government Area of Rivers State. From the table above, item 11(Malfunction of the brain is one of the Mental Health problems) has the highest mean (3.43) and standard deviation (0.58). The item with the least mean (2.70) and standard deviation (0.95) was item 14 (A person affected by arsenicosis do fall sick.). Meanwhile, grand mean (2.97) and standard deviation (0.84) is greater than the critical value of 2.50, hence we conclude that mental health problems such as malfunction, drinking, arsenicosis are associated with water pollution in Gokana Local Government Area of Rivers State.

Research Question 3: What are the social health problems associated with water pollution in Gokana Local Government Area of Rivers State?

Table 3: Descriptive Analysis of social health problems associated with water pollution in Gokana Local Government Area of Rivers State.

S/N	ITEMS	SA	A	D	SD	Mean	St. D.
	Social health problems association with water pollution						
	Discrimination is one of the social health problems.	111	98	24	17	3.21	0.87
	Arsenicosis patients are not allow to join people in the public or been isolated.	44	32	107	67	2.21	1.03
	An individual suffering from social health problems will be afraid to go to school and church.	46	42	63	99	2.14	1.13
	Arsenicosis may be contacted if living with a person suffering from it.	22	60	101	67	2.15	0.91
	Arsenic affects individual socially leading to sociopathic.	107	91	39	13	3.16	0.87
	Grand Mean					**2.57**	**0.96**

Table 3 explained the descriptive analysis of social health problems associated with water pollution in Gokana Local Government Area of Rivers State. From the table above, item 16 (discrimination is one of the social health problems.) has the highest mean (3.21) and standard deviation (0.87). The item with the least mean (2.14) and standard deviation (1.13) was item 18 (An individual suffering from social health problems will be afraid to go to school and church). Given that the grand mean (2.57) and standard deviation (0.96) is greater than the critical value of 2.50, then we agree that the social

health problems such as discrimination, arsenic and arsenicosis are associated with water pollution in Gokana Local Government Area of Rivers State.

Research Question 4: What are the environmental problems associated with water pollution in Gokana Local Government Area of Rivers State?

Table 4: Descriptive Analysis of environmental problems associated with water pollution in Gokana Local Government Area of Rivers State

S/N	items	SA	A	D	SD	Mean	St. Dev.
	Environmental problems associated with water pollution						
	Burning of toxic waste and urban pollution is an environmental problems associated with water pollution.	136	83	23	18	3.27	0.90
	Less in soil fertility is a result of excessive cultivation.	136	96	4	14	3.41	0.78
	Population growth and urbanization is an environmental problems associated with water pollution.	73	109	23	45	2.84	1.04
	Water pollution affects the economy and contribute to degradation of the environment.	143	93	7	7	3.49	0.69
	Flooding due to the accumulation of solid waste and soil erosion an environmental problem.	135	96	8	11	3.42	0.76
	Grand Mean					**3.29**	**0.83**

Table 4 showed the descriptive analysis of environmental problems associated with water pollution in Gokana Local Government Area of Rivers State. From the table above, item 23(Population growth and urbanization is an environmental problem associated with water pollution.) has the highest mean (3.84) and standard deviation (1.04). The item with the least mean (3.27) and standard deviation (0.90) was item 21 (Burning of toxic waste and urban pollution is an environmental problem associated with water pollution). In view of the fact that the grand mean (3.29) and standard deviation (0.83) is greater than the critical value of 2.50, then we agree that the environmental problems associated with water pollution in Gokana Local Government Area of Rivers State.

Discussion of Findings

The result of this study in table 2 indicated that the grand mean (3.54) and standard deviation (0.73) is greater than the critical value of 2.50, then it was agreed that the physical health problems such bacteria, viral parasitic and oil spilled are associated with water pollution in Gokana Local Government Area of Rivers State. the result of this study is in credence with report of World Health Organization (2015) that the major cause of physical health problems are water pollution which affect the health status of the population resulting into millions of death of children and adults. The result of this study is in agreement with Chowdhary et al. (2020) that thousands to millions of people dead daily and yearly from contraction of water borne infections caused by availability of water pollutants. Mondal (2015) added that physical health problems such as dysentery, diarrhea, cholera, salmonellosis, schistosomiasis, among others are caused by water infections. Marisa and Carl (2012) affirmed that several physical health challenges such as microbial infections are traceable to water pollution that may cause death of the population. It is plausible because water pollution is a major cause water-borne infections that causes millions of deaths of the population. As of the time of this study, there was contrary findings that were not in consonance with the present study.

The grand mean (2.97) and standard deviation (0.84) is greater than the critical value of 2.50, hence it was concluded that mental health problems such as malfunction, drinking, arsenicosis are associated

with water pollution in Gokana Local Government Area of Rivers State. The result of this study was expected because water pollution can cause water borne infections that affect the health status of population. The result of this study is in credence with report of United Nation Environmental Programme (2006) that water pollution occurs as a result of introduction of pollutants through man's activities that affect the health status of workers such as mental health problems and others. The result of this study is in corroboration with findings of Ansari and Akhmatov (2020) which revealed that water pollution has been the major of death aquatic animals and ill-health in human. Isaiah (2012) and Pitt et al. (2012) whose studies buttressed that the effect of water pollution to human being was nervous system disorder leading to morbidity and mortality increase among the population. Previously, Ansari and Akhmatov (2020) and Chen (2019) added that water pollution had contributed several health care problems to population among which are mental health problems. It is possible that water pollution is one of the environmental problems that cause deleterious and adverse effects to human especially poor health status.

The grand mean (2.57) and standard deviation (0.96) is greater than the critical value of 2.50, then it was agreed that the social health problems such as discrimination, arsenic and arsenicosis are associated with water pollution in Gokana Local Government Area of Rivers State. The result of this study is required because open dumping and indiscriminate disposal of waste in the environment does not only cause physical implication but affect the social well-being of the environment. The result of this study is in line with Ansari and Akhmatov (2020) that offensive smell from domestic and solid waste affect the beautification of the environment causing poor health status. Isaiah (2012) which indicated that poor disposal of domestic waste cause the environment to be ugly and pose offensive smell to the environment thereby affect social well-being. Okunniyi (2004) affirmed that indiscriminate dumping of solid waste and other chemical pollutants in the environment are very offensive to the population and leads to health problems.

The grand mean (3.29) and standard deviation (0.83) is greater than the critical value of 2.50, then it was agreed that the environmental problems associated with water pollution in Gokana Local Government Area of Rivers State. The result of this study is required because water pollution is one of the major environmental problems that are adverse and deleterious to human and others organisms. The result of this study is in line with Mondal (2015) which revealed that pollutants such as herbicides, fertilizers, manures, and other hazardous chemicals cause water pollution that affect the environment. Afroz et al. (2017) buttressed that the major problem in the environment is the release of pollutants and particulates into the water bodies and waste disposal Safari et al. (2014) and Marisa and Carl (2012) whose studies affirmed that the contamination of water such as water pollution constitute adverse effects to human beings. Anderson and Fenger (2003) added that water pollution constitutes a major environmental problem that affects plants and animals including human being. It is possible because water is part of the environment that are affected impurities and particulates leading to reduction of qualities of water. Once water bodies are affected by pollutants the environment is also affected.

Conclusion

Considering the findings of this study, it was concluded that health and environmental problems are strongly associated with water pollution leading to physical, social and mental health problems, hence the need to control indiscriminate disposition of solid waste and other particulates in the water bodies.

Recommendations

1. Government should make laws against indiscriminate disposal of waste in the water bodies as a means of controlling water pollution.
2. Government and non-governmental organization should launch a campaign and awareness programme to the population on the consequences of dumping waste in the water environment.
3. Government should make provision of waste disposal equipment and facilities to the pollution to reduce improper disposal of solid waste and other forms of waste.
4. Individual and communities should desist from dumping waste into the water bodies as it would cause impure water affecting the source of drinking water.

5. Families should ensure that borehole facility should constructed at 6 metres away from the sewage tank prevent pollution of underground water.

References

Achalu, O. E., & Achalu, E. I. (2004). *Environmental health and pollution control.* Splendid.

Afroz, R., Rahman, A., & Rahman, A. (2017). Health impact of river water pollution in Malaysia. *International Journal of Advance in Applied Sciences, 4* (5), 7885. doi:10.21833.

Anderson, I., & Fenger, B. H. (2003). *Environment and human health.* European Environment Agency.

Ansari, Z. Z., & Akhmatov, S. V. (2020). *Impacts of water pollution on human health: A case study of New Delhi, India*.

Bessong, P. O., Odiyo, J. O., Musekene, J. N., & Tessema, A. (2009). Spatial distribution of diarrhoea and microbial quality of domestic water during an outbreak of diarrhoea in the Tshikuwi Community in Venda, South Africa. *Journal of Health Population and Nutrition, 27* (5), 652659. doi:10.3329.

Chen, B., Wang, M., Duan, M., Ma, X., Hong, J., & Xie, F. (2019). In search of key: protecting human health and the ecosystem from water pollution in China. *Journal of Clean Products, 228,* 101111. doi:10.1016.

Chowdhary, P., Bharagava, R. N., Mishra, S., & Khan, N. (2020). Role of industries in water scarcity and its adverse effects on environment and human health. *Environmental Concerns Sustainable Development,2,* 235256. doi:10.1007.

Eheazu, C. L. (2016). *Situational challenges of environmental degradation in Nigeria: Adult education as a response.* University of Port Harcourt.

Kumarasamy, P., Govindaraj, S., Vignesh, S., Rajendran, R. B., & James, R. A. (2012). Anthropogenic nexus on organochlorine pesticide pollution: a case study with Tamiraparani river basin, South India. *Environmental Monitoring and Assessment, 184*(6), 3861–3873. doi.10.1007.

Marisa, B. & Carl, H. (2012). *Pollution.* Pennsylvania State University. Pennsylvania State. www.gradscho.psu.edu/.

Michael, K. A. (2010). A short-term effect on pollution levels on pulmonary function of young adults. *The Internet Journal of Pulmonary Medicine, 1*(2).

Mondal, K. (2015). A review on use of plant protein sources in diets for fish feed formulation. *Journal of International Academic Research for multidisciplinary. 25*; doi. 10.8876.

Odibo, A. A. (2005). *Essential issues on health education.* COEWA .

Okuniyi, O. N. (2004). *The influence of family Background on students developmental self-concept among junior secondary school students in Abeokuta South LGA of Ogun state*. An Unpublished M.Ed. Thesis, University of Lagos.

Omosa, I. B., Wang, H. T., Cheng, S., & Li, F. T. (2012). Sustainable tertiary wastewater treatment is required for water resources pollution control in Africa. *Environmental Science and Technology, 46* (13): 7065-7066.

Pitt, M. M., Rosenzweig, M., & Hassan, N. (2012). The effects of improved nutrition, sanitation and water quality on child health in high-mortality populations. *Journal of Econometrics. 1(2).*

Russel, J. E. (2002). *Fundamental issue on health education.* University Press.

Safari, A. Z., Naderi, B. and Ghasam, M. V. (2014). Environmental education as a solution for the prevention of water pollution. *Journal of Survey in Fisheries Sciences. 1.*

United Nation Environmental Programme (2006). *The impact of environmental pollution: Ogoniland.*

World Health Organization (2015). *Guide to integration health education in environmental health.* www.whofactsheet.

World Health Organization (2019). *Water requirement.* www.who.mt/:/nutwaterreuiredusgs.gov

World Health Organization (2019). *Ambient (outdoor) air pollution.* Factsheet.

World Health Organization Occupational and Environmental Health Team. (2004). *Outdoor air pollution: Assessing the environmental burden of disease at national and local levels.* Ostra Ben

pp. 116-121 https://dx.doi.org/10.4314/johasam.v7i1.13

Eliminating Barriers to Accessing Healthcare through Public-Private Health Sectors Collaboration and Resource Utilization for Achievement of Efficiency in Nigeria's Educational System

[1]Elechi, Stella Onyinye, [2] Elsie Williams & [3]Nkoli Ogechukwu Elem

[1]School of Public Health, Rivers State College of Health Science and Management Technology Oro-Owo, Rumueme. Port Harcourt elechistella132@gmail.com+234 8037264698

[2] Sports Institute of Rivers State, Isaka adosieadosie@gmail.com +234 8033123813

[3] School of Community Health Rivers State College of Health Science and Management Technology, Oro-Owo, Rumueme. Port Harcourt. contactnk15@yahoo.com +2348061901388

Abstract

Collaboration occurs when two or more independent sectors willingly work together for a common course to achieve a goal. Health and education are interconnected: Good health status cannot be attained without knowledge of health promotional activities acquired through education. Likewise, knowledge cannot be acquired without physical, mental and social stability. This implies that, positive health is attained when all the three dimensions are met. However, due to so many factors ranging from economic, political, cultural, religion and many others, it is difficult for an individual to be completely healthy. Public and private healthcare facilities exist to provide health promotional, therapeutic and rehabilitative care, including primordial services through community social responsibilities to ensure individuals and families are free from diseases that would hinder them from learning. This is because effective teaching and learning can only take place when the teacher and learner are at reasonable state of wellbeing. Ability to access healthcare has a profound effect on overall health. Poor access to healthcare results in higher morbidity and mortality. Barriers to healthcare could be individual-base, government-based or system-base. This paper considers strategies to eliminate barriers to accessing healthcare through public-private health sectors collaboration as means to achieving efficiency in educational sector.

Keywords: eliminating, barriers, healthcare, public-private, collaboration, resource utilization, efficiency, educational sector

Introduction

There is no demarcation between health and education. Positive health is achieved through education and the ability to withstand the rigors of education is by being in complete state of wellbeing. Hence health is a pre-requisite for education and education is needed to achieve health (Hahn & Truman, 2015). Adopting the WHO 1948 definition of health, Syalastog et al. (2017) noted that health is a relative state in which one is able to function well physically, mentally, socially, and spiritually to express the full range of one's unique potentialities within the environment in which one lives. Physical wellbeing focuses on the proper functioning of the organs of the body and requires both medical and non-medical interventions, mental and social wellbeing basically require non-medical interventions, except in cases of deviation from normal like in mental illnesses. Likewise, the three domains of education; cognitive, affective and psychomotor can effectively be applied if the individual's health is in a state of equilibrium. The health care system exists in order to provide services that culminate to ensure complete state of wellbeing of individuals, families and communities. The health care system includes both private and public health owned facilities and personnel. The private facilities exist mainly as a business for profit making while the government facilities exist to provide services to the public at a minimal cost using the revolving fund system to ensure continuity. Challenges facing the public health sector such as lack of consumable working materials, equipment, personnel, lack of commitment, industrial actions etc, makes the system unreliable. These challenges are not faced by the private health sectors because, their existence is profit-oriented, the owners ensure that human and material resources needed to provide services are not lacking, as they are sure of return on investment.

There is a wide demarcation between the private and public health sectors in meeting the health needs of the population arising from the divergent objectives, thus posing a challenge to accessing healthcare. Barriers to health care are factors that prevent an individual, population, and/or community from acquiring access to health services and/or achieving best health. Such barriers include race, ethnicity, gender, sexual orientation, intellectual and physical disability, location, age, language, national origin, incarceration status, religion and cultural beliefs, socioeconomic status, and health literacy and ability to access information (Butkus et al., 2020).

The fact remains, that health is paramount, a universal basic need, unique and cannot be equated to anything else in the economy. Based on this, are there areas in which the public and private health sectors can collaborate to eliminate these barriers to accessing healthcare so as to promote health and wellbeing for efficient academic performance? This paper explores some of the areas.

Education is a human right, which is state's responsibility, but not exclusively. Private involvement is required to increase resources (finance, personnel and material) committed to education to support the state in order to absorb growing demands for education (National Academy of Sciences, 2015). On the learner's perspective**,** Basch (2018) asserts that the educational benefits derived from both curricular and extra-curricular activities in schools are limited unless the students are motivated and able to learn. Basch identified seven relevant conditions with health disparities namely; vision, asthma, teen pregnancy, aggression and violence, physical activity, breakfast and inattention hyperactivity that greatly influence students' motivation and ability to learn. In the same vein, Basch conceptualizes education beyond attainment and demonstrates centrality of the schooling process to health. The author's views imply that the state of health of an individual is a motivating factor to attainment of educational achievements.

Corroborating the above views, Enyia and Emelah (2022) assert that for educational system in Nigeria to achieve its objective of self-sufficiency, sustainability, scientific and industrialization, Public Private Partnership intervention (which also means collaboration) should be considered most. Grazzini and Petretto (2014), emphasize the peculiarity between education and health that justifies public intervention on efficiency as they are multi-dimensional services. It therefore requires active collaboration among the public and private health sectors to alleviate challenges to education in order to put the individual in a favourably disposed learning condition. Possible areas of collaboration are as outlined below.

1. Efficient referral system: A free-flowing and organized referral system is important for prompt treatment. Referral could be one-way or two-way depending on the nature of the case. However, two-way referral is most preferred as it guarantees feedback which is not obtainable in the one-way referral public and private health facilities could collaborate in this aspect by linkage. This can be achieved by creating a directory of health facilities (private and public) and type of services each of them provide. Each health facility should possess the directory in hard copy and also be made available online for easy access. There should be a policy of no-case-rejection. This is emphasized here. Any case referred from one facility to the other will be taken up promptly for treatment without delays.

2. Eliminating mandatory out of pocket payment in medical emergencies: Most deaths that could have been averted occurred due to demand for payments before providing services. Result from Multidimensional Poverty Index (MPI) survey has it that, the population of Nigerians living in poverty is 63% (133 million people), according to National Bureau of Statistics (2022) among a population of 223,499,836 (World Population Review, 2023) at the ratio of4:10 (World Bank, 2022). This means that 4 out of every 10 Nigerians live below the national poverty line. These are either students or the parents who sent them to school. They are also among those affected by multiple health-related issues. This population waste time in seeking health care or do not seek health care at all because of lack of money to make out of pocket payment. Private and public health service providers can eliminate this barrier by softening this rule. Patients can also be given a platform of paying in instalments after treatment.

3. Affiliating the tertiary institutions social health insurance programme to both private and public health facilities: Tertiary Institutions Social Health Insurance Program (TISHIP), is a programme in the National Health Insurance Authority (NHIA) meant for students in tertiary institutions. This program can be obtained by all learners and teachers not only in selected tertiary institutions, but in all tertiary institutions, in private health facilities and public health facilities. This is to ensure that the participants (teachers and learners) access healthcare not only when the institutions are in session but also during the holiday periods when the participants are in their homes and can attend the facilities close to them. According to Ramalingam et al. (2023) in their study on the effect of health insurance status on school attendance revealed that unadjusted odds of chronic absenteeism were found to be 16% (OR=1.16) higher in children without insurance or with gaps in insurance compared to children with consistent insurance throughout the year and concluded that the disparities in health insurance status among children may exert educationally relevant consequences. This implies that health insurance coverage is a means to which the gap in educational disparity can be bridged for educational efficiencies.

4. Extending health insurance to secondary and primary levels of education linked to school health programme: In Nigeria, the National Health Insurance prgramme does not cover all citizens. According to Akor (2023), a survey conducted by NOI polls revealed that only 17% of Nigeria's population has health insurance coverage. In fact, the awareness rate is still very low. Initiating the health insurance scheme at this lower level of education will improve health seeking behaviours of the student population and early detection of health challenges that could pose difficulty in learning.

5. Provision of medical consultancy services: Irrespective of practitioner's primary place of employment (whether public or private), Medical Professionals can provide consultancy services when called upon anywhere.

6. Scaling up donor agencies' participation in healthcare: This is mainly private health sector based. In the Nigerian health system, the public-private partnerships initiative has been a financing strategy to mobilize funds for infrastructural development and service provision to improve public health activities/services, or the management of public sector health resources. It can go beyond this, to donation of high level and sophisticated diagnostic equipment and machines. Most diagnostic machines and accessories are very expensive. This has also affected the cost of carrying out investigations. Investigations like MRI, cardiac echogram and many more are very expensive. If these machines are donated, it will reduce the cost of investigations.

7. Appropriate citing of health facilities: One of the reasons for non-utilization of health facilities and poor health seeking behaviour is distance from the facility to where the people (consumers) reside. When health facilities are far from the people, so many things are put into consideration before deciding to access the services. Most important factor considered is cost of transportation. According to Grazzini and Petretto (2014), healthcare includes all those goods and services aiming at improving health or preventing its deterioration, such as primary and specialized healthcare, hospitalization, and pharmaceuticals. These must be provided at facilities accessible to the consumers. The average rural or urban dweller would prefer to visit nearby health facilities when they are ill. This will not only save cost, but would also save the man hour and energy which can be converted to other uses. Long distance to health facilities has also contributed to many lives being loss in cases of emergency.

Many private facilities are clustered in a particular area because the human population in that area is large and perhaps of high socio-economic status, while the general, specialist and teaching hospitals that are public owned are mostly located at the outskirts of the community because it requires a larger land mass. The health centres however have helped to bridge this gap between the people and the secondary/tertiary health facilities to a certain extent. However, these health centres are limited in the type of services provided. A good rule of thumb is to locate health facilities within 20 minutes of the residential area (Javier, 2020). This can also be adopted by the private health practitioners in citing their facilities so as to avoid delays in accessing health due to distance. This way health challenges that could impede academic performance would be averted.

8. Avoidance of Monopoly: Health practitioners should see healthcare as a collaborative effort. As the human body is made of systems which must function together to achieve optimal health and wellbeing, so is the health system which is composed of organisations, people and actions aimed at delivering health services to the population. According to Asogua and Odoziobodo (2016), the interface between activities of the public and private sectors on one hand and between health institutions in the public sector on the other is limited in the present institutional arrangements of the national health system. Therefore, the National Health Policy strongly recommends an increased participation of the private sector in provision and financing of healthcare services (FMOH, 2004 in Asogua & Odoziobodo, 2016).

Also, Hahn and Truman (2015) advocate that collaboration between .public health policy makers, health practitioners and educators, departments of health and education to implement educational programmes and policies for public health benefits**.** This calls for increased involvement of health providers, faith-based organisations and individuals whether they exist for-profit or not-for-profit in the delivery of healthcare services. All these units are relevant to providing efficient health services. None should dominate the other.

9. Healthcare subsidy: Lack of fund to pay for health services is a major factor in non-utilization of health services. Many people are encumbered with chronic ailments because of inadequate treatment through self-medication or patronage of quarks. In this chronic state of health, they cannot withstand the rigours of education. Subsidizing healthcare will improve the citizens' health seeking behaviour. Healthcare will be sought promptly to avoid chronicity. It is not about health insurance which requires payment of premium. Health subsidy is about taking away completely a certain percentage of cost of treatment especially for the low income and non-income earners. Health subsidy can also mean providing completely free treatment for terminal diseases like cancer, diseases requiring organ transplant or replacement, dialysis, amputation and any handicapping condition. Management of organ laboratories should be subsidized by public-private participation. To avoid discontinue education because of ill-health coupled with lack of fund to meet up educational needs, the subsidized portion of the health services can be channelled to take care of the educational needs. Medical subsidy can also be achieved by deploying students undergoing medical training with some level of experience to penurious areas where they can provide free and accessible health services to the population.

Telehealth: Telehealth is an innovation in healthcare propelled by the use of electronic devices to deliver services. Health professionals are able to monitor and communicate with their patents wherever they are. It has the advantage of reducing consultation and waiting time in the out-patient clinics. It also enable patients monitor their health conditions and report appropriately. Using telehealth in rural areas to deliver and assist with the delivery of healthcare services can reduce or minimize challenges and burdens patients encounter, such as transportation issues related to traveling for specialty care and also improve monitoring, timeliness, and communications within the healthcare system (Stevens, ND). Students attending schools in rural areas where physical facilities are lacking can assess health care through telehealth. Public and private health providers can the telehealth technology to effect referrals.

10. Establishing co-existing health facilities: This means providing a space (premises or building which has a space for provision of healthcare services and space for other non-health services. To achieve efficiency in education, health care facilities can be cited in premises where academic activities at primary, secondary and tertiary levels are taking place. These health facilities can also serve as demonstration clinics for pupils and students. Beginning demonstration clinical exposure from primary level guarantees early career guidance for a child whose area of interest is health-related. Only few tertiary institutions have health facilities attached to them. At the primary and secondary levels, it is called school health clinics, provided by nurses or community health extension workers. At the colleges, it is a demonstration clinics manned by nurses, midwives, community health extension workers and a medical doctor and in the universities it is a teaching hospital manned by all

cadres of health personnel with consultants in different fields of healthcare. These facilities co-exist with the primary or secondary schools, colleges of health and universities accordingly.

11. Training of Skilled Health Personnel: Both private and public health sectors can be involved in training health personnel that would provide needed health services to the populace. Trainee health personnel can be deployed to private health facilities for industrial training. Where the public health facilities are lacking the necessary training laboratories, the private sectors can augment. Trainee health personnel can also benefit from private medical libraries where the public-owned are insufficient. This will improve quality of training and number of health personnel for quality services delivery.

12. Support of Training Health Institutions: Institutions involved in training of health workers need adequate financial and material support. The quality of training received is directly proportional to the quality of health services to be provided. According to Reddy et al. (2013), the role of private-public partnership in health education is integral to the effort of promoting a healthier population thus the concept has been proposed as a potential model for providing education services. In their study to survey the practices of Private-Public Partnership (PPP) in health education in India among 50 personnel from private entities, result showed, that some of the services provided to the public to enhance health education were printed books, audio visual materials (slides, videos, audio cassettes), lend pamphlets and broachers, and information about oral health among others. Active support is required for quality educational achievements.

Conclusion

Education and health are basic human right which cannot be compromised. To be healthy one needs to acquire knowledge and skill regarding activities for healthy living and to acquire knowledge and skill, one must be in health. Barriers to health are key factors to not achieving educational goals. Because of the enormous resources required to overcome these barriers, private and public health sectors' collaboration is of essence to minimize the financial burden on the populace and to improve health seeking behaviour. Areas of collaboration as explained in this paper are effective referral system, training of health personnel, citing of health facilities, consultations, health insurance and others. The call for collaboration is because the state alone cannot satisfactorily eliminate these health barriers, and not eliminating them impairs learning.

References

Akor, O. (2023). Only 17% of Nigerians have health insurance coverage – Poll https://dailytrust.com/only-17-of-nigerians-have-health-insurance-coverage-poll/

Asogwa, M. N.O., & Odoziobodo, S. I. (2016). Public private partnership in the provision of health services for the millennium development goals: The imperative need for optimizing the public-private mix. *European Scientific Journal, 12*(29).

Basch , C. E. (2017). *Healthier students are better learners: A missing link in school reforms to close the achievement gap.* https://www.healthyschoolscampaign.org/wp-content/uploads/2017/03/A-Missing-Link

Butkus, R., Rapp, K., Cooney, T. G., & Engel, L.S. (2020). *Envisioning a better U.S. health care system for all: Reducing barriers to care and addressing social determinants of health*. https://doi.org/10.7326/M19-2410

Enyia, D.C. & Emelah, G. (2022). *Public-private partnership in education and sustainable development in Nigeria*. https://www.researchgate.net/publication/365776260_Public-Private_Partnership_in_Education

Grazzini, L. & Petretto, A. (2014). *Public-private partnership and competition in health-care and education* https://www.researchgate.net/publication/307671730_Public-Private_Partnership_and_Compet DOI:10.12870/iar-10198

Hahn, R. A. & Truman, B. I. (2015). *Education improves public health and promotes health equity*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4691207/

Javier, A. R. (2020). *How to choose the best location for your medical practice?*

https://www.linkedin.com/pulse/how-choose-best-location-your-medical-practice-rendon

National Academy of Sciences (2015). *How can the health sector support education sector Efforts at the level of students, families, and schools* https://www.ncbi.nlm.nih.gov/books/NBK316097/

National Bureau of Statistics (2022). *Nigeria launches its most extensive national measure of multidimensional poverty*. https://nigerianstat.gov.ng/news/78

World Population Review (2023). *Nigeria population* 2023 (live) https://worldpopulationreview.com/countries/nigeria-population

Reddy, J. J., Multani, S., Bhat, N., Sharma, A., Singh., S & Patel, R. (2013). Role of private-public partnership in health education: A survey of current practices in Udaipur City, Rajasthan, India. *Int J Prev Med*, *4*(9): 1086–1094 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3793494/

Ramalingam, N., Darias, E., Soeder, E., & Castro, G. (2023). *The effect of health insurance status on school attendance*. https://www.researchgate.net/publication/368774315_The_Effect_of_Health_Insurance_Status DOI:10.7759/cureus.35366

Svalastog, A. L., Doncho, D., Kristoffersen, N. J., & Srećko, G. (2017). Concepts and definitions of health and health-related values in the knowledge landscapes of the digital society. *Croat Med J*.58(6): 431–435. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5778676/

World Bank (2022*). Deep structural reforms guided by evidence are urgently needed to lift millions of Nigerians out of poverty. New World Bank Report* https://www.worldbank.org/en/news/press-release/2022/03/21/afw-deep-structural-reforms-guided-by-evidence-are-urgently-needed-to-lift-millions-of-

Zajacova, A. & Lawrence, E. (2018). The relationship between education and health: reducing disparities through a contextual approach. *Annual Review of Public Health,* 39(1). DOI:10.1146/annurev-publhealth-031816-044628

pp. 122-131 https://dx.doi.org/10.4314/johasam.v7i1.14

Academic Analysis of Student-Centred Teaching and Emotional Intelligence of Children with Learning Disabilities in Primary Schools in Gokana Local Government Area of Rivers State

Ann Nwala
School of Foundational Studies
Rivers State College of Health Science and Management Technology
Oro-Owo, Rumueme, Port Harcourt
+234803720161
telihaan@gmail.com

Mbu Dickson Mbu
School of Foundational Studies
Rivers State College of Health Science and Management Technology
Oro-Owo, Rumueme, Port Harcourt
+2348062571569, mbu2md@gmail.com/mbu22md@yahoo.com

Amba Marian Orisa-Couple
School of Public Health Technology,
Rivers State College of Health Science and Management Technology
Oro-Owo, Rumueme, Port Harcourt
ambaorisa@gmail.com

Abstract

This research work was conducted to ascertain the academic analysis student-centred teaching and emotional intelligence of children with learning disabilities in primary school in Gokana Local Government Area of Rivers State. The study was conducted with a sample of 80 teachers drawn from a total population of 622 teachers from 4 different primary schools using convenient sampling techniques. The instrument used for data collection was questionnaire titled "Students-Centered Teaching Strategies and Emotional Intelligence Inventory (SCTSEII) which was validated by experts. Reliability of the instrument using Cronbach alpha technique yielded a value of 0.79. Mean and standard deviation were used to answer the research questions. Result from the study showed that learning disabilities had a negative impact on the academic achievement of primary school pupils in Gokana Local Government Area of Rivers State. The result further showed that children-centered practices such as questions and tasks that stimulate learners' thinking beyond rote memorization, as well as integration of emotional intelligence in the teaching and learning process can significantly improve the academic achievement of pupils with learning disabilities, especially dyslexia.

Keywords: academic analysis, children, emotional intelligence, learning disabilities

INTRODUCTION

Emotional intelligence has become a major topic of interest in scientific circles as well as in the lay public. Emotional intelligence is described as having the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and action**.** Emotional intelligence is described as that dimension of intelligence responsible for our ability to manage ourselves and our relationship with others. It is believed that emotional intelligence is a factor that is useful in understanding and predicting one's performance at school and work (Zeidner et al., 2002*).* Meanwhile, educators and policy makers have become increasingly aware of the significance of providing students with educational opportunities that enhance emotional development (Graczyk et al., 2000). Emotional processes are an important area of focus for students with learning disabilities, specifically in reading (Pellitter, 2006).

Over the past decades, it has been revealed that both researchers and practitioners in the field of specific learning disabilities have debated over an appropriate definition as well as the diagnostic criteria. Although there are many definitions of learning disabilities, for the purpose of this study, the

educational model of learning disabilities enacted by the Individual Disabilities Education Act (IDEA) was used. According to IDEA (2004), the term "learning disabilities" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which manifests itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculation. This term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term "specific learning disabilities" does not include a learning problem that is primarily the result of visual, hearing, motor disabilities, mental retardation, emotional disturbances, or environmental, cultural, or economic disadvantage.

According to Goleman (1995), the elements of emotional intelligence are crucial abilities for effective living. When looking at the constructs of emotional intelligence and its emotional processes, one would also have to consider the constructions of reading comprehension. Reading comprehension is a complex process which refers to (a) extracting information in a reading passage, (b) using higher-order thinking skills, which includes drawing inferences and conclusions, raid inferring the author's purpose, mood, and tone, (c) using meta cognitive knowledge to predict outcomes, and (e) summarizing and clarifying content (Robertson, 2001).

The importance of emotional intelligence in learning cannot be overemphasized, especially as it relates with learning. Emotions influence cognition *by* providing the energy that drives, organizes, amplifies, and attenuates all thinking and reasoning. Likewise, it is believed that cognition helps us to understand our emotions by providing the words, contexts, and reasons for the emotions one feels. Emotions are also described, as internal feelings, which may be negative or positive, and that these emotions are the underlying force for all thinking (Zambo & Brem, 2004). It is suggested that negative emotions can disrupt thinking and learning.; fleet motivation, and influence how we perceive and react to life, in turn determining how content and successful we are.

Research has shown that while emotions affect the learning functioning of students. It also has serious implications for those with learning disabilities. According to Gorman (1999), research demonstrates that students with learning disabilities experience emotional distress related to their difficulties. Students with learning disabilities tend to have higher levels of emotional concerns, such as depression, anxiety, loneliness, and low-self-esteem, than do their peers without learning disabilities. Elias (2004) suggests that these students sit in regular education classes feeling confused about what is being presented and often times have emotions of anger for a variety of reasons. Abrams (1986) suggests that constant failure and frustration may lead to strong feelings of inferiority, which in turn may intensify the initial learning deficiency. It is for this reason that it is important for teachers to integrate aspect of emotional intelligence training in the teaching and learning process. As such, the current study seeks to investigate on teachers' opinion on academic achievement analysis, student-centered teaching and emotional intelligence for the care of the learning disabled primary school children in Gokana Local Government Area of Rivers State.

REVIEW OF RELATED LITERATURE

Academic Achievement Analysis: The concept of academic achievement is seen as the learning outcome of a particular knowledge acquired. Academic achievement as noted by Gipps (1990) is probably most often defined in terms of levels of standard in basic knowledge and skills and are therefore related to test scores and exam results. Academic Achievement refers to the quality of performance in terms of test and class exercise with academic content. 'In other words, it is the attainment of a given standard of excellence or qualified standard of academic performance i.e. the extent or the degree of success an individual has in his/her studies. The evaluation of academic achievement in schools can be done in various ways such as taking tests both oral and written, home-works, performing presentations, and participating in group discussions and other class activities. Pupils are also appraised by the level of achievement on "standardized tests recommended for specific ages (Bell 2010).

In the past, Teacher's observation was used to measure academic achievement of students but today's method of assessment has recent inventions which are fairer than those used in the past. For instance, grading systems was first used in the United States but were originally critiqued based on the heightened prejudice. Some teachers appreciated varying features of learning than

others, and while some standardization were endeavored to ensure a fairer system, despite this, the problem persisted. Currently, variations have been implemented to disagree with students' abilities, and researches into finding alternative methods of measuring achievement are still ongoing.

Student-Centered Teaching: The term Students-Centered learning refers to a wide variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual pupil and groups of students. To accomplish this goal, schools, teachers, guidance counselors, and other educational specialists may employ a wide variety of educational methods, from modifying assignments and instructional strategies in the classroom to entirely redesigning the ways in which students are grouped and taught in a school. The term “student-centered teaching” most likely arose in response to educational decisions that did not fully consider what students needed to know or what methods would be most effective in facilitating learning for individual students or groups of students. For example, many traditional approaches to schooling could be considered "school-centered." rather than pupil-centered, because schools are often organized and managed in ways that work well for organizational operations, but that might not reflect the most effective ways to educate students.

Emotional Intelligence: While emotional intelligence has a long history, it only emerged into the classroom when Daniel Goleman published the book *Emotional Intelligence* (Goleman, 1995). Goleman (1995) proposes that emotional intelligence plays a critical role in determining one's success in life. Since then, research has been conducted in the field of emotional intelligence. Studies have covered such areas as identifying methods for measuring emotional intelligence, determining the importance of emotional intelligence skills to one's effectiveness, and applying and integrating emotional intelligence in a variety of settings, including school rooms (Weissinger, 1998). As such there has been various definitions of emotional intelligence which are briefly presented below.

Emotional intelligence refers to the capacity for recognizing one's own feelings and those of others for motivating oneself, and for managing emotions well in our relationships. It describes abilities distinct from, but complementary to, academic intelligence, the purely cognitive capacities measured by 1Q. Although a comprehensive theory of emotional intelligence was provided by Salovey and Mayer (1990), and another pioneering model of emotional intelligence was proposed in the 1980s by Reuven Bar-On (1988). Other theorists have proposed variations on the same idea. Goleman has adopted Salovev and Mayer's and modified into a version for understanding how these talents matter in the work life. Goleman's (1995) adaptation includes the following five basic emotional and social competencies.

- **Self-awareness:** knowing what we are feeling at the moment, and using those preferences to guide our decision making; having a realistic assessment of our own abilities and a well-grounded sense of self-confidence.
- **Self-regulation:** handling our emotions so that they facilitate rather than interfere with the task at hand; being conscientious and delaying gratification to pursue goals; recovering well from emotional distress.
- **Motivation:** using our deepest preferences to move and guide us toward our goals, to help us take initiative and strive to improve, and to persevere in the face of setbacks and frustrations.
- **Empathy:** sensing what people are feeling, being able to take their perspective, and cultivating rapport and attunement with a broad diversity of people. Empathy also refers to the identification with the state of another person.
- **Social Skills**: handling emotions in relationships well and accurately reading social situations and networks; interacting smoothly; using these skills to persuade lead, negotiate and settle disputes, for operation and teamwork.

In line with the above assertion, emotional intelligence shall be defined n this study as the ability to perceive accurately, appraise, and express emotions, the ability to access and or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth.

Concept of Learning Disability

The concept of learning disability has been variously defined from the educational, political, social and workforce perspectives. One of the most widespread definitions of learning disability has been that provided by Valuing People (2001) in which learning disability was defined as a significantly reduced ability to understand new or complex information, to learn new skills (impaired intelligence), with; a reduced ability to cope independently (impaired social functioning) which started before adulthood, with a lasting effect on development.

This definition is broad consistent with that used in the current version of the World Health Organization's International Classification of Disease (ICD-10), although this does use the outdated and (to many) offensive term 'mental retardation. The term learning disability was introduced to replace the term 'mental handicap'. The term "learning disability" and learning difficulties have been used interchangeably. According to Tambulwa (2009), learning difficulties and learning disabilities are two terms that are difficult to distinguish: some scholars argued that both have the same meaning and can therefore be used interchangeably, while some argued that learning disability is a generic term which encompasses learning problems including disability. Crowl et al. (1997) assert that, this implies that learning disability could become a disability when it is diagnosed to be a severe disorder. They further posited that, the degree of the learning condition makes the difference. Further arguments by other authorities point to the fact that learning is a non-categorical definition, including all these who have difficulties learning one or more of the basic academic skills.

On the other hand, learning disability is a categorical definition based on diagnosis. Strydom (2009) opined that learning disability is an all-embracing term for children with any type of learning problem or disorders. The preference by the United States of America to use the term learning disability is only for the convenience of clarification. Strydom is of the opinion that the United States of America classified children with learning disability on two grounds. First, that the learning problem is presumed to be due strictly to some Neurological dysfunction and not by external factors. Secondly, a child classified as a learning disabled when he has been properly diagnosed and the result shows discrepancy between a child's potential and his achievement.

The most widely accepted definition of learning disabilities was given by the American National Joint Committee on Learning Disabilities (NJCLD) in Abekhale and Okpenge (2009) as a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to the dysfunction of the central nervous system. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g. sensory impairment, psychogenic factors) it is not the direct result of these conditions or influences.

The definition, so far are all presumptions because the actual causation of learning difficulties is yet to be determined, since the assumption that learning difficulties have a neurological connections or that they result from a dysfunction of the central nervous system is yet to be empirically proved. Whatever be the case, teachers and counselors have a stake in the identification and remediation of children with learning difficulties. Which can be clearly identified based on certain character.

Characteristics of Problems Associated with Learning Disabilities

Following the definition that has just been presented however, it seems possible to identify the following as part of the problems confronting the learning disabled child. These are:

1. Difficulty in listening comprehension which involves -an in ability to receive oral language effectively.
2. Unusual difficulty in making or learning oral speech, which involves an inability to express oneself in oral language.
3. Written language disabilities demonstrated in an unusual difficulty in learning to read and write.
4. Unusual difficulty in visual-motor co-ordination which involves the problem of learning how to make one's hands and feel work together with what the eyes see.
5. Problems of in attention which involves two kinds of difficulties: difficulty in selecting attention and difficulty in sustaining attention.

6. Disabilities in authentic skills/concepts, which involve unusual difficulties in computational skills. Symbolic language expression, understanding of spatial relationships, effective development, arithmetic concepts, seriation and conservation abilities and the ability to associate written numerals or figures with the quantities they represent (Nwoye, 1988).

How to Identity a Child with Learning disability

In order to identify children with learning disability, Denga (2009) posited the following methods:

- **The use of Checklist:** Checklist can be constructed by the teacher and used to identify and assess the child with learning disability. The checklist contains the child's name, his class, the sex, approximate age and the various items against which the extent of learning disability can be checked.
- **Observation:** Observation by teachers, counselors and special educators is very important initial activity. It is tied up with the checklist because a teacher or counselors can more confidentially check what he has observed rather depend on secondary source. If possible visits can be paid to the parents at home to find out what the child does at home. Observation calls for a team effort.
- **Use of Tests:** If standards psychological tests are available, they could be used to ascertain the extent of leaning difficulty. These tests can be obtained from experts on tests construction or from the Faculty of Education nearest to the school.
- **Face to Face Interviews with the Children Suspected to have Learning disability:** The teacher can ask the child to tell a story, to read a passage, to narrate about his achievements and his relationship with other children. During this face to face discussion, several problems can be identified for treatment. Assessment may be done both in mother tongue and in English. A child can be asked to write short passage from a book so that the ear-hand coordination can be assessed.

Types of Learning Difficulties

Deficits in any area of information processing can manifest in a variety of learning difficulties. However, the umbrella term" learning difficulties" is used to cover a wide variety of learning difficulties. Many people use it synonymously with dyslexia (difficulty with words), but it is now generally accepted that dyslexia is only one of a group of difficulties that may include others to be discussed as presented by Iwundu (2004).

Dyslexia or Reading Difficulty: This is the most common learning disability. It is often referred to as dyslexia which is a language based disorder of institutional origin characterized by difficulties in single word decoding, reflecting insufficient psychological processing including problems in acquiring reading, writing and spelling (Kenyon, 2003). Kenyon further mentioned that dyslexia can rise from mild to severe difficulty. It is assumed that this disorder has a hereditary connotation because it is often seen a run in families. A reading difficulty can affect any part of the reading process, including difficulty with accurate and/or fluent word recognition, word decoding, reading rate, prosody (oral reading with expression), and reading comprehension. According to Wikipedia (2019), before the term, "dyslexia"' came into prominence, this learning disability used to be known as "word blindness." The common indicators of reading difficulty include with phonemic awareness the ability to break up words into their component sounds and difficulty with matching combinations to specific sounds (sound-symbol correspondence). Strydom (2009) identified severe signs of and symptoms of reading difficulty, amongst which are the following:

- Reading slowly and painfully
- Experiencing decoding errors especially with the order of letters
- Showing wide disparity between listening and reading comprehension of some text
- Having trouble with Spelling
- Exhibiting difficulty recalling known words
- Having difficulty with written language
- Substituting one small sight word for another like a, I, he, the, there, was

Types of Dyslexia

Dyslexia can be classified into two broad types based on the origin. According to this classification, dyslexia can be classified into developmental and required. Acquired dyslexia refers to dyslexia that has its origin due to sickness or ill health. On the other hand, developmental dyslexia has no known origin but is assumed to have started from birth. Another classification of dyslexia is based on the types of deficit. In this approach, there are three broad types namely phonological, surface and deep.

Phonological dyslexia is extreme difficulty reading that is a result of phonological impairment, meaning the ability to manipulate the basic sounds of language. The individual sounds of language come 'sticky', unable to be broken apart and manipulated easily. Surface dyslexia is a condition in which there is difficulty with whole word, recognition and spelling, especially when the words have irregular spelling-sound correspondences. Lastly, deep dyslexia is an acquired form of dyslexia, meaning it arrives later in life and does not usually result from genetic, hereditary (developmental) causes. It represents a loss of existing capacity to head, often because of head trauma or stroke that affects the left side of the brain.

Treatment of Dyslexia

Various types of psycho-educational approaches have been proposed as treatment of dyslexia. Some of these approaches include:

- **Multisensory Teaching:** This involves regular interaction between the teacher and the student and the simultaneous use of multiple senses including auditory, visual, and kinesthetic (touch). For example, a dyslexic learner is taught to see the letter A. say its name and sound and write it in the air- all at the same time. The use of multisensory input is thought to enhance memory storage and retrieval.
- **Structured and Cumulative Learning:** This involves training students on language elements and rules by introducing the logical and understandable order words and their approach to learning. Students go back to the very beginning of their language learning, to lay a proper foundation. Beginning by reading and writing sounds in isolation (phonemes), then blending sounds into syllables and words. Elements of language consonants, vowels, digraph blends, and diphthongs are introduced in an orderly fashion. Only later, learners proceed to advanced structural elements such as syllable types, roots, prefixes and suffixes.
- **Personalized and Flexible:** Teaching begins with recognizing the differing needs of learners. Building a close teacher-student relationship with continuous feedback and positive reinforcement leading will lead to success and self-confidence. Instructors ensure the learner is not simply recognizing a pattern and applying it without understanding. When confusion of a previously taught rule is discovered, it is re-taught from the beginning.

Thesis Statement

Many students, despite the best academic effort of parents and teachers seem not to be performing well in schools. Especially at the primary school level, students continue to experience persistent difficulties which get them frustrated as their grades begin to continuously fail with the increasing difficulty they experience with school work. These difficulties if not attended to may cause the student to experience a catalogue of emotional and social problems; gradual loss of self-esteem and frustration leading to some juvenile delinquencies which can linger to adulthood. It has therefore become vital that teachers understand the factors which predispose students towards poor academic achievement, one of which is learning disabilities. It is therefore against this background that the current study seeks to survey teachers" opinion on academic achievement analysis, Students-Centered teaching and emotional intelligence for the care of learning disabled primary school children in Gokana Local Government Area of Rivers State.

Statement of Objectives

The objective of this study is to ascertain teachers" opinion on academic achievement analysis, Students-Centered teaching and emotional intelligence for the care of learning disabled primary school children in Gokana Local Government Area of Rivers State. In more specific context, the objectives of this study include the following:

1. To ascertain the impact of learning disability on the academic achievement of primary school pupils in Gokana Local Government Area of Rivers State.
2. To ascertain some Students-Centered teaching strategies for the care of the learning disabled primary school children in Gokana Local Government Area of Rivers State.
3. To investigate the relationship between emotional intelligence and Students-Centered teaching strategies for the care of learning disabled primary school children in Gokana Local Government Area of Rivers State.

Theoretical Framework

The theoretical framework for this study is anchored on the Goleman's (1995) theory of Emotional Intelligence. According to Goleman's theory, emotional intelligence is a constellation of skills that help students succeed in schools. These skills when present improve academic performance and when absent leads to poor academic performance. These skills are broadly classified into five namely self-awareness, self-regulation, motivation, empathy and social skills.

The implication of this theory to the current study is that students with learning disabilities are likely to perform poorly because they also experience social and emotional challenges. Therefore schools that fail to broaden their definition of intelligence to include emotional development will ultimately shortchange students and limit their academic performance. Goleman therefore argued that educators should view emotional development not as another add-on or something to do in between activities or classes: rather, emotional development should be viewed as an opportunity for success in school. As posited by Ormsbee (2000), if schools are to be effective, they must change the way in which they deal \\ith students and develop effective social and emotional competencies.

Methodology

The design for this study was the descriptive survey research design. The descriptive research design is that which seeks to describe the present state of an event, person or situation. This research design was adopted for this study because the researcher surveyed teachers' opinion on academic achievement "analysis, Students-Centered teaching and emotional intelligence for the care of learning disabled primary school children in Gokana Local Government Area of Rivers State, with specific focus on dyslexia. The population for this study comprised of all public primary school teachers. Convenience sampling technique was used due to logistics and time consideration for the study to select 80 teachers from secondary schools in Rivers State.

Data collection for the study was done using an instrument developed by the researcher titled Students-Centered teaching Strategies and Emotional Intelligence Inventory (SCTSEII) The instrument was constructed using a four-point Likert scale of Strongly Agree (SA), Agree (A), Disagreed (D) and Strongly Disagreed (SD) which was scored 4, 3, 2, and 1 point(s) respectively. The instrument had 15 items in total. Validation of the instrument was done by subjecting the instrument to expert judgment. The instrument was given to one expert each in Educational Psychology and Measurement and Evaluation. Their contributions were integrated into the final version of the instruments before administration. Reliability of the instrument was done using the Cronbach Alpha method. The merit was administered to 20 teachers who were not part of the target sample in Gokana Local Government Area After analysis, alpha coefficient of 0.79 was obtained for the SCTSEII. This indicated that the instruments possessed suitable level of reliability. For data analysis, mean and deviation were used to answer the research questions. The results obtained are presented in below.

Results

Table 1: Impact of learning disabilities on the academic achievement of primary school pupils

S/N	ITEM	X_2	SD	Decision
1.	Students regularly miss from class due to their learning disabilities	3.31	0.73	Agreed
2.	Poor level of comprehension makes students answer questions wrongly	*2.94*	0.73	Agreed
3.	Inattention during class activities	*2.1%*	0.81	Agreed
4.	Delay in completion of assigned texts	3.05	0.66	Agreed
5.	Inability to contribute to class assignments and texts	3.18	0.71	Agreed
	Grand Mean	**3.05**	**0.73**	**Agreed**

According to the results on Table 1, teachers' opinion on the impact of learning disability includes that students regularly miss from class due to their learning disabilities (mean = 3.31, SD = 0.73). Poor level of comprehension makes students answer questions wrongly (mean = *2.94*, SD = 0.73). Inattention during class activities (mean = *2.78*, SD = 0.81), delay in completion of assigned texts (mean = 3.05. SD [r]- 0.66) and lastly inability to contribute to class assignments and texts (mean = 3.18. SD - 0.71). On the whole a grand mean of 3.05 was obtained which suggests that teachers agreed that learning disabilities had a significant negative impact on the academic achievement of pupils in Gokana Local Government Area of Rivers State.

Table 2: Students-Centered teaching strategies for the care of learning disabled primary school children

	ITEM	*X*	SD	Decision
6	Including relevant materials and activities that are personally relevant to learners	*2.87*	1.08	Agreed
7	Providing learners with increasing responsibility for the learning process	2.99	1.00	Agreed
8	Provide questions and tasks that stimulate learners' thinking beyond rote memorization	3.04	0.95	Agreed
9	Include peer learning and peer teaching as part of the instructional method.	3.05	1.00	Agreed
10	Manage time in flexible ways to match learner needs.	3.01	0.98	Agreed
	Grand Mean	**2.99**	**1.02**	**Agreed**

Regarding teachers' opinion on the various children-centered teaching strategies for helping those with learning disability, the result showed that some of the agreed strategies were to include relevant materials and activities that are personally relevant to learners, providing learners with increasing responsibility for the learning process, provide questions and tasks that stimulate learners' thinking beyond rote memorization, include peer learning and peer teaching as part of the instructional method, and manage time in flexible ways to match learner needs. From the grand mean value of 2.99, it therefore, suggests that adopted children-centered teaching strategies can improve the academic achievement of students with dyslexia in Gokana Local Government Area of Rivers State.

Table 3: Teachers'opinion on the relationship between emotional intelligence and Students-Centered leaching strategies for the care of learning disabled primary school children

	Relationship between emotional intelligence and child-centred teaching strategies	***X***	**SD**	**Decision**
11	Emotional intelligence enable teachers to work with students of different background, including those with learning disabilities	*2.59*	1.02	
12	Teachers with emotional intelligence 'are empathetic towards students with learning disabilities	2.80	1.02	
13	Social skills enable teachers to identify students who need help with their learning disabilities.	3.20	0.84	
14	With emotional intelligence, teachers can help students navigate their unique challenges	3.00	0.93	
15	Emotional intelligence is an important skill to help both students with and without learning disabilities	2.12	1.03	
	Grand Mean	**2.68**	**0.96**	

According to the result Table 3 on the relationship between emotional intelligence and Students-Centered teaching strategies for the care of learning disabled children in primary schools, the result led that it was agreed that emotional intelligence enable teachers to work with students of different round including those with learning disabilities, as well as it equip teachers to be empathetic towards students with learning disabilities. In addition, it was the teachers' opinion that social skills enable teachers easily; identify those who need help with their academic challenges. From the grand mean of 2.68, it therefore indicates that there is a significant relationship between emotional intelligence and Students-Centered teaching strategies for the care of learning disabled children in Gokana Local Government Area of Rivers State.

CONCLUSION

This study was conducted to ascertain the opinion of teachers on academic achievement analysis, child Students-Centered teaching and emotional intelligence for the care of learning disabled primary school children in Gokana Local Government Area. Based on the outcome of the study, it was revealed that learning disabilities, especially dyslexia, had a negative impact on the academic achievement of primary school pupils in Gokana Local Government Area. However, it was shown that with the adoption of Students-Centered teaching strategies, pupils can be helped to develop improved academic achievement. Furthermore, the teachers agreed that being emotionally intelligent is a panacea for students with learning disabilities to be assisted.

References

Abekhale, R. S., & Okpenge, A. I. (2009). *Understanding special education from the Nigerian perspective.*
Penguin.

Abrams, C. (1986). On learning disabilities: Affective considerations. *Journal of Reading, Writing and Learning Disabilities, 2,* 189-196.

Bell, S. (2010). Investigating the effect of project based learning on students' academic achievement and attitudes towards English Language. *Online Journal of New Horizons in Education*

Crowl, T. K., Kaminsky, S., & Xl'odell, D.M (1997). *Educational psychology: Windows on teaching*. Brovsn and Benchmark.

Denga, D. I. (2009). *Education and special counselling services for primary and junior secondary in Nigeria.* Rapid Educational.

Elias, M. J. (2004). The connection between social/emotional learning and learning disabilities for intervention. *Disabilities Quarterly,* 27, 53-59.

Gipps, C. (1990). *Assessment: A teacher's guide to the issues.* Hodde and Stoughton.

Goleman, D. (1995). *Emotional intelligence.* Bantam Books.

Gorman, J. C. (1999). Understanding children's hearts and minds: Emotional functioning and learning disabilities. *Journal of Teaching Exceptional Children, 31(3), 71-77.*

Gracyk, P., Weissberg, R., Payton, J., Elias, M., Greenberg, M., & Zins, J. (2000). Criteria for evaluating the quality of school-based social and emotional learning programs. In R. P. Bar-On & J. D. A. Parker (Eds.). *The handbook of emotional intelligence: Theory, development, assessment and application at home, school, and in the workplace* (pp. 391-410). Jossey-Bass.

Iwundu, C. O. (2004). *Psychology for the education and health professions.* Paragraphics.

Ormsbee, C. K. (2000). Review of the book developing emotional intelligence. *Journal of Intervention in School and Clinic, 36(2),* 125-126.

Pelliter. J. (2006). Emotional intelligent interventions for students with reading disabilities. *Reading & Writing*
Quarterly, 22, 155-171.

Robertson, G. (2001). *Wide range achievement test-expanded manual.* Wide Range Achievement.

Salovey, P. & Mayer, J. (1990). Emotional intelligence, imagination and cognition, and personality. *Educational Psychologist, 9,* 185-211.

Strydom, J. (2009). *The right to read: Beating dyslexia and other learning disabilities.*

Tambulwa, M. U. (2009). *Identification and intervention strategies for learning difficulties.* Paper Presented At The 9^{lh} Annual National Conference of The Nigerian Society Of Educational Psychologist (NISEP) at Obafemi Awolowo University. Ile-Ife

Zambo, D. & Brem, S. (2004). Emotion and cognition in students who struggle to read: New insights and ideas. *Reading Psychology, 25,* 189-204.

Zeidner, M., Richard, R., & Matthews, G. (2002). Can emotional intelligence be schooled? A critical review. *Educational Psychology,* 37(4), 229.

pp. 132-142 https://dx.doi.org/10.4314/johasam.v7i1.15

Evaluation of the Topsoil Quality for Polycyclic Aromatic Hydrocarbons Near Automobile Repair Facilities in Eleme, Rivers State, Nigeria

[1]**Nakara Michael TIMOTHY** (08039378922, tnakaramichael@yahoo.com)
[2]**William Azuka IYAMA** (08033415424, willy4a@yahoo.com)
[3]**Omeni Chukwudi EGBUNEFU** (08035008101, egbunefuco@yahoo.com)
[4]**Lekia Yenor GBODE** (08038893262, mdaagbara@gmail.com)
[5]**Onisogen Simeon EDORI** (08038984391, onisogen.edori@yahoo.com)
[6]**Enize Simeon EDORI** (08160796038, enizeedori@yahoo.com)
[7]**Ejikeme ThankGod ANELE** (08060992020, ejikemeanele@gmail.com)
[8]**Osademe Chukwudi DOLLAH** (08037648197, oscardollah@yahoo.com)
[9]**Desmond OGBEHI** (08039413495, pstdesmond7@gmail.com)

[1,3,4,7,9]Rivers State College of Health Science and Management Technology, P.M.B. 5039, Port Harcourt Rivers State, Nigeria
[2,8]Institute of Geosciences and Environmental Management, Rivers State University, Port Harcourt
[5,6]Ignatius Ajuru University of Education, P.M.B. 5047, Port Harcourt, Nigeria
Corresponding Author: tnakaramichael@yahoo.com

Abstract

The activities of automobile repair workshops may have a negative impact on the immediate environment due to the kind of waste that is constantly generated and disposed of around these areas. With a view to ascertaining their possible impact on the surrounding soils, top soil samples were therefore collected from selected automobile repair shops in Eleme. The processed composite soil samples were analysed for their polycyclic aromatic hydrocarbon (PAH) content following standard analytical procedures. Results from the impacted sites as well as the control site revealed that PAHs were detected at these stations at varying concentrations in all of the topsoil sampled, following the order: Station 3 > Station 1 > Station 2. There was a considerable difference between the concentration of PAHs in the soil from the automobile repair shops and the control site. The total concentration (mg/kg) of the 16 US EPA PAHs in the soil samples ranged from 34.729 to 35.647, with a mean value of 35.305±1.561, which was markedly higher than the 2.116±0.185 concentration found in the control sample. Source identification and diagnostic ratios of polycyclic aromatic hydrocarbons in the soils revealed that the increased ratio of pyrogenic or combustion-based PAHs found in soil samples from different automobile repair stations is an indication that anthropogenic sources, especially combustion and spills of petroleum products, were the main sources of PAH component input. Therefore, the control of oil spills and automobile use of spent oils should be checked by providing central storage tanks that could be recycled for other purposes.

Keywords: automobile, Eleme, evaluation, mechanic village, polycyclic aromatic hydrocarbon, topsoil

INTRODUCTION

The establishment of automobile repair shops is a common practice in Eleme Local Government Area in particular and in Nigeria at large. Large portions of land are allocated for automobile activities and are designated as mechanic workshops or mechanic villages where automobile repair services are offered to the public (Timothy et al., 2022). The wastes generated comprise gaseous, liquid, and solid wastes. Toxic chemicals such as chlorinated compounds, solvents, glycols, polycyclic aromatic hydrocarbons (PAHs), etc. are produced (Timothy et al., 2023). Generally, PAHs are organic pollutants that are toxic, tenacious, and widely disseminated in the environment. Natural sources that release these organic pollutants into the environment include volcanoes and forest fires, but anthropogenic sources are the most common and are responsible for the majority of air pollution. Anthropogenic sources commonly include the burning of fossil fuels, which includes power plants, emissions from cars and other transportation, the burning of wood, the incineration of household and commercial waste, and a wide range of other activities (Eneji et al., 2017).

Although they are biodegradable, their sequestration and persistent nature make the process of biodegradability and their accessibility to chemical attack difficult. Additionally, because of their hydrophobic character, which results in very low water solubility and a high octanol-water partition coefficient, PAHs are strongly adsorbed on organic matter in soil and are less prone to biological and chemical deterioration. Different types of PAHs are formed based on combustion temperature, where high temperatures form simple PAHs and low temperatures create more complex PAHs (Eneji et al., 2017). Many compounds of PAHs enter water bodies, sediment, soil, and biological materials through the atmosphere. In the environment, polycyclic aromatic hydrocarbons (PAHs) are ubiquitous and can be found in sediments, soils, and waterways in both solution and adsorbed forms. Additionally, burning fossil fuels, burning other organic materials, or the processes involved in oil exploration and production all cause PAHs to enter the environment (Ribeiro et al., 2014). PAHs are widely spread in the environment, and some of them can cause cancer in people even at extremely low levels. Even though PAHs are present everywhere, they are more prevalent in locations like oil spill sites, gas works, coal gasification sites, and auto mechanic workshop sites. Several PAHs are known to have teratogenic, mutagenic, and carcinogenic properties, and their presence in soils raises concerns (Yu, 2002).

The Environmental Protection Agency (EPA) has designated sixteen (16) of the hundreds known PAHs as high-priority pollutants, including naphthalene (NAP), acenaphthene (ACE), acenaphthylene (ACY), fluorene (FLU), phenanthrene (PHEN), anthracene (ANTH), fluoranthene (FLTH), pyrene (PYR), benzo[a] anthracene (B[a]A), chrysene (CHRY), benzo[b] fluoranthene (B[b]F), benzo[k] fluoranthene (B[k]F), benzo[a]pyrene (B[a]P), benzo[g,h,i] perylene (B[ghi]P), indeno [1,2,3-c,d]pyrene (IND), and dibenz[a,h]anthracene (D[ah]A). These 16 PAHs are of environmental concern because of their potential toxicity to humans and other organisms and because of their prevalence and persistence in the environment. Several PAHs are probable or known carcinogens (International Agency for Research on Cancer, 2006). Some of the properties of these priority hydrocarbon pollutants are listed below in Table 1. Automobile repair activities directly increase the levels of hydrocarbons in the soil environment, particularly polycyclic aromatic hydrocarbons, which are a major component of petroleum hydrocarbons (Joseph et al., 2017). Presumably, the activities of the auto mechanics in Eleme may have a negative impact on the immediate environment due to the kind of waste that is constantly generated and disposed of around these areas. Wastes generated and disposed of in the environment by automobile repair workshops are of great concern, given that these wastes are released into the environment without consideration for potential toxicological effects. Based on this assumption, the study evaluated the topsoil quality for polycyclic aromatic hydrocarbons near automobile repair facilities in Eleme, Rivers State, Nigeria, in order to determine any alteration of the concentration of PAHs as well as their potential danger.

Table 1: Physical and Chemical Properties of Polycyclic Aromatic Hydrocarbons

PAH	Chemical formula	Number of rings	Molecular weight ($gmol^{-1}$)	Pure solid Aqueous Solubility(µg/L)	Vapour pressure (Pa)
Naphthalene	$C_{10}H_8$	2	128.18	31690	10.4
Acenaphthene	$C_{12}H_{10}$	3	154.21	3420	2.9E-1
Acenaphthylene	$C_{12}H_{10}$	3	152.20	3930	8.9E-1
Fluorene	$C_{13}H_{10}$	3	166.22	1690	8.0E-2
Phenanthrene	$C_{14}H_{10}$	3	178.24	1000	1.6E-2
Anthracene	$C_{14}H_{10}$	3	178.24	45	8.0E-4
Fluoranthene	$C_{16}H_{10}$	4	202.26	206	1.2E-3
Pyrene	$C_{16}H_{10}$	4	202.26	130	6.0E-4
Benzo[a]anthracene	$C_{18}H_{12}$	4	228.30	5.7	2.8E-5
Chrysene*	$C_{18}H_{12}$	4	228.30	1.8	8.4E-5[a]
Benzo[b]fluoranthene*	$C_{20}H_{12}$	5	252.32	14	6.7E-5[a]
Benzo[k]fluoranthene*	$C_{20}H_{12}$	5	252.32	4.3	1.3E-8[a]
Benzo[a]pyrene*	$C_{20}H_{12}$	5	252.32	3.8	7.3E-7
Dibenz[a,h]anthracene*	$C_{22}H_{14}$	5	278.36	0.5	1.3E-8[a]
Benzo[g,h,i]perylene*	$C_{22}H_{12}$	6	276.34	0.26	1.4E-8
Indeno[1,2,3-c,d]pyrene*	$C_{22}H_{12}$	6	276.34	0.53	1.3E-8[a]

*PAHs classified by the U.S. EPA as possible human carcinogens,[a]at 20°C, others at 25°C(Rogers *et al*., 2002)

MATERIALS AND METHODS

Description of the Study Area

The study area is the Eleme local government area of Rivers State, located in the Niger Delta of Nigeria. Eleme Local Government Area is one of the 23 local governments in Rivers State in south-south Nigeria. And it is part of the Port Harcourt metropolitan area. Eleme Local Government Area is located at 4°47'15" (between 4°60' and 4°35') north of the Equator and 7°8'37" (between 7° and 7°15') east of the meridian. It covers an area of 138 square kilometres (km^2), and at the 2006 Census, it had a population of 190,884 (Obenade et al., 2020). The Eleme people are Eleme's main indigenous ethnic group, with ten main towns that include Agbonchia, Alesa, Aleto, Akpajo, Alode, Ebubu, Ekporo, Eteo, Ogale, and Onne. Eleme is bounded by six local government areas: on the north, Obio/Akpor and Oyigbo Local Government Areas; on the east, Tai Local Government Area; on the south, Ogu/Bolo and Okrika Local Government Areas; and on the west, Okrika and Port Harcourt City Local Government Areas (Wokocha et al., 2017).

Sample Locations

Three (3) different automobile repair shops located within three communities in the Eleme Local Government Area, which include Aleto (Station 1), Alesa (Station 2), and Onne (Station 3), were identified and selected as impacted sites, and a pristine farmland located not less than 100 km from each of the impacted sites was identified and chosen as a control site where there was no existing industry and/or no history of previously established industry in the locality.

Sample Collection

Three topsoil samples were collected six times from each impacted site as well as a control site from the three (3) different automobile repair shops identified using a hand auger. At each location, surface soil samples were randomly collected from the same depth of 0–20 cm to form composite samples (as prescribed by Marcus et al., 2017). Thus, a total of twenty-four (24) soil samples were collected and analysed six times within the period of eleven months (November 2021 to September 2022). In each month, three (3) top composite soil samples from the chosen automobile repair workshop were collected, stored in sample bags, and labelled as Station 1, Station 2, and Station 3, representing surface soil samples around automobile repair shops in selected communities in the Eleme local

government areas. Control soil samples were also collected six times, just as those from the impacted sites, stored in polythene bags and coded as "control samples" (CS), and taken to the laboratory for laboratory preparation and analysis.

Sample Preparation

The coning and quartering procedure was used to bulk down each composite sample in order to get a representative sample. To prevent microbial degradation, all samples were air-dried to a consistent weight. The air-dried samples were homogenised by grinding them in a clean porcelain mortar and pestle, sieved through a 2 mm plastic screen, and then stored in plastic cans with labels (Emoyan et al., 2020).

Sample Analysis

The polycyclic aromatic hydrocarbons in the soil samples were determined by extraction techniques using Soxhlet Extraction, and the extract was analysed with gas chromatography coupled with a mass spectrometer following a method prescribed earlier (Ekanem et al., 2019). Precisely 10g of the soil sample was carefully measured and mixed with 10g of anhydrous sodium sulphate, wrapped in filter paper, and placed in an extraction thimble of the Soxhlet extraction chamber. A 200-ml mixture of n-hexane and dichloromethane in a 3:1 ratio was poured into a 500-ml round-bottom flask containing a boiling chip (added to the solvent to make it boil more calmly). Following that, the extractor and condenser were appropriately connected to the flask. Using the reflux cycle at a rate of six cycles per hour, the sample was extracted for 24 hours.

At the completion of the extraction, the extract was allowed to cool. Using a glass column filled with activated neutral alumina, the soluble organic matter was separated into aliphatic and aromatic fractions. The column was well cleaned with redistilled n-hexane after 10g of alumina were put inside. The extract was applied to the alumina and allowed to elute, with the aliphatic fractions being removed using redistilled n-hexane, into a 25-ml container that had already been cleaned. With the use of a 50-ml 3:1 n-hexane/dichloromethane combination, the aromatic fraction was recovered. A rotary evaporator was used to condense the aromatic fraction to around 2.0 mL. Under the influence of a stream of nitrogen gas, this fraction was further concentrated to 1.0 mL and transferred into organic free sample vials that had already been cleaned and labelled. It was kept chilled at 4 °C until analysis by gas chromatography coupled with a mass spectrometer was done.

Source Determination and Diagnostic Ratio Assessment of PAHs

In order to distinguish between naturally occurring and anthropogenically produced PAHs in the environment, a diagnostic ratio has been used as a technique for identifying the sources of PAHs in an ecosystem. Numerous researchers have used the technique to identify the point origins of PAH pollution in the environment (Muze et al., 2020). The following source indicator ratios are used to determine the input sources of PAHs: Fluoranthene/Fluoranthene + Pyrene ratio (Flu/Flu + Py), Anthracene/Anthracene + Phenanthrene ratio (An/An + Ph), Benzo [a] anthracene/Benzo [a] anthracene + Chrysene ratio (BaA/BaA + Ch), and the LMW-PAHs to HMW-PAHs ratio. To determine where the hydrocarbon pollution originated, these diagnostic ratios are employed (Ilechukwu*et al*., 2016). When the computed ratio of low molecular weight PAHs (LMW) to high molecular weight PAHs (HMW) is greater than 1 (LMW/HMW >1), the origin may be from petrogenic input, whereas values less than 1 come from pyrogenic sources. Anthracene/anthracene + phenanthrene (An/An + Phe) ratio calculations show that anthracene has a petrogenic origin when the ratio is less than 0.1 and a pyrogenic origin when the ratio is greater than 0.1. In view of the higher molecular weight of PAHs, when the calculated ratio between Fluoranthene and Fluoranthene + Pyrene is greater than 0.5 (Flu/Flu+Py > 0.5), it is an indication that the origin is from pyrogenic sources, but if the ratio calculated is less than 0.4 (Flu/Flu+Py < 0.4), it suggests that it is of petrogenic origin.More source identification was performed by calculating the ratio of benzo [a] anthracene/benzo [a] anthracene + chrysene. When this ratio is less than 0.2 (BaA/BaA + Ch < 0.2), it is an indication of petrogenic input, but when the ratio is greater than 0.35 (BaA/BaA + Ch > 0.35), it reveals that it originated from pyrogenic input sources.

RESULTS AND DISCUSSIONS

Tables 2–5 show the results of PAHs in the topsoils of the studied locations of Aleto (Station 1), Alesa (Station 2), Onne (Station 3), and Eleme, as well as the control site. From the results, it is observed that in all the sample soils examined, PAHs were detected at these study stations at varying concentrations. The total concentration (mg/kg) at Station 1, Station 2, and Station 3 study locations were 35.540±1.607, 34.729±1.517, and 35.647±1.663, respectively, and ranged from 34.729 to 35.647. The order of total PAH contamination in Eleme's auto-mechanic workshops was Station 2 > Station 1 > Station 3, indicating the amount of activity in these areas.

There was a marked difference between the concentration of PAHs in the soil from the automobile repair garages and the control site (Table 5). In contrast, these levels were highly above the value obtained from the control site of 2.116±0.185 mg/kg. This is an insinuation that the soils from the automobile repair shops have been contaminated and that the high concentrations of PAHs obtained from the soils of the impacted site are a result of the activities of the automobile repair shops in the area. Figure 1illustrates the comparison of the mean concentrations of polycyclic aromatic hydrocarbons in topsoils around selected automobile workshops in Eleme and the control site. The measured values from the studied locations were all higher than those of the control, except for the concentrations of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, and pyrene, which were not detected in the sample soil obtained from the control site. Looking at the results generally, it was noted that the low molecular weight (LMW) PAHs had the highest concentrations, which suggests that LMW PAHs are easily lost into the atmosphere through volatilization and transported into the soil by water since their solubility in water is higher than that of the high molecular weight (HMW) PAHs (Eneji et al., 2017). This result differed from those observed by Alabi et al. (2019), who found higher concentrations of HMW PAHs (5 and 6-membered rings) in an investigation conducted in the soil of auto-mechanic workshops in Akure, Nigeria. Anegbe et al. (2016) also found the absence of LMW PAHs except fluorene and phenanthrene in all soil samples from the vicinity of mechanic workshops in Benin City, as well as Obini et al. (2013), who found very low concentrations of flourene and phenanthrene among the LMW PAHs and benzo[a]anthracene, benzo[k]fluoranthrene, and chrysene among the HMW PAHs in soil contaminated with spent motor engine oil in Abakaliki Auto-Mechanic Village, Nigeria.

Table 2: Mean levels of two-monthly determinations of PAHs in soil around automobile repair workshop at Aleto, Eleme (Station 1)

PAHs (mg/kg)	Months						Mean ± S.D
	November	January	March	May	July	September	
Na	5.216±0.081	3.716±0.052	4.624±0.061	4.726±0.042	4.218±0.041	4.116±0.097	4.436±0.482
Acy	4.644±0.012	2.644±0.114	4.735±0.023	2.439±0.014	1.550±0.002	3.544±0.061	3.259±1.165
Ace	4.827±0.067	3.927±0.091	4.916±0.053	3.467±0.051	2.810±0.021	3.811±0.074	3.960±0.736
Fl	4.710±0.012	2.710±0.031	5.420±0.011	2.817±0.071	1.610±0.031	2.610±0.023	3.313±1.316
Ph	3.961±0.031	1.761±0.043	4.709±0.032	2.762±0.034	3.751±0.007	3.761±0.078	3.451±0.945
An	5.579±0.065	4.680±0.071	5.419±0.066	4.611±0.091	3.379±0.040	3.380±0.031	4.508±0.872
Flu	2.984±0.016	2.884±0.100	2.764±0.023	3.184±0.060	5.784±0.005	2.784±0.010	3.397±1.077
Py	2.619±0.012	3.919±0.021	3.419±0.032	3.959±0.012	4.619±0.012	1.619±0.001	3.359±0.987
BaA	0.740±0.021	0.150±0.011	0.652±0.011	0.950±0.009	0.640±0.061	0.540±0.011	0.612±0.242
Ch	0.743±0.011	0.135±0.005	0.560±0.020	0.445±0.006	0.743±0.012	0.427±0.012	0.509±0.209
BbF	0.670±0.023	0.192±0.043	0.751±0.019	0.298±0.053	0.388±0.031	0.199±0.001	0.416±0.220
BkF	0.270±0.004	0.170±0.090	0.281±0.007	0.175±0.080	0.270±0.001	0.270±0.011	0.239±0.047
BaP	0.833±0.023	0.133±0.019	0.864±0.033	0.153±0.014	0.233±0.011	0.633±0.003	0.475±0.312
IP	0.754±0.031	0.156±0.029	0.762±0.025	0.556±0.026	0.754±0.210	0.354±0.002	0.556±0.232
DA	0.674±0.021	0.174±0.005	0.587±0.023	0.178±0.005	0.574±0.009	0.634±0.021	0.470±0.211
Bp	1.945±0.001	1.945±0.099	1.896±0.081	3.345±0.092	3.425±0.003	2.925±0.030	2.580±0.670
Total	**41.169±1.904**	**29.296±1.631**	**42.359±1.979**	**34.065±1.643**	**34.748±1.756**	**31.607±1.466**	**35.54±1.607**

Source: Field Survey (2022)

Table 3: Mean levels of two-monthly determinations of PAHs in soil around automobile repair workshop at Alesa, Eleme (Station 2)

PAHs (mg/kg)	Months						Mean ± S.D
	November	January	March	May	July	September	
Na	4.116±0.097	4.218±0.041	5.011±0.091	3.227±0.051	3.625±0.040	3.926±0.041	4.021±0.551
Acy	3.544±0.061	1.550±0.002	4.401±0.073	1.652±0.012	2.631±0.032	2.021±0.032	2.633±1.038
Ace	3.811±0.074	2.810±0.021	3.830±0.044	2.910±0.010	2.890±0.023	3.930±0.022	3.363±0.496
Fl	2.610±0.023	1.610±0.031	4.311±0.013	1.914±0.035	2.625±0.060	2.819±0.073	2.648±0.858
Ph	3.761±0.078	3.751±0.007	3.462±0.056	3.753±0.009	3.663±0.018	4.633±0.030	3.837±0.371
An	3.380±0.031	3.379±0.040	4.320±0.040	3.475±0.041	3.484±0.025	3.537±0.082	3.596±0.329
Flu	2.784±0.010	5.784±0.005	2.658±0.020	5.384±0.015	2.652±0.011	4.412±0.011	3.946±1.313
Py	1.619±0.001	4.619±0.012	3.217±0.011	4.720±0.022	5.679±0.020	5.541±0.029	4.233±1.417
BaA	0.540±0.011	0.640±0.061	0.572±0.009	0.640±0.050	0.442±0.031	0.394±0.081	0.538±0.093
Ch	0.427±0.012	0.743±0.012	0.468±0.019	0.875±0.012	1.463±0.017	1.107±0.001	0.847±0.360
BbF	0.199±0.001	0.388±0.031	0.256±0.011	0.368±0.021	0.488±0.030	0.383±0.031	0.347±0.094
BkF	0.270±0.011	0.270±0.001	0.228±0.010	0.200±0.001	0.271±0.052	0.219±0.001	0.243±0.029
BaP	0.633±0.003	0.233±0.011	0.647±0.030	0.283±0.013	0.524±0.027	0.254±0.021	0.429±0.177
IP	0.354±0.002	0.754±0.210	0.607±0.009	0.784±0.010	0.763±0.032	0.821±0.012	0.681±0.161
DA	0.634±0.021	0.574±0.009	0.599±0.031	0.970±0.009	0.534±0.019	0.586±0.006	0.650±0.146
Bp	0.925±0.030	3.425±0.003	0.927±0.036	1.465±0.003	4.714±0.022	4.845±0.042	2.717±1.683
Total	**29.607±1.465**	**34.748±1.756**	**35.514±1.761**	**32.62±1.607**	**36.448±1.642**	**39.428±1.871**	**34.729±1.517**

Source: Field Survey (2022)

Table 4: Mean levels of two-monthly determinations of PAHs in soil around automobile repair workshop at Onne, Eleme (Station 3)

PAHs (mg/kg)	Months						
	November	January	March	May	July	September	Mean ± S.D
Na	3.616±0.031	3.621±0.031	3.625±0.040	3.926±0.041	3.716±0.052	4.218±0.041	3.787±0.221
Acy	2.544±0.012	2.220±0.012	2.631±0.032	2.021±0.032	2.644±0.114	1.550±0.002	2.268±0.393
Ace	2.811±0.032	3.812±0.032	2.890±0.023	3.930±0.022	3.927±0.091	2.810±0.021	3.363±0.528
Fl	1.610±0.023	2.911±0.023	2.625±0.060	2.819±0.073	2.710±0.031	1.610±0.031	2.381±0.552
Ph	3.761±0.010	4.731±0.010	3.663±0.018	4.633±0.030	1.761±0.043	3.751±0.007	3.717±0.975
An	3.380±0.022	3.584±0.022	3.484±0.025	3.537±0.082	4.680±0.071	3.379±0.040	3.674±0.456
Flu	2.784±0.001	4.312±0.001	2.652±0.011	4.412±0.011	2.884±0.100	5.784±0.005	3.805±1.137
Py	5.619±0.030	5.340±0.030	5.679±0.020	5.541±0.029	3.919±0.021	4.619±0.012	5.120±0.643
BaA	0.140±0.001	0.314±0.001	0.442±0.031	0.394±0.081	0.150±0.011	0.640±0.061	0.347±0.173
Ch	1.426±0.011	1.257±0.011	1.463±0.017	1.107±0.001	0.135±0.005	0.743±0.012	1.022±0.463
BbF	0.388±0.031	0.361±0.041	0.488±0.030	0.383±0.031	0.192±0.043	0.388±0.031	0.367±0.083
BkF	0.270±0.001	0.269±0.001	0.271±0.052	0.219±0.001	0.170±0.090	0.270±0.001	0.245±0.038
BaP	0.233±0.021	0.154±0.021	0.524±0.027	0.254±0.021	0.133±0.019	0.233±0.011	0.255±0.128
IP	0.754±0.012	0.801±0.012	0.763±0.032	0.821±0.012	0.156±0.029	0.754±0.210	0.675±0.233
DA	0.574±0.009	0.486±0.006	0.534±0.019	0.586±0.006	0.174±0.005	0.574±0.009	0.488±0.144
Bp	4.925±0.032	4.943±0.032	4.714±0.022	4.845±0.042	1.945±0.099	3.425±0.003	4.133±1.112
Total	**34.835±1.706**	**39.116±1.854**	**36.448±1.642**	**39.428±1.871**	**29.296±1.631**	**34.748±1.756**	**35.647±1.663**

Source: Field Survey (2022)

Table 5 : Mean levels of PAHs in soil across the three selected automobile repair workshops in Eleme

PAHs (mg/kg)	Stations			Range	**Mean ± S.D**	Control
	1	2	3			
Na	4.436±0.482	4.021±0.551	3.787±0.221	3.787 – 4.436	4.081±0.268	ND
Acy	3.259±1.165	2.633±1.038	2.268±0.393	2.268 – 3.259	2.720±0.409	ND
Ace	3.960±0.736	3.363±0.496	3.363±0.528	3.363 – 3.960	3.562±0.281	ND
Fl	3.313±1.316	2.648±0.858	2.381±0.552	2.381 – 3.313	2.781±0.392	ND
Ph	3.451±0.945	3.837±0.371	3.717±0.975	3.451 – 3.837	3.669±0.161	ND
An	4.508±0.872	3.596±0.329	3.674±0.456	3.596 – 4.508	3.926±0.413	ND
Flu	3.397±1.077	3.946±1.313	3.805±1.137	3.397 – 3.946	3.716±0.233	ND
Py	3.359±0.987	4.233±1.417	5.120±0.643	3.359 – 5.120	4.237±0.719	ND
BaA	0.612±0.242	0.538±0.093	0.347±0.173	0.347 – 0.612	0.499±0.112	0.162±0.019
Ch	0.509±0.209	0.847±0.360	1.022±0.463	0.509 – 1.022	0.793±0.213	0.155±0.011
BbF	0.416±0.220	0.347±0.094	0.367±0.083	0.347 – 0.416	0.377±0.029	0.577±0.050
BkF	0.239±0.047	0.243±0.029	0.245±0.038	0.239 – 0.245	0.242±0.002	0.123±0.011
BaP	0.475±0.312	0.429±0.177	0.255±0.128	0.255 – 0.475	0.386±0.095	0.163±0.020
IP	0.556±0.232	0.681±0.161	0.675±0.233	0.556 – 0.681	0.637±0.058	0.192±0.021
DA	0.470±0.211	0.650±0.146	0.488±0.144	0.470 – 0.650	0.536±0.081	0.163±0.010
Bp	2.580±0.670	2.717±1.683	4.133±1.112	3.787 – 4.436	3.143±0.702	0.581±0.011
Total	**35.540±1.607**	**34.729±1.517**	**35.647±1.663**	**34.729 – 35.647**	**35.305±1.561**	**2.116±0.185**

Source: Field Survey (2022)

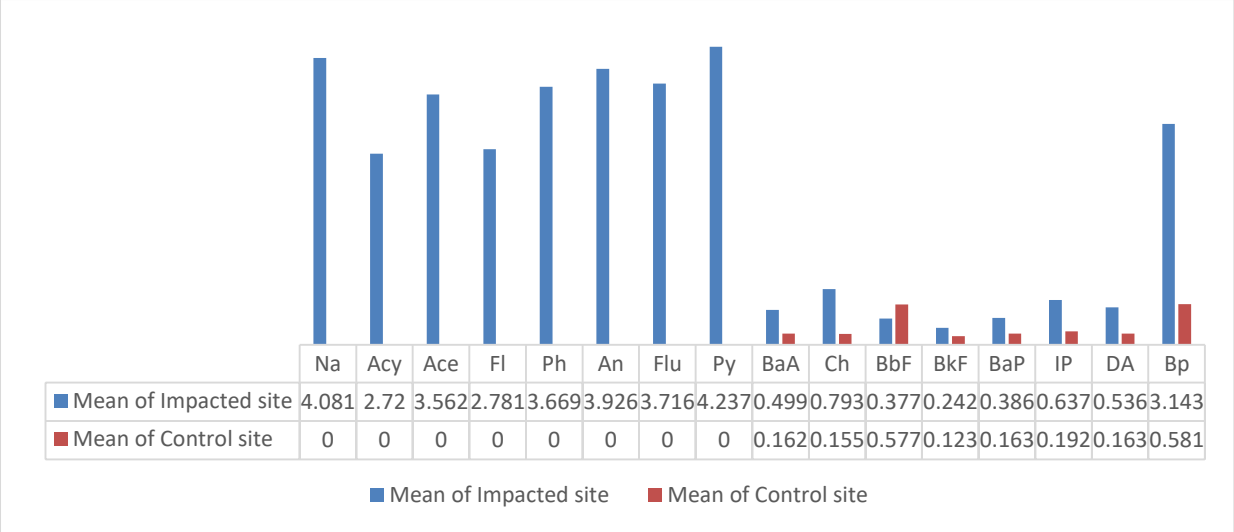


Figure 1: Mean concentrations of polycyclic aromatic hydrocarbon of topsoil around selected automobile workshops in Eleme in comparison with the control within the sampled period

The concentration of total PAHs in this study was similarly in the same range of 245±21 to 23400±25 µg/kg as noted in soils at automobile workshops by Ipeaiyeda and Ogungbemi (2020), but lower than the range of 214.83±14.875 to 404.16 ± 69.940 mg/kg as reported in the soil environment around Selected Auto-Technicians' Workshop in ObioAkpor, Rivers State, Nigeria (Daniel et al., 2020). On the other hand, the concentrations observed in the present study were higher than the concentration ranges of 0.14 and 0.21 mg/kg as obtained in soil from an auto-mechanic workshop in Akure City, Nigeria, by Alabi et al. (2019); 1.998 and 8.682 mg/kg gotten from soil at the vicinity of mechanic workshops in Benin City by Anegbe et al. *(2016)*; < 0.02 to 1.80 mg/kg as found in the soil of auto-mechanic workshops at Alaoji, Aba and Elekahia, Port Harcourt, Niger Delta, Nigeria, by Muze et al. (2020); 0.0184 ± 0.02 to 0.1385 ± 0.2 mg/kg as assayed in soil contaminated with spent motor engine oil in Abakaliki Auto-Mechanic Village by Obini et al. (2013); 0.83 to 12.98mg/kg as examined in soil around automobile repair workshops within Eket Metropolis, Akwa Ibom State, Nigeria by Ekanem et al. (2019); 66.4 - 5321.9 µg/kg as observed in soils from selected vehicle-parks in southern Nigeria by Emoyan et al. (2020); 325–1122.8 µg/kg as noted in soil around auto-mechanic workshops in major towns in Benue State, Nigeria by Eneji et al (2017); 3.246 - 6.890 mg/kg as observed in soil from auto-mechanic workshops along Ikokwu Mechanic Village, Port Harcourt, Nigeria (Akomah & Osayande, 2018).

Based on how long the mechanics' workshops have been operating, the presence of PAHs may be attributable to the ongoing dumping of spent engine oil. The study thus demonstrates that organic soil content contributes to the sequestration of PAHs in the soil-water system. According to Ipeaiyeda and Ogungbemi (2020), most auto lubricants that leak on soil contain polycyclic aromatic hydrocarbons (PAHs), which have been identified as probable human carcinogens and are major contaminants associated with used engine oil and are typically deposited on soil surfaces. Due to the leaking of vehicle lubricants and the careless abandonment of tyres and spare parts, auto repair shops have been identified as a possible source for the enrichment of soils with heavy metals and polycyclic aromatic hydrocarbons. These pollutants are carried into the storm sewer system by rain and leached into the groundwater. Used engine oil spreads fast and eventually seeps into bodies of water (Anegbe et al., 2016). Regular use of petroleum-based products, including gasoline, frequently leads to the substantial and unavoidable spilling of the majority of these products into the environment. The top soils of the examined car shops included PAHs, primarily as a result of the auto mechanics' improper treatment and disposal of used oil. For both plants and animals, as well as people who interact with the environment either directly or indirectly, this may have a number of detrimental health effects (Daniel et al., 2020).

According to Alabi et al. (2019), residents of an auto-mechanic village may be predisposed to a greater risk of cancer due to long-term exposure to PAHs through contaminated soils, rivers, and

groundwater because auto-mechanic activities are constant. Since there is no dose at which PAH's carcinogenic effects do not occur, the values of PAH found in this study should be considered seriously and should not be taken for granted.

Source Identification and Diagnostic Ratios of PAHs in the Soils

Table 6: Diagnostic Ratios of PAHs in soil Sample from Eleme

Stations	∑LMW PAHs	∑HMW PAHs	LMW/HMW	An/(An+Ph)	Flu/(Flu+Py)	BaA/(BaA+Ch)
1	22.927	12.613	1.817727741	0.566402814	0.502812315	0.545941124
2	20.098	14.631	1.37365867	0.483788511	0.482455068	0.388447653
3	19.190	16.457	1.16606915	0.497091057	0.426330532	0.253469686
Petrogenic			> 1	< 0.1	< 0.4	< 0.2
Pyrogenic			< 1	> 0.1	> 0.5	> 0.35

LMW (Low Molecular Weight), HMW (High Molecular Weight), An (anthracene), Ph (phenanthrene), Flu (fluoranthene), Pyr (pyrene), BaA (benzo [a] anthracene), Ch (chrysene)

The sum of LMW PAHs was 22.927; HMW was 12.613; and the ratio LMW/HMW was 1.817727741. The An/(An+Ph) ratio was 0.566402814, the Flu/(Flu+Py) ratio was 0.502812315, and the BaA/(BaA+Ch) ratio was 0.545941124. The sum of LMW and HMW at Station 2 was 20.098 and 14.631, respectively. LMW/HMW was 1.37365867, An/(An+Ph) was 0.483788511, Flu/(Flu+Py) was 0.482455068, and BaA/(BaA+Ch) was 0.388447653. At Station 3, the summation values of LMW and HMW were 19.190 and 16.457, respectively, and the LMW/HMW ratio was 1.16606915. The An/(An+Ph) ratio was 0.497091057, the Flu/(Flu+Py) ratio was 0.426330532, and the BaA/(BaA+Ch) ratio was 0.253469686.

The sources and nature of polycyclic aromatic hydrocarbons have a resultant effect on their pattern of distribution or spread in an environment and are very effective in the evaluation of their overall detrimental effects on the environment. The pattern of occurrence relative to the polycyclic aromatic hydrocarbon ratio is an excellent tool for predicting, identifying, and diagnosing its source and origin in any given environment, as well as separating the various input sources. The pattern and nature of spreading in the levels of polycyclic aromatic hydrocarbons in the different soil samples in this investigation are impacted by the source implications and spreading of PAHs, and these effects are superimposed by the results recorded for the source diagnosis and identification. As a result, the source diagnosis was calculated primarily using the ratios or proportions among the distinct PAHs, and it was then interpreted in light of the range that each ratio falls into.

The increased ratio of pyrogenic or combustion-based PAHs found in the soil samples from different car garage stations indicated that anthropogenic sources, especially combustion and spills of petroleum products, were the main sources of PAH component input. Approximately 20 million gallons of used engine oil are produced annually by mechanic shops in Nigeria, according to Alabi et al. (2019), who also lamented the lack of industry-standard practices for managing spent oil in these facilities.

According to Muze et al. (2020), the results of the diagnostic ratio of phenanthrene to anthracene point to a pyrogenic origin. He observed that all of the An/Phe+An values were below one, suggesting that the PAHs are of petrogenic origin. In the six sample locations that were examined, the values of the Fla/Pyr ratio were all less than one, with the exception of one sample, indicating that the PAHs in these samples were of petrogenic origin, whereas those in the other samples were of pyrogenic origin. The values observed for Fla/Pyr+Fla in all but one of the sample sites were less than 0.5, indicating that the PAHs in that sample were due to emissions from petroleum products, whereas

those in the other samples were due to diesel emissions. This may be a result of the auto mechanics' actions in the locations under investigation. These PAHs are present in the research area as a result of the burning of carbonaceous materials, as shown by the ratios of 0.24 and 0.30 for Ba/Ba+Chy in two study locations. Additional samples produced results greater than 0.35, showing the presence of PAHs from both combustion and vehicle emissions. PAHs are most likely produced during the combustion of biomass and petroleum products, according to the values of the Ind/Ind+B(ghi)p ratio. He came to the conclusion that the results of the diagnostic ratio analysis indicate that the petroleum products from the vehicles repaired in the mechanic villages are the primary cause of the PAHs.

Similar to this, Ekanem et al. (2019) reported that the diagnostic ratio used for source determination revealed that the PAHs in the study were primarily from both petrogenic and pyrogenic origins. They assessed PAHs levels in soil around auto repair workshops within Eket Metropolis, Akwa Ibom State, Nigeria and came to the conclusion that soil contamination with PAHs was a result of automotive maintenance activity.

CONCLUSION

The results of polycyclic aromatic hydrocarbons in the soils of the studied locations of Eleme and part of Khana, as well as the control site, revealed that PAHs were detected at these stations at varying concentrations in all of the sample soils examined. There was a marked difference between the concentration of PAHs in the soil from the automobile repair garages and the control site. Looking at the results generally, it was noted that the low molecular weight (LMW) PAHs had the highest concentrations, which suggests that LMW PAHs were easily lost into the atmosphere through volatilization and transported into the soil by water since their solubility in water is higher than that of the high molecular weight PAHs. According to source identification and diagnostic ratios of polycyclic aromatic hydrocarbons in the soils, combustion and spills of petroleum products were the main sources of PAH component input.

References

Akomah, O. N., & Osayande, A. D. (2018). Evaluation of hydrocarbons level and identification of indigenous bacteria in soil from auto-mechanic workshops along Ikokwu Mechanic Village, Port Harcourt, Nigeria. *Journal of Applied Sciences and Environmental Management*, *22*(1), 115-118.

Alabi, A. B., Aiyesanmi, A. F., & Ololade, I. A. (2019). Qualitative and Quantitative Assessment of Hydrocarbons in Soil Profiles of Auto-Mechanic Workshop: A Case Study of Akure City, Nigeria. *Polycyclic Aromatic Compounds*, *4*(1), 45-58.

Anegbe, B., Okuo, J. M., & Okieimen, F. E. (2016). The impact of inorganic and organic pollutants in soil from the vicinity of mechanic workshops in Benin City. *International Journal of Chemical Studies*, 4(3), 106-112.

Daniel, U. I., Utuh, I. A., & Nwaichi, E. O. (2020). Profile of Polycyclic Aromatic Hydrocarbons in Soil Environment around Selected Auto-Technicians' Workshop in ObioAkpor, Rivers State Nigeria. *Journal of Environmental Protection*, *11*(05), 399-407.

Ekanem, A. N., Osabor, V. N., & Ekpo, B. O. (2019). Polycyclic aromatic hydrocarbons (PAHs) contamination of soils and water around automobile repair workshops in Eket metropolis, Akwa Ibom State, Nigeria. *SN Applied Sciences*, *1*, 1-17.

Emoyan, O. O., Onocha, E. O., & Tesi, G. O. (2020). Concentration assessment and source evaluation of 16 priority polycyclic aromatic hydrocarbons in soils from selected vehicle-parks in southern Nigeria. *Scientific African*, *7*, e00296.

Eneji, I. S., Vesuwe, R. N., & Oloruntoba, S. O. (2017). Analysis of polyaromatic hydrocarbons in soil around auto-mechanic workshops in major towns in Benue State, Nigeria. *FUW Trends in Science & Technology Journal*, *2*(1), 79-84.

Ilechukwu, I., Osuji, L. C., & Onyema, M. O. (2016). Source apportionment of polycyclic aromatic hydrocarbons (PAHs) in soils within hot mixed asphalt (HMA) plant vicinities. *Journal of Chemical Society of Nigeria, 41*(2), 10-16.

International Agency for Research on Cancer (2006). *List of all agents evaluated to date.* http://www.monographs.iarc.fr/ENG/Classification/index.php

Ipeaiyeda, A. R., & Ogungbemi, A. O. (2020). Decontamination of automobile workshop soils containing heavy metals and PAHs using chelating agents. *International Journal of Environmental Pollution and Remediation, 8*, 37-45.

Joseph, A. A., Titilope, J. J., Oguntimehin, I. I., & Lajide, L. (2017). Delineation of heavy metals in soils from auto− mechanic workshops within Okitipupa, Ondo State, Nigeria. *International Research Journal of Public Environmental Health*, *4*, 136-147.

Marcus, A. C., Nwineewii, J. D., & Edori, O. S. (2017). Heavy metals assessment of leachate contaminated soil from selected dumpsites in Port Harcourt, Rivers State, Nigeria. *International Journal of Chemical Studies*, *5*(6), 1507-1511.

Muze, N. E., Opara1, A. I., Ibe, F. C., & Njoku, O. C. (2020). Assessment of the geo-environmental effects of activities of auto-mechanic workshops at Alaoji Aba and Elekahia Port Harcourt, Niger Delta, Nigeria. *The Korean Society of Environmental Health and Toxicology/Korea Society for Environmental Analysis*, *35*(2), 1-12.

Obenade, M., Ugochi, E. E., Ogungbemi, A. A., Kanu, C. C., & Henry, U. O. (2020). Assessment of the Socio-economic Effects of Land Use Trends and Population Growth in Eleme, Rivers State, Nigeria. *International Journal of Scientific & Engineering Research*, *11*(9), 1737-1757.

Obini, U., Okafor, C. O., & Afiukwa, J. N. (2013). Determination of levels of polycyclic aromatic hydrocarbons in soil contaminated with spent motor Engine oil in Abakaliki Auto-Mechanic Village. *Journal of Applied Sciences and Environmental Management*, *17*(2), 169-175.

Ribeiro, J., Silva, T. F., MendonçaFilho, J. G., & Flores, D. (2014). Fly ash from coal combustion–An environmental source of organic compounds. *Applied Geochemistry*, *44*, 103-110.

Rogers, S. W., Ong, S. K., Kjartanson, B. H., Golchin, J., & Stenback, G. A. (2002). Natural attenuation of polycyclic aromatic hydrocarbon-contaminated sites. *Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management*, *6*(3), 141-155.

Timothy, M. N., Iyama, W. A., Egbunefu, C. O., Aalonee, E. B., Emejuru, S. W., Nimame, P., Gbode, L. (2023). Assessment of organic level contamination of soils surrounding vehicle repair workshops in Wiiyaakara Town, Khana, Rivers State, Nigeria. *Middle East Research Journal of Engineering and Technology*, *3*(2), 21-26.

Timothy, M. N., Marcus, A. C., & Iyama, W. A. (2022). Assessment of trace metal content in soils of automobile workshops around Bori urban area, Rivers State, Nigeria. *European Journal of Applied Sciences*, *10*(3), 209–221.

Wokocha, C.C., Wuche, G. E., & Kamalu, O. J. (2017). Determining the effect of vegetation on soil properties using GIS in Eleme Area of Rivers State. *International Journal of Agriculture and Earth Science*, *3*(8). 15-30.

Yu, H. (2002). Environmental carcinogenic polycyclic aromatic hydrocarbons: Photochemistry and phototoxicity. *Journal of Environmental Science and Health, Part C*, *20*(2), 149-183.

pp. 143-149 https://dx.doi.org/10.4314/johasam.v7i1.16

Family Factors and Community Agencies: Pathways to Students' Academic Performance in Nigeria

Shedrack Ikechukwu Nwadike
Institute of Education, Faculty of Education
Rivers State University
shedrack.nwadike@ust.edu.ng
+2348079485319

Abstract

Academic performance of students is dependent on the various contributory factors that play major roles for quality output in human capital development in Nigeria. Therefore, this paper x-rayed the various family factors which are: parental attitude to education, parental occupation, family structure, parental educational background and parental involvement in education. Also community agencies are of two types which are: the registered and the unregistered agencies. The various pathways to students' academic performance are: time management, enrolment style, motivation, robust financial aids, and friendly academic curriculum. It was concluded that family, community and government are the major cardinal points to student academic performance. It was suggested amongst others that family factors that contributes to the success of students should be fully adopted for continuity of academic performance of the students. The various pathways and community agencies should always be allowed to play out in ensuring that students' academic performance is secured.

Keywords: family factors, community agencies, pathways, academic performance

Introduction

Students' academic performance is as important as education itself which is all about teaching and learning with the main focus on students' academic well being. Academic performance of students is dependent on the level of management of some factors like family factors, community agencies and educational resources that contribute towards the production of man power within the educational sector. In agreement to this, Aba (2019) stated that proper management of factors of production in education contributes positively to students' academic performance. Evaluation, assessment and judgment are the means by which a teacher, a mentor and a guardian can ensure that a student's academic performance is either positive or negative based on the level of knowledge acquired.

Furthermore, the functionality of every school for a productive outcome is based on the corporation and assistance given by both the community and the family. Akano (2017) opined that schools cannot function in isolation; therefore, all hands must be on deck. Educational resources which include financial resources, physical resources and human resources, all come together to achieve a common goal in education. Adequate provision, distribution and utilization of educational resources help to boost the understanding of the subject matter and the academic performance of students in a contemporary world.

According to Jones and Jack (2018), community agents are the foot soldiers and the eyes of every school. Most schools within the local communities rely solely on the community in solving their needs due to the failure of the government to intervene promptly. Banks (2015) described family factors as different economic, social and cultural beliefs that function within a family unit so as to influence an individual's development. Every student's life is being affected either negatively or positively by the kind of family factor that is surrounding him. A good and well structured family means a lot to the students in helping them pursue their academic goal and aspiration faster.

Banks (2015) stated that, occupational status, parenting style, family structure, family support and family history are the major family factors that contribute to any student's development. The type of occupation parents do, the parenting style of every family, the level of support (financial, morally and spiritual) family gives to a child, and the family history seriously affect the academic life of the student either for good or for bad. Although, it is an obligation that families should provide for their younger ones and failure to perform the basic functions, a faulty foundation with a wrong path will be laid which will in turn affect the academic performance of the child. Ogar (2015) stated that family is

a small section of a micro unit of a society, yet very strong and the oldest institution in the history of mankind. The molding of character and good behavior of every child begins from family and this is because family is the primary agent for socialization and development of every student as a basic fundamental social unit.

Family factors, to a large extent, contribute0 to the shaping of the life of students and their level of academic performance. Also community agencies play a major role in giving life to the educational institutions domiciled in their community so as to encourage quality academic delivery in school. Therefore, family factors and community agencies are the pathways to students' academic performance in Nigeria when properly managed.

The Concept of Family Factors

Family factors and family influence are very essential and germane for all students in Nigeria. Ogar (2015) defined family factors as different variables within a family that can influence the life and character of its members. In the same vein, Taiwo (2017) posited that family factors or family background is the machinery that puts the students' life on track. However, family factors remain the life wire and a channel through which students achieve their educational prowess for the betterment of the society. According to Ogar (2015), there are few types of family factors which are parental attitude to education, parental occupation, family structure, parental educational background, and parental involvement in child education.

1) Parental Attitude to Education: Parents' attitude to education has been a major issue in the educational sector, whereby parents do not care what goes on in school whether their child is doing well or not. Attitude of parents is of two dimensions: the positive attitude and the negative attitude. Positive attitude of parents to education include (i) performing a role at home with the child by teaching and rehearsing with the child for better mastery of work, (ii) giving emotional and mental sufficiency to the child for a balanced academic know-how, (iii) monitoring extra-curricular activities of the child and maintaining self discipline, (iv) ensuring of a conducive environment for reading and studying of the student within the home.

Negative attitude of parents to education include (i) lack of assistance and encouragement to the child, (ii) failure to provide a conducive environment for students at home, (iii) emotional and psychological disturbance of students.

2) Parental Occupation: The type of job parents engage in obviously shows the level of financial assistance parents give to their children based on his income. Mudassir and Norsuhaily (2015) categorized parental occupation into most prestigious occupation and lower ranking occupation. The most prestigious occupations are seen to be the juicy jobs of some parents with a high class positioned societal status and they include doctors, lawyers, engineers, lecturers, oil workers and other lucrative jobs with the inclusive of high class business men and women in the society. On the other hand also, lower ranking occupation by parents include: mason, labourers, taxi drivers sales, persons, cleaners, electricians, motor mechanics, shoe repairers and so on. Parents who are prestigiously occupied make more money and provide more for their family in ensuring quality academic performance of their children in school having provided all their needs. Also, the lower ranking occupation parents find it very difficult to provide and assist their family financially so as to boost the academic performance of their children; parental occupation significantly affects the academic performance of their children. This happens because the ways by which parents of different class train, discipline and pay attention to issues that concerns the children differs from the two class of parental occupation.

Tatah (2014) stated that, there is an obvious relationship between parent occupation and academic performance of students in school. Emotionally, mentally and psychologically children of the rich are more balanced and in most cases better than the children of a common man in the society. Also common narration shows that children at a younger age push to be like their parents by wishing to do or replicate the job of their parents. Therefore, there is need for parents to engage in a better occupation so as to influence the academic performance of their children and boost their mental thinking.

3) Family Structure

The composition of a family which comprised of either nuclear family or extended family is seen as family structure. Banks (2015) stated that family structure is the living together of one or more minors under the guardian of their both parents, single parents or the legal custodian of the minor in providing shelter for the child. The link between parenthood and academic performance of students are inseparable and it's a major factor in the development of every child. Aba (2019) stated that, family structure is made up of both parents, single parent, nuclear and extended family. A good family for the betterment of every student in the Nigerian settings remains the both parents' structure.

(a) Both parents: this is an act of both parents jointly putting resources together in other to train and give their children the best of the best in life. This type of parenthood helps the children in the following ways (i) it helps the students to be emotionally and psychologically healthy, hence thinks positively (ii) children in this cadre performs much better academically (iii) full resources are provided for students by their parents due to adequate surplus of financially resources (iv) children of both parents behave well in the society because of the joint or combine training from the both parents.

(b) Single parent: this is a situation whereby one parents is solely responsible for the training and upbringing of a child in the society. This happens mostly as result of divorce among the parents and in rare cases death of a partner and marital status. Single parenthood affects the children following ways (i) emotional, psychological and mental health in balance. (ii) Negative behavior as result of one sided advice and training. (iii) Low academic standard (iv) lacks the basic academic resources however, family structure is major factor in upbringing of a child both academically, socially and economically. Therefore, much focus and attention is needed by parents (both and single) so as to give every child a sound background for a better academic performance.

4) Parental Educational Background

The educational background of parents has much impact on the children and in most cases mere or mares their academic prowess. In a family where the two parents are educationally grounded, their children academic life and achievement are usually their priority and in so doing, the children performs very well academically. On the other hand, the children of a low level educationally background parents, rarely excel academically because their parents have no idea of what education means and its benefits. According to Ogar (2015), a research confirmed that both educators, parents, policy makers, government complained that lack of provision of essential needs of the students contributes heavily to low academic performance of student. Again, there are also some less educationally developed parents who ensures their children gets the best of the best academically despite having low academic background.

Therefore, parental educational background effect on students is of two ways (a) some educated parents do not come about their children's academic background and achievement thereby making the child to achieve less in school. This means that, it is not guaranteed that the child of a learned person must be educated also (b) in most cases, some literate parents strive so hard to ensure their children excel and perform well academically. A good number of successful persons in the world today all have low educational developed parents. More so, the future of every child is dependent on the willingness of the parents to show concern both academically and socially in the training of their children

(5) Communication: the style of communication adopted by the parents goes a long way in training of a child. The culture, life style interactive mode, hobbies and values adopted and implemented by parents in every family heavily influences the development of the children either positively, or negatively. It is through proper communication that messages, thought feelings and togetherness are conveyed. A good communication is instruction based which emanate from the sender (parents) to the receiver (children) which is geared towards solving family problems, relief of stress and anger and to ensure appropriateness in family structure.

Finally, all the factors of family structure play a major role in the development and upbringing of children within the family for a better academic performance of students. Good number of communities in Nigeria frequently and continuously plays important roles towards ensuring the

development of local schools within their vicinity. In addendum to the submissions earlier made on family above, school and communities work hand in hand in other to achieve a common goal of quality education amongst family and students in Nigeria. Nwadike and Godwins (2020) had established that organizations within the community contribute to a large extent good percentage of work in making sure schools progress. The primary function of a community to school is to provide security to school plants through community vigilante groups and also to assist schools through donations of financial aids, implementation of government policies within the school and to give directions or guidelines to school administrators.

Meaning of Community Agencies

Community agencies can as well be seen as community organizations whose contributions are very vital in community development and are usually a non-profit agent. Nwadike and Nwogu (2019) defined community organizations as a vehicle through which communities identify their problems and possible solutions to the problems. In achieving a goal within the community, both the government, the non-governmental organizations (NGOs), security agencies all make use of grassroots organizations or agencies in achieving their goals. In the same vein, it is also seen to be a private or public organization whose services are geared towards preventing, developing and solving environmental, social and health problems that basically affects mankind within a community. More so, community agencies or organizations pose as a channel that links both the government and the school together for a smooth relationship, cooperation and understanding among themselves.

Types of Community Agencies

There are different or various types of agencies or organizations that works for every community. Azi (2021) opined that community organizations are of two types which are environmental community organizations and social community organization. The problems of the community usually are human problems which are resolved always under the two categories above. However, community agencies can also be categorized into two organizations which are:

- Registered or Recognized agencies
- Unregistered or Unrecognized agencies

Registered or Recognized Agencies:

In common terms, these types of organizations are wholly, clearly and purely recognized by the government which means they can sue and be sued in any law court. In the eyes of the law, they are seen as entities and not humans that are registered under the law of the nation.

Types of Registered agencies:

a) International federation of women lawyers (FIDA),
(b) International society for human rights and social justice,
(c) Nigerian labour congress (NLC)
(d) Nigerian medical association (NMA),
(e) Civil society organizations (CSOs),
(f) Academic staff union of universities (ASUU)
(g) Nigerian Union of Teachers (NUT)
(h) Trade Union Congress (TUC)

Unregistered or Unrecognized organizations

Any organization, association, group, gathering that are not recognized or registered with the government is termed informal or illegal in the eyes of the law. This means that the group cannot sue or be sued as an entity in any law court.

Types of unregistered or unrecognized organizations in the community

- Clubs
- unions

- women meetings
- old boys associations
- churches
- fraternities
- youth organizations
- alumni associations
- age grade associations
- community development committee
- parents teachers associations (PTA)
- cliques

Functions of community Agencies

Agencies or organizations of the community aimed at ensuring a desired upgrade to the community's social health, economic and well being of the people. Both registered and unregistered organizations in the community have a common interest or functions which are established below. The functions include:

1. Empowerment: most Nigerian students, schools and other public learning institutions are being empowered, encouraged and assisted heavily by the community agencies. As a matter of fact, they contribute good percentage in the development of schools and individuals.
2. Mobilization: in protecting the interest of the community and the students, the agencies as listed above most times embark on strike or protest in other to attract the attention of the government in solving some basic problems within the community and the school at large.
3. Projects: the two organizations regularly embark on projects like building of schools, maintenance of school facilities, provision of resources both human and material etc.
4. Protection of school facilities: Community agents play a vital role in the protection of life and properties of the school through a local vigilante security outfit that is set up by the community
5. Scholarship to Student: most community regularly gives out scholarships to merited students within the community
6. Direction; Host community usually gives good direction to schools on how to manage some pressing problems and also avoid future problems within the community.

Challenges of Community Agencies

Organizational challenges are inevitable in every society. As a matter of fact, challenges are part of community agencies. On that note, here are some stated challenges facing community organizations.

- Embezzlement of fund: most leaders of the various organizations are not trust worthy. They embezzle the money under their custody which is meant for projects, empowerment, mobilization etc within the community that would have been used for the betterment of the students.
- Insecurity: due to the rising security challenges around Nigeria today, most communities and schools have been affected in terms of project execution. Both the government and groups finds it very difficult going down to the communities and schools to ascertain the problems and challenges schools and communities are facing.
- Lack of cooperation: group members in many occasion disagrees with each other either on the type of projects to deliver or a place (site) where such project will be sited. This is one of the major challenges that every community organization face in carrying out their statutory duties.
- Lack of fund: the only oil that lubricates the engine of every organization is fund. When there is no fund both the government, non-governmental organizations, community organizations etc all will fail to function thereby slowing their statutory functions down.

Path Ways to Students Academic Performance (PSAP)

Every student needs a footpath that can enable them smoothly excel academically, socially and otherwise. Kai (2018) opined that the road to academic success is gained through joint effort of academic stakeholders. Educational stakeholders include: parents (family), government (community) and students (academic performance) and the coming together of this stakeholders and performing joint task always add positive value to students academic performances. The various pathways to students' academic performance include;

(1) Time management: proper management of time by the stakeholders both at home and in school to accommodate the students, helps the child to have enough time to rehearse and know more things he never knew. Judicious application of time table programmes accordingly, obviously helps every student academically

(2) Enrolment style: Admitting students in a particular class based on the stipulated requirements of the class like age, height, intellectual capability also helps and contributes to every student's learning standard and understanding. Again, moderate enrolment of student, that is admitting students based on the number of teachers available and the class size helps to boost or fast track the performance of the student

(3) Friendly academic curriculum: Introduction of friendly and understandable courses in school gives the students an edge to understanding and knowing the purpose or reason why he is studying that course hence, the high performance of that student is assured

(4) Robust financial aid: provision and availability of financial assistance to students through donations, subsidy, scholarships, gifts etc gives the students additional strength in studying and focusing on the academic programme and thereby making him to succeed and perform better academically

(5) Motivation: Aba (2019) stated that a motivated mind is a progressive person. Students' motivation comes through their role models, parents, teachers and friends. Therefore there is need for students to be surrounded by people of good character and good intention that will encourage the student into doing the right thing so as to be on the pathway to academic performance in school.

Conclusion

Family, community and government are the major cardinal points to students' academic performance. Family factors plays essential role in the upbringing of every child, although single parenthood to an extent affects the performance of the student due to the absence of the other partner. Secondly, community agencies are also good machineries that compliments the functions of the family factors in ensuring that students follows the right pathways to their academic performance within the educational sectors.

Suggestions

1) The family factors that contributes to the success of the students should be fully adopted for continuity of academic performance of the students
2) Community agents and their functions should always be allowed to contribute their quota in ensuring that students' academic performance is secured
3) The success and performance of every student is dependent on the pathways chosen by the student. Therefore, there is need for students to follow positive pathways to academic performance.

References

Azi, C. C. (2021). Introduction to educational administration managing and supervision. *Journal of Management,* 3(2)

Banks, W (2015). Parents involvement in education. Northwest regional education research series 16 (3)

Jones, F., & Jack, M. (2018). The quality of family communication as a factor in psychograph: A sense of duties and consumption patterns for children. *Advances in Social Science, Education and Humanities Research, 366*

Kai, B.A (2018). Family-school partnership: Issues and way forward for quality academic delivery in Nigeria. *Journal of School Community Education,* 8(2)

Mudassir, I. U., & Norsuhaily, B. A. (2015). The impact of parents' occupation on academic performance of secondary school students in Kuala Terengganu. *Multilingual Academic Journal of Education and Social Sciences,* 3(1)

Nwadike, S. I., & Nwogu, U. J. (2019). Management of educational triangle in Nigeria: Meaning, challenges and way forward. *International Journal of Innovative Education Research, 7*(2), 85-96.

Nwadike, S. I., & Godwins, M. (2020). Participation of educational stakeholders and triangular life style of students' in the management of secondary education in Nigeria. In Oluwuo, S. O., Nwafor, S. O., & Enaowho, J. E. (Eds). *Educational management in Nigeria*. Uniport Press.

Ogar, T.U. (2015). Effective strategies for school improvement and drop-out prevention in Nigeria. *Journal of Literacy Education,11*

pp. 150-154 https://dx.doi.org/10.4314/johasam.v7i1.17

Attitudes and Practice of Flood Control Measures among Residents of Rumueme Community, Obio/Akpor Local Government Area of Rivers State

[1]Ogbuehi Desmond
pstdesmond7@gmail.co
[1,2]School of Environmental Health,
Rivers State College of Health Science and Management Technology, Port Harcourt

Dike Blessed O. P.
dikeblessed2@gmail.com
School of Medical Imaging Technology
Rivers State College of Health Science and Management Technology, Port Harcourt

Achi Godspower Ikechi
godspowerikechi286@yahoo.com
School of Medical Laboratory Science
Rivers State College of Health Science and Management Technology, Port Harcourt

[2]Ntegun Emmanuel Lawson
ntegunmansion1@gmail.com

Abstract

The study investigated the attitudes and practice of flood control measures amongst residents of Rumueme Community, Obio/Akpor Local Government Area of Rivers State. A descriptive research survey design was adopted. Sample size was 102 respondents which is 10% of the target population of study selected through simple random sampling technique. Instrument for data collection was a validated structured questionnaire. Data collection was through direct delivery and retrieval method which allowed for high return rate of the instrument. Data were analyzed using statistical tool of frequency, tables and simple percentage. Findings revealed poor environmental management options (55%), weak implementation of planning policies (58%), streams and channel obstruction due to indiscriminate waste disposal habits and human activities in flood plains (65%), lack of drainage infrastructure (57%), indiscriminate dumping of refuse on drainage channels and poor drainage conditions (61%) and extensive rainfall in the Community (70%) were the causes of flooding in the study area. With regards to the attitude towards flood control measures, residence indulge in indiscriminate littering and open dumping of waste generated in drainages (77%), nonchalant attitudes amongst residence on flood control measures (85%), inability to obey relevant land use laws which help to mitigate the flooding in the area (83%) and not involving in regular cleaning of the drainages in order to reduce flooding and divert excessive flow (79%). Recommendations were made among others that Government and Community Leaders should provide a master plan for flood control and relief measures for victims, enact and enforce sanitation laws which are aimed at mitigating floods in the community.

Keywords: Attitudes, community, control, drainage, flood, measures, residents.

INTRODUCTION

Flood is the most frequent type of natural disaster and occurs when an overflow of water submerges land that is usually dry. Floods are often caused by heavy rainfall, rapid snowmelt or a storm surge from a tropical Cyclone or Tsunami in coastal areas Floods can cause widespread devastation, resulting in loss of life and damages to personal property and critical public health infrastructure. Between 1998 and 2017, floods affected more than 2 Billion people worldwide. People who live in floodplain or non-resistant building or lack warning system and awareness of flooding hazard, are most vulnerable to floods. (Rufa'I, 2020).

Extreme flood events have recently hit several parts of the world despite the varying contexts, the climate change connection is evident. Floods are the result of a combination of two factors: first,

heavier-than-normal rainfall, and second, limited capacity of rivers, drainage and water harvesting structures to withstand and discharge the excess rainwater, especially in a short time span. In all these recent events, the floods followed a period of unusually heavy rain, equivalent to a year's rainfall dumped in just a couple of days, overwhelming flood defenses (Relief Web, 2021).

In 2021, the Emergency Event Database (EM – DAT) recorded 432 disastrous events related to natural hazards worldwide overall, these accounted for 10,492 deaths affected 101.8 Million people and caused approximately 252.1 Billion US Dollars of economic loses. As a continent, Asia was the most severely pool arbor, suffering 40% of all disaster event accounting for 49% of the total number of death and 66% of total number persons affected were their 20-year average, 2021 was marked by an increase in number of flooding events and extensive economic losses. Five of the top ten most economically costly disasters in 2021 occurred in United States of America and resulted in a total Economic cost of 112.5 Billion, US Dollars (CRED, 2022).

Heavy rains and flood continued to take a significant toll on human life, property, farmlands and livestock, killing 1,418 people, injuring 4,398 and displacing 2.9 Million. Nigeria, Chad, The Democratic Republic of Congo, The Republic, Liberia etc, has been severely impacted by torrential rains and floods, some 513,000 houses were totally or partially destroyed in the region (Simon, 2019). Nigeria is one of the most flood prone countries in West Africa, many areas in Nigeria Experienced annual flooding which usually happens during heavy rains for and one of the reasons is poor drainage systems (Tabiri, 2015). Ajasa (2022) reported that widespread flooding caused by extreme rainfall and the release of excess water from a dam in neighboring Cameroon left 1.4 million Nigerians displaced and claimed 500 lives. The floods also injured 1,546 people, inundated 70,566 hectares of farmland and "totally damaged" 45,249 homes, said Nasir Sani-Gwarzo, the permanent secretary in Nigeria's Ministry of Humanitarian Affairs, Disaster Management and Social Development.

Flooding affected 27 of Nigeria's 36 states. It continued to the south, including a noticeably widespread area spanning southern Kogi and the northern part of Anambra state," The Niger River adjacent to the towns of Agenebode and Idah in southern Nigeria in June. All of a sudden, people were left with no homes and turned to beggars in weeks. No matter how rich they were, the displacement reduced them so much.(Ajasa,2022).

Rivers State was not exempted of the 2022 Nigerian floods in the nation. Bamidele and Badiora (2019) opined that reduction of flood risk will depend largely on the amount of information on floods that is available and knowledge of the areas that are likely to be affected during a flooding event. Correia et al. (2018) suggest "Early Warning" as a proactive measure to curbing flood menace in Nigeria. Early warning is a proactive mechanism in which certain recognized bodies or agencies take to the study of climate and human interactions with the environment towards foretelling the occurrences of floods and thus issuing warnings to both individuals and government structures with a view of effectively being prepared and curbing the occurrence of floods, averting loss of lives and properties and checking the outbreak of epidemics.

Also, Danumah et al. (2015) believe that it is necessary to use modern day techniques in developing measures that will help government and relief agencies in identification of flood prone areas and in planning against flooding events in the future. The knowledge of remote sensing and geographical information system (GIS) is a tool which can be used to investigate and map areas that are less or more vulnerable to flooding in conjunction with forecasting techniques to predict the precipitation intensity and duration in the nearest future. Across the globe, floods have posed tremendous danger to people's lives and properties. Floods cause about one third of all deaths, one third of all injuries and one third of all damage from natural disasters. In Nigeria, the pattern is similar with the rest of the world (Daniel & Udo, 2019). Preliminary investigation revealed that flooding has negative implications on the survival of livelihoods, social and economic activities in communities. It has affected the lives, properties and sustainability of the environment.

STATEMENT OF THE PROBLEM

Over the years, flood has always been a reoccurrence disaster especially during rainy seasons in Rumueme Community, Obio/Akpor Local Government Area of Rivers State. For instance, flooding affect housing, roads and other physical structures, making Rumueme Community not to be attractive to residents which in turn affects the economic development. As a man-made disaster, stopping

flooding in Rumueme Community could be possible since its residents are contributors to the causes of flooding in the area. Structures are built on lands where flood control measures should have been dug. It was against this backdrop that this research assessed the attitudes and practice of flood control measures amongst residents of Rumueme Community, Obio/Akpor Local Government Area of Rivers State.

MATERIALS AND METHODS

A descriptive research survey design was carried out among residents of Rumueme Community numbering 1,020 people through balloting irrespective of sex and religious denominations or educational status in Obio/Akpor Local Government Area, Rivers State. The sample size of this study was 102 respondents which is 10% of the population of study and it was selected through simple random sampling technique. Data for this study were collected through the use of questionnaire. The data gathered from the questionnaire were analyzed using statistical parameters of frequency, tables and simple percentage.

RESULTS

Table 2: Causes of flooding in Rumueme Community, Obio/Akpor L.G.A, Rivers State.

S/N	Statement	A	S.A	$\overline{X}$	D	S.D	$\overline{X}$
1	Flooding occur due to poor environmental management options in the community	15	40	55(55%)	30	15	45(45%)
3	Flooding is caused by weak implementation of planning policies in the Community	45	13	58(58%)	39	3	42(42%)
4	Streams and channel obstruction due to indiscriminate waste disposal habits and human activities in flood plains can lead to flooding	20	15	65(65%)	20	15	35(35%)
5	Lack of drainage infrastructure can result to flooding in the Community	1	56	57(57%)	30	13	43(43%)
6	Indiscriminate dumping of refuse on drainage channels and poor drainage conditions have been observed to lead to floods in the Community	31	30	61(61%)	20	19	39(39%)
7	Floods can occur as a result of extensive rainfall in the Community	18	52	70(70%)	10	20	30(30%)

Table 3 showing respondents' response to the attitude of residence towards flood control in Rumueme Community, Obio/Akpor Local Government Area of Rivers State (N = 100).

S/N	Statement	A	S.A	$\overline{X}$	D	S.D	$\overline{X}$
1	The citizens indulge in indiscriminate littering and open dumping of waste generated in drainages	2	75	77(77%)	13	10	23(23%)
2	There is nonchalant attitudes amongst residence of Rumueme Community on flood control measures	15	70	85(85%)	13	2	15(15%)
3	Residence does not obey relevant land use laws which help to mitigate the flooding in the area.	43	40	83(83%)	10	7	17(17%)
4	The people do not to involve in regular cleaning of the drainages in order to reduce flooding and divert excessive flow.	19	50	69(69%)	30	1	31(31%)

Discussion

On the causes of flooding in Rumueme Community, Obio/Akpor L.G.A, Rivers State, (55%) of the respondents agreed that flooding occur due to poor environmental management options in the community, weak implementation of planning policies in the Community (58%), streams and channel obstruction due to indiscriminate waste disposal habits and human activities in flood plains (65%), lack of drainage infrastructure (57%), indiscriminate dumping of refuse on drainage channels and poor drainage conditions (61%) and extensive rainfall in the Community (70%).

To assess their attitudes toward flood control measures, the finding shows that the residence indulge in indiscriminate littering and open dumping of waste generated in drainages (77%), nonchalant attitudes amongst residence on flood control measures (85%), inability to obey relevant land use laws which help to mitigate the flooding in the area (83%) and not involving in regular cleaning of the drainages in order to reduce flooding and divert excessive flow (79%).

Conclusion

There is nonchalant attitude of the residents of Rumueme Community towards flood control measures because most of them indulge in indiscriminate littering and open dumping of waste generated in drainages, inability to obey relevant land use laws which help to mitigate the flooding in the area, and do not involve in regular cleaning of the drainages. The effects of this nonchalant attitudes cannot be over emphasized because flooding has led to the loss of properties in the Community, affect the sustainability of the environment in the Community, affect housing, roads and other physical structures, making the community not to be attractive to residents, floodwater is often contaminated with sewage, which can lead to illness and affect clean drinking water in the Community, flooding provide the perfect breeding ground for mosquitoes, which can transmit Malaria and other diseases in the community, it can lead to disruption of power supplies in the community and businesses and other facilities such as hospitals and schools can be forced to shut down due to flooding in the community.

Recommendations

(1) Government and Community Leaders should provide a master plan for flood control and relief measures for victims.
(2) Government and Community Leaders should enact and enforce Sanitation laws which is aimed at mitigating floods in the community
(3) Government should employ more train sanitary staff that will educate the residents and also enforce the sanitary laws.
(4) Adequate setting of lower disposal fees at waste management sites and higher fines for illegal dumping will help in solving illegal dumping problem.

References

Ajasa, A. (2022). *Flooding in Nigeria kills 500, displaces 1.4million, government says*. https://www.washingtonpost.com › 2022/10/15 › nige

Bamidele, O. F., & Badiora, A. I. (2019). Flood disaster vulnerability in North Central Nigeria. *International Journal of Research and Innovation in Social Science, 3*(12): 364-371

Center for Research on the Epidemiology of Disasters (2021). *Disasters in numbers: extreme events defining our lives*. https://cred.be › sites › default › files › 2021_E.

Correia, F. N., Fordham, M., Saraivam, M., & Bernardo, F. (2018). Flood hazard assessment and management: interface with the public. *Water Resources Management, 12*, 209–227.

CRED (2022). *Disasters in numbers*. Brussels: https://cred.be/sites/default/files/2021_ EMDAT_report.pdf

Daniel, E. E., & Udo, R. (2019). "Human-environment interactions". In Ibok, E., Daniel, E., and Atakpa, O. (Eds). *The politics of global environmental policies*. University of Calabar Press.

Danumah, J. H., Odai, S, N.,Saley, B. A., Szarzynski, J., Thiel, M., Kwaku, A., Kouame, F., & Akpa, L (2015). Flood risk assessment and mapping in Abidjan district using multi-criteria analysis (AHP) model and geoinformation techniques, (Cote d'Ivoire). *Geoenvironmental Disasters, 3*(10).

ReliefWeb (2021). *Strengthening climate resilience through better flood management*.

Rufai, A. (2020). Household preparedness to flood hazard in Nigeria. *International Journal of Science, Environment and Technology, 9*(3): 473 – 478.

Simon, E. (2019). Aggravating flood situation in Uyo: The cause, the way forward. *Mentor Newspaper Online*, 8 July.

Tabiri, M. O. (2015). Perennial problem of floods in Accra: What is the way forward? *International Journal of Advanced Research in Education & Technology, 2*(3), 198-201.

Yoade, A.O., Adeyemi, S.A., & Adelabu, T.A. (2020). Vulnerability analysis of flood disaster in Ibadan, Nigeria. *Annals of Global History, 2*(1), 27-38.

pp. 155-161 https://dx.doi.org/10.4314/johasam.v7i1.18

The Woman's Health, Child Birth, Social Encumbrances: A Clog to Efficiency to Western Education

Gloria Eme Worugji
Department of English and Literary Studies
Faculty of Humanities
Rivers State University, Nkpolu-Oroworukwo, Port Harcourt
Email: ajieleeme@yahoo.com
Phone: 08035085285
&
Lilian A. Okoro
Department of Theatre and Media Studies
University of Calabar
Email: lilianokoro@unical.edu.ng
Phone :08036424721

Abstract

The issue of childbirth remains a significant challenge to women in most African countries where culture and patriarchy dominate the women's freedom, reasoning and desire to grow educationally. To a large extent, this has hindered some women's advancement in their educational pursuits. This paper aims to showcase such situations and categorically state that, despite all these challenges, the woman who wishes to advance educationally still did. The paper adopts the African feminist theory, otherwise known as womanism. The theory recognizes the African man or husband as the head, but, reminds them that the woman is an individual with a positive duality and, who must be recognized in society, respected as partners in progress. It is a qualitative research as information is obtained from textbooks, journals, observations, and interactions, among other sources. Findings revealed that the modern African woman who wishes to forge ahead educationally still did, despite her challenges and hurdles to achieving such a feat. The paper concludes that women are achievers, given the numerous roles they play in society. The paper recommends that archaic traditions go into extinction, and men who practice them in these modern times should change.

Keywords: women, health, childbirth, education, efficiency, patriarchy, society, Africa

INTRODUCTION

The African woman has come a long way in her quest for self-actualization and independence, away from the shackles of culture and tradition that had hindered her progress for ages. The African woman's personality means different things to different people depending on the angle or approach. In some cases, the woman is her own enemy as she sometimes refuses to key into the contemporary world but chooses to remain in the archaic culture that has caged her for several decades.

There are several ideas about women in the African society. In some settings, a woman is a male appendage. It means that she cannot exist without a male figure. To that effect, this has constituted a holistic picture of the African woman to date. In some traditional societies, married women are highly esteemed; such societies regard them as responsible persons. Their responsibilities include fetching water, cooking, and doing other household chores. They live for their husbands and children as well as other family relations. On the other hand, unmarried woman in this society is despised and regarded as irresponsible; no wonder some traditional-minded parents push and force their innocent daughters of marriageable age into a relationship or marriage unsolicited and some, in the process, meet untimely deaths. At the same time, some went mental/developed all manner of sicknesses that had rendered them unproductive and vulnerable to themselves and the society at large.

Childbirth and child rearing have remained a significant challenge to women in most African societies; culture, tradition and patriarchy have not helped either. While some have outgrown this clog, some have remained on the web. Some African women have sacrificed western Education on the altar of culture, tradition and domestic issues. To these categories of women, progress in western

Education is far from being a reality, and they do not mind. *Tell It to Women,* a play by Tess Onwueme, reveals this.

Who is the African Woman?

The African woman in the context of this paper is a female. Her culture and tradition have denied several rights she is naturally entitled to. It has been proven overtime through the works of African writers, both males and females.

The Woman's Health

The woman's health (referred to here) has to do with her experiences during and after pregnancy. Some African environments are so harsh on the woman that the woman, out of fear, has caged herself and sacrificed her strength and ego to satisfy the insatiable culture. Nnu-Ego is an instance of this, a female character and mother in Buchi Emeheta's novel *Joys of Motherhood*. This character never experienced the joys of motherhood despite her struggles to meet each family member's needs, including that of her spouse.

The woman's level of exposure has a lot to play in her understanding of her health conditions, even when the doctors explain to her. Some traditional-minded women have sacrificed their health due to a lack of exposure to western Education to satisfy the insatiable culture and tradition even when they feel unwell. For instance, a woman gives birth and has no assistance at home. She still takes care of the new born baby, caters for the older children, her husband, and other relations living with the family despite her not fully recovering from childbirth pains and stress. At other times, she may have been advised by her doctor to take an entire rest upon discharge from the hospital or skip some years before having another baby due to some medical challenges observed during delivery, but, at most times, advice by medical experts is ignore. They carry on and endanger their lives with more excruciating task.

Childbirth

Childbirth has become a significant factor that has hindered the African woman from being free from cultural demands. Most African women strive to have children by all means; so they do many things to achieve this goal. Some get into forced marriages because being husbandless, to them, is a misnomer. They see themselves as unfulfilled in life. Some have lost their lives in trying to satisfy this tradition of: “l must have a child or children” despite medical warnings. And some have been emotionally traumatised as revealed in some works of African female writers like, Ama Ata Idoo, Efua Sutherland, Zulu Sofola, Tess Onwueme among others.

Theoretical Framework

This work adopts the Feminist Theory. Feminist theory is that which campaigns for equal rights of women with men in all spheres of life. In the words of Lisa Turtle (1986), “Feminism is an “advocacy of women’s rights based on a belief in the equality of the sexes and its use. The word refers to everyone who is aware of and seeking to end women’s subjugation in any way for any reason (104)”. Also, Helen Chukuma (2003), defines feminism as a political doctrine advocating for equal rights and treatment of women as of men (44)”. Another scholar, Anthonia Umoren (2002), defines feminism as a “world wide cultural activity poised for the liberation of women from the bottle-neck of tradition with a view to imploring on their subordinate status in the society (3)”. Judith Bardwick notes that feminism is "an implicit rejection of the lifestyle created by strongly coercive norms that define and restrict what women are and can do" (5). It confronts sexism and the constraints imposed on women in the name of culture and seeks to reconstruct the female psyche and empower her to function maximally as a free human person. Beginning with the works of women abolitionists and first-generation feminists like Mary Wollstonecraft Godwin, Elizabeth Stanton, Lucretia Mott, among others, and second-generation feminists such as De Beauvoir, Betty Friedan, Millet, Germain Greer, Luice Irigary, Elaine Showalter, Julia Kristeva, Helene Cixious; the agenda has been to break the yoke of sexism in the lives of women.

Indeed, Alice Walker calls African feminism "womanism," a concept she expounds in *In Search of Our Mothers' Gardens.* Chikwenye Ogunyemi explains it in detail:

> Womanism is black-centred; it is accommodationist. It believes in the freedom and independence of women like feminism. It wants meaningful union between black women and black men and black children and will see to it that men begin to change from their sexist stand (63).

So African feminism is not just "a struggle to end sexist oppression" or "a struggle to defend the rights of women" (23), as Bell Hooks says; instead, it places both within a cultural context. Feminism defends the dignity of women without completely ignoring the cultural reality of each society. This is the point that Chukwuma is making when she speaks against the disorderliness and extremism, which she associates with "misguided, frustrated and disgruntled women." (*Feminism…* ix). However, then, it seeks to enhance women's abilities in every sphere of human endeavour. In doing this, Ogundipe-Leslie comments that the female writer corrects the "false images of the women in Africa." In doing this, she adds, "she (the woman writer) must know the reality of the African woman, must know the truth about African women and womanhood" (8). The truth is that African women are burden bearers, so the negative impacts of tradition dehumanize African womanhood.

Chukwuma is specific about African feminism and how it operates when she states: "African feminism is accommodationist not exclusive ad negativistic. Men remain a vital part of the women's lives" (*Feminism* … xvi). Feminist literature emancipates women, makes them conscious of the societal institutions that bind them, and sensitizes them to strive for self-discovery, self-realization and self-fulfilment. Feminism looks at issues from the female point of view. According to IniobongUko, feminism emphasizes that:"Sex role socialization is not the only duty that a woman can offer to society" 18). It has been attested to by the numerous contributions of women to human development.

Feminism in Africa and the Western world have common ground - task of challenging the myth of women's inferiority to men by confronting the discriminatory social attitudes that subjugate women in society. Both desire the equality of the sexes and oppose sexism, male discrimination and the social exploitation of women. This is the point Ini Uko makes when she attests that "whether it is in Europe, America, Africa or the Diaspora, the issue of women's inferiority to men is fundamental" (9). The feminist theory is relevant to this study because it critiques men's writings and traditional views of women and extends to the sociological, even the formalistic and psychoanalytic approaches to criticism.

Because of the above, some of these suppressions of expressions of even the best impulses of women played out in the thematic thrust of works by female writers in the literary space. This voice was aided and abated by the woman's exposure to Education. In the words of Worugji, Gloria Eme (2019, 354), "Education, therefore, is believed to be the bedrock to the enlightenment of the female Gender in that it is fundamental to the emancipation of the female and the entire community from unhealthy patriarchal norms and culture.

The African Mother as Educationist

Worugji (2023) explains that the child's first Education begins at home and with the mother as the first teacher. She must groom the child to know the basic principles of life. She ensures and endures the huddles in getting this done for the child at all costs; hence she is an *Ndanda* meaning “an ant”. This view becomes significant when considering Diedre Badejo's remark that "women are the first teachers of the children". Badejo says, "Kwame Nkrumah said it well, you train a man, you train an individual, but if you train a woman, you have trained a nation" (385).

Chioma Opara (2004), in affirmation of Badejo's statement, throws more light on what Education does to the female recipient when she alludes, "female education is programmed towards … economic empowerment, … strictly contrasted with poverty and deprivations" (118). This further means that being a mother in the African environment is an enormous task, laden with tirelessness, selflessness, industry, and much more, time. African mother is a burden bearer who carries many loads, not minding their weight on her. She ensures that the family is not lacking at any time irrespective of the challenges faced in achieving that. This fact about African mother is not overemphasized. Motherhood, in the African sense, and especially in the African environment, is laden with burdens, her husband's and children's burdens, and family burdens/relations’ burdens, among others.

This paper draws instances of these from some literary works by African authors. For instance, *The Activist* by Ojaide takes a swipe into the socio-political and economic activities in the rich oil region,"which celebrates young academia and freedom fighters who combine courage and intellect to advance popular resistance against exploitation by the federal government and its foreign collaborator" (Darah, 2010). These freedom fighters like Pere, Omagbemi, the area boys are like the Mau Mau in Ngugi's *A Grain of Wheat*.

Ojaide further probes into gender and health concerns which have continued to destroy communities in the Niger Delta. The police, army and naval marines unleash terror on the people instead of protecting them.

Nevertheless, exploring the woman's age-long plight, in two plays (*The Broken Calabash* (1986) and *The Reign of Wazobia* (1988), Tess Onwueme engages womanism under African feminism in her theoretical exploitation of women's issues. She imbued and endowed her heroines with solid character traits hitherto dwarfed by the pen of the male writers in the literature.

Also, Christianity gives liberation to women when it declares that (there is no male nor female with God, Gal: 3:28). God made Adam. Onwueme lends her voice in her plays with other women writers to redefine the position of women from docility to active, fear to brave, ignorance to knowledge, assertive, loving, and negative to positive agents of change in all spheres of life.

As pointed out earlier, marriage is one of the traditional obligations the African society expects from all women of marriageable age. And another male author would state that an unmarried woman in some parts of Africa is regarded as a wayward person who trivializes the traditionally accepted ethical codes of marriage, just as Amadi uses the character Ahurole in *The Concubine* to project that the woman has no right to choose a marriage partner like Ojebeta in Buchi Emecheta's *The Slave girl*, Adah in *Second Class Citizen* and Ebla in Farah's *From A Crooked Rib.* Ahurole is imposed on Ekwueme in order not to fault the traditional law. She is used to satisfying her custom. Some African men marry for the sake of care and attention; this is why Amadi, in his advice to Ekwueme in *The Concubine*, states: you need "A mature woman, soothing and loving, a woman … like your mother" (138). Flora Nwapa presents a similar situation in *Efuru* and *Idu. However, she* creates more engaging female characters with adequate skill and personal ingenuity to survive social exploitation and retain their balance.

Elechi Amadi in *The Concubine presents* Okachi, Ihuoma's mother, as a mother figure. She is used to demonstrate that the image of the African woman is anchored on the male presence when she advises Ihuoma, "Still you need a man to look after you" (*The Concubine,* 40). This suggests the sexist and patriarchal values that the woman cannot exist as an individual; she is meaningfully recognized in this society due to her relationship with a man. All these show that spinsterhood is an offence and deviant behaviour in most African societies, especially Igbo land, an ethnic group in Nigeria.

Naana Banyiwa Horne's view in Emelia Oko (2004), "Men writers tend to play the sexuality of their female characters over, creating the impression that women have no identity outside their roles. Their women are primarily concerning male protagonists and in secondary roles" (120). In *The Great Ponds,* The cases of Chisa and Oda confirm this over-simplification. As Emelia Oko reveals, "the very reason for this oversimplification of the female is that men cannot experience what Simone de Beauvoir describes as a whole genetic and cultural complex of being a woman" (67); Oda and Chisa's predicament in the war speaks for itself.

Oda loses her pregnancy in the process of her being raped - she does not dwell on the psychological aspect of her experience; instead, her worry is male-biased, as revealed by the passage:"… Oda broke down…shuddered and wept. Olumba held her close. What of … of …Olumba stammered gazing at his wife's belly. Dead. Male or female? Male. The woman wept again" (182). As the passage reveals, Oda sheds tears bitterly because she has lost a male child, although her personal feelings is not separated from the loss. This image is typical of the African woman, which some has held unto tenaciously irrespective of its adverse effects on them. Christie Achebe confronts this in her work on "Woman's Role in Nigerian Society" (4).

Chisa, EzDiali's daughter, a virgin – does not weep for the pain and emotional destabilization she encountered in the process of being sexually abused; she weeps for disappointing Ikechi, her spouse, as if it was her fault to lose her pregnancy with a male child. The passage reveals:

> Chei! Chei! and she wept violently. Chisa cried as if she would never stop. … I did my best, she whispered in agony; believe me, I did my best. I slapped him, bit him, and threatened to commit suicide. I even told him I was a leper. However, he forsook his three wives and repeatedly came after me (185).

The woman, in this sense, becomes man's need meter. The pains the woman encounters in making the man happy or meeting him at the point of his need is not considered. The incidence of influenza attacks on the community in Amadi's *The Great Ponds*further reveals this image of the woman. Everybody, including Nyom Olumba's wife, was too ill to do domestic work. Nevertheless, seeing Olumba in this confusion, she managed to the kitchen"… washed the pot and scoured the dirty mortar. Olumba, let her. He knew these things were beyond him … the prospect of cooking scared him" (161). Nyoma took the risk to ensure the family fed despite her deteriorating health. This is why some African writers state that each society has what are appropriate female roles, which constitute the cultural theory about Gender.

Given the above, African motherhood is adorn with pains and scars. It is more bitter because the fathers contribute to these scars and pains. It is what Theodora Akachi Ezeigbo condemns thus" It is a yoke to be a woman because the woman is the burden bearer who must do two-thirds of the chores" (7). This is in summary, the position of the traditional African woman in a traditional setting.

Conclusion and Recommendation

In conclusion, the work revealed that the modern African woman who wishes to forge ahead educationally still did, despite her challenges and hurdles to achieving such a feat. The paper recommends that archaic traditions and the men who practice them in these modern times should grow beyond tradition and progress in their minds, reasoning and action because society is growing and not static, and so are humans, especially women who are a majority. Women are the species that add colouration to the progress and beauty of any society; take away their presence, and you find dullness, chaos, and a lack of visible progress.

Works Cited

Achebe, Chinua. (1980). *Things Fall Apart*. London: Heinemann.

---. (1982). *Arrow of God*. London: Heinemann.

---. (1988). *Anthills of the Savannah*. Ibadan: Heinemann.

Achebe, Christie. (1981)"Continuities, Changes, and Challenges Women's Role in Nigerian Socie"*Presence Africaine* 120, 4th Quarterly; pp. 1-10.

Amadi, Elechi. (1978). *The Slave*. London: Heinemann Books.

---. (1981). *The Great Ponds.* Ibadan: Heinemann Books.

---. (1988). *The Concubine*. Ibadan: Heinemann Books.

Bardwick, J. M. (1980). *Women in Transition*. London: The Harvesterpress.

Chukwuma, Helen Ed. (1994). *Feminism in African Literature: Essays on Criticism*. Enugu: New Generation Books.

Chukwuma, H. (2000)"The face of Eve: Feminist Writing in African Literature". Major Themes in African Literature. Ed. Damian U. Opata and Aloysius O. Ohaegbu. Nsukka: A.P. Express Publishers, 101 – 114.

Daminabo, A. (2008). "The Niger Delta in the era of Globalization". The Future of the Niger Delta: The Search for a Relevant Narrative. Ed Abi Alabo Derefaka and Atei Mark Okorobia. Port Harcourt: Onyoma Research Publications, 288 – 290.

Darah, G.G. (2010) "Revolutionary Pressure in Niger Delta Literatur". Nigerian Literature Today: A Journal of Contemporary Nigerian Writing. 1 (1), 99 – 118.

De Beauvoir, Simone. (1952). *The Second Sex*. Harmondsworth Bantam.

Durkheim, E. (1895). *The Division of Labour in Society*. New York: Free Press.

Emenyi, A. (2005). Intersection of Gendered Voices. Lagos: Concept Publication.

Ekwensi, Cyprian.(1961). *Jagua Nana.* London: Hutchison.

Habila, H. (2010). *Oil on Water*. London: Hamish Hamilton.

Hooks, Bell. (1979). *The Remembered Gate:Origins of American Feminism*. New York: Oxford University Press.

La Guma, Alex (1972). *In the Fog of the Season's End*. London: Heinemann.
Millet, Kate (1972). *Sexual Politics*. London: Sphere Books.
Nnolim, Charles. (1994). "A House Divided"*Feminism in African Literature: Essays on Criticism.* Enugu: New Generation Books; pp. 248-261.
Oko, Emelia (1991:66-79) "Issues of Gender: Images of Women in Nigerian Writi." *NDUNODE* vol. 1, no.5.
Ogundipe, Leslie Molara (1987). "The Female Writer and Her Commitment". *ALT.15*; pp. 5- 13.
Ogunyemi, O. Chikwenye. (1988). "Women and Nigerian Literature"*Perspective on Nigerian Literature 1700-The Present. Vol.ONE,* Guardian Books Nigeria; pp. 60 – 72.
Ojo-Ade, Femi. (1983)"Female Writers, Male Critics Recent Trends in the Novel. *ALT*. 13; pp. 158-159.
---. (1996)"Education as a Colonial Heritage and the Nigerian Women in Literature". Proceedings of the First International Conference on Women in Africa and the African Diaspora" Bridges Across Activism and Academy in Nsukka, 5; pp.157-167.
Onwueme, Tess. (1986). *The Broken Calabash.* Ibadan, Nigeria: Heinemann.
Ogunyemi, O. (1996). *African Wo/man Palava. The Nigerian Novel by Women*. Chicago: The University of Chicago Press.
Ojaide, T. (2010). *The Activist*. Princeton: New Jersey: AMU Publishers. 195
Onyema, C. (2011)"Jungle and Oil Green: Currents of Environmental Discourse in Four Upland Niger Delta Narrativ" From Bloom to Doom: Protest and Conflict in the Literature of the Niger Delta. Ed. ChinyereNwahunanya. Owerri: Springfield Publishers, 189-208.
Opara, C. (2004). *Her Mother's Daughter*: *The African Writer as Woman*. Port Harcourt: University of Port Harcourt Press.
Ousmane, S. (1992). *God's Bits of Wood*. London: Heinemann.
Simon, Eton, Dien &Worugji, Gloria Eme (2019) "Gender, Health and Socio-Political Issues in Tanur Ojaide's *The Activity*". *Journal of Language, Discourse & Society*. Language & Society, R.C. 25 of the International Sociological Association. 2019.7,1, June. ISSN:2239-4192. http://language-and-society.01:/journal
Saro W. (1993)"They are killing my people". Interview, The News, 22 – 27.
Schrud, A. (1988). Political Terrorism: A Guide to Actors. New York: North Holland publishers.
Stratton, F. (1994). Contemporary African literature and the politics of Gender. Routledge, London, Pp.245-256.
Soyinka, Wole. (1963). *The Lion and The Jewel.* Oxford: Oxford University Press.
---. (1963). *A Dance of The Forest.* Oxford: Oxford University Press.
---. (1964). *The Trials of Brother Jero.* Oxford: Oxford University Press.
Sofola, Zulu. (1990). Interview with Adeola, James. *In Their Voices: African Women Writers Talking.* London; pp.142 – 153.
---. (1988). *Times International*. Vol. 7. no.16, January; p.6.
Spacks, Meyer Patricia. (1976). The Female Imagination: A Literature and Psychological Investigation of Women's Writings. London: George Allen and Unwin Publishers; pp. 1 – 21.
Tapping, Craig. (1981)"Irish Feminism and African Tradition: A Reading of BuchiEmecheta's Medium & Message. 1, Proceedings of International Conference of
Teilanyo, I. (2008)"Modern Literature and the Future of the Niger Del". The future of the Niger Delta: The Search for a Relevant Narrati". Ed AbiAlaboDerefaka and Atei Literature and English Language (ICALEL), University of Calabar; pp.160 – 190.
The Holy Bible. New Living Translation.
Uko, Iniobong. (1996)"Female Portraiture in Zulu Sofola and TessyOnwueme: A Study in Social Consciousness" PhD dissertation, Department of English and Literary Studies, University of Port Harcourt; pp 1- 20.
Umoren, Tonia. (2002). *Portrait of Womanhood African Literary Tradition: Reflections on ElechAmadi's Works*. Calabar: Clear Lines Publications & Cats Publishers; p.32.

Uwen God'sgif O. and Ekpe, Stella I. (2018) "De-echoing feminine identity in the language of three Nigerian paramilitary agency". *Abuja Journal of Gender Studies and Youth Advancement, 1(1&2), pp.55-74.*

UwenGod'sgift O. (2019)"English loanwords as lexical enrichment to the Erie language". *Journal of the Nigerian Language Project.* 1(1), pp. 54-66.

Walker, Alice. (1984). *In Search of Our Mother's Garden.* LondonWomen's Press.

WaThiongo, N. (1967). *A Grain of Wheat*. Heinemann: London.

Wilson –Tagoe, Nana. (1981)"The Woman Writer in Africa: Her Dilemma Her Choice: A Reading of Ama Ata Aid". *Medium and Message*. Vol.1; pp.79 – 110.

Worugji, Gloria Eme. "Protest against Racial Discrimination in Tes Onwueme's *Riot in Heaven*". *African Research Review*. vol.,5, no 4, S/N 21. July. *An International Multidisciplinary Journal. Indexed African Journals* 5.4 (2011). Print.

Worugji, G.E & Akpan, Brenda Akpan "Marginalization of Women in John Pepper Clark's, *The Wives Revolt*". *NDUNODE*: *Special Edition of Calabar Journal of Humanities. A publication of Faculty of Arts, University of Calabar.* 2017. 12, 1, 351- 361.

Worugji, Gloria Eme.“A Call for Change: Traditional African Value and Modern Africa in the Play *The Broken Calabash* by Tess Osonye Onwue*" LWATI: A Journal of Contemporary Research*. 2010. 7, 4, 100 -106. Beijing- China. ISSN: 1813-2227. Print.

Worugji, Gloria Eme & Unimbobeshe Ushie "Female Voices in African Drama- The Concept Self in Ama Ata Idoo’s The Dilemma of a Ghost, Zulu Sofola’s *Wedlock of the Gods,* and Tess Onwueme’s *The Broken Calabash*. *Port-Harcourt Journal of History and Diplomatic Studies*. (PJHDS) 7,2. 2020. June, 109-117. www.phjhds.com.ISSN:2736-0660. Print.

Worugji Gloria Eme & Effiom, E. B. "Quest for Female Freedom in *Wedlock of the Gods, The Marriage of Anansewa* and *Then She Said* ". *South-South Journal of Humanities & International Studies*. 3. 2. 2020. June, 39-51. www.ssjhis.org. ISSN: 2636-7417. Print.

Worugji, Gloria Eme & Stella I. E "Analysis of Female Experiences in Two African Short Stories: The Feminist Theory Approach". International Journal of Pedagogy, Innovation and New Technologies. 2019. The Maria Gazegorzewska University/40SZCZESLIWICKA. S.T. /02-3 WARSAW/POLAND/ WWW.IJPINTCOM. Print.

Worugji, Gloria Eme. (2000) "The Image of Women in Elechi Amadi's Novel". M.A Thesis, Department of English & Literary Studies Unpublished, University of Calabar; pp 6, 7, 9, 10.

pp. 162- 168 https://dx.doi.org/10.4314/johasam.v7i1.19

Prevalence of Sexual Dysfunction and Associated Demographic Factors among Postpartum Women in Rivers State

[1]Opirite Boma Peter-Kio
opirite.peter-kio@iaue.edu.ng
&
[2]Abigail Ugbana Joab

[1&2]Department of Human Kinetics, Health and Safety Education. Ignatius Ajuru University of Education, Port Harcourt

Abstract

This study investigated the prevalence of sexual dysfunction and associated demographic factors among postpartum women in Rivers State. The study adopted descriptive research design with a population consisting of 2,670,903 postpartum women in Rivers State. A multi-stage sampling procedure was used to select a sample size of 1,200. Data were collected using an adapted questionnaire titled "Female Sexual Function Index (FSFI)" with a reliability coefficient of 0.85. The data collected were analyzed with the aid of Statistical Package for Social Sciences (SPSS) version 23.0 using linear regression at 0.05 alpha level. The findings of the study showed that the prevalence of sexual dysfunction among postpartum women in Rivers State was very high (98.0%); and that there existed statistically significant relationship between age ($r = 0.91$; $p<0.05$), and parity ($r = 0.85$; $p<0.05$). It was concluded that sexual dysfunction among postpartum women in Rivers State was traceable to demographic characteristics such as age and parity. It was recommended that, community stakeholders should liaise with the primary healthcare providers under the federal parastatals to make provision for aged women with sexual health challenges, providing medical equipment to check their sexual organs from time to time.

Keywords: demographic factors, postpartum women, prevalence, sexual dysfunction

Introduction

Sexual dysfunction is a common but demeaning health problem; it affects the quality of life and the general wellbeing of the individual. The prevalence of sexual dysfunction is evidenced in several reports. According to Harlow et al. (2014), the lifetime estimates of dyspareunia ranged from 10 to 28%. Global reports showed that about 22 - 43% of women all over the world experience sexual dysfunction and 30 - 50% in the United States of America (Yvone, 2015). The range of dysfunctions across USA as given by Sarit et al. (2014) includes: lack of interest in sex (27 - 32%), inability to achieve orgasm (22 - 28%), pain during sex/dyspareunia (8 - 21%), sex not pleasurable (17 -27%). In Malaysia, Nur et al. (2020) revealed that more than one-third (35.5%) of women had postpartum sexual dysfunction with the most common types being lubrication disorder (85.6%), followed by loss of desire (69.7%), and pain disorders (62.9%), including satisfaction disorder (7.3%), orgasmic disorder (9.7%) and arousal disorder (11.0%) which were less common sexual problems. In Ghana Nafiu et al. (2010) gave the prevalence of sexual dysfunction as 72.8% among women. In Nigeria, Olugbenga-Bello et al. (2020) showed the prevalence of sexual dysfunction to be as high as 89% and was found to be associated with fear, sadness and guilt in 6.4%, 8.8% and 17% of respondents respectively.

The above reports substantiate sexual dysfunction as a public health problem that requires attention. Sarit and Roger (2014) noted that sexual dysfunction is more prevalent in women than men, 43% compared to 31%. According to Fajewonyomi et al. (2007), sexual dysfunction severely affects the quality of life of women with many consequences such as inhibition of sexual desire, painful intercourse and infidelity among spouses leading to increased prevalence of sexually transmitted infections and broken homes.

Sexual dysfunction connotes an aberration in the sexual functioning of a person. Sexual dysfunction (SD) refers to a problem during any phase of the sexual response cycle that prevents the individual from experiencing satisfaction from the sexual activity (Lo et al., 2020). The categories of

sexual dysfunction are sexual desire disorder, sexual arousal disorder, sexual orgasmic disorder and sexual pain disorder (Yvone, 2015). However, Rezaei et al. (2017) stated that, a large component of sexual desire in women is responsive rather than spontaneous. Therefore, motivation and ability of women to find and respond to sexual arousal and subsequent sexual desire is crucial but complex. The Cleveland Clinic (2015) posited that sexual dysfunction prevents postpartum women from experiencing satisfaction from sexual activity and they include: desire disorders, arousal disorders, orgasm disorders and pain disorders also known as dyspareunia. Several factors could be associated with sexual dysfunction in postpartum women including parity and age.

Age is an important demographic variable when it comes to the reproductive health and sexuality of an individual. Age is the number of days, weeks, months or years an individual has spent on earth often measured in years among humans. Nur et al. (2020) opined that, sexual dysfunction can affect any age at postpartum, although it is more common in those over 40 years because it is often related to a decline in health associated with aging. Observations from other studies showed that female sexual dysfunction increases with increase in age (Sarit & Roger, 2014). This can be reiterated with the view that as the age of women increases, there is the possibility of decrease in their sexual hormone production which makes sexual activities sometimes unpleasant for them.

Parity is one notable factor that determines sexual dysfunction in postpartum women. Parity refers to the number of living children a woman has. Childbirth represents a central event in a woman's reproductive lifetime, in physical and psychosocial terms, with the potential to impact female sexual function. The number of children a woman has is related to the extent of domestic activities she engages in, of which excessive domestic duties is linked to sexual dysfunction (Nur et al., 2020). This is because a woman who is overladen with many children to care for might always be stressed out, not having adequate time to think or prepare for sexual activities, owing to the fact that sexual intercourse is a thing of the mind. This could deter her sexual function.

In Rivers State, women as well as men are all active in several economic activities for the upkeep of the family due to the economic situation of the country, making their focus concentrated mainly on survival rather than pleasure; postpartum women are not excluded in this scenario. Postpartum women are a special group that requires more attention in scholarly research just as pregnant women, specifically in sexual and reproductive health issue. At postpartum the woman's body system still functions relatively as it used to be during pregnancy. Yet, reports have shown that their sexual dysfunction lacks professional recognition (Nur et al., 2020). Harlow et al. (2014) specified that most researches on painful sex has been based on small clinical samples and these studies exclude women who have not sought help and are therefore not representative of other groups of women including the postpartum mothers. Thus O'Sullivan et al. (2014) stated that other categories of women including postpartum mothers have also not received adequate attention in research studies. This makes it imperative that attention be given to them. This study therefore aimed at investigating the prevalence of sexual dysfunction and associated demographic factors among postpartum women in Rivers State.

Research Questions

i What is the prevalence of sexual dysfunction among postpartum women in Rivers State?

ii What is the relationship between age and sexual dysfunction among postpartum women in Rivers State?

iii What is the relationship between parity and sexual dysfunction among postpartum women in Rivers State?

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between age and sexual dysfunction among postpartum women in Rivers State.
2. There is no significant the relationship between parity and sexual dysfunction among postpartum women in Rivers State.

Methodology

The study adopted descriptive research design with a population consisting of 2,670,903 postpartum women in Rivers State. A multi-stage sampling procedure was used to select a sample size of 1,200.

Data was collected using an adapted questionnaire titled "Female Sexual Function Index (DFSDQ)" with a reliability coefficient of 0.856. The data collected were analyzed with the aid of Statistical Product for Service Solution (SPSS) version 23.0 using simple linear regression at 0.05 alpha level.

Results

Table 1: Percentage distribution showing prevalence of sexual dysfunction among postpartum women

Sexual dysfunction	Frequency	Percentage
No dysfunction	24	2.0
Mild	363	30.8
Moderate	606	51.4
Severe	186	15.8
Total	1179	100.0

The result in Table 1 indicated that only 2.0% of the women did not have sexual dysfunction but, majority (98.0%) had sexual dysfunction; of which 30.8% had mild, 51.4% had moderate while 15.8% had severe sexual dysfunction. Thus, the prevalence of sexual dysfunction among postpartum women in Rivers State was very high (98.0%).

Table 2: Regression analysis showing on relationship between age and sexual dysfunction among postpartum women in Rivers State

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Decision
1	.91	.839	.83	1.16	**Very High relationship**

Table 2 revealed regression analysis on relationship between age and sexual dysfunction among postpartum women in Rivers State. The result showed that there was a very high positive relationship between age and sexual dysfunction (r = 0.91). The result further showed that agecontributed 83.9% of the variance in sexual dysfunction among postpartum women (R^2 = 0.839). Therefore, the relationship between age and sexual dysfunction among postpartum women in Rivers State was very high.

Table 3: Regression analysis showing relationship between parity and sexual dysfunction among postpartum women in Rivers State

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Decision
1	.85	.725	.72	1.52	**Very High relationship**

Table 3 revealed regression analysis on relationship between parity and sexual dysfunction among postpartum women in Rivers State. The result showed that there was a very high positive relationship between parity and sexual dysfunction (r = 0.85). The result further showed that paritycontributed 72.5% of the variance in sexual dysfunction among postpartum women (R^2 = 0.725). Therefore, the relationship between parity and sexual dysfunction among postpartum women in Rivers State was very high

H_{o1}: There is no significant relationship between age and sexual dysfunction among postpartum women in Rivers State

Table 4: Simple Linear Regression analysis on significant relationship between age and sexual dysfunctionamong postpartum women in Rivers State

Model		Sum of Squares	df	Mean Square	F	Sig.	Decision
1	Regression	8315.43	1	8315.43	6158.57	.00*	**Rejected**
	Residual	1590.56	1178	1.35			
	Total	9906.00	1179				

*Significant, p<0.05

Table 4 presented the regression analysis on significant relationship between age and sexual dysfunction. The findings of the study revealed that there was a significant relationship between age and sexual dysfunction [f(1,1178) = 6158.57, p<0.05]. Therefore, the null hypothesis which stated that there was no significant relationship age and sexual dysfunction among postpartum women in Rivers State was rejected.

H_{o2}: There is no significant relationship between parity and sexual dysfunction among postpartum women in Rivers State

Table 5: Linear Regression analysis on significant relationship between parity and sexual dysfunctionamong postpartum women in Rivers State

Model		Sum of Squares	df	Mean Square	F	Sig.	Decision
1	Regression	7179.49	1	7179.49	3101.94	.00*	**Rejected**
	Residual	2726.50	1178	2.31			
	Total	9906.00	1179				

*Significant, p<0.05

Table 5 presented the regression analysis on significant relationship between parity and sexual dysfunction. The findings of the study revealed that there was a significant relationship between parityand sexual dysfunction [f(1,1178) = 3101.94, p<0.05]. Therefore, the null hypothesis which stated that there was no significant relationship parity and sexual dysfunction among postpartum women in Rivers State was rejected.

Discussion of Findings

The findings of the study showed that the prevalence of sexual dysfunction among postpartum women in Rivers State was very high (98.0%). The is not surprising because, at the postpartum period, women seem to be occupied with the care of the new born baby and even the mother; this might have taken over all their attention such that they may have not remember anything about sexual activities, coupled with stomach pains some go through during the postpartum period. The implication however, could be that some male partners of the postpartum women who cannot control their sexual desires might resort to having sexual activities with other female partners, which would consequently predispose them to the contraction of sexually transmitted infections.

This finding is similar to other studies which reported very high prevalence, such as that of Norafini et al. (2020) carried out in Sarawak which showed a very high prevalence (98.6%) of sexual satisfaction disorder. The finding of this study is also in line with that of Adebusoye et al. (2020) whose study in Nigeria revealed that the prevalence of sexual dysfunction was very high (99.4%) for sexual desire. The finding of this study is also similar to that of Mirfat and Sheren (2019) whose study in Egypt revealed a high prevalence of sexual dysfunction (53.1%). The finding of this study is also similar to that of Iliyasu et al. (2018) whose study among postpartum women in Kano, Northern Nigeria revealed a prevalence of sexual dysfunction to be high (64.2%). The finding of this study is also similar to that of Jafarzadeh et al. (2016) whose study on female sexual dysfunction in North-East of Iran revealed that the prevalence of postpartum sexual dysfunction was high (62.1%). The finding

of this study is also similar to that of Anzaku and Mikah (2014) whose study on sexual morbidity among Nigerian women in Jos revealed the prevalence of sexual dysfunction among women to be high (62.6%). The finding of this study is also similar to that of Figen et al. (2018) whose study among postpartum women in Turkey revealed a prevalence of 74.3% for postpartum sexual dysfunction. The finding of this study is also in keeping with that of Rezaei et al. (2017) whose study on postpartum sexual functioning among women in Iran revealed a high prevalence (76.3%). This similarity found could be attributed to the homogeneity of the study population as both the present study and the previous ones were carried out among postpartum women.

However, the finding of this study is at variance with that of Szollosi and Szabo (2020) whose study in Hungary revealed a prevalence of 48.79% which is almost half of what was reported in the present study. The finding of this study is at variance with that of Khalid et al. (2020) whose study on the prevalence of sexual dysfunction among postpartum women on the East Coast of Malaysia revealed a low prevalence (35.5%). The difference in the sample sizes could explain for this variation found as a much smaller sample size was used in the previous study compared to what was used in the present study.

The result in Table 2 revealed that older age was a determinant of postpartum sexual dysfunction; and there was a significant relationship between age and prevalence of sexual dysfunction ($p<0.05$). This is not surprising because, physiologically, as individuals grow older, their sexual function decreases due to the certain impairments and natural deterioration of their organs, this could be implicated for the positive relationship which implies that sexual dysfunction increases with increasing age. The finding of this study is in line with that of Adebusoye et al. (2020) whose study in Nigeria revealed that there was a statistically significant relationship between the prevalence of sexual dysfunction and older age. The finding of this study is also similar to that of Mirfat and Sheren (2019) whose study in Egypt revealed a statistically significant relationship between prevalence of sexual dysfunction and age. The finding of this study is in keeping with that of Jafarzadeh et al. (2016) whose study on female sexual dysfunction in North-East of Iran revealed that the prevalence of postpartum sexual dysfunction has a statistically significant relationship with increasing age. The finding of this study is in consonance with that of Nwagha et al. (2014) whose study on the prevalence of sexual dysfunction among females in a university community in Enugu, Nigeria revealed that there was a statistically significant relationship between sexual dysfunction and increasing age of the respondents. This similarity found between the previous studies and the present one could be attributed to the homogeneity of the study population as both were carried out among postpartum females.

However, the finding of this study is at variance with that of Rezaei et al. (2017) whose study on postpartum sexual functioning among women in Iran revealed a non-statistically significant relationship between sexual dysfunction and age. The difference in the study location could explain for the variance found in both studies as the present study was carried out in Nigeria while the previous one was carried out in Iran.

The result in Table 5 revealed a significant relationship between parity and prevalence of sexual dysfunction ($p<0.05$). Explaining for this finding, it could be said that having more children requires more attention and hard work to cater for them, considering the prevailing economic situation resulting in high level of stress among the populace including women, almost all attention will be on caring for the children with minimal attention on pleasure including sexual activities. The finding of this study gives credence to that of Adebusoye et al. (2020) whose study in Nigeria revealed that there was a statistically significant relationship between the prevalence of sexual dysfunction and parity. The finding of this study is also in keeping with that of Rezaei et al. (2017) whose study on postpartum sexual functioning among women in Iran revealed a statistically significant relationship between sexual dysfunction and parity. The similarity between the both studies could be due to the homogeneity of the study population.

Conclusion

It was concluded that sexual dysfunction among postpartum women in Rivers State is not without any cause and the causes can be traced to the demographic characteristics such as age and parity.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Community stakeholders should liaise with the primary healthcare under the federal parastatals to make provision for aged women with sexual health challenges, providing medical equipment to check their sexual organs from time to time.
2. Husbands of postnatal women should help to ease the postpartum stress on the mothers, especially those with high parity, by assisting adequately in the home chores and caring for the new born and other children at home, this will help her to respond expectedly to her sexual responsibilities.
3. The State healthcare board should help postpartum women to ease sexual health problems by establishing special sexual health units for postnatal mothers in every healthcare facility.

References

Adebusoye, L. A., Ogunbode, O., Owonokoko, K. M., Ogunbode, A. M., & Aimakhu, C. (2020). Factors associated with sexual dysfunction among female patients in a Nigerian ambulatory primary care setting. *Annals of Ibadan Postgraduate Medicine, 18*(1), 9-17.

Anzaku, A. S., & Mikah, S. (2014). Postpartum resumption of sexual activity, sexual morbidity and use of modern contraceptives among Nigerian women in Jos. *Annals of Medical & Health Sciences Research, 4*(2), 210-216.

Cleveland clinic foundation (2015). *Sexual dysfunction in females.* The Cleveland Clinic Foundation.

Fajewonyomi, B.A., Orji, E.O., & Adeyemo, A.O. (2007) Sexual dysfunction among female patients of reproductive age in a hospital setting in Nigeria. *Journal of Health Population and Nutrition,25,* 101-106.

Figen, A. Y., Dilek, A., Yilda, A. A., Resmiye, O., & Nafiye, D. (2018). Sexual dysfunction in postpartum Turkish women: It's relationship with depression and some risk factors. *African Journal of Reproductive Health, 22*(4), 54-63.

Harlow, B.L., Kunitz, C.G., Nguyen, R.H., Rydell, S.A., Turner, R.M., & MacLehose, R.F. (2014). Prevalence of symptoms consistent with a diagnosis of vulvodynia: population-based estimates from 2 geographic regions. *American Journal of Obstetrics and Gynecology, 210*(40), e1–40.

Iliyasu, Z., Galadanci, H. S., Danlami, K. M., Salihu, H. M., &Aliyu, M. H. (2018). Correlates of postpartum sexual activity and contraceptive use in Kano, Northern Nigeria. *African Journal of Reproductive Health, 22*(1), 103-112.

Jafarzadeh, E. R., Fazel, N., Dashti, S., Moshkani, S., Haghighi, H. F., Foji, S., & Kamalimanesh, B. (2016). Female sexual dysfunction and the associated risk factors: An epidemiological study in the North-East of Iran. *Journal of Midwifery & Reproductive Health, 4*(1), 498-505.

Khalid, N. N., Jamani, N. A., Abd Aziz, K. H., & Draman, N. (2020). The prevalence of sexual dysfunction among postpartum women on the East Coast of Malaysia. *Journal of Taibah University Medical Sciences, 15*(6), 515-521.

Lo, S.S. & Kok, W.M. (2014). Sexual behavior and symptoms among reproductive age Chinese women in Hong Kong. *Journal of Sexual Medicine, 11,* 1749–56.

Mirfat, M. L. E., & Sheren, E. E. (2019). A study of sexual dysfunction and its associated factors among women in childbearing age, Egypt. *Journal of Nursing Education & Practice, 9*(3), 95-108.

Nafiu, A., William, K.B., Eric, W., Otchere, A.M., & Lawrence, Q. (2010). Incidence of sexual dysfunction: A prospective survey in Ghanaian females. *Reproduction, Biology and Endocrinology,8,* 106-112.

Norafini, S., Syahnaz, M. H., Norfazilah, A., & Suzaily, W. (2020). Sexual dysfunction among women at four to six months postpartum: A study in a primary care setting. *Malaysian Journal of Public Health Medicine, 20*(1), 235-243.

Nur, N., Khalid, M., Nurjasmine, A., Jamani, M., Karimah, H., & Nani, D.M. (2020). The prevalence of sexual dysfunction among postpartum women on the East Coast of Malaysia.Journal of Taibah University Medical Sciences, 15(6), 515-521.

Nwagha, U. I., Oguanuo, T. C., Ekwuazi, K., Olubobojun, T. O., Nwagha, T. U., Onyebuchi, A. K., Ezeonu, P. O., & Nwadike, K. (2014). Prevalence of sexual dysfunction among females in a university community in Enugu, Nigeria. *Nigerian Journal of Clinical Practice*, *17*(6), 792-796.

Olugbenga-Bello, A. I., Adebayo, K. O., Goodman, O. O., Oke, O. S., & Olukunle, T. O. (2020). Prevalence and socio-demographic predictors of sexual dysfunction among married women of reproductive age group in South West Nigeria. *Journal of Reproductive Medicine Gynecology & Obstetrics,* http://www.di.org/10.24966/RMGO-2574/100046

O'Sullivan, L. F., Brotto, L. A., Byers. E. S., Majerovich, J. A., Wuest, J. A. (2014). Prevalence and characteristics of sexual functioning among sexually experienced middle to late adolescents. *Journal Sex and Medicine,11*, 630–641.

Rezaei, N., Azadi, A., Sayehmiri, K., & Valizadeh, R. (2017). Postpartum sexual functioning and its predicting factors among Iranian women. *Malaysia Journal of Medical Sciences, 24*(1),94–103.

Sarit, O. A., & Roger, P. G. (2014). *Female sexual function and pelvic floor*. Sarit.

Szollosi, K., & Szabo, L. (2020). Postpartum female sexual dysfunction in Hungary: A cross-sectional study. *Development in Health Sciences, 2*(4), 108-113.

Yvone, B., & Julie, A. E. (2015). *Female sexual dysfunction. Cleveland Clinic.* Ohio.

pp. 169-176 https://dx.doi.org/10.4314/johasam.v7i1.20

Factors Influencing Non-utilization of Primary Health Care Facilities among Residents in Selected Communities in Etche Local Government Area, Rivers State

Gloria Stanley Accra Jones
School of Public Health Nursing, Rivers State College of Health Science and Management Technology, Rumueme, Port Harcourt.
glostan545@gmail.com

Patience Nnenna Njoku
School of Public Health Nursing, Rivers State College of Health Science and Management Technology, Rumueme, Port Harcourt.
pchikezie6@gmail.com .07030472974

Emmanuella Awajinombek Jones
Benjamin Carson School of Medicine
Babcock University, Ilishan-Remo, Ogun State, Nigeria
flawlezzcash@gmail.com

Abstract

This study investigated the factors influencing non- utilization of primary health care facilities among residents in selected communities in Etche Local Government Area, Rivers State. The study adopted descriptive design. The population of the study was 40,995 drawn from1991 census of the selected communities which a sample size of 396 was obtained using Taro Yamen's formula. Self- structured questionnaire comprising section A and B was used for data collection from residents 18 years and above. Data obtained were presented in tables and analyzed using Statistical Package for Social Sciences. Findings revealed absence of staff and socio-cultural norms and belief as responsible for non- utilization of primary health care facilities, thus, the need to improve utilization of health care facilities by carrying out awareness campaign in the rural areas on causes of diseases, and monitoring of providers.

Keyword: factors, influencing, non-utilization, primary health care facility.

Introduction

Primary Health Care (PHC) is a programme that is designed for the prevention, promotion, treatment and rehabilitation of people in their everyday environment in order to maintain, sustain and improve health and well-being status of the population of residents. PHC is the essential healthcare based on practical, scientifically sound and socially acceptable method and technology made universally accessible to individual and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self determination (Packard, 2016). The concept of Primary Health Care was adopted at the Alma-Ata conference of 1978 which was attended by 134 countries and many international organizations. This was in search for solution to the growing demand for improved health, and primary health care was identified as the strategy for achieving Health for all by the year 2000. The conference declared that health is a fundamental human right and health care must be accessible, affordable and socially relevant to meet the needs of the people (Olise, 2012).

According to Wagle (2020), Primary Health Care is an approach to health care which integrates at the community level. All the factors required for improving the health status of the population. It is described also as the first level of health care available to all people which is essential for good health and care.

According to WHO (2020), Primary Health Care is a whole of society approach to health aimed at ensuring the highest possible level of health and well-being and their equitable distribution by focusing on people's need and as early as possible along the continuum from health promotion to treatment, rehabilitation and palliative care and as close as feasible to peoples' everyday environment. This means that Primary Health Care focuses on people's needs within their environment through

health promotion, treatment of aliment and rehabilitation thereby ensuring a state of complete physical, social and mental well-being of the people.

In 2018, forty years after 1978 declaration the global conference took place. It reaffirms Primary Health Care as the most essential and efficient methodology to achieve universal Health coverage (UHC) and the sustainable Development Goal (SDG). Based on this insight the 2018 declaration of Astana centered on four commitments. These are: making bold political choice for health across all sections, building sustainable Primary Health Care adapted to each country's local content, empowering individuals and communities, aligning stakeholders support with national policy (WHO, 2018).

The strategic of operational framework of Primary Health Care 2018 declaration is transforming vision into action and these can be achieved through core and operational levers

Core lever: These strategies include: political commitment and leadership, governance and policy framework, funding and allocation of resources, engagement of community and other stakeholders

Operational Lever: These include: models of care, the way health services are delivered, Primary Health Care workforce, physical infrastructure, medicines and other health products, engagement with private sector provider, purchasing and payment system, digital technology for health system for improving the quality of care, primary health care oriented research, monitoring and evaluation (Wagle, 2020).

These strategic levers are the things or forces that are necessary to ensure that Primary Health Care works. These are capacities that enable long term, ethical and exceptional performance to occur in Primary Health Care. The presence of health care facility alone is not a grantee or requisite for utilization but involves multifactors. That purpose of utilization of service is the actual coverage and it is categorized into three: ambulatory medical care service (out- patient and home), impatient service (hospital) and preventive services. To achieve highest level of use, all the three categories must join up with the co-operation and resourcefulness of the population as well as those of the health services providers. It means that the presence of health facility in a place does not determine its usage but the population and the care givers must co-operate in doing or carrying out their respective duties (Adam & Awunor, 2019).

Pascal et al. (2021) stated that workforce is critical in emergency preparedness, response and the delivery of integrated people centered health services and also critical pathway to attain the health target in Sustainable Development Goal (SDG), health and well-being. He further asserted that management and support staff make up the workforce. According to Doherty (2021), most Nigerian still fail to access Primary Health Care services. Adebayo and Asuzu (2015), in a study, "utilization of community base health facilities in low income urban communities in Ibadan" identified low usage of primary health care facilities.

Several factors are implicated in the non-utilization of primary health care facilities. Nitoimo et al. (2019), Osifeso (2013) and Asuzu (2015) reported the commonest to be lack of skilled health workers: lack of possibilities for diagnostic facilities, self-medication promoted by uncontrolled access to drugs through pharmacies and patent medicine vendor, determination of government facilities, lack of community participation, lack of essential drugs, informal payment of staff, cultural norms and beliefs, ignorance of available services, types of services rendered, absenteeism, inadequate manpower, truancy of health care providers, low quality of services and always closed facilities.

The non-utilization of primary health care facilities and their inability to provide basic medical services to the Nigerian population has made both secondary and tertiary facilities experience an influx of patients (Aregbeshola & Khan, 2017). There is exploration of Traditional Birth Attendants (TBAs). Most deliveries and other treatment provided by TBAs results in high mortality and morbidity rate (Maduka & Ogu, 2020). Some factors that have been outlined to affect the rate of non-utilization of primary health care facilities are education and awareness campaign, improve and expand service beyond maternal and child care and immunization to mental health and other components of primary health care (Osifeso, 2013; Adebayo & Asuzu, 2015; Arebeshola & Khan, 2017; Kadui et al., 2018; Doherty, 2021).

Ahuru et al. (2019), in a study of Non-utilization of Primary Health Care centers for skilled pregnancy care among women in rural communities in Southern Nigeria, identified health system,

community level, individual/house hood and policy issues as barrier to non-utilization of health care centers. Reports indicate that the non- utilization of primary health care facilities is difficult to address in the rural areas because of inability to improve the economy and policy, perceptions culture and other factors peculiar to the community. These challenges therefore emphasize the need for continuous monitoring, evaluation and study of the influencing factors in the communities across Nigeria to effectively tackle the problem of non-utilization of primary health care facilities.

Statement of the Problem

World Health Organization strongly recommends the utilization of primary health care services by communities as first point of care for prevention, promotion, treatment and rehabilitation of health. Despite the existence of various levels of primary health care facilities in some communities in Etche, the health status of the people is under improved. The facilities are either not utilized or underutilized. Quarks, traditional healers, spiritual homes and drug shops are frequently patronized. This has led to late diagnosis, lack of proper referral, follow up and rehabilitation resulting in high rate of mortality and morbidity. The above background demands the need for a study to investigate factors influencing the non-utilization of primary health care among residents in selected communities in Etche Local Government Area, Rivers State.

Research Questions

1. To what extent is absence of doctors and other health care providers a factor to non-utilization of primary health care facilities?
2. To what extent is community participation a factor to non-utilization of primary health care facilities?
3. To what extent are socio-cultural norms and belief a factor to non-utilization of primary health care facilities?
4. To what extent is non availability of resources a factor to non-utilization of primary health care facilities?

Methodology

The study used descriptive research design. Descriptive search design is a type of research methodology that aims to describe or document the characteristics, behaviour, attitude, opinions or perception of a group or population been studied. This research design is suitable for the study because it allowed the researcher to measure opinions towards factors influencing non- utilization of primary health care facilities. The population of the study was 40,995 residents draw from 1991 census of the five selected communities. The sample size was 396. A convenient sampling technique was used. The instrument for data collection was a self-structured questionnaire titled “factors influencing non- utilization of primary Health Care facilities among residents (FINUPHCER). Data was analyzed using Statistical Package for Social Sciences, using 0 - 49 as low, 50 - 69 moderate and 70 - 100 high in rating for effective analysis in order to obtain concise and meaningful information.

RESULTS

Variable	Description	Frequency	Percentage (%)
Age	18-27	77	22%
	28-37	89	27%
	38-47	90	25.7%
	48 and above	94	26.9
	Total	**350**	**100%**
Sex	**Male**	**128**	**36.6**
	Female	222	63.4
	Total	**350**	**100**
Marital status	**Married**	**197**	**56.29%**
	Single	105	30%
	Divorced	7	2%
	Separated	11	3.14%
	Widow	30	8.57%
	Total	**350**	**100**
Religion	**Christianity**	**235**	**67.14%**
	Islam	10	2.86%
	African traditional belief	105	30%
	Others	-	-
	Total	**350**	**100**
Educational status	**Non-formal**	**20**	**5.7%**
	Primary	25	7.14%
	Secondary	192	54.86%
	Tertiary	113	32.29%
	Total	**350**	**100**
Occupation	**Self-employed**	**50**	**14.29**
	Civil servant	53	15.14
	Farming	180	51.43
	Trading	67	19.14
	Total	**350**	**100**

Table 1 showed that 77 (22%) of the respondents were within the ages of 18-27 years, 89 (25.4%) were within 28-37 years, 90 (25.7%) fall within 38-47 years and 94 (26.9%) were within 48 years and above. Table 4.1.2 showed that 128 (36.6%) were male and 22 (63.4%) were female. Table 4.1.3 showed that 197 (56.29%) of respondents were married, 105 (30%) were single, 7 (2%) were divorced, 11 (3.14%) were separated and 30 (8.57%) were widows. Table 4.1.4 showed that 235 (67.4%) respondents were Christians, 10(2.86%) were Islam, 105(30%) were traditional believers. Table 4.1.5 showed that 20 (5.71%) respondents did not attend formal education, 25(7.14%) had primary education, 192(54.86%) had secondary education while 113 (32.29%) had tertiary education. Table 4.1.6 showed that 50(14.29) of respondents were self-employed, 53(15.14) were civil servants, 180(15.43) were farmers and 67(19.14) are trading.

Table 2: Extent of absence of doctor and other health care providers as a factor to non-utilization of primary health care facilities among residents in selected communities in Etche LGA

Statement	Yes	%	No	%	Remarks
There is no doctor and other health care workers posted in the health centre.	171	48.86	179	51.14	350(100)
Doctors and other health workers do not come to work	322	92%	28	8%	350(100)
They do not stay till close of work	302	86.29	48	13.71	350(100)
They come to work late	199	56.86	151	43.14	350(100)
Total		71%		29%	

Table 2 showed that 171 (48.86%) of the respondents said there is no doctor and other health workers posted in the health centers while 179(51.14%) said there is doctor and other health workers posted in the health centers. 322 (92%) of respondents said doctors and other health workers do not come to work while 28(8%) said doctors and other health workers come to work. 302(86.29%) of respondents said they do not stay till close of work while 48(13.71%) said they stay till close of work. 199(56.86%) of respondents said they come to work late while 151(43.14%) said they do not come to work late.

Table 3: Extent of community participation as a factor to non-utilization of primary health care facilities among residents in selected communities in Etche L.G.A

Statement	Yes	%	No	%	Remarks
Community members are not aware of the existence of the health center	-	-	350	100	350(100)
Health center is located far from community	19	5.43%	331	94.57	350(100)
The community members do not like the services provided	151	43.14	199	56.86	350(100)
Health centers are only open at a time not suitable for the community members	262	74.86	88	25.14	350(100)
Total		30.86		69.14	

Table 3 above showed that the total respondents 350(100%) said community members are aware of the existence of the hospital. 19(5.43%) of respondents said health centre is located far from the community while 331(94.57) said health centre is not located far from the community. 151(43.14%) of respondents said community members do not like the services provided while 199(56.86%) said they like the services provided. 262(74.86%) of respondent said health centre are only open at a time not suitable for the community members while 88(25.14%) said health centers are not only open at a time not suitable for the community members.

Table 4: Extent of socio-cultural norms and belief as factors to non-utilization of primary health care facilities among residents in selected communities in Etche L.G.A.

Statement	Yes	%	No	%	Remakes
We do not go to hospital because illness is caused by evil spirit	235	67.14	115	32.86	350(100)
Traditional medicine acts faster than modern medicine	310	88.57	40	11.43	350(100)
Medical treatment worsen illness whose cause are from evil spirit	297	84.86	53	15.14	
Hospital do not provide spiritual protection	243	69.43	107	30.57	
Total		77.5		22.5	

Table 4 showed 235 (67.14%) of respondents do not go to hospital because illness is caused by evil spirit 115(32.86%) said illness is not caused by evil spirit. 310(88.57) of respondents said traditional medicine acts faster than modern medicine while 40(11.43%) said tradition medicine does not act faster than modern medicine, 297 (84.86) of the respondents said medical treatment worsen illness whose cause is from evil spirit while 53(15.14) said medical treatment does not worsen illness whose cause is from evil spirit. 243(69.43%) of respondents said hospital do not provide spiritual protection while 107 (30.57%) said Hospital provide spiritual protection.

Table 5: Frequency distribution and percentage to determine to what extent non-availability of material is a factor to non-utilization of primary health care facilities among residents in selected communities in Etche L.G.A.

Statement	Yes	%	No	%	Remarks
There are no beds in the hospital for admission	157	44.86	193	55.14	350(100)
The centre do not have laboratory to carryout fest	307	87.71	43	12.29	350(100)
The centre lack essential drugs.	302	86.29	48	13.71	
The centre lack equipment for checking vital signs (blood pressure and temperature)	169	48.29	181	51.71	350(100)
Total		66.79		33.21	

Table 5 showed that 157(44.86%) of respondents said there are no beds in the hospital for admission while 193(55.14%) said there are beds in the hospital for admission. 307(87.71%) of respondents said the centre does not have laboratory to carryout test while 43(12.29) said the centre do have laboratory to carry out test. 302(86.29%) of the respondents said that centre Lack essential drugs while 48(13.71%) said the centre do not lack essential drugs. 169(48.29) respondents said the centre lack equipment for checking vital signs (blood pressure and temperature). While 181(51.71%) said centre do not lack equipment for checking vital signs (blood pressure and temperature).

Discussion

Table 2: From the result, 71% of respondents said yes while 29% said no. The extent to which absence of doctor and other health care providers is a factor is high. It implies that absence of doctor and other health care provider is a factor to non-utilization of primary health care facility utilization in selected communities in Etche L.G.A. This result may have occurred because of lack of posting of health care providers to the rural areas or their unwillingness and attitude towards working in the rural areas which may be associated with lack of social amenities and or insecurity. This findings agreed with Muhammed (2013); Ochia (2012); Adebayo and Asuzu (2015) in their various studies which asserted that absenteeism of staff and lack of physician on site is a problem affecting non-utilization of primary health care facilities. The finding correlates with Ahuru et al (2021) who identified that absenteeism is characterized by lateness, leaving early than work schedule.

Table 3: The result revealed that 30.86% of respondents said community participation is a factor to non-utilization of primary health care facilities while 69.14% said no. From the finding the extent to which community participation is a factor to non-utilization of primary health care facilities is low. This implies that community participation is not a factor to non-utilization of primary health care facilities among residents in selected communities in Etche L.G.A. The result may have occurred because the residents are active participants already in the activities of the facilities. This finding is in contrast with Muhammed et al. (2021) which state that poor community involvement and deficiency in the community right to make decision and perceived poor service influence non-utilization of primary health care facilities.

Table 4: From the result, 77.5% of respondents said yes while 22.5% said no. From the finding the extent to which socio-cultural norms and belief a factor to non-utilization is high. This implies that socio-cultural norms and belief is a factor to non-utilization of primary health care facilities in selected communities in Etche Local Government Area. This result may be associated with the fact that 67.14% of the respondents who were Christians among whom, some are unstable with their faith, and may choose to prayer and on the other hand about 30 percent of the respondents practice traditional belief. This findings correlates with the work of Bolin and Bellamy (2012) which

identified socio-cultural norms and belief as barriers to non-utilization of primary health care facilities by residents in rural communities. It also agrees with Philip and Paul (2017) who asserted that many people attribute illness to mystical cause so the need for traditional healer and spiritual attention as sometimes practiced in churches. Monchache et al. (2020) also reported that some residents do not seek primary health care for health care services without first going to the herbalist and further more injection may worsen ailments whose source is from traditional practice.

Table 5: From the result, 66.79% of respondents said yes while 33.21% said no. The extent to which non-availability of materials is a factor is moderate. This implies that non-availability of materials to an extent is t a factor influencing non-utilization of primary health care in selected communities in Etche L.G.A. This result may have occurred like this because the facilities lack diagnostic equipment and essential drugs. This may be attributed to poor funding, and failure of drug revolving policy.

This study agrees with Ochai (2022) and Ahuru et al. (2021) in their various studies which stateed that non-availability of medical equipment and lack of essential drugs influence availability of facilities. It also relates with Adebayo and Asuzu (2015); Oni (2020) which stated that non-availability of medical equipment for diagnosis, hospital drugs and other consumable is associated with poor quality of service which is one of the barriers to non-utilization of primary health care facilities in the community.

Conclusion

This study revealed absence of doctors and other health care provider, socio-cultural norms and belief, and non-availability materials as factors influencing non-utilization of primary health care facilities among residents in Etche. This, therefore calls for committed effort of the government to review policy and monitor the activities, (manpower, material and finance) of Primary health care in rural areas and concerted effort to give the rural residences adequate health literacy education and awareness on the causes of diseases.

Recommendations

In view of the finding obtained from the study the following recommendations are made.

1. Health literacy education and awareness programme should be carried out in the rural areas so that the resident will be well informed on the causes of disease and management
2. Government at all level should show commitment in providing adequate materials and essential drugs in the primary health care facilities.
3. The activities of health care providers posted in the rural should be monitored; it will ensure the services are always available.

References

Adam, V.V., & Awunor, N.S. (2019). Predictions and factors affecting utilizations of health service in a rural community in Southern Nigeria. *Journal of Biomedical Science*. www.research gate net.

Adebayo A. M., & Asuzu M. C. (2015). Utilization of Community base health facility in low income urban communities in Ibadan Nigeria. *Primary Health Care Fam Med, 5*(7) 1: 735. doi:10.4102/Primary Health Care fm,v7:1.735,PMID: 26245600, PMCID. PMC 4564905

Aregbeshola, B. S., & Khan, S M (2017). *Primary health care in Nigeria 24 years after Olikoye Ransome-Kuti's leadership.* Doi:10.3389/FPubh, 2017.00048 Pmcid: PMC 5346888 PMIDs 28349050 inim. nch.gov published in line 2017 mar 13.

Doherty, O. (2021). *Primary health care: Importance and needs for improvement in Nigeria.* https://healthpartner.compg 1-6.

Kadui- Eneh, N. P., Azuike, E. C., Tobin-West, C., & Uzochukwu B. S. C. (2018). *An assessment of the potential for retention of primary health care workers in Rivers State Nigeria*. www.ajol.info

Maduka, O., & Ogu, R. (2020) *Preventing maternal mortality during child birth, the scourge of delivery with unskilled birth attendants.* https://www.infechopen.com Chapters (70749P 24

Nitoimo, I. F. C., Okonofua, F. E., Igboin, B., Ekwo, C., Imongag, W., & Yaya S. (2019). Why rural women do not use primary health care centers for pregnancy care evidence from a qualitative study in Nigeria. *BMC Pregnancy and Child*, Article No 19. biomedcentral.com.

Olise, P. (2012). *Primary health care for sustainable development*. Ozefe.

Osifeso, A. A. O. (2013). *Utilization of primary health care centers by residents of the community. A Study of Agbow Community in Ikosi- Enjinrin Local Government Council Development Area*

Packard, R. (2016). *A history of Global health Baltimore.* John Hopkins.

Pascal, Z., Zapata, T. & Okorafor (2021). The importance of strengthening the health workforce in Nigeria to improve health outcome. *Journal of Public Health 43* (supplement 1). 10: 1093/Pubmed/Fdaboizpp i1 – i3

Wagle K. (2020). Primary health care: History, principles, pillars, elements and challenges. public health. *Notes of School of Public Health Bangladesh, Article 212*

WHO (2018). *Building the primary health care Workforce of the 21st Century. Cc BY –NC- SA 3.O IGO World Health Organization*. https://apps.who.int/Iris/handle/10665/328072

WHO (2020). *A vision for primary health care in the 21st central. Towards UHC and universal health coverage and sustainable development goals*. Https://apps.who.int/iris/handle/10665/328065

pp. 177-182 https://dx.doi.org/10.4314/johasam.v7i1.21

Public Health Implications Associated with the Consumption of Crystal Myth among Youths in Wilsue-Ko Community in Khana Local Government Area of Rivers State

Kobhamologi Napoleon Ogoniba
School of Environmental Health
Rivers State College of Health Sciences and Management Technology
+2347038071531, +2348058519196 moneyluvme2018@gmail.com

Abstract

This study covered public health implications associated with the consumption of crystal myth among youths in Wilsue-ko community in Khana Local Government Area of Rivers State. The study comprises four specific objectives, a descriptive study. The population of the study consisted of 2214 youths within the study area and sample technique for this study was Taro Yamane formula, the sample size for the study was 400. Questionnaire was the instrument used to gather information from the respondents. Results showed that 300 (75%) of the respondents said that they had adequate knowledge about crystal myth (ice) while 100 (25%) of the respondents stated that they did not have adequate knowledge about crystal myth (ice). The results further showed that 300 (75%) of the respondents had knowledge about the factors that give rise to crystal myth (ice) while 100 (25%) of the respondents did not. The study concluded that that crystal myth has significant public health implications among youths in Wilsue-ko community in Khana Local Government Area of Rivers State. Based on the conclusion, the study recommended that the effects of crystal myth on youths behaviour and academic performance should receive attention in education policy fora; and that parents should always relate to their children with love and affection and provide for their needs.

Keywords: public, health, implications, consumption, crystal myth, youths

Introduction

Crystal mythamphetamine (crystal myth) is a highly addictive psychostimulant drug (Paneka & MacEwan, 2016), the abuse of which has reached epidemic proportions in western countries (Rose & Grant, 2018). A number of findings suggest that its chronic abuse can lead to serious cognitive, psychiatric and neurological impairments in the user and can have negative consequences on the development of children exposed to crystal mythamphetamine or crystal myth in utero as well as to children raised by parents addicted to crystal mythamphetamine or crystal myth (Rose & Grant, 2018).

Moreover, crystal mythamphetamine or crystal myth toxication can be lethal (Kalasinsky, 2020). Currently there are no pharmacological treatments available to treat crystal mythamphetamine or crystal myth dependence (Aron & Paulus, 2017). In order to develop necessary treatments a greater understanding of the drug's mechanism of action and of the way its abuse can affect the brain of the user is needed.

Crystal mythamphetamine belongs to a group called "amphetamines" and was introduced in 1893, six years after the first compound in this group amphetamine was synthesized. The substances in this group have similar biological properties and structures. Although the illicit manufacture of the drug began already in the 1960s (Berma et al., 2018), it is the great expansion of the crystal mythamphetamine or crystal myth market in the 1980s that made it one of the most wide-spread illicit drugs of abuse and has developed into an epidemic across the world (Rose & Grant, 2018). One reason lying behind the wide-spread use of crystal mythamphetamine or crystal myth is its relative ease and low cost of synthesis (Cadet et al., 2017). The most common precursors for producing crystal mythamphetamine or crystal myth in amateur laboratories are ephedrine and pseudoephedrine (Sulzer et al., 2015) which can be found in nonprescription allergy medicines. Manuals for crystal mythamphetamine or crystal myth production are readily available in the internet (Barr et al., 2016).

Statement of the Problem

The great amount of crystal mythamphetamine or crystal myth abuse all over the Wilsue-ko community in Khana Local Government Area causes enormous social and criminal justice problems.

In the human brain the abuse of crystal mythamphetamine or crystal myth causes implications on both structures and functions given rise to acute as well as long term symptoms. Effects of crystal mythamphetamine or crystal myth abuse among youths in Wilsue-ko community had made most of the youths to become security without watching over any properties.

The abuse of this drug over the lifestyle of this youth has been described in the manner of the drug mechanism such as the impact on neurotransmitters, structural deficits with decreased and increased volumes and the implication on attention, memory, decision making and emotions. It is upon this note the researcher tries to investigate on evaluating the public health implications associated with the consumption of crystal myth among youths in Wilsue-ko community in Khana Local Government Area of Rivers State.

Research Questions

1. What is the level of knowledge of crystal myth among youths?
2. What are the predisposing factors responsible for involvement of crystal myth among youth?
3. What are those complications associated with the consumption of crystal myth?
4. What is the current innovation to control those complications associated with the consumption of crystal myth?

Design of the Study

This research adopted the descriptive survey design. In this design a group of people or items are studied by simply collecting and analyzing data from a section of the people or items which are considered to be a representation of entire group. Therefore, the researcher employed the descriptive survey approach to evaluate the public health implications associated with the consumption of crystal myth among youths in Wilsue-ko community in Khana Local Government Area of Rivers State.

Study Area

This study was conducted in Study Area Khana Local Government Area is one of the 23 Local Government Area in Rivers State of Nigeria created in 1st October 1991 with a land mass of 704km – Density 272/Km2. Khana Local Government Area has boundaries at the North with Gokana Local Government Area, Oyigbo Local Government Areas to the West, Wilsue-ko it has boundaries with AkwaIbom State to the South and Elem Local Government Areas of Rivers State to the East. The geographical landmark features of the Local Government Area are surrounded with river. Khana people are predominantly famers, traders, hunters and Fisher men with many others in white collar job. The languages spoken are; Ogoni Language and English and has a population of 282,988 (National population census, 2006). Majority of the facilities are short started, having as low as 4 staff and many are poorly equipping with dilapidated infrastructures, and lack of instrument needed for sterilization. It is only few of the health facilities in the LGA that are fenced with many other not having a single security man. Sharp medical wastes from the facilities are periodically returned to the Local Government Council While non-sharp medical wastes are disposed within in the facilities. Also, due to inadequate power supply, most of the facilities lack sufficient water supply and use lamp and candles for light during night duties.

Population of the Study

The population of the study comprises 2214 youths in Wilsue-ko community, which are females 1,247 and male 967. The information was obtained by the researcher from the Local Government Council.

Sample and Sampling Techniques

The population of this study is 2214 while the Taro Yamane formular was used to have the sample size, which was 399.67.

Instrument for Data Collection

A well-structured questionnaire was constructed by the researcher which was in line with the research objectives. The questionnaire has two (2) sections; Section A and Section B. The section A comprises

the socio-demographic data of the respondents while section B comprises specific research questions. The questionnaires were distributed to respondents participating in the study.

Methods of Data Analysis

The collected data were first tallied, coded and presented in table. The study applied simple percentage to analysis the data collected in the questionnaire and it was used to relate to the research questions. This method is the best alternative when determining the number of respondents who agree or disagree with the options provided in the questionnaire.

RESULTS

Frequency Distribution of Biometric Data of Respondents

Table 1: Showing Age of the respondents

Age	No. of respondents	Percentage (%)
13-19 years	40	10
20-25 years	124	31
26-30 years	96	24
31 years and above	140	35
Total	400	100

Source (Field Survey, 2023)

From Table 1 above, 40 (10%) of the respondents were 13-19 years of age, 124 (31%) were between the ages of 20-25 years, 96 (24%) were between the ages of 26-30 years while 140 (35%) were between the ages of 31 years and above respectively.

Table 2: Marital Status of respondents

Marital Status	No. of respondents	Percentage (%)
Single	286	71.5
Married	99	24.8
Divorced	15	3.7
Total	400	100

Source (Field Survey, 2023)

From Table 2 above, 286 (71.5%) were single, 99 (24.8%) of the respondents were married, 15 (3.7%) were divorced

Table 3: educational Attainment of Respondents

Religion	No. of respondents	Percentage (%)
Non formal	88	22
F.S.L.C	148	37
WAEC	133	33.3
Bsc./ HND/OND	31	7.8

Source (Field Survey, 2023)

From Table 3 above, 88 (16%) of the respondents are had non-formal education, 148 (37%) of the respondents have F.S.L.C, 133 (33.3%) of the respondent had WAEC education and 31 (7.8%) of the respondent had Bsc./ HND/OND

Table 4 Showing Research Question 1

What is the level of knowledge of crystal myth among youths							
s/n	Option	Yes	(%)	No	(%)	Total	(%)
1	Do you have adequate knowledge about crystal myth (ice)?	300	75	100	25	400	100
2	Do you have knowledge about the factors that give rise to crystal myth (ice)?	300	75	100	25	400	100
3	Do you have knowledge about the public health effect of crystal myth (ice)?	300	75	100	25	400	100
4	Do you have knowledge about the complications association with crystal myth (ice)?	300	75	100	25	400	100
5	Do you know how to manage those complications associated with crystal myth (ice)?	300	75	100	25	400	100

Source (Field Survey, 2023)

Table 4 item 1; above, 300 (75%) of the respondents said yes that they have adequate knowledge about crystal myth (ice) while 100 (25%) of the respondents said no that they do not have adequate knowledge about crystal myth (ice). Table 4.5 item 2; 300 (75%) of the respondents said yes that they have knowledge about the factors that give rise to crystal myth (ice) while 100 (25%) of the respondents said no that they do not have knowledge about the factors that give rise to crystal myth (ice). Table 4 item 3; 300 (75%) of the respondents said yes that they have knowledge about the public health effect of crystal myth (ice) and while 100 (25%) of the respondents said no that they do not have knowledge about the public health effect of crystal myth (ice). Table 4 item 4; 300 (75%) of the respondents said yes that they have knowledge about the complications association with crystal myth (ice) while 100 (25%) of the respondents said no that they do not have knowledge about the complications association with crystal myth (ice). Table 4 item 5; 300 (75%) of the respondents said yes that they know how to manage those complications associated with crystal myth (ice) while 100 (25%) of the respondents said no that they do not know how to manage those complications associated with crystal myth (ice).

Table 5: Showing Research Question 2

What are the predisposing factors responsible for involvement of crystal myth among youth?							
S/n	Option	Yes	(%)	No	(%)	Total	(%)
1	Peer pressure	400	100	0	0	400	100
2	High morale	400	100	0	0	400	100
3	Feel among	400	100	0	0	400	100
4	Sexual satisfaction	400	100	0	0	400	100

Source (Field Survey, 2023)

From Table 5 item 1; above, 400 (100%) of the respondents said yes that peer pressure is one of the predisposing factors responsible for youth involvement with crystal myth. Table 5 item 2; 400 (100%) of the respondents said yes that high morale is one of the predisposing factors responsible for youth involvement with crystal myth. Table 5 item 3; 400 (100%) of the respondents said yes that feel among is one of the predisposing factors responsible for youth involvement with crystal myth. Table 5 item 4; 400 (100%) of the respondents said yes that sexual satisfaction peer pressure is one of the predisposing factors responsible for youth involvement with crystal myth.

Table 6: Showing Research Question 3

What are those complications associated with the consumption of crystal myth?							
s/n	Option	Yes	(%)	No	(%)	Total	(%)
1	Restlessness	400	100	0	0	400	100
2	Insomnia	400	100	0	0	400	100
3	Paranoia	400	100	0	0	400	100
4	aggression and suspiciousness	0	0	400	100	400	100

Source (field Survey, 2023)

From Table 6 item 1, 400 (100%) of the respondents said yes that restlessness is one of the complications associated with the consumption of crystal myth. Table 6 item 2, 400 (100%) of the respondents said yes that insomnia is one of the complications associated with the consumption of crystal myth. Table 6 item 3; 400 (100%) of the respondents said yes that paranoia is one of the complications associated with the consumption of crystal myth. Table 6 item 4; 400 (100%) of the respondents said no that aggression and suspiciousness is one of the complications associated with the consumption of crystal myth.

Table 7: Showing Research Question 4

What is the current innovation to control those complications associated with the consumption of crystal myth?							
s/n	Option	Yes	(%)	No	(%)	Total	(%)
1	Community mobilization	400	100	0	0	400	100
2	Involvement of drug enforcement agency	400	100	0	0	400	100
3	Price regulation	400	100	0	0	400	100
4	Government policy	400	100	0	0	400	100

From Table 7 item 1, 400 (100%) of the respondents said yes that community mobilization is the current way to control those complications associated with the consumption of crystal myth. Table 7 item 2, 400 (100%) of the respondents said yes that involvement of drug enforcement agency is the current way to control those complications associated with the consumption of crystal myth. Table 7 item 3; 400 (100%) of the respondents said yes that price regulation is the current way to control those complications associated with the consumption of crystal myth. Table 7 item 4; 400 (100%) of the respondents said yes that government policy is the current way to control those complications associated with the consumption of crystal myth.

Conclusion

The statistical analysis revealed that crystal myth had significant effects on youth health and activities during and after consumption. Based on this, the study therefore concluded that crystal myth had significant public health implications associated with the consumption of crystal myth among youths in Wilsue-ko community in Khana Local Government Area of Rivers State.

Recommendations

Based the findings, the research recommended the following:

1. The effects of crystal myth on youths' behaviour and academic performance should receive attention in education policy fora; and that parents should always relate to their children with love and affection and provide for their needs.
2. There should be public enlightenment programmes to combat mass ignorance and public awareness on the right to freedom from all forms of crystal myth.
3. There should be provision of nurturing and supportive child friendly school, learning environment free from noise, distractions, discrimination and abuse of any kind.
4. Intense awareness should be created among communities using seminars, workshops and training programs about what constitutes crystal myth.

5. All forms of abuse should be exposed to these youths so as to draw their attention to some of the unintentional acts that bother on crystal myth.

References

Aron, D., & Paulus, A. J. (2017). Understanding Adolescence, Current Development in Adolescent Psychology. Allyn and Bacon, USA.

Barr, K., Cooper, D. R., & Schindler, P. S. (2016). Business Research Methods (9th edition). USA, McGraw - Hill.

Berma, G., Adelekan, M. L., Makanjuola, A. B., Ndom, J. E., Fayeye, J. O., Adegoke, A. A., & Amusan O. (2018). 5 yearly monitoring trends of substance use among Boarding Secondary School students' in Ilorin, Nigeria, 1988-1998. *African Journal of Medicine*.

Cadet, F., Aden, A., Dimlo, E. A., Ndolo, U. N., & Chinda, M. L. (2016). Socio-economic Effects of Khat Chewing in North Eastern Kenya. *East Africa Medical Journal,*

Kalasinoky, D., Abdulkarim, A. A, Mokuolu, O. A., & Adeniyi, A. (2020). Drug use among Adolescents in Ilorin, Nigeria. *Tropical Doctor*, 35, 225 - 228

Paneka, B., & MacEwan, A. (2016). Social Foundations of Thought and Action, Social Cognitive Approach. Eaglewood Cliff, N.J, Prentice Hall.

Rose, B., & Grant, C., (2018). The state and schooling in Kenya, Historical developments and current challenges. *Africa Today*, 46 (1), 95-117.

Sulzer, D., Conger, J., & Peterson, J. (2015). Adolescence and Youth. Psychological Development in changing World. R. R. Donelly and Sons Co. USA.

pp. 183-189 https://dx.doi.org/10.4314/johasam.v7i1.22

Knowledge and Health Impact of Crystal Meth Consumption among Youth in a Rural Community in Rivers State

[1]Joe Nengi Brown
08065126073
nengi084@yahoo.com

&

[2]Jaja Abraham Ephraim
08060198088
abrahamjaja633@gmail.com

[1,2] School of Community Health, Rivers State College of Health Science and Management Technology, Rumueme, Port Harcourt.

Abstract

This study investigated knowledge and health impact of crystal meth consumption among youth in a rural community, Rivers State. Three objectives were formulated to guide the conduct of the study. The study adopted cross sectional descriptive design involving 100 respondents. Random sampling technique was used for the study. The instrument for data collection was self-structured questionnaire. The demographic characteristics of respondents and the research questions were analyzed using simple frequencies and percentages and chart. Results of the study revealed that 68.2% of the respondents agreed that youth have knowledge about crystal meth, 65.5% agreed that there are factors that promote crystal meth consumption among the youth such as unemployment and poverty, abusive parental discipline, friends involvement in drug, availability of drug (crystal meth), boldness and confident and 63.6% agreed that there are health impact of crystal meth consumption among the youths such as a change in brain circuit, increases of heart rate, high blood pressure and stroke, violent behaviour, aggressiveness and psychosis, nosebleeds, sinus problem and damage inside the nose. Based on the findings, recommendations were made that there should be education of family units on the dangers of drug abuse by government, professional bodies, NGOs among others and parents should give their children proper upbringing and build up healthy communication relationship with them to know when they have started indulging in abusing drugs

Keywords: knowledge, health, impact, crystal meth, consumption, youth, rural, community, Rivers State.

Introduction

Among a myriad of public health concerns, harmful substance use has gradually emerged as one of the most tropical issues in global health and significantly contributes to the global disease burden and mortality rate (Kristjansson et al., 2020). One of such substance is crystal meth. Crystal meth also known as Methamphetamine (MA) is a synthetic stimulant that affects the brain and central nervous system and smoking is the most common route of administration for it (Klasser & Epstein, 2015). When smoked or injected, it produces an initial rush that lasts only a couple of minutes but is intensely pleasurable. This is followed by prolonged high results in an extended period of euphoria (Saw et al., 2015). The half-life of crystal meth (Methamphetamine) ranges from 10–30 hours depending on the purity of the drug, urine pH, and the amount consumed and like other psychoactive drugs of abuse, Chronic crystal meth use can result in tolerance, where increased amounts of crystal meth (MA) are required to produce the same high (Lake & Quirk, 2014).

Crystal meth (Methamphetamine) as a stimulant produces physiological and psychological effects similar to those elicited by cocaine and stimulates the release of dopamine, norepinephrine, and serotonin, and blocks their reuptake (Sulzer et al, 2015). This excess amount of neurotransmitters in the synapses produces sensations of euphoria, lowered inhibitions, feelings of invincibility, increased wakefulness, heightened sexual experiences, and hyperactivity resulting from increased energy for extended periods of time (Marcelle et al., 2016). Deleterious short-term effects include

increased heart and respiration rates, hyperthermia, chest pain, hypertension, increased respiration, decreased appetite, anorexia, irritability, confusion, tremors, convulsions, anxiety, aggressiveness, and symptoms of psychosis such as hallucinations and paranoia (Slavin, 2014). This is followed by mental and physical exhaustion, headaches, reduced concentration, hunger, decreased energy, anhedonia, and a craving for more crystal meth. Cognitive impairments and changes in the brain that result in symptoms similar to those of Parkinson's disease can occur. Long-term use of crystal meth is associated with neurotoxicity, neurodegeneration, and clinical depression that may lead to homicidal and suicidal ideation and action (Klasser & Epstein, 2015).

Crystal methamphetamine use among youth, mirroring a global trend that puts amphetamine-type stimulants as the second most widely used illicit drug in the world, following cannabis and is manufactured from common, easily obtainable precursor chemicals and is synthesized in small-scale, local "meth labs", as such, it widely available and easily to obtain on the street level (Slavin, 2014). Crystal methamphetamine is a highly potent form of methamphetamine and is more commonly injected than other forms of methamphetamine, resulting in higher addiction potential and blood borne disease transmission (Klasser & Epstein, 2015). In terms of high-risk drug activities, crystal methamphetamine use has been associated with injection drug use, and syringe borrowing and lending to transmission of infection from one person to another. Use of methamphetamine and amphetamine has increased rapidly throughout the world, with more than 34 million users worldwide.

The prevalence of crystal meth drug use in the South East is about 13.8 per cent, based on a United Nations Office on Drugs and Crime (UNODC) estimate (UNODC, 2015). It is the third highest in the country (Nigeria), following South South and South West with 22 per cent and 16.6 per cent, respectively. This figure simply means that one out of every seven persons in the South East between 15 to 64 years of age has used an illicit drug (crystal meth). A video clip of youths in villages and communities of the South East flogging persons said to be involved in the sale and consumption of (crystal meth) went viral in the social media. Many of them had their hands and legs fastened with strings while the beating went on; there were cases where the persons concerned died in the process. In fact, in one of the videos, a young man alleged to have killed his mother and only sister after taking (crystal meth) known in the village parlance as "mkpuru mmiri" was allegedly stoned to death by villagers.

Most youth consume crystal meth without understanding its complications which include mood disorders, psychotic symptoms and schizophrenia, depression, suicide, anxiety, paranoia, hallucination, violent behavior, cardiovascular and cardiomyopathy problems, teeth damage, and infectious disease risk (Yeo et al., 2017). Methamphetamine use among the youths also increases the risk of Parkinson's disease (PD), using this substance increases the risk of high-risk sexual behaviors and, consequently, the risk of acquired immune deficiency syndrome (AIDS) and violent behaviors (Vearrier et al,. 2013). In 2013, methamphetamine was mostly-used illegal narcotic substance after opium in Iran and the prevalence of methamphetamine among Iranian youths aged 19-29 years was reported to be 7.1% (Bagheri et al, 2017). In the similar vein a study conducted in Myanmar indicated that 73.0% of men and 60.5% of women started taking methamphetamine before age 18 (Saw et al. 2017).

Statement of the Problem

Crystal meth (Methamphetamine) is one of substances regularly abused by youths. It has been observed that crystal meth, glass or ice have proven to be the most commonly used hard drugs among the youths today, just as is now very rampant in communities in Rivers State. Investigation has shown that most of youths claimed to use crystal meth as pills for cold remedies and as basis for its production. Some of the people in the community claimed to have friends that indulge in abusing the substance, and from their statement the drug have the same level of addiction like cocaine and highly affordable for just N500. According to them, the meth "cook" extracts ingredients from those pills increase its strength when combine the substance with chemicals such as battery acid, drain cleaner, lantern fuel and antifreeze to manufacture it. It was also discovered that users smoke crystal meth with a small glass pipe and may also swallow, snort or inject it into their vein. Crystal meth is commonly manufactured in illegal hidden laboratories, mixing various forms of amphetamine (another stimulant drug) or derivatives with other chemicals to boost its potency. The health impact of crystal meth

among the youths include increased heart and respiration rates, hyperthermia, chest pain, hypertension, increased respiration, decreased appetite, anorexia, irritability, confusion, tremors, convulsions, anxiety, aggressiveness, and symptoms of psychosis such as hallucinations and paranoia, mental and physical exhaustion, headaches, reduced concentration, hunger, decreased energy, anhedonia, addiction neurotoxicity, neurodegeneration, and clinical depression that may lead to homicidal and suicidal ideation and action . Though the users have a quick rush of euphoria shortly after taking drug, but its effect is dangerous and can damaging to one's body with psychological problems. It is imperative that urgent attention need to be taken to reduce its impact on the health of the youths. Based on this premises the research carry out this research to ascertain the knowledge and health impact of crystal meth consumption among youth of Obeama Community, Oyigbo Local Government Area of Rivers State .

Research Questions

1. What is the knowledge on health impact of crystal meth consumption among youth of Obeama Community, Oyigbo Local Government Area Rivers State?
2. What are the factors responsible for crystal meth consumption among youth in Obeama Community, Oyigbo Local Government Area Rivers State?
3. What is the health impact of crystal meth consumption among youth in Obeama Community, Oyigbo Local Government Area Rivers State?

Methodology

This study adopted a cross sectional descriptive study design. According to Nkwankwo (2016) descriptive study design is a non-experimental research carried out to analyze and explain events or behaviour as they occur in their natural phenomenon without influencing them in any way. This research design was suitable for the study because it is flexible for collecting various types of data posed on the opinion of the respondent without manipulation.

Obeama Community is in Oyigbo Local Government Area, Rivers State, 30 kilometers from the city of Port Harcourt and a local government area of Rivers State, Nigeria. It has an area of 126 km2 and a population of 228,828 at the 2006 census. Geographically, coordinates latitude 4° 40′ 5″ N and 4° 43′ 19.5″ N and longitude 7° 22′ 53.7″ E and 7° 27′ 9.8″ E. Obeama is mostly an agrarian society. A mixture of both cash and food crops is cultivated by the people these including, yam, cassava, plantain, banana, cocoa, cocoyam, oil palm etc. Livestock rearing is carried out mostly in a non-commercial manner and is limited native goat and chickens. Other traditional crafts that the people engage in include palm wine tapping, hunting, fishing, canoe building and weaving. Modern occupations such as barbing, hairdressing, tailoring, masonry, carpentry and bicycle repairs are also engaged in by a significant part of the population. Weaving in the community which is mostly carried out by the female population deserve special mention as the famous 'Akuruaku' material is a product of the ingenuity of these women. These craft has evolved from the use of raffia yarn to dyed cotton and silk for producing traditional wrappers, dresses, suits, shirts, chieftaincy regalia and household furnishing. There are schools in the community such as primary and secondary schools. Most of the people in the community are Christians, few are Muslims and traditionalists. The population of this study consisted of one hundred (100) youths residing in Obeama Community, Oyigbo Local Government Area of Rivers State (Obeama Youth Register, 2022). The sample size for this study consisted of one hundred (100) youths.

Random sampling technique was used because every member of the population was studied. A structured questionnaire was used to generate a quantitative data from the respondents. Data collection was done through the use of questionnaire. The questionnaire distributed to respondents by the researcher was retrieved immediately on the spot after filling. The retrieved copies of the questionnaire were subjected to descriptive statistical analysis using the statistical package of social science (SPSS 20.0 version 2010). The results of this study were presented in percentages, tables, and chart.

Results

Research Question 1: What is Knowledge of Youth on Crystal Meth Consumption?

Table 1: Knowledge of Youth on Crystal Meth Consumption

S/N	Items	Yes	%	No	%	Total
1.	Have you heard about crystal meth before?	73	73	27	27	100(100)
2.	Have you consumed crystal meth before?	69	69	31	31	100(100)
3.	Do you get it from your community?	68	68	32	32	100(100)
4.	Was it sold at a cheap price?	68	68	32	32	100(100)
5.	Is crystal meth sold in an undisclosed location?	63	63	37	37	100(100)
	Overall Percentage		68.2		31.8	

Source: Researcher Survey, 2023

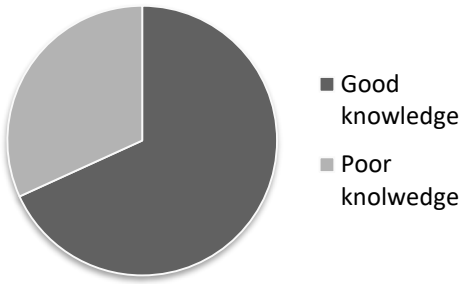


Fig. 1: Level of Knowledge of Youth on Crystal Meth Consumption

Table 1 and Fig 1 show knowledge of youth on crystal meth consumption. 73 respondents representing 73% agreed that they have heard about crystal meth before while 27(27%) said they have not heard about it. 69(69%) accepted that they have consumed crystal meth before and 31(31%) disagreed. 68(68%) indicated that they get crystal meth from their community and 32(32%) said they don't know. 68(68%) agreed that crystal meth is sold at a cheaper price while 32(32%) said no. 63(635) affirmed that crystal meth is sold in a disclosed location and 37(37%) disagreed. The overall percentage is 68.2% which means that youth have knowledge about crystal meth consumption.

Research question 2: What are the factors that promote crystal meth consumption among youth?

Table 4.2 Factors that Promote Crystal Meth Consumption among the Youth

S/N	Items	Yes	%	Yes	%	Total
6.	I consume crystal meth due to unemployment and poverty	68	68	32	32	100(100)
7.	Abusive parental discipline drives me into consuming crystal meth?	65	65	35	35	100(100)
8.	I abuse drugs because my friends are involved	58	58	42	42	100(100)
9.	`Availability of the drug (crystal meth) makes me to consume it.	64	64	36	36	100(100)`
10.	Consuming drug make me to be bold and confident	73	73	27	27	100(100)
	Overall Percentage		65.6		34.4	

Source: Researcher Survey, 2023

Table 2 shows factors that promote crystal meth consumption among the youth. 68 respondents representing 68% agreed that they consumed crystal meth due to unemployment and poverty and 32(32%) said no. 65(65%) accepted abusive parental discipline drives them into consuming crystal meth and 35(35%) disagreed. 58(58%) affirmed that they abuse drug because their friends are involved while 42(42%) disagreed. 64(64%) indicated that the availability of drug (crystal meth) make them to consume it and 36(36%) said no. 73(73%) agreed that consuming drug make them to be bold and confident and 27(27%) disagreed. The overall percentage is 65.6% which means that there are factors that promote crystal meth consumption among the youths.

Research Question 3: What is the health impact of crystal meth consumption among youths?

Table 4.3 Health Impact of Crystal Meth Consumption among Youths

S/N	Items	Yes	%	Yes	%	Total
11.	Consuming crystal meth causes change in brain circuit that makes it difficult to stop even with negative effect.	72	72	28	28	100(100)
12.	My heart rate increase, blood pressure rises and being at risk of stroke after taking crystal meth.	68	68	32	32	100(100)
13.	I exhibit violent behaviour, aggressiveness and become psychosis after consuming crystal meth.	61	61	39	39	100(100)
14.	Crystal meth causes nosebleeds, sinus problem and damage inside the nose.	54	54	46	46	100(100)
15,.	I share unsterile equipment without knowing its increasing risk of contacting blood borne virus.	63	63	37	37	100(100)
	Overall Percentage		**63.6**		**36.4**	

Source: Researcher Survey, 2023

Table 3 shows health impact of crystal meth consumption among the youths. 72 respondents representing 72% agreed that taking crystal meth causes change in their brain circuits that makes it difficult to stop smoking it even with its negative effect and 28(28%) disagreed. 68(68%) accepted that their heart rate increases, blood pressure rises and being at risk of stroke after consuming crystal meth and 32(32%) said no. 61(61%) indicated that they exhibit violent behaviour, aggressiveness and become psychosis after consuming crystal meth and 39(39%) disagreed. 54(54%) agreed that crystal meth causes nosebleeds, sinus problem and damage inside the nose while 46(46%) said no. 63(63%) affirmed that they shared unsterile equipment without knowing its increasing risk of contracting blood borne virus and 37(37%) disagreed. The overall percentage is 63.6 which means that there is health impact of crystal meth consumption among the youths.

Discussion

Knowledge of Youth on Crystal Meth Consumption

The fining of this study is in Table 4.1. The result of the study showed that majority of the respondents (68.2%) agreed that youth have knowledge about crystal meth. The study revealed that the youth have heard about crystal meth before, consumed crystal meth before, got crystal meth from their community at a cheaper price and in an undisclosed location. The finding of this study is in line with the work of Radfar & Rawson, (2014) that more than 52 million people aged 15-64 years have at least once used amphetamine stimulant. Among the amphetamine stimulants, methamphetamine is the most widely-used illegal stimulant such as cries, meth, speed, ice, crystal, and crank are the common names of methamphetamine among the consumers who use it in powder or smoking form. The 2016 Australian National Drug Strategy Household Survey reported that the highest proportion of people using crystal meth (CM) were in the adolescent and young adult age categories (Radfar & Rawson, 2014). Among Australians aged 14–19 years, approximately 0.8% reported using crystal meth in the past 12 months in 2016; this increased to 3.0% for young people aged 20–29 years.

Factors that Promote Crystal Meth Consumption among the Youth

The finding of this study is in Table 4.2. The result revealed that majority of the respondents 65.5% agreed that there are factors that promote crystal meth consumption among the youth. It was revealed that factors such as unemployment and poverty, abusive parental discipline, friends' involvement in drug, availability of drug (crystal meth), boldness and confident push them into consuming crystal meth. This finding is in line with the work of Hides et al. (2015) that it is often a combination of many factors such as mental health issues and socio-economic reasons such as unemployment and poverty, homelessness, sexual assault, other forms of abuse, family dysfunction, or the long-term effects of residential school experience on Indigenous people that drive people into drug.

Health Impact of Crystal Meth Consumption among Youths

The finding of this study is in Table 4.3. The result of the study showed that majority of the respondents (63.6%) agreed that there are health impacts of crystal meth consumption among the youths. It was revealed that change in their brain circuits that makes it difficult to stop smoking it even with its negative effect, heart rate increases, blood pressure rises and a risk of stroke, violent behaviour, aggressiveness and psychosis, nosebleeds, sinus problem and damage inside the nose are health impact of crystal meth consumption among the youths. The study showed that the youth shared unsterile equipment without knowing its increasing risk of contracting blood borne virus. This finding is in line with the work Radfar and Rawson (2014).

Conclusion

This study concluded that youth have knowledge about crystal meth. There are factors that promote crystal meth consumption among the youth such as unemployment and poverty, abusive parental discipline, friends' involvement in drug, availability of drug (crystal meth), boldness and confidence. The health impact of crystal meth consumption among the youths include change in brain circuit, increases heart rate, high blood pressure and stroke, violent behaviour, aggressiveness and psychosis, nosebleeds, sinus problem and damage inside the nose.

Recommendations

Based on the findings of this study, the following are therefore recommended:

1. There should be education of family units on the dangers of drug abuse and by government professional bodies, NGOs among others.
2. Parents should give their children proper upbringing and build up healthy communication relationship with them to know when they have started indulging in abusing drugs and crime.
3. Illegal sales of drug should be banned and their selling points close down.
4. Counseling centers should be established so that adolescents can be counseled on dangers of drug abuse and crime.
5. There should be introduction of drug abuse and crime as a subject into the school curriculum.
6. Government, NGOs, schools and religious bodies should carry out awareness campaign against drug abuse and crime.
7. There should be recreation of rehabilitation centers for the treatment of drug abused individuals.

References

Hamdi, E., Sabry, N., & Sedrak, A. (2016): Sociodemographic indicators for substance use and abuse in Egypt. *Journal of Addiction Prevention*, 4(1), 8.

Karechio, D. O. (2016) Drug abuse among Nigerian adolescent's strategies for counselling. *International Journal of Social Research Methodology*, 20, 341- 347.

Klasser, G. D., & Epstein, J. (2015). Methamphetamine and its impact on dental care. *J Can Dent Assoc*, 71(10):759–62.

Marcelle, G. (2016). *Methamphetamines: A guide for parents and other caregivers.* Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Administration, National Clearinghouse for Alcohol and Drug Information.

Saw, Y. M., Saw, T. N., Yasuoka, J., Chan, N., Kham, N. P. E., & Khine, W. (2017). Gender difference in early initiation of methamphetamine use among current methamphetamine users in Muse, Northern Shan State, Myanmar. *Harm Reduct J.*. *14*(1), 21.

Slavin, S. (2014). Crystal methamphetamine use among gay men in Sydney. *Contemporary Drug Problems, 32*, 425–65.

Sulzer, D., Sonders, M. S., Poulsen, N. W., & Galli, A. (2015). Mechanisms of neurotransmitter release by amphetamines: a review. *Prog Neurobiol,75,* 406–33.

United Nations Office on Drugs and Crime (2018). *Prevention of drug use and treatment of drug use disorders in rural settings.* https://www.unodc.org/documents/17-01904_Rural_treatment_ebook.pdf. Assessed 26 Aug 2018.

Yeo, E., Gawad, T., Khoweiled, A., Sidrak, A. E., Amer, D., & Mamdouh, R. (2017). Lifetime prevalence of alcohol and substance use in Egypt: A community survey. *Substance Abuse*, 34, 97-104.

pp. 190-195 https://dx.doi.org/10.4314/johasam.v7i1.23

Contemporary Issues on Innovation Focus on Artificial Intelligence for efficiency in Nigerian Health and Educational System

Joy Harry
Rivers State College of Health Science and Management Technology
Oro-Owo, Rumueme, Port Harcourt
joyluvus97@gmail.com - 08033099992

Abstract

This study investigated the contemporary issues on innovation focus on artificial intelligence (AI) for efficiency in Nigerian health and educational system. The study employed the qualitative research method. The concept of artificial intelligence and its impact on health and educational sector of Nigeria was extensively discussed. The contemporary issues of Artificial Intelligence as revealed in the study are **bias in the data**, limited knowledge, data piracy and security, amongst others. The study concluded that AI technology can certainly carter for greater services in the health and educational sector of the Nigerian economy. The implementation of the AI technology in the healthcare sector can be used to understand medical data and reach the right conclusion without direct human input. The study finally suggests that governments and educational institutions should encourage generalist education, emphasizing future-resilient skills, so that individuals are better prepared for the future work economy, as well as adopt systems to personalize education, generate literacy on AI issues, and encourage lifelong learning.

*Keywords***:** artificial intelligence, contemporary issues, health and educational system

Introduction

The replication of human intellectual processes by machines, particularly computer systems, is known as Artificial Intelligence, and it is one of the modern world's fastest developing technologies. Artificial intelligence applications are considered as a part of an organization's competitive intelligence of organizations (Ranjan & Foropon, 2021). According to the general three-dimensional model of artificial intelligence in influencing innovation, the first dimension indicates that artificial intelligence explores the success of search and innovation algorithms and then disseminates them through commercially available smart devices and services, and the second dimension is the impact of automation research and artificial intelligence to explore existing best practices and their reflection on the organization's ability to launch services based on artificial intelligence, while the third dimension relates to shaping the business context using artificial intelligence.

This indicates that artificial intelligence can contribute to raising the ability of organizations to provide organizational innovations (Al-Otaibi et al., 2021; Lee, 2021). In recent years, Artificial Intelligence (AI) has emerged as a transformative technology with the potential to revolutionize various sectors, including healthcare and education. In Nigeria, a country facing unique challenges in its health and educational systems, the adoption of AI-driven innovations hold the promise of significantly improving efficiency, accessibility, and outcomes in these critical areas.

Statement of the Problem

With new technological advancements come new opportunities as well as challenges. The Nigerian healthcare and educational systems face persistent challenges that hinder their effectiveness and accessibility. These challenges stem from a range of issues including inadequate infrastructure, resource constraints, and limited access to quality services. In the context of these challenges, the integration of Artificial Intelligence (AI) into the Nigerian health and educational systems presents some opportunities. However, Artificial intelligence (AI) is missing from existing publications presented in the state-of-the-art above. This study will therefore fill the gap by introducing the importance of AI in the health care and educational system in Nigeria and its contemporary issues.

Objectives

The objective of this study is to investigate contemporary issues on innovation in relation to Artificial Intelligence (AI) for efficiency in Nigerian health and educational system.

The specific objectives are to;

(i) Find out the relationship between Artificial Intelligence (AI) and efficiency in the Nigerian healthcare and educational system.

(ii) Determine the contemporary issues affecting Artificial Intelligence in the Nigerian healthcare and educational system.

Significance of the Study

The study is significant as the findings from this study will assist organizations, educators and healthcare professionals to bring to limelight the effect of Artificial Intelligence (AI) on Nigerian healthcare and educational system and its contemporary issues. It will also assist scholars and make valuable addition to the knowledge that has been acquired from other studies and may help other individuals and researchers who might wish to undertake further studies.

Literature Review

Artificial Intelligence

Artificial intelligence is superior to natural intelligence in that it is more consistent, durable, faster in processing and publishing, every step it takes can be documented, and it can perform certain tasks much faster and better than humans (Al-Hawamdeh & Alshaer, 2022). AI is used to simplify the management of IT processes and accelerate, automate problem-solving in modern and complex IT operating environments. Iftikhar, et al. (2020) define artificial intelligence as a set of techniques and models that are used to build machines capable of simulating human intelligence with the help of technological devices to reproduce advanced knowledge that facilitates and accelerates the achievement of goals. Artificial intelligence is also based on the development of smart programs capable of learning, thinking, collecting, and perceiving knowledge, and these complex programs perform tasks through environmental sensing and response processes and can simulate the behaviors of individuals, thinking and acting smart decisions (Cockburn et al., 2018).

Based on these definitions, the concept of AI refers to the introduction to making machines think and act as human beings, making it possible for the machines to perform human tasks and adapt to or interact with its surrounding environment (Kamble & Shah, 2018). However, it is important to note that what we call AI changes with time as technology advances. When certain AI technologies become highly accessible to us, it is taken for granted and not called AI anymore. This is because the term AI is perceived as a future technology. Some of the goals of AI is learning, reasoning and perception. Using these characteristics enables AI to rationalize and take actions towards the highest probability of achieving its goal (Frankenfield, 2020). The above-mentioned characteristics give AI enormous potential regarding problem solving. With the ability to think and act as human beings, solving problems that human beings do becomes accessible to AI.AI programming focuses on three cognitive skills: learning, reasoning and self-correction.

Innovation

Innovation is the practical implementation of ideas. Innovation can *refer to something new*, such as an invention, or the practice of developing and introducing new things. An innovation is often a new concept or modernizing an already existing product. Many definitions have been proposed to explain innovation, and as a result the term has gained greater ambiguity (Garcia & Calantone, 2002). A number of process models have been developed in the literature suggesting that innovation consists of a variety of different phases: idea generation, research design and development, prototype production, manufacturing, marketing and sales (Johnson, 2001; Knox, 2002; Poolton & Ismail, 2000). However, theorists have suggested that there is more to innovation than the process. Innovation thus has many facets and is multidimensional. Also many definitions of innovation focus on the concept of newness. The newness theme is especially important to understanding the link between Artificial Intelligence and Innovation.

Healthcare system in Nigeria: challenges and opportunities

Nigeria's healthcare system grapples with numerous challenges, such as inadequate infrastructure, a shortage of healthcare professionals, and limited access to quality medical care in rural areas. These challenges contribute to suboptimal healthcare outcomes and hinder progress towards achieving universal healthcare coverage (Ranjan & Foropon, 2021). However, AI offers an array of solutions that could transform the healthcare landscape.AI-powered diagnostic tools can enhance the accuracy and speed of disease identification, allowing for early detection and treatment. Telemedicine applications driven by AI can bridge the gap between urban medical facilities and remote regions, providing access to expert medical advice even in underserved areas. Additionally, predictive analytics can assist healthcare administrators in efficiently allocating resources and planning for outbreaks. Despite these opportunities, implementing AI in healthcare requires navigating regulatory hurdles, addressing data privacy concerns, and ensuring equitable access to technology (Lee, 2021).

Application of artificial intelligence in healthcare system

Lee (2021) highlighted the application of Artificial Intelligence in the health care system; it is stated below.

Diagnosis and treatment planning: AI can be used to analyze imaging, such as X-rays and MRIs, to help doctors identify diseases and plan treatment. For example, AI-powered algorithms can detect signs of cancer in mammograms with a high degree of accuracy, which can help doctors make a diagnosis and plan treatment more quickly.

Predictive Analytics: Electronic health records and other patient data can be analyzed by AI to predict which patients are at risk of developing certain conditions. This may help doctors intervene early, before a condition becomes more serious, and can also help healthcare organizations allocate resources more effectively (Kim & Huh, 2021).

Drug Discovery and Development: AI can be used to examine data on drug interactions and side effects, as well as to predict which compounds will be most effective in treating certain conditions. This can speed up the drug discovery and development process, which may ultimately lead to new treatments for patients.

Virtual Assistants and Chatbots: AI-powered virtual assistants and chatbots can help patient's access healthcare information and services more easily. For example, a chatbot can answer patients' questions about their symptoms or help them schedule an appointment with a doctor.

Artificial Intelligence and educational system in Nigeria

The Nigerian educational system also faces significant challenges, including limited access to quality education, outdated teaching methodologies, and a lack of personalized learning experiences. These issues contribute to low literacy rates and hinder the development of a skilled workforce. Integrating AI into education has the potential to address these challenges and foster innovation (Cockburn et al., 2018).

AI-powered learning platforms can offer personalized learning experiences tailored to each student's pace and learning style, reducing dropout rates and improving educational outcomes. Virtual tutors and intelligent content delivery systems can enhance the quality of education, especially in areas with a shortage of qualified teachers. Furthermore, AI-driven data analytics can help educational institutions identify trends and optimize curriculum design to align with market demands. However, successful implementation requires overcoming barriers related to digital infrastructure, teacher training, and ensuring that AI technologies do not exacerbate existing inequalities (Al-Hawamdeh & Alshaer, 2022).

Contemporary Issues of Artificial Intelligence

Artificial Intelligence (AI) is developing with such an incredible speed, sometimes it seems magical. There is an opinion among researchers and developers that AI could grow so immensely strong that it would be difficult for humans to control. Humans develop AI systems by introducing into them possible intelligence they could, for which the humans themselves now seem threatened (Lee, 2021). The following are the contemporary issues of Artificial intelligence.

Data privacy and security: The use of AI in healthcare requires large amounts of patient data, which raises concerns about data privacy and security. It is important to ensure that patient data is protected from unauthorized access and that patients have control over how their data is used (Zraqat, 2020).

Bias in the data: AI systems can be biased if the data they are trained on is not representative of the population they will be used to serve. This may lead to inaccurate or unfair results, particularly for marginalized communities.

Lack of transparency: Many AI systems are considered "black boxes" because it is difficult to understand how they arrived at a particular decision. This lack of transparency can make it difficult for doctors and other healthcare professionals to trust the results of an AI system.

Regulation and Governance: There is currently a lack of clear regulations and guidelines for the use of AI in healthcare. This can make it difficult for healthcare organizations to know how to use the technology responsibly and can also make it difficult for patients to know what to expect when they interact with an AI system.

Lack of understanding: Many healthcare professionals and patients may not have a good understanding of how AI works and what it can and cannot do. This can lead to unrealistic expectations and mistrust of the technology.

Job displacement: AI is a fast-evolving technology with great potential to make workers more productive, to make firms more efficient, and to spur innovations in new products and services. At the same time, AI can also be used to automate existing jobs and exacerbate inequality, and it can lead to discrimination against workers. AI systems have already started replacing the human beings in the industry. It should not replace people in the sectors where they are holding dignified positions which are pertaining to ethics such as nursing and surgeon (Trocin et al., 2021).

Conclusion

The AI technology can certainly carter for greater services in the health and educational sector of the Nigerian economy. The implementation of the AI technology in the healthcare sector can be used to understand medical data and reach the right conclusion without direct human input. It can be applied in diagnosis processes, treatment protocol development, drug development, personalized medicine, and patient monitoring and care.

From the study Artificial Intelligence (AI) is driving innovation and exiting traditional design models. As Nigeria strives to enhance its healthcare and educational systems, the integration of AI-driven innovations holds immense promise. By leveraging AI technologies, the country can overcome traditional limitations and create more efficient, accessible, and effective systems in healthcare and education. However, realizing this potential requires careful consideration of ethical, regulatory, and accessibility concerns, ensuring that the benefits of AI are equitably distributed across all segments of the population.

To fully realize these benefits, significant challenges such as data privacy and security, bias in the data, lack of transparency, regulation and governance, and lack of understanding need to be overcome. It is crucial that healthcare organizations, regulators and researchers work together to ensure that the technology is used in an ethical, actionable and meaningful manner.

Contribution to Knowledge

Policymakers, administrators, and decision-makers in the Nigerian government, healthcare, and education sectors can make informed decisions about the allocation of resources, investments, and policy reforms to enhance the quality and accessibility of services. The provided insights guide them in making choices that align with technological advancements and societal needs.

This exploration raises awareness among stakeholders about the potential benefits and pitfalls of adopting AI technologies. It educates individuals about how AI can be harnessed to address critical issues in these sectors.

Suggestions

1. Governments and educational institutions should encourage generalist education, emphasizing future-resilient skills, so that individuals are better prepared for the future work economy, as well as adopt systems to personalize education, generate literacy on AI issues, and encourage lifelong learning.
2. Offer training programs for healthcare professionals to familiarize them with AI technologies. This will enable them to effectively use AI tools and contribute to their continuous improvement.
3. Develop clear and robust regulatory frameworks that govern the ethical use of AI in healthcare and education. This should encompass data privacy, algorithm transparency, and accountability.

References

Al-Otaibi, S., Alkhammash, H. I., & Ullah, N. (2021). Short-and long-term predictions of novel corona virus using mathematical modeling and artificial intelligence methods. *International Journal of Modeling, Simulation, and Scientific Computing*, *12*(03), 2150028.

Al-Hawamdeh, M. M., & Alshaer, S. A. (2022). Artificial intelligence applications as a modern trend to achieve organizational innovation in Jordanian commercial banks. *The Journal of Asian Finance, Economics and Business*, *9*(3), 257-263.

Cockburn, I. M., Henderson, R., & Stern, S. (2018). The impact of artificial intelligence on innovation: An exploratory analysis. In *The economics of artificial intelligence: An agenda* (pp. 115-146). University of Chicago Press.

Frankenfield, J. (2020). *Artificial intelligence (AI).* Investopedia.

Garcia, R. & Calantone, R, (2002). A critical look at technological innovation typology and innovativeness terminology: a literature review. *Journal of Product Innovation Management, 8(*19), 110-132.

Iftikhar, P., Kuijpers, M. V., Khayyat, A., Iftikhar, A., & De Sa, M. D. (2020). Artificial intelligence: a new paradigm in obstetrics and gynecology research and clinical practice. *Cureus*, *12*(2).

Johnson, D. (2001). What is innovation and entrepreneurship? Lessons for larger organisations. *Industrial and Commercial Training*, *33*(4), 135-140.

Kamble, R., & Shah, D. (2018). Applications of artificial intelligence in human life. *International Journal of Research–Granthaalayah*, *6*(6), 178-188.

Kim, S. K., & Huh, J. H. (2021). *Artificial intelligence based electronic healthcare solution: Advances in computer science and ubiquitous computing.* Springer.

Knox, S. (2002). The boardroom agenda: developing the innovative organization. *Corporate Governance*, 2(1), 27-39.

Lee, D. (2021). Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International Journal of Environmental Research and Public Health*, *18*(1), 271.

Poolton, J. & Ismail, H. (2000). New developments in innovation. *Journal of Managerial Psychology*, 15(8), 795-811.

Ranjan, J., & Foropon, C. (2021). Big data analytics in building the competitive intelligence of organizations. *International Journal of Information Management*, *5(6)*, 102-113.

Trocin, C., Hovland, I. V., Mikalef, P., & Dremel, C. (2021). How Artificial Intelligence affords digital innovation: A cross-case analysis of Scandinavian companies. *Technological Forecasting and Social Change, 17(3)*, 121-118.

Zraqat, O. M. (2020). The moderating role of business intelligence in the impact of big data on financial reports quality in Jordanian telecom companies. *Modern Applied Science, 14*(2), 71-85.

pp. 196-204 https://dx.doi.org/10.4314/johasam.v7i1.24

Perceived Occupational Hazards of Sanitation Workers in Hydrocarbon-Oil Producing and Servicing Companies in Rivers State, Nigeria

[1]Chime Ishmael Onumbu
chisonish@gmail.com
09017207947; 08032704330

[2]Dornu Gbeneneh
08039286372
gbenenehdornu@gmail.com

[1,2] Rivers State, College of Health Science and Management Technology, Rumueme, Port Harcourt

Abstract

It is not arguable that sanitation workers in hydrocarbon-oil producing and servicing companies in Rivers State, Nigeria are bound to suffer from severe occupational hazards while doing their work, given the kind of surroundings they work in. What is more interesting here is how some of them perceive what constitute their hazards at work. The probability that their awareness of what their occupational hazards were, may in the long run define their safe acts while doing work, makes this study a necessity. A descriptive survey research design was chosen in this study. Out of 1000 sanitation workers, including their supervisors who were sampled as part of the population for this study through a preliminary investigation survey, from the 26 oil companies, 250 sample size was contrived, comprising 200 sanitation workers and 50 sanitation supervisors. A validated questionnaire instrument was used and a reliability coefficient of 0.9 was obtained using Spearman's ranking order. A research question and null hypothesis were posed for this study. The findings of the study indicated that the sanitation workers were highly exposed to physical objects injury, machine injury, and inhalation of hydrocarbon from generators and automobiles. They were also heavily exposed to chemical hazards from insecticides, pesticides, herbicides and contacts with washing solvents and toxicants. Although, they were also exposed to cigarette odour and smoke from offices, electric shock, mosquitoes and snake bite which ranked low in their perceptions. On the whole, the null hypothesis showed that there was no significant difference between the perceptions of the sanitation workers and their supervisors on the types of occupational hazards facing the workers was accepted, at 0.05. It was recommended conclusively, that provision and implementation of sound occupational health and safety policies to this set of workers should be made by the stakeholders on their awareness.

Keywords: occupational hazards, sanitation workers, hydrocarbon oil producing, servicing companies.

INTRODUCTION

Back in the years, in the colonial and post-colonial eras in Rivers State, members of the hinterlands in rural communities, out of panic and ignorance misconstrued what the term environmental sanitation is. Most of them went about cutting down the surrounding trees and burning bushes in fear of prosecution by the statutory sanitation officers, especially, prior to the designated sanitation days. These acts are unsafe and non-environment friendly. Nwakile et al. (2017) defined the word sanitation as the policy and practice of protecting health through hygienic measures. These imply that sanitation is an act and a process. To keep the surrounding spick and span is also known as sanitation to an extent.

However, a more advanced meaning of sanitation is that it is the practice and process of preventing disturbances, harm, damage, diseases or loss through creating appropriate orderliness and hygienic measures in an environment. It involves keeping the surrounding substances orderly and clean in order to save lives and property, through establishing principles, policies and laws as the case may be.

Anamali et al. (2019) asserted that one of the greatest problems facing developing countries is sanitation due to inadequate facilities, poor funding, and poor implementation of policies as well as wrong lifestyle. This means that sanitation work is as hazardous as it is risky. Onumbu (2022) rightly stated that occupational hazards are conditions, circumstances or substances in a work environment which have the potential of causing disturbances harm or loss to the worker or his property or both of them. Schulte et al. (2018) emphasized that occupational hazards involve short term and long-term dangers or risks associated with unhealthy workplace environment. This means that the effects of improper practice of work may not be felt at the short-term or immediately. International Labour Organization (ILO) (2018) declared that occupational hazards pose health and safety risks and have negative impact on the economy, which accounts for roughly a 4% loss in global annual gross domestic product (i.e $2.8 trillion annually).

Sanitation workers who work in organizations like hydro-carbon oil producing and servicing companies engage in such tedious tasks as sweeping the premises and offices and garages or engine rooms, lawn mowing, field cutting, spraying of insecticides, pesticides, fungicides, herbicides, washing of drainages, cleaning of gutters, toilets, work-shops, mopping, and others. These tasks exposes them to certain health challenges like acute respiratory problems due to inhalation of dusts, fumes and other gases or chemicals; burns, electrocution, hearing loss from noisy machines and engines; skin abrasion, lesion and necrosis, toxicity, pierce and cut injuries, trips, slips and falls, bruises, contaminated wears and skin from ticks, lice, some, other pests and pathogens: if appropriate preventive measures are ignored.

Hence, it has been observed by some scholars that some sanitation workers are alternate vectors or contaminants of family health and neighbourhood health. Some may carry pathogens and some pests on their skins and clothes and transmit same to the homes if they did not wash-off at the close of work. Levy and Wegman (1981) have observed that many pesticides accumulate in body fat and the liver, creating potential long-term health effects. They added that most pesticides are readily absorbed through the skin, posing great risks for those in direct contact with them.

It has been observed by Hricko (1994) that sanitation workers are bound to be exposed to industrial fumes from vehicles, lorries, and power generators. They continued by stating that these machines of course, emit certain poisonous compounds like benzene, toluene, oxylene, mlp-xylene, trimethyl, lead, ethyl-benzene, carbonmonoxide, aldehydes, and others. Mann et al. (2001) lent their support to the above when they stated that benzene can enter the indoor air because of vehicle emissions and other sources such as smoke. It could be noted herein that most of the above stated substances have the potentiality of causing severe adverse health effects on prolonged exposures in which case they could bring about health challenges to the sanitation workers such as-haematotoxicity, genotoxicity and carcinogenicity. Occupational Asthma may result out of prolonged exposure to incineration smoke by the sanitation employees.

Biologically speaking, sanitation workers may contact infectious hepatitis A and B, Giardia lamblia, tuberculosis and skin dermatophytes through contact with flies and toilet materials. Outdoor workers like sanitation employees, are at risk of vector-borne diseases. Onumbu (2008) quoted Murray and Zentner (1985) to have found out that cigarette smoke, as an air pollutant, caused increased carbon monoxide content in the blood of sanitation workers when inhaled for a long time.

Of course, you know that most foreigners in the multinationals seldom obey "No Smoking" rules in their offices, despite the safety signals. Hence, some sanitation workers in these organizations face a risk of effects of second-hand smoke effects of cigarettes which are cancerous on-exposure.

Exposures to latex, cleaning and disinfecting agents are in the opinion of Arif and Delclos (2012) possible cause of asthma to health-care workers like sanitation employees. Psycho-social and ergonomic hazards to this class of low socio-economic group of workers cannot be ruled out. Hence, Barielnen and Abraham (2019) posited that people perform better when they are physically and emotionally able to work and have the willingness to work. Stress-burden on the sanitation workers due to heavy work-loads may not be ruled out too. If appropriate safety policies, laws, inducements and supervisions are applied to the workers, there may be improved safe work practices among the sanitation workers.

Even though Amani et al. (2017), reported that awareness is not only a necessary condition for the development of health behaviour; they concluded by stating that the more the level of

awareness of the risks in a job will result in the more health behaviours. This latter position is made apparent by Onumbu and Elechi (2022) when they opined that knowledge of occupational hazards is a likely determinant of the workers' attitude towards the management of these hazards and possible prevention of the same. Since Jain and Rao (2015) have declared that safety of self and others is the responsibility of each employee, it is therefore on this premise that the perceived occupational hazards of the sanitation workers by themselves should be studied so as to determine if it may affect their safety practices.

Various Classes of Occupational Hazards of Sanitation Workers and their Effects to Health

	Classes of Hazards	**Types of Effects or Harm**
1.	**Physical hazards:-**These are non-machine oriented hazards which are incurred in cause of one's physical contacts or motions at work. E.g. building architectural designs and materials noise, fire, electricity, attacks, assault etc.	Knife cuts, auditory damage, lack of hearing, snake-bite, fall, trip, slip, collision, struck-by or against, heat, burns, cold-bite, cold-stroke, heat-stroke, strain, bruises, feverishness, deformity, stress ionizing radiation, death.
2.	**Mechanical hazards:-** These come from relationship with active machines i.e machine in motion, by the worker e.g cloth-washing machine mower, air suction pump, generators, grinding machines, and filing machines, etc.	Cuts, bruises deformity, severe wounds or death.
3.	**Biological hazards:-** These emanate from pathogens, herbs pests, pets, wild animals and livestock; and are plants and animals in nature	Malaria, snake-poison, (bite), dermatitis, dermatoses, tuberculosis, hepatitis, dengue fever, bronchitis, asthma, pneumoconiosis, emphysema, gardiasis, cancer, sting poison etc.
4.	**Chemical hazards:-** They are from chemical substances and are corrosive or toxic in nature e.g. pesticides, fungicides herbicides, insectides, paints, solvents, petrol, engine oil, fumes and particulates, dangerous gases etc.	Burns, cancer, tumors, skin lesions respiratory problems, skin denaturing, asphyxiation, death etc.
5.	**Psycho-socio logical hazards:-** They emanate from leadership and management failures at work and human relations with colleagues. E.g. job security, job status, conditions of services, threats and harassment, etc.	Feeling of frustration, inferiority complex, social stigma, fear, poverty, worry, anger, lack of motivation, emotional disturbances, etc.
6.	**Ergonomic hazards:-** Theses are positions of man to work and this approaches to work instruments	Limb pains, waist pain, lumbargo, fatigue, muscle-spasm, cramp, numbness, disfiguration, heart-attack, slumping.

Statement of the Problem
Based on the nature of work they perform, sanitation workers are bound to face severe hazards and health threats. In most organizations in Nigeria, sanitation workers are health-care givers, majority of who are less-educated and uninformed low-income earners. It is believed that conscious, regular conscientization and sensitization on their occupational hazards and preventive practices may help improve compliance to safe work habits among the sanitation workers. In the light of the above, the problem of this study is to investigate the perceived occupational hazards of sanitation workers in hydro-carbon-oil producing and servicing companies in Rivers State, so as to make necessary recommendations and add to the pool of existing knowledge.

Aim and Objective
The aim of this study is to know if the sanitation workers are conscientized and aware of the risks and hazards involved in their practices, which could inform their attitude to safety at work. The objective of this study is to determine the sanitation workers opinion on the type of hazards they encounter while doing work.

Research Question
What are the perceived occupational hazards of sanitation workers in hydrocarbon oil producing and servicing companies in Rivers State?

Research Hypothesis
A null hypothesis was adopted for this study as below: there is no significant difference between perceptions of the sanitation workers and their supervisors on the types of hazards sanitation workers are exposed to, at 0.05 level of significance.

Delimitations of the Study
This study does not include petroleum products distribution filling stations and sanitation workers in offshore rigs or plat-forms.

Theoretical Frame Work
Safety culture by Efficient Safety Supervision model of Providence, A. (2012) which emphasized that people are more willing to accept the restrictions that some precautions bring if they are consulted and feel involved. This model advised that organizations embarking on construction projects should have a clear policy on the management of health and safety. This model is adopted in this study to understand why the sanitation workers perceived their hazards the way they do, in relation to the supervisors' encouragement.

Materials and Methods
Research Designs: Descriptive survey research design was used to describe the events as they were.

Population of the study: Population of this study was made up of 1000 sanitation workers and their employers who were found out through pre-liminary investigation survey by making use of some resource persons who worked in these companies. The companies are as 26 in number according to the exploratory preliminary survey, due to inadequacy of data bank. The hydro-carbon oil producing and servicing companies include the premises and work sites of these corporate organizations, including but not limited to Shell Petroleum Development Company (SPDC), Exon/Mobil and Elf Petroleum Nigeria Limited (EPNC), Nigeria Agip Oil Company (NAOC), Nigerian National Petroleum Corporation (NNPC), Port Harcourt and others, based on the size and land-scape design of their office premises and sites. This number is tentative because most sanitation works are contracted out and the contractors at times exhibit the powers of "hire and fire" to this class of non-unionized low income earners, based on the revelations.

Sampling and Sampling Techniques
The sample size of this study is 200 sanitation workers and 50 supervisors, which represent 25% of the target population. The disproportionate random sampling technique was used in selecting the sanitation practitioners and their employers in each of the companies; hence the sample population became 250 employees.

Variables: The satisfactory variables are the responses from the sanitation workers and their supervisors in the companies on types of occupational hazards sanitation workers faced.

Instrument for Data Collection: A composite questionnaire is the basic research instrument utilized for the study and it is titled perceived occupational hazards of sanitation workers in Hydrocarbon Oil Producing and Servicing Companies in Rivers State (POHSWHOPSCRS).

The questionnaire is in two parts – part one for the sanitation workers and part 2 for their supervisors. The questionnaire is a close-ended type which is contrived from modified Likert's Model of fashioning a questionnaire; as follows:

Strongly Agree (SA) = 4 points
Agree (A) = 3 points
Disagree (D) = 2 points
Strongly Disagree (SD) = 1 point
Content validity of the instrument was got from perusal and contributions made by some experts in this field who are senior academics from University of Port Harcourt, Nigeria.

Reliability of the Instrument
The split half method of measuring reliability was adopted by administering the questionnaires randomly to selected ten (10) respondents outside the main population. The items results, which were divided into two parts were correlated and tested for reliability. A correlation coefficient of 0.9 was obtained using the Spearman's Ranking Order. This shows that the instrument was reliable.

Method of Data Analysis
The obtained data from the responses were organized in numerical terms and used to get the descriptive statistical result. The group means, grand mean, mean set and rank order were used to present answers to the research question. The grand mean is the average of the means of the two groups' responses on each of the analyzed items.

$$\text{Grand mean} = \frac{x_1 + x_2}{2}$$

A group mean score in each of the items that was below the mean set was considered an unfavourable response while that which was from the mean set is 2.50 (constant) for each item. This was got by finding the average of the 4 score weights 4, 3, 2 and 1.
The t-test formula was used to constitute the inferential statistical analysis of the null hypothesis that was posed from the research question.

$$\text{Formula for t-test} = \frac{x_1 + x_2}{SDX}$$

$$\text{While SDX} = \sqrt{\frac{S^2_1 + S^2_2}{n^{-1}_1\ n^{-1}_2}}$$

x_1 = mean of group 1 x_2 = mean of group 2

SDX = Standard error of difference

S_1 = Standard deviation 1

S_2 = Standard deviation 2

n_1 and n_2 = number of cases or sample sizes for samples 1 and 2

Presentation and Analysis of Data
Data obtained from the field were analyzed as follows:

Research Question 1
What are the perceived occupational hazards of sanitation workers in these hydrocarbon Oil Producing and Servicing Companies in Rivers State?

Table 2: This shows the mean analysis of the perceptions of sanitation workers and their supervisors respectively on the types of hazards the sanitation workers were exposed to.

S/N	Items Cluster 1	Sanitation Workers		Supervisors			
		x	Rank order	x	Rank order	GM	Rank order
1.	Exposed to machine or any other physical object, accident or injury	3.10	2nd	3.96	2nd	3.55	2nd
2.	They are exposed to second-hand cigarette odour or smoke from staff rooms	1.55	7th	2.20	6th	1.875	7th
3.	They are exposed to hydrocarbon smoke from the power generator and motor vehicle while at work	3.40	4th	2.80	5th	3.10	4th
4.	They are exposed to chemical splash accident	3.50	3rd	3.00	4th	3.25	3rd
5.	Have come in contact with any of the following solvents at work-glues, paints, oil sprays, fumes or vanishes?	3.00	5th	3.00	4th	3.00	6th
6.	Sanitation staff are exposed to dusts	4.00	1st	4.00	1st	4.00	1st
7.	Do you bath immediately after work before going to the house?	1.00	9th	1.92	7th	1.46	9th
8.	Are you exposed to snake bite?	2.00	6th	1.00	8th	1.50	8th
9.	Use of insecticides, herbicides or pesticides while at work could be harmful?	3.00	5th	3.06	3rd	3.03	5th
10.	Has electric shocked you while at work before	1.24	8th	1.00	8th	1.12	10th
	Total N		200			50	

Legend $\bar{x}$ = Mean

N = Number of respondents

GM = Grand Mean

Table 2 depicts that by the perceptions of both the sanitation workers and their supervisors, the sanitation workers were mostly exposed to dusts while doing their work. This item ranked first in the opinions of both groups of respondents with the means at 4.00 in both groups. This is followed by the opinions that the sanitation workers are also exposed to machine or any other physical object accident or injury and chemical splash while doing their work.

This is because based on their mean values, these opinion items ranked 1st, 2nd, and 3rd, respectively from the table. With the mean set already put at 2.50 it does follows that other opinion items in the table whose means are below 2.50 are not well favoured by the two groups of respondents. From the table, item number 7 was not categorically a type of occupational health case

of workers but is a community health problem; hence it ranked the least from the list. The grand mean of the items that were favoured most by the responses almost tallied in ranking order with those of the separate groups except in those that are far below the mean set.

Hypothesis 1. There is no significant difference between the perceptions of the sanitation workers and those of their supervisors on the types of occupational hazards the former are exposed to at 0.05 level of significance.

The calculated t-test value of the mean responses from the perception of sanitation workers and their supervisors to the types of occupational hazards the former were exposed to, provided basis for taking decision on the hypothesis; see the table below.

Table 3: A t-test value of the responses of sanitation workers and their supervisors to the perceived types of occupational hazards the sanitation workers were exposed to.

Cluster 1	**Subjects**	$\bar{x}$	**N**	**df**	**S.D**	**t-crit (table)**	**t-cal**	**Level of sign.**	**Result**
Types of occupational hazards the sanitation workers are exposed to	Supervisors	2.59	50	248	17.57				
	Sanitation workers	2.58	200		34.00	1.96	0.07	0.05	Accepted

Keys
$\bar{x}$ = mean
N = Number of respondents
Sd = Standard Deviation
t-crit = Critical or table t value
t-cal = Calculated t test value

The calculated t value of 0.07 at 0.05 significant level is less than the table t-value of 1.96.
The Decision Rule: is that we reject the null hypothesis if the t-calculated is greater than the t-critical, otherwise, we do not reject the null hypothesis (Ho). The hypothesis 1 is therefore accepted as postulated. We therefore uphold the statement that "there is no significant difference between the perceptions of the sanitation workers and their supervisors on the types of occupational hazards the former were exposed to.

Discussion of Findings
On the types of occupational hazards, the study revealed that the occupational workers in hydrocarbon oil producing and servicing companies in Rivers State perceived that they were exposed to machine and physical object injury, hydrocarbon smoke inhalation from automobiles and generators, and chemical splash impacts. Exposure to insecticides, pesticides or herbicides was also perceived as harmful by the respondents. On the other hand, exposure to cigarette odour and smoke in the offices, bathing immediately before going to their homes, exposure to snake bite, and electric shock ranked low in their perceptions. This is because their mean responses ranked below the mean set of 2.50. However, not all of the respondents had low perceptions on those items.

The study further revealed that there is no significant difference between the perceptions of the sanitation workers and their supervisors on the types of occupational hazards the former were

exposed to, because, their perception responses were almost related across the grand mean of 2.50. The decision rule is that the hypothesis is therefore accepted as postulated, because the t-calculated is not greater than the t-critical from the table, 0.07 and 1.96 respectively at 0.05 level of significance.

The result of this study corresponds with the positions of Hricko (1994) and Mann et al. (2001) who averred that machines from work place emit certain dangerous hydrocarbons which contain some toxic compounds that are harmful to the workers. The study also indicated that many of the workers were not taking their bathes or changing their work-wears before going to their homes, in line with the report of Murray and Zentner (1985) in Onumbu (2008).

In agreement with the result of this study, Ofonime and Ukeme (2020), studied occupational hazards, health problems and utilization of PPE among street sweepers in Uyo, Nigeria, they revealed that out of 150 street sweepers in Uyo, about 141 (94.0%) reported that dusts were their hazard and cold 129 (86%), mosquitoes 74 (49.3%) and prolonged bleeding 149- (99.3%), were their common hazards. Also the result of Chinda et al. (2022) on occupational hazards of sanitation workers in Port Harcourt metropolis, Rivers State, Nigeria, revealed that there was high exposure of the workers to some chemical hazards, with average mean rating of 2.76 ± 1.040. These results are relatively related in agreement with the present study.

CONCLUSION

The level of awareness of these sanitation workers must have affected their level of perception of types of hazards in their work. Performance as regards safety procedures' compliance by these workers would be improved if both their supervisors and the sanitation workers are given regular orientations on exposure to hazards and their implications to health and safety of this set of workers.

RECOMMENDATIONS

1. Sanitation workers in these hydro-carbon oil producing and servicing companies should have sound occupational health and safety policy guidelines peculiar to their type of work which must be rehearsed to them by their supervisors at work.
2. Casualizing and contracting sanitation work in these companies bring about some elements of poor motivation at work which in themselves are hazardous to the employee. Their condition of service should be upgraded to making them full staff of the companies.
3. Adequate provision of relevant personal protective equipment (PPE) should be provided to the sanitation workers and there should be strict enforcement of compliance to using them at work by those responsible for that.
4. Management should encourage unionization of the sanitation workers so as to bring to light, proper under-standing and practice of safe acts among the sanitation workers through peer review.

References

Amani, F., Bahadoram, M., & Hazrati, S. (2017). Evaluation of occupational injuries among welders in North-West Iran. *Journal of Preventive Epidemiology. 2* (2) e08. Dol:10.15171/jpe.2017/.08. http//jprevepi.com (online).

Anamali, C. P., Amadi, C. O. A., Okereke, C. O., Azuamah, I. C., & Amadi, A. N. (2019). Assessment of the sanitation status in tertiary institutions in South-Eastern Nigeria. *International Journal of Research and Review. 6* (11): 616-622.

Arif, A. A., & Delclos, G. L. (2012). Association between cleaning-related chemicals and work-related asthma symptoms among health-care professionals. *Occupational Environment Medicine. 69,* 35-40.

Barielnen, V., & Abraham, N. M. (2019). Managing physical hazards for academic staff productivity in public universities in Rivers State, Nigeria. *International Journal of Research and Innovation in Social Science. 3,* (9) 217-223. www.rsisinternational.org (online).

Chinda, S. C., Sunday, B.E., Onyiri, C. J., & Amadi, K. M. (2022). Occupational hazards of sanitation workers in Port Harcourt metropolis, Rivers State, Nigeria. *International Journal of*

Multidisciplinary Research and Growth Evaluation. 3 (4): 109-117. www.allmultidisciplinaryjournal.com, www.researchgate.net>publication.

Hricko, A. (1994). Rings of controversy around benzene. *Environmental Health Perspectives. 102* (3), 276-281.

ILO. (2018). International labour standards on occupational safety and health, http://www.ilo.org/global/standards/subjects-covered-by-international-labour-standards/occupational safety-and-health/lang-en/index.htm

Jain, R.K., & Rao, S. S. (2015). *Industrial safety, health and environment management systems (4th ed.).* Khanna.

Levy, B.S., & Wegman, D.H. (1981). Environmental and occupational hazards. In L. J. Schneiderman (ed.). *The practice of preventive health-care.* Addison-Wesley.

Mann, H.S., Crump, D., & Brown, V. (March 2001). Personal exposure to benzene and integral garages. *The Journal of the Royal Society for the Promotion of Health (JRSH). 121,* (1): 38-46.

Ofonime, E. J., & Ukeme, A. J. (2020). Occupational hazards and health problems among street sweepers in Uyo, Nigeria. *Ibom Medical Journal. 13* (2): 90l-100.

Onumbu, C. I. (2008). Occupational hazards of sanitation workers in petroleum-products based companies in Port Harcourt, Nigeria. A Master Degree-Thesis, Department of Human kinetics and Health Education, University of Port Harcourt, Nigeria.

Onumbu, C. I. (2022). Knowledge of occupational hazards and safety practices among welders in Rivers State. An unpublished Ph.D Thesis, Ignatius Ajuru University of Education, Rivers State, Nigeria.

Onumbu, C. I., & Elechi, C. E. (2022). Knowledge of occupational hazards among welders in Rivers State. *FNAS Journal of Scientific Innovations. 3* (3). 105-113.

Providence, A. (2012). Developing safety culture through efficient safety supervision system in Nigerian Construction Industries. *Nigerian Institute of Safety Professionals Journal. 3* (3): 22-28.

Schulte, P. A., Pandalai, S., & Wulsin, V. (2018). Interaction of occupational and personal risk factors in work-force health and safety. *American Journal of Public Health. 102* (3): 434-448.

Nwakile, T. C., Eze, C. C. & Okanya, A. V. (2017). Sanitation practices on students health: A Case Study of Students of Vocational and Technical Education in the University of Nigeria, Nsukka. *International Journal of multidisciplinary and Current Research. 5,* 1-6. http://ijmdcr.com (online).

pp. 205-210 https://dx.doi.org/10.4314/johasam.v7i1.25

Politics of Healthcare Delivery in Nigeria: A Critical Analysis for Change

Alozie H. A. Nwafor
aloziedgreat@Gmail.Com, 08063283638
School of Foundation Studies, Rivers State College of Health Science and Management Technology, Port Harcourt, Rivers State

Abstract

This paper examined the effects of politics on healthcare delivery in Nigeria. It is against the backdrop of the obvious health inequality and lack of universal health coverage in the country, thereby making healthcare delivery inaccessible and unaffordable. The qualitative research method was adopted for the study, and it relied on the exegesis and analysis of secondary sources. The theoretical background for the study is the utilitarian theory that espouses the pleasure or happiness of the greater number over that of the lesser number. The inability of government to provide governance and implement health policies and programmes, inadequate budgetary provision for health sector and pervasive corruption, lack of rural developmental programmes, and absence of qualified health personnel are some avenues politics has negatively impacted health care delivery in Nigeria. This has tremendous effects on the country in terms of national development, which is largely dependent on a healthy and strong population, and loss of revenue through medical tourism. To remedy the situation, it was recommended among others that there should be improved funding of health sector, as well as the political will and commitment to implement health policies and programmes; improvement of the socio-economic and political situation in the country, and a legislation banning medical tourism by government officials.

Keywords: politics, health, healthcare delivery

Introduction

The desire for good health is one of the basic needs of man and the society, beside food, clothing and shelter. This is because the continued existence of human society to a great extent depends on the health status of its members, and the fact that no country or society can make meaningful progress and development without a healthy population. It is on this premise that Adefolaju (2011) described illness as a sociological issue because apart from the pain the sick suffers, he becomes a liability to his family and well-wishers. This would affect the discharge of their duties and responsibilities to themselves and the society at large, as they would give more time, attention, energy and resources toward ensuring the recovery of their sick one. It results in loss of material resources and man hours that could be channeled towards the economic growth of the individual and advancement of the country.

The quality of health care available to over 200 million Nigerians, has been of great concern to all, because the provision of quality healthcare that is not only accessible but also affordable, has remained largely unachievable, as well as a controversial one due to the prevailing political, economic and social factors in the country. As a result, governments at different levels in Nigeria have failed in their quest to provide universal healthcare services to her population.

In view of the role of political decisions play in every facet of a nation's life and history, this study attempts to examine how politics and political stakeholders have affected health care delivery in Nigeria, the encumbrances therein, and possibilities of having a better health care system.

Conceptual Clarification

The key concepts around which this topic of discourse revolves, would be contextually clarified for a better understanding. The concepts are politics and healthcare.

The Concept of Politics

The term politics which is synonymous with government is perceived differently by different people. To the layman, it is a vocation or activity people who seek political offices engage in in order to attain political offices or governance. Guda and Mando (2020) referred to politics as a "dirty game" because

of the struggle for power by individuals or groups by all means. It is on this strength that Nwogu (2001) links politics with power, because it places an individual or group of persons in a position to exert authority or influence over others. For Haralambos and Holborn (2008), politics can be seen in the everyday life of the people and in various institutions and organizations like family, education, health, etc., where decisions have to be taken on behalf of others. It is indispensable to man as most of his activities and decisions depend on it.

In democratic settings, political office holders represent the greater population that put them in power, and they are accountable to them. The authority and power associated with offices are held in trust for those that voted them into those positions or offices, thereby conferring some power and authority on them. Decisions made and actions taken should be in the overall best interest of those that vested them with those powers, because undermining the masses could lead to loss of political position through civil interest, revolt or referendum. Politics in this context would not be limited to the activities of government functionaries, but also that of key actors and stakeholders in the health sector.

The Concept of Healthcare Delivery

The term health has been loosely and traditionally used to describe a state that is devoid of illness and without any form of disease, infection or infirmity. This narrow or shallow perception of health only considers the physical state of the individual, thereby relegating his mental, emotional and social state of mind to the background. In a view to give the definition of health a holistic outlook, the World Health Organization, WHO (1948) stated that "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. In other words, it considers not just the prevention and treatment of diseases, but also an individual's life style, environmental and social factors among others. This state of complete well-being of the individual has attracted much criticism from scholars who consider it not just unrealistic but also utopian in nature (van Druten et al., 2022).

Healthcare delivery is concerned with the patients and the services they receive at health facilities such as diagnosis and treatment. It is the process of providing medical care or services for individuals and communities, and it makes up the most apparent task of the health system to the patients and the society. Effective healthcare delivery involves a comprehensive approach that comprises prevention, detection and treatment. The care provided should not only be accessible, but also affordable and of high quality. Therefore, well trained and motivated personnel, functional infrastructure, facilities and equipment, adequate funding, and latest technologies and innovations in the health sector, among others, are necessary for effective health care system. They would enable the healthcare industry to respond to challenges and opportunities effectively. One salient question on the lips of everyone is "how effective and efficient is healthcare delivery in Nigeria?

Theoretical Background

This paper is anchored on the theory of utilitarianism.

Utilitarianism: This is a normative ethical theory developed by Jeremy Benthan (1748-1832), who championed the maximization of pleasure or happiness over pain. It holds that the rightness or wrongness of action is solely dependent on the outcome or effect of the action on others (Ayotunde, 2018). When an action produces greater pleasure for the greater number (population) it is said to be right. On the other hand, an action is considered wrong if it produces pain, aguish and suffering for the greater majority. With an estimated population of over 200 million, a greater percentage of Nigerians lack access to quality and affordable health care, while a minute percentage that make up the political class at all levels of government can afford the best health services within and outside the country at the expense of the masses, who have no choice but to rely on the inefficient healthcare industry in Nigeria. The actions of the ruling class, have in no small measure plunged the healthcare industry into a pitiable state of comatose, making it difficult for it to provide universal health coverage for Nigerians. This practice negates the utilitarian principle, as it does not make for the happiness or pleasure of the masses, rather it subjects them to anguish and untold hardship.

Historical Overview of Healthcare in Nigeria

Prior to the arrival of European missionaries, the various kingdoms and empires that made up Nigeria were renowned for their cultural and religious practices which included traditional or indigenous or medicine. This includes the local birth attendants, herbalists, and local healers, etc. Traditional medicine which is as old as man depended on the use of materials sourced from the immediate environment to prevent and treat illness (Adefolaju, 2014). It entails the use of plants and animal extracts to provide cure for various illness. This health system which is still being practised today is closely linked to superstitious beliefs and conjecturing (Ibrahim & Olaitan, 2022) because it lacked empirical and scientific explanations. It has however continued to enjoyed large patronage because traditional health practitioners are readily available in the neighbourhoods. The efficacy of traditional health services in Nigeria was never in doubt as it provided cure and healing for the sick.

Orthodox health services in Nigeria was introduced by the missionaries who used religion and education to bring about the relegation of the traditional healthcare to the background. Most indigenous health practices were condemned by the missionaries because they were regarded as evil and unchristian (Adefolaju, 2014). Provision of health care for sick converts especially women and children also served as a means of evangelism. The establishment of hospitals and clinics by the missionaries did not achieve much as the scope of services provided was quite limited and available to a small segment of the society. With time, orthodox medicine gained popularity and gained wide spread acceptability because the diagnoses were accurate and the style of treatment and cure (Agbiji & Landman, 2014). The cost of accessing such healthcare service is something most Nigerians cannot afford, hence the continued reliance on traditional or indigenous medicine.

Politics and Healthcare in Nigeria

All over the world, politics to a great extent, affects every facet of a country's existence. This is even worst in Nigeria where everything including the health and life of her citizens are politicized. The situation is more worrisome considering the fact that Nigeria practises a democratic system of government that should be responsive and responsible to the needs of her citizens. This accounts for the large health inequality prevalent in the country, especially in the rural communities. Politics can affect healthcare delivery in Nigeria in the following ways:

1. **Governance and Policy Implementation-** Governance refers to the methods used to control and manage the various sectors of a country. This includes deciding the sectors or ministries that should be given greater priority or attention, while formulating the necessary policies to meet the policy thrust of the government. It is not limited to the protection of lives and property, provision of power, transportation, education, and quality healthcare, among others. The importance of governance cannot be over emphasized as it engenders the actualization of the potentialities of the nation through collective decisions, formulation of all inclusive policies that have far reaching effects on the people, and effective utilization of scarce resources.

   The enactment of the National Health Act in 2014 and the National Health Promotion Policy which was formulated in 2006 and revised in 2019, were designed to provide universal health coverage for Nigerians. The level of success recorded so far in this direction leaves much to be desired as the realities of health inequality continue to stare Nigerians in the face. Government at all levels has not exhibited sufficient commitment to implement these policies to the letter, especially at the local government level. The health system has remained regrettably weak, and perpetually ineffective and inaccessible. The appointment those who oversee the various aspects of these policies are based on ethnic, religious or political affiliation, overlooking those who are eminently qualified for such positions. This amounts to putting a round peg in a square hole, as such inefficiency has remained the order of the day.

   Again, the formulation of every policy is usually done within a political context and this according to Bambra et al. (2005) spells out what is and what is not feasible or admissible. As a result, a change in leadership could lead to the abandonment of the programmes and policies of the previous regime, for new ones that would require substantial time and resources to come into effect. This has been the situation with Nigeria where policies and programmes are not sustained because there is no long term health development blueprint that every government that comes into office keys into. It is also instructive to point out that some decisions of government have done

much harm than good to the health sector. For example, the suspension of polio vaccination programme by the governors of Kano, Kaduna and Zamfara States worsened the polio situation in Nigeria.

2. **Finance:** Effective implementation of health policies and programmes, and by extension the provision of universal health coverage for Nigerians depends largely on the availability and effective utilization of funds. Funding is necessary for provision of health facilities, medical consumables, remuneration of health workers, funding of research institutes, among others. It is on this premise that countries are expected to spend a large part of their Gross Domestic Product (GDP) on healthcare (Yunusa et al., 2014). This is because of the positive association between economic growth of any country and the state of health of her citizens. Unfortunately, the budgetary provisions for the 2023 budget is 5.75% of the total budget, which falls short of the 15% budget commitment of African leaders to address the deficiencies in their health systems. This ugly situation if not curbed will make the actualization of quality health for all elusive and unattainable.

   Also, corruption which is pervasive in every sector of Nigeria is another clog in the wheel of progress towards improving the healthcare delivery. Effective utilization of available resources, no matter how little it is, would bring about little improvement in health care delivery, even though it could be seen as small or insignificant. The practice of transparency, probity and accountability, over the years would have harnessed the available resources to put in place something better than what is obtainable in the health sector. Until the federal and state ministries of health, and management of the various health facilities (especially secondary and tertiary) purge themselves of fraud and financial misconduct, health sector would remain perpetually in its poor state. This situation can only change if government shows strong political will and commitment to fight corruption from within and without, irrespective of political leaning, and ethnic and religious sentiments.

3. **Rural-Urban dichotomy and Development:** Rural-Urban dichotomy to some extent influences government development programmes in Nigeria. This situation also affects the location of key government projects like healthcare facilities, among others. The urban areas boast of more health care facilities, both private and public, especially the secondary and tertiary healthcare centres which provides more specialized and referral services. It creates a situation where urban dwellers have better access to healthcare services, though not free, unlike their rural counterparts, who may have nothing more than the primary health care at their disposal. The geographical disparities would in most cases require rural dwellers to take the risk of making long, exhaustive and expensive journeys on bad roads, to access better healthcare services in the urban areas. The health outcomes for these two areas would certainly not be the same, because of the advantages urban areas has over rural areas. A robust rural development programme would encourage the siting of more health facilities in rural areas thereby improving health outcomes.

4. **Manpower:** No healthcare system can function effectively without adequate qualified health personnel to run the various health facilities, who should work in synergy with stakeholders, government agencies and non-governmental organizations (NGOs) to implement the health policies and programmes. Unfortunately, there is a serious dearth of manpower in the health sector in Nigeria. This can be attributed to the absence of a recruitment framework that would ensure immediate replacement in the event of retirement or death. Importantly, the poor conditions of service in Nigeria have led to brain drain in search of greener pastures and better working conditions overseas. Government policies and the socio-economic conditions in the country have contributed in no small measure to making the health sector to be grossly understaffed and obviously unable to provide the requisite health care service delivery.

   Again, the location of secondary and tertiary healthcare facilities in urban areas also affects the distribution of health personnel in the country, since some of these healthcare facilities are sited in urban or developing areas. The posting of health workforce according to the location of these facilities, gives urban areas some advantage over rural areas, thereby creating a situation where

the urban areas enjoy better facilities and personnel at the expense of others (Okpani & Abimbola, 2015). This situation is worsened by lack of incentives and special allowances for rural health personnel, which would encourage those posted to such areas to stay instead of lobbying for posting to urban centres.

Implication of Politics of health Delivery for Nigeria

From the foregoing discussions, it is crystal clear that politics has done much harm than good to health care delivery in Nigeria, which has impacted the nation in the following ways:

1. **National Development:** Attainment of development is the goal of every government that has the interest of her citizens at heart by improving on their well-being. This is only possible when the citizens are able to discharge their duties and responsibilities as expected of them. It is difficult for a nation to grow or make meaningful progress if her citizens are not healthy and strong (Osibogun, 2020). This will enable them to perform their expected roles affectively, as it would result in decreased productivity and efficiency.

2. **Medical Tourism:** A dysfunctional health sector would not be able to meet the health needs and challenges of the people, rather it would make them to seek medical help outside the shores of the country. This would consequently result in loss of revenue on the one hand, and on the other hand contributing to the revenue generation of foreign countries. This ugly situation as elucidated by Zhang et al. (2022), makes the healthcare industry of the foreign countries to experience improvement and provide better services for the consumers, thereby improving their economy and enhancing their gross domestic product (GDP). Investments in the healthcare delivery would ensure the availability of state of the art facilities, qualified health personnel and better services (Alvarez et al., 2013). This would make Nigeria a choice destination for medical tourism and contribute to her economy by stemming the trend of medical tourism by the ruling class.

3. **Human capital Flight:** Nigeria has lost some of her best medical personnel to other countries due to obnoxious government policies, insecurity and the harsh socio-economic situation in the country. These factors which usually have political undertone have made highly skilled nurses, physicians and other ancillary health practitioners, to seek better opportunities and improved working conditions in other countries where they would bring their training, experience and expertise to bear, while robbing Nigeria of their services. It is in the light of the above that Okoro et al., (2014) submitted that capital flight results in a steady decrease in the economic growth of developing countries. It can therefore be argued that the sustained decline in the overall development of Nigeria is partly due to the loss of eminently qualified personnel to other countries.

Conclusion

This paper has attempted to examine politics and healthcare delivery in Nigeria, and how it affects the inalienable rights of her citizens to affordable and accessible healthcare. Political decisions have contributed in widening the health inequality in the country, as the lower and middle classes find it difficult to access quality healthcare services. This is largely as a result of the inability of the political class who superintend over the affairs of the country, to take deliberate actions that would directly or indirectly improve the health sector and make it more efficient and effective. This has profound implications for sustainable national development which has been a major policy thrust of the federal government in recent years. It is therefore a call for action for government at all levels, as it is only a healthyand vibrant population that can drive the development agenda of government, improve the economy of the country and enhance the living conditions of the people.

Recommendations

Based on the issues raised and analyzed concerning politics and healthcare delivery in Nigeria, recommendations for change to improve healthcare delivery are made as follows:

1. The political class should see themselves as servants whose duty is to improve the welfare of the citizens and their living conditions, rather than seeing themselves as rulers who should be served

with the resources of the nation at the expense of the masses. This would ensure that governance and its dividends such as quality and affordable healthcare delivery is provided the citizens.

2. Government at all levels should show sufficient commitment and strong political will to implement health policies and programmes. This would be achieved by ensuring that there is improved funding, upgrading of healthcare facilities, and provision of eminently qualified, well-motivated and committed medical personnel.
3. Interference in the activities of anti-graft agencies such as Independent Corrupt Practices Commission (ICPC) and Economic and Financial Crimes Commission (EFCC) should be discouraged, to enable them investigate and prosecute corrupt officials of Ministries of Health and heads of tertiary health facilities. It would serve as a deterrent to other corrupt officials.
4. There should be a deliberate rural development programme by government as it would go a long way in discouraging health personnel posted to rural areas from seeking transfer to urban centres where there are basic amenities like electricity, pipe born water, roads schools, etc.
5. The socio-economic and political conditions in the country should be improved upon so as to stem the ugly trend of human capital flight which has robbed Nigeria of the services of some of the best brains in the healthcare sector.
6. A stringent legislation should be enacted against medical tourism by top government functionaries and their families, so that the ruling class would see the urgent need to address the health inequality in the country and improve the economy of Nigeria by saving the huge amount spent on medical tourism.

References

Adefolju, T. (2011). The dynamics and changing structure of traditional healing system in Nigeria. *International Journal of Health Research*, 4(2), 99-106.

Adefolaju, T. (2014). Traditional and orthodox medical systems in Nigeria: The imperatives of a synthesis. *American Journal of Health Research*, 2(4), 118-154.

Agbiji, E., & Landman, C. (2014). Health and health care in Nigerian historical context. *Studia Historiae Ecclesiasticae*, 40(1), 233-249. http://www.scielo.org.za/pdf/she/v40n1/14.pdf

Alvarez, M. M., Smith, R.D., & Chanda, R. (2013). The Impact of medical tourism in low-and middle-income countries. In Botterill, D., Pennings, G. & Mainil, I. (Eds.) *Medical tourism and transnational health care*. Palgrave Macmillian.

Ayotunde, L. (2018). Oil Production and Host Community Relations in Nigeria: The Limits of Utilitarian approach. *Journal of Sustainable Development Law and Policy*, 9(2), 125-151.

Guda, S.T., & Mando, P. N. (2020). Politics of educational policies and programmes for the underserved groups in Nigeria. *Benue State University Journal for Educational Management*, 2(1), 147-156.

Haralambos, M., & Holborn, M. (2008). *Sociology: Themes and perspectives* (7thed). Harper Collins

Ibrahim, M.A., & Olaitan, A. A. (2022). Traditional healthcare practices: Growing demands and emerging trends. *GSC Advanced Research and Reviews*, 13(02), 069-079.

Nwogu, G.A.I. (2001). *Politics of education in Nigeria: A Philosophical analysis*. Ceruos& Company Nigeria.

Okoro, C.C., Omeluzor, S.U., & Bamidele, I. A. (2014). Effect of Brain drain (Human capital flight) of Librarians on service delivery in some selected universities in Nigeria, *Sage Open*, 4 (3).https://journals.sagepub.com/doi/epub/10.1177/2158244014541131

Osibogun, A. (2020). Health: A Critical Determinant of national development. *Annual of Health Research*, 6(1), 1-10.

van Druten, V. P., Bartels, E. A., van de Mheen, D., De Vries E., Kerekhoffs, A.P.M., & Nahar-van Venrooij, L.M.W. (2022). Concepts of health in different contexts: A scoping review. *BMC Health Services Research*, 22(1) 389-402.https://doi.org/10.1186/s12913-022-07702-2

World Health Organization (1948). *Summary Reports on Proceedings Minutes and Final Acts of the International Health Conference held in New York from 19 June to 22 July 1946*. World Health Organization.https://apps.who.int/iris/handle/10665/85573

Zhang, W., Qin, Z., & Tang, J. (2022). Economic benefit analysis of medical tourism industry based on Markov Model. *Journal of Mathematics*, 2022, 1-9.

pp. 211-218 https://dx.doi.org/10.4314/johasam.v7i1.26

Sewage Management in Correctional Facilities and Its Public Health Implications in Rivers State, Nigeria

Unwobuesor Richard Iloma & Israel Victoria Ue-Leebari

.

School of Environmental Health Technology,
Rivers State College of Health Science and Management Technology
Oro-Owo, Rumueme-Port Harcourt
+2348037736670, richardiloma528@gmail.com

Abstract

This study investigated sewage management in correctional facilities and its implications for public health in Rivers State. The research design adopted for this study was the cross-sectional research design. A sample of 75 inmates who had spent at least, six months in the correctional facilities was drawn from three selected facilities in Rivers State. A multi-staged sampling procedure was employed to arrive at the sample. The instrument for data collection was a 17-item validated Sewage Management Correctional Facilities Public Health Implications Questionnaire (SMCFPHIQ) with a reliability index of 0.78 using Cronbach Alpha. A Focus Group Discussion (FGD) was also conducted with five (5) selected Correctional Facility Officers and the results presented qualitatively. Descriptive statistics of percentage and frequencies were used and results obtained, presented in tables. Findings revealed that pour flush was the most common type of toilet (46.7%) used for sewage management in correctional facilities. Unhealthy conditions always present in the sewage management facility were leakages from septic tanks (58.7%), odour nuisance (88%), overflow of fecal matters inside the toilet (68%) and irregular power supply for pumping of water (88%). Poor maintenance culture (33.3%) and negative attitude of inmates (20%) were the most common challenges affecting sewage management while fly infestation (66.7%), odour nuisance (74.7%), disease outbreak (66.7%), rodent infestation (70.7%) and unsightliness (88%) were always present with serious implications to public health. Improved maintenance culture, expansion of sewage management facilities and regular awareness programmes on sanitary use of facilities by inmates were recommended.

Keywords: sewage management, correctional facilities, public health implications.

Introduction

Correctional facilities are facilities used to confine persons convicted, remanded or awaiting trial for various degrees of crime in order to ensure safe custody, reformation and rehabilitation of the offenders under humane conditions (Tarhule, 2019). In Nigeria, correctional facilities hitherto known prisons were first established in 1861 with the declaration of Lagos as a Colony (Nigerian Correctional Service-NCS, 2023). Globally, prison population rate was estimated at 144 per 100,000; however, from the year 2000, it has grown by 20% above estimated 18% increment over the same period; United States has the highest prison population rate of 716 per 100,000 (Roy, 2015). In Nigeria, it is estimated that among every 2961 persons, there is a prisoner with a total estimate of 75,567 prisoners presently (Fatunmole, 2023). Studies show that many countries in the world, especially, developing countries have serious challenge in providing adequate sanitation facilities for citizens and as such, leaving people at risk of various related diseases (Fatunmole, 2023; World Prison Brief, 2023). Despite serious efforts made to improve sanitation, it is estimated that 2.4 billion people globally were still using unimproved sanitation facilities with majority of the population residing in Sub-Saharan Africa and Southern/Eastern Asia (Sustainable Development Goal-SDG Assessment Report, 2015). It is also estimated that the overall sanitation coverage in Nigeria is at 33% which is far below average, while only 30% of the population in sub-Saharan Africa (SSA) use improved private sanitation (Global Waters, 2022). At least 9.1% of global disease burden and 6.3% of all deaths would be prevented if sanitation was considered (Bartram et al., 2008). Sanitation is critical in health, survival and development of any population world-over.

It is believed that greater gaps in sanitation deficiencies exist among vulnerable groups, especially, prisoners due to overcrowding which exerts so much pressure on available facilities

(Millennium Development Goals-MDG Assessment Report, 2015). Most of the prison systems in the world do not function at the level of the United Nation Standard Minimum Rules (UN-SMR) for the Treatment of criminal offenders which are basic international standards. One of the central problems in prison management around the globe that poses serious challenge to the health and wellbeing of inmates are associated with poor sanitation due to overcrowding and difficulty to control and administer basic rules (International Prisons & Correctional Services Association-IPCSA, 2012).

A study carried out in the United Kingdom (UK) in 2006 revealed that the country had the highest rate of imprisonment in Western Europe estimated at 155 prisoners per 100,000 people irrespective of the fact that Europe is highly developed with relatively abundant resources to cater for such (Cavadino, 2006). Overcrowding has led to sanitation problems that conflict with human rights agreements in the United Kingdom with many prisons having decaying infrastructures below minimal standards leading to serious conditions where many prisoners were expected to "slop out" their chamber pans since they did not have twenty-four-hour access to a toilet facility (Cavadino, 2006). The United Nations (UN) observers in 2012 also noted that 70 percent of prisoners in Haiti prisons lacked basic hygiene and sanitation facilities. Thus, prisoners slept in shifts due to severe overcrowding, leading to serious sanitation and ventilation problems (IPCSA, 2012).

A report by Ombudsman (2012) on the general conditions in nine correctional facilities in Africa indicated that lack of good sanitation in overcrowded facilities led to death of inmates. Study also revealed that inmates in Makala prison in the Democratic Republic of Congo had no toilets and were forced to urinate and defecate on the floor (IPCS, 2012). An investigation by Omar (2012) indicated that overcrowding is the massive issue in Uganda Prisons where prisoners lie so tightly together in one room and that there was only one bucket in the corner of the room where everyone would use as a toilet. Prisoners were exposed to co infectious diseases like diarrhea, scabies and even tuberculosis (Omar, 2012).

Nigerian correctional facilities (Prisons) are faced with serious sewage management problems which has in turn, adversely affected the quality of sanitation and posed serious associated problems which can be linked to several years of neglect (Ogugua, 2018). For instance, Nigeria has invested so much in the establishment of new courts and police stations in the last two decades with very little or no attention at all in the expansion and improvement of facilities in correctional centres; this has in turn, resulted in over-congestion of prisons with inmates subjected to horrifying and dehumanizing conditions (Ogugua, 2018). This is exacerbated by the condemnation mentality rather than rehabilitation for criminal convicts.

Between 2007 and 2011, there were about 228 to 239 prison facilities in Nigeria with an increase in inmate population from 39,691 in 2007 to 75,261 in 2010 before declining to 49,451 in 2011 and later, increasing to 74, 059 in 2023 (National Human Development Report, 2015; Fatunmole, 2023). Given this large number of inmates confined in correctional facilities across the country, there are great concerns about the sanitary conditions of these facilities with particular attention on toilet facilities. Studies revealed that the most common sanitation challenges of correctional centres in most developing countries including Nigeria were over-filled soak-away pits, broken septic tanks oozing out faeces, inadequate toilet units, non-functional and highly dilapidated toilet systems and poor sewage treatment procedures (Kuo et al., 2016; Rojas-Valencia et al., 2017; Burrell et al., 2018; Boateng et al., 2019; Capodaglio et al., 2020).

The primary causes of morbidity and mortality among inmates in Nigerian correctional facilities include malnutrition, insanitary living conditions exacerbated by overcrowding (Ogugua, 2018). The prevalence of communicable diseases in correctional centres remains alarmingly high as those centres now serve as a reservoir for various kinds of infectious diseases with prisoners being frequently implicated in the spread of communicable diseases upon release back into their communities (Spaulding et al., 2019).

Sewage management refers to the sanitary collection, treatment and/or disposal of wastewater including faeces and urine generated by households, businesses and industries; effective sewage management is of utmost importance for safeguarding public health, protecting the environment, and promoting the overall well-being of communities (World Health Organization-WHO, 2018). Inadequate management of sewage can lead to the contamination of water sources, resulting in the

spread of harmful pathogens such as bacteria, viruses, and parasites and contributing to the proliferation of diseases such as cholera, typhoid, and diarrhea (WHO, 2018).

Sewage management conditions in correctional facilities within the study area are shrouded in high secrecy with very little or no documentation that can be useful to policy makers, donor agencies and prison administrators in order to improve the sanitary conditions of correctional centres and general wellbeing of inmates and staff members. It was in view of the above that this study investigated sewage management in correctional facilities and its potential public health implications in Rivers State.

Methods:

The research design adopted for this study was the cross-sectional research design. A sample of 75 inmates who had spent at least, six (6) months in the correctional facilities was drawn from three selected facilities in Rivers State. The inmates included both those who had been convicted and those awaiting trial. A multi-staged sampling procedure consisting of purposive, proportionate and convenience sampling techniques was employed to arrive at the sample. The choice of this non-randomized method and sample size was due to the restricted peculiarities of the target population and environment. The instrument for data collection was a 17-item validated Sewage Management Correctional Facilities Public Health Implications Questionnaire (SMCFPHIQ) with a reliability index of 0.78 using Cronbach Alpha.

One (1) Officer working in each of the selected correctional facilities with unhindered access to the inmates who agreed to participate in the study were properly instructed and used as research assistants. The consent of respondents was sought and the wishes of those who declined were fully respected. The instrument was researcher-administered in order to minimize error and facilitate retrieval. Retrieved copies of the instrument were coded and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. A Focus Group Discussion (FGD) was also conducted with three (3) selected Correctional Facility Officers who volunteered to participate in the study and their responses manually copied, paraphrased and read to their confirmation since they all objected to the use of any form of electronic recording or identification. Data were obtained and the results presented qualitatively. Descriptive statistics of percentage and frequencies were used and results obtained, presented in tables.

Results

Table 1.Distribution of Respondents by Gender, Age and Period under Custody (N=75)

Variable	Option (values)	Frequency	Percentage
Gender	Male	66	88%
	Female	09	12%
Age	18-28	14	18.7%
	29-39	46	61.3%
	40-50	11	14.7%
	Above 50	04	5.3%
Period under Custody	6-11 months	17	22.6%
	1-3 years	32	42.7%
	4-5 years	18	24%
	6-8 years	06	8%
	Above 8 years	02	2.7%

Source: Field Survey, 2023

Table 1 revealed that a vast majority of the respondents were males (88%) while 12% were females. Again, respondents within ages 18-28 years were (18.7%), 29-39, (61.3%), 40-50, (14.7%) while those above 50 were (5.3%). Respondents under custody for a period of 6-11 months were 22.7%, 1-3 years (42.7%), 4-5 years (24%), 6-8 years (8%) while those above 8 years were 2.7%.

Table 2: Type of Sewage Facilities in Correctional Centres in Rivers State

Variable	Option (values)	Frequency	Percentage
Type of toilet available	Water closet	20	26.7%
	Pour flush	35	46.7%
	Pit latrine	05	6.7%
	Bucket latrine	07	9.3%
	Others (nylon/paper bag)	08	10.6%

Source: Field Survey, 2023

Table 2 indicated that a vast majority of the respondents (46.7%) use pour flush, 26.7%, (water closet), 14.2% (pit latrine), 6.4% (bucket latrine) and 3% (nylon/paper bags).

Table 3: Condition of Sewage Management Facilities in Correctional Centres, Rivers State

Variable	Frequency (percentage-%)			
	Always	**Most times**	**Rarely**	**Never**
Leakages from Septic tank	44 (58.7%)	21 (28%)	10 (13.3%)	0 (0%)
Odour nuisance from toilet	66 (88%)	5 (6.7%)	4 (5.3%)	0 (0%)
Regular water supply for flushing	0 (0%)	12 (16%)	15 (20%)	48 (64%)
Overflow of fecal matters inside toilet	51 (68%)	17 (22.7%)	5 (6.7%)	2 (2.6%)
Irregular power supply for pumping of water	66 (88%)	4 (5.3%)	5 (6.7%)	0 (0%)

Source: Field Survey, 2023

Table 3 revealed that leakages from septic tank occur in the following manner; always (58.7%), most times (28%), rarely (13.3%) and never (0%). Again, the statement on how odour nuisance is perceived was; always (88%), most times (6.7%), rarely (5.3%) and never (0%). On the issue of regular water to flush toilet, responses indicated that; always (0%), most times (16%), rarely (20%) and never (64%). On the overflow of fecal matters inside toilet, responses indicated that; always (68%), most times (22.7%), rarely (6.7%) and never (2.6%). Lastly, on the statement about irregular power supply for pumping of water, responses indicated the following; always (88%), most times (5.3%), rarely (6.7%) and never (0%).

Table 4: Compliance with Existing Sewage Management Regulations by Inmates in Rivers State

Statements	Frequency (percentages)			
	SD	**D**	**A**	**SA**
1. You only used designated toilets and latrines	63 (84%)	5 (6.7%)	5 (6.7%)	2 (2.6%)
2. You never defecate in open places	66 (88%)	5 (6.7%)	4 (5.3%)	0 (0%)
3. Septic tanks and soak-away pits are always maintained	50 (66.7%)	13 (17.3%)	12 (16%)	0 (0%)
4. You always wash hands thoroughly after using the toilet	41 (54.7%)	27 (36%)	5 (6.7%)	2 (2.6%)

Source: Field Survey, 2023

Table 4 revealed that majority of the respondents (84%) strongly disagree (SD) that they only use designated toilets and latrines, (6.7%) disagree (D), (6.7%) agree (A) while (2.6%) strongly agree

(SA). Again, majority of the respondents (88%) strongly disagree that they never defecate in open places (6.7%) disagree while (5.3%) agree. Furthermore, (66.7%) strongly disagree that septic tanks/soak-away pits are always maintained, (17.3%) disagree while (16%) agree. Lastly, (54.7%) strongly disagree that they always wash their hands thoroughly after using the toilet, (36%) disagree, (6.7%) agree while (2.6%) strongly agree.

Table 5: Perceived Challenges Affecting Effective Sewage Management in Correctional Centers in Rivers State

Variable	**Option (values)**	**Frequency (N=233)**	**Percentage**
Challenges affecting effective sewage management in correctional facilities	Poor maintenance culture	25	33.3%
	Lack of manpower	5	6.7%
	Lack of fund	4	5.3%
	Lack of basic equipment	11	14.7%
	Negative attitude of inmates	15	20%
	Corruption by Administrators	15	20%

Source: Field Survey, 2023

Results in table 1 revealed that the most commonly reported challenge was; poor maintenance culture (33.3%), followed by negative attitude of inmates and corruption by administrators with (20%) each and lack of basic equipment (14.7%), lack of manpower (6.7%) and lastly, lack of fund, (5.3%).

Table 6: Perceived Implications of Sewage Management Practices on Public Health in Correctional Centers in Rivers State

Variable	**Frequency (percentages)**			
	Always	**Most times**	**Rarely**	**Never**
Fly infestation	50 (66.7%)	20 (26.6%)	5 (6.7%)	0 (0%)
Odour Nuisance	56 (74.7%)	15 (20%)	4 (5.3%)	0 (0%)
Outbreak of Diarrheal-related Diseases	50 (66.7%)	20 (26.6%)	5 (6.7%)	0 (0%)
Rodent infestation	53 (70.7%)	15 (20%)	5 (6.7%)	2 (2.6%)
Unsightliness	66 (88%)	5 (6.7%)	4 (5.3%)	0 (0%)

Source: Field Survey, 2023

Table 6 revealed that fly infestation occurred in the following manner; always (66.7%), most times (26.6%), rarely (6.7%) and never (0%). Again, odour nuisance had the following responses; always (74.7%), most times (20%), rarely (5.3%) and never (0%). On the issue of outbreak of diarrheal-related diseases, responses indicated as follows; always (66.7%), most times (26.6%), rarely (6.7%) and never (0%). On rodent infestation, responses indicated that; always (70.7%), most times (20%), rarely (6.7%) and never (2.6%). Lastly, on the statement about unsightliness, responses indicated as follows; always (88%), most times (6.7%), rarely (5.3%) and never (0%).

Discussion of findings

Findings from the study indicated that the most common type of sewage management facility in correctional centers in Rivers State was pour flush, followed by water closet. This supports the notion that pour flush systems are commonly employed in correctional facilities due to their relatively low cost of installation and management. One striking thing about the findings was the fact that the use of insanitary methods like pit latrine, bucket latrines and nylon/paper bags accounted for 23.6%. This is in line with similar studies conducted in some correctional facilities in developing countries (Balsamo, 2002; Smith et al., 2018). The implication of this to practice is that odour nuisance, fly

infestation; rodent infestation and open defecation will be regular occurrences in correctional facilities within the study area.

Again, results from the study revealed that the conditions of sewage management facilities in Correctional center were insanitary. For instance, there were always leakages from septic tank, odour nuisance, overflow of fecal matters inside toilet and irregular power supply for pumping of water. A study by Johnson *et al*. (2019) examining sewage management practices in correctional facilities in a neighboring state found similar high frequencies of odor nuisance and toilet leakage, indicating inadequate maintenance and management of sewage systems. The implication for this to practice is that inmates will be constantly exposed to insanitary conditions injurious to health. Apart from the high level of unsightliness, the conditions of sewage facilities are fertile for the spread of faeco-orally transmitted infections. There is therefore the need for improved maintenance practices, infrastructure upgrades, and awareness campaigns to improve adherence to sewage management guidelines in correctional facilities.

The study also revealed that there was poor compliance with existing sewage management regulations by inmates in correctional facilities in Rivers State. For instance, a vast majority of the respondents do not only use designated toilets but also defecate in open places. There was no serious attention given to the maintenance of septic tanks/soak-away pits and inmates do not have what it takes to always wash their hands thoroughly after using the toilet. This is in agreement with the findings of Anderson et al. (2017) who reported comparable findings regarding designated toilet use and the prohibition of open defecation.

Findings from the study indicated that poor maintenance culture, negative attitude of inmates and corruption by administrators were the most perceived challenges affecting effective sewage management in correctional centers. Brown *et al*. (2018) examined challenges in sewage management facilities in correctional centers across multiple states and identified similar challenges. This suggests that these challenges are systemic in correctional centers in Nigeria. Findings from the study also indicated that fly infestation, odour nuisance, outbreak of diarrheal-related diseases, rodent infestation and unsightliness were the perceived public health implications of sewage management practices in correctional centres in Rivers State. This is in line with the findings of previous studies (Roberts et al., 2019). The implication of this to practice is that inmates will be vulnerable to associated diseases which will make their stay in the correctional facilities very unsafe.

All the findings above were corroborated by the outcome of the FGD with correctional facility officers. The conditions of toilet facilities across our prisons in the State are in a big mess; they cause more harm to the inmates resulting to different kinds of diseases, one of the participants stated. All the W/Cs are either damaged or constantly overflowing with faeces, no water to flush toilets, most of the connecting pipes in the toilets are badly damaged with broken septic tanks another participant stated. From the above, it is therefore evident that the state of sewage management in correctional facilities in Rivers State is insanitary and may pose significant public health challenges on both inmates and members of staff.

It is thus, recommended that all stakeholders in this sector, especially the government must be more intentional to improve the health of inmates by improving their sewage management facilities through adequate funding, improved infrastructure and personnel, regular awareness campaigns and effective supervision to ensure that funds tied to projects are judiciously utilized.

References

Abubakar, I. (2018). Nigerian prisons and the challenges of rehabilitation and reintegration of ex-convicts into society. *IOSR Journal of Humanities and Social Science*, 23(3), 14-21. doi: 10.9790/0837-2303011421

Adeniji, E. (2019). *State of sanitation in correctional facilities in Nigeria*. Prison Fellowship Nigeria. *https://pfnigeria.org/state-of-sanitation-in-correctional-facilities-in-nigeria/*

Aggarwal, R., & Ranganathan, P. (2019). Study designs: Part 2 - Descriptive studies. *Perspectives in Clinical Research*, *10*(1), 34–36. https://doi.org/10.4103/picr.PICR_154_18

Anderson, J. K., Petersen, M. A., & O'Connell, D. J. (2017). Inmate compliance with environmental health regulations: A study of West Virginia correctional facilities. *Journal of Correctional Health Care*, 23(3), 317-328.

Brown, J. M., O'Connell, D. J., & Smith, A. B. (2018). Implementation of environmental health services in state correctional facilities—United States, 2017. *Morbidity and Mortality Weekly Report*, 67(19), 557-562.

BusinessDay. (2020). *FG allocates N1.6bn to Nigerian Correctional Service for COVID-19 prevention.* BusinessDay. *https://businessday.ng/coronavirus/article/fg-allocates-n1-6bn-to-nigerian-correctional-service-for-covid-19-prevention/*

Fatunmole, M. (2023). Nigeria ranks 27th among countries with highest number of prisoners | The ICIR- Latest News, Politics, Governance, Elections, Investigation, Factcheck, Covid-19. *https://www.icirnigeria.org/nigeria-ranks-27th-among-countries-with-the-highest-number-of-prisoners/#:~:text=In%20Nigeria%2C%20the%20most%20populous,The%20nation%20has%2074%2C059%20prisoners.*

Federal Republic of Nigeria. (2019). *Nigerian Correctional Service Act 2019.* *https://www.nassnig.org/document/download/12192*

Global Waters (2022). *Nigeria*. *https://www.globalwaters.org/wherewework/africa/nigeria#:~:text=Nigeria-,Overview,percent%20have%20access%20to%20sanitation.*

Human Rights Watch. (2020). Nigeria: COVID-19 threatens detainees. *Human Rights Watch.* *https://www.hrw.org/news/2020/04/29/nigeria-covid-19-threatens-detainees*

Johnson, S. J., Peterson, L. M., & Davis, R. E. (2019). Environmental health and safety in correctional facilities: A review of key issues, challenges, and promising practices. *International Journal of Prisoner Health*, 15(3), 276-289.

Ogugua, O. C. (2018). An examination of the human rights of Nigerian prisoners: A study of the Nigerian correctional centers. *Journal of Law, Policy and Globalization*, 72, 1-12.

Olatunji, O. (2019). Overcrowding and sanitary conditions in Nigerian prisons. *African Journal of Criminology and Justice Studies*, 12(1), 84-98.

Onyeoziri, O. (2018). Inadequate funding as a major constraint to the Nigerian Prison Service. *IOSR Journal of Humanities and Social Science*, 23(2), 55-62. doi: 10.9790/0837-2302015562

Roberts, T., Henderson, P. W., & Anderson, M. R. (2019). Sanitation practices and perceptions in Kakuma Refugee Camp, Kenya: Comparing the status quo with a novel service-based approach. *PloS One*, 14(12), e0226756.

Smith, R. D., Jones, P. Q., & Johnson, M. W. (2018). Sustainability of sanitation services in low income settings: A systematic review and qualitative synthesis of evidence. *Wiley Interdisciplinary Reviews: Water*, 5(2), e1264.

Spaulding, A. C., Seals, R. M., McCallum, V. A., Perez, S. D., Brzozowski, A. K., Steenland, K., Okafor, C. N., Okorie, N. C., Zewudie, T., Zoba, N., Zuberi, T., & Blankenship, K. M. (2019). Prisoner disenfranchisement: A public health issue. *American Journal of Public Health*, 109(7), 976-979. https://doi.org/10.2105/AJPH.2019.305109.

Tarhule, V.V. (2019). Synoptic appraisal of the Nigerian Correctional Service ACT, 2019. *https://bsum.edu.ng/journals/files/law/vol9/article1.pdf*.

pp. 218-225 https://dx.doi.org/10.4314/johasam.v7i1.27

Socio-Demographic Determinants of Choice of Delivery Place among Antenatal Women Attending Health Facilities in Eleme Local Government Area, Rivers State

Goodluck Azuonwu
Department of Nursing, University of Port Harcourt, Rivers State, Nigeria.
goodator2002@yahoo.com
+234 803 464 8721

Evelyn George-Obe
Department of Foundation Studies,
Rivers State College of Health Science and Management Technology Port Harcourt, Nigeria
eveluv4life@gmail.com
08067931016

Abstract

This study investigated the socio-demographic determinants of choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area. Four research questions and four hypotheses guided the study. The research design adopted for this study was a descriptive research design with a population of 134,100 women of childbearing age. A multistage sampling procedure was adopted to select a sample size of 440. The instrument for data collection in this study was a structured questionnaire with a reliability coefficient of 0.718. The finding of the study showed that the choice of delivery place among women was healthcare facility 226 (55.5%), which was chosen more among women who were single, those with fewer number of children, younger women within 20-24 years and those who resided in the semi-urban environs. The result revealed that there was a significant relationship between choice of delivery place and marital status (X^2- value = 24.12, df = 12, P < 0.05). It was concluded that the socio-demographic determinants of their choice were marital status, parity, age and location. It was recommended that health professionals should increase their campaign on maternal health with more emphasis on health facility delivery among women.

Keywords: socio-demographic, determinants, choice, delivery place, antenatal women

Introduction

The choice of delivery place is where the women chose to deliver her baby. Kifle et al. (2018) noted that, the choice of delivery place can be referred to the place where women preferably choose to delivery their babies at the time of child birth which could be either in a health facility delivery or at home. According to Singh et al. (2014), the choice of delivery place is where pregnant women decide to go for child delivery under the supervision of birth attendant; and the decision on where to deliver during labour is an important aspect of maternal healthcare which must not be compromised if positive delivery outcome is expected and that, childbirth in a health facility attended by skilled birth attendant is associated with lower rates of maternal morbidity and mortality than home births. Thus, women are expected to choose healthcare facility for delivery where they will be attended to by skilled birth attendant, but several factors could influence their choice which could vary in certain socio-demographic context such as marital status, age, location and parity.

The number of children a woman has, also known as parity has been found to determine their choice of delivery place as shown in literature. Tebekaw et al. (2015) revealed that having fewer number of children is associated with delivery at health care facilities. This could be explained by the fact that those having fewer number of children have lesser financial commitment for the upkeep of the children thus, are more likely to be able to shell out other bills including healthcare bills, than those with more children; who will be saddled with more financial burden due to the high cost of living in Rivers State cum the high cost of skilled healthcare added to resources which are limited. This scenario is even worse if a woman has a marital status that does not promote intimacy and facilitate support from the husband, particularly, non-married women. According to Nwankwo et al.

(2019), the utilization of health facilities for childbirth may increase if there is involvement of relations, especially husbands. The marital status notwithstanding, the location an antenatal woman is could also influence her choice of delivery place.

The location an individual is can influence their health behaviour due to several environmental factors and referral orders surrounding the person which suggests and appeal to the person's senses with a result action. The study of Yaya et al. (2018) showed that, overall percentage of women who delivered at health facility was 39.8%, with the rate being substantially higher among urban (67.8%) compared with their rural (30.2%) counterparts. This report may not be argued against because those in the rural areas may have more challenges accessing health care facilities due to the debilitated nature of the facilities in several rural areas, inadequate or absence of healthcare personnel in some cases as more healthcare workers are more desirous to be in the urban area than the rural areas. This makes many women take to traditional birth attendants who are easily accessible to them. Thus, being in a rural or urban area could also be investigated as a determinant factor to the choice of place of delivery. In any location a woman is, the prevailing religion could also contribute to the person's choices.

Age is the number of years an individual has lived on earth which is basically measured in years. Age is an important demographic variable when it comes to the reproductive health of an individual. According to Yahya and Pumpaibool (2019), age was found to have a significant association with the choice of place of birth. This association could be that younger women, particularly adolescent women may be shy and may have been pregnant out of wed-lock and at such, not bold enough to move around with the pregnancy to register in a healthcare facility for delivery. But, if such women are well taken care of by their older relatives, they may be encouraged to have a health care facility-based delivery.

In Rivers State, despite the effort of government in ensuring that health care facilities are distributed across the different local government areas, observation has shown the prevalence of non-facility based delivery attended that unskilled birth attendants. Certainly, some factors could be implicated for this thus, this study was aimed at investigating the socio-demographic determinants of choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area. The following research questions were answered:

1. What is the relationship between marital status and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area?
2. What is the relationship between parity and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area?
3. What is the relationship between age and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area?
4. What is the relationship between location and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area?

Hypotheses: The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between marital status and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.
2. There is no significant relationship between parity and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.
3. There is no significant relationship between age and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.
4. There is no significant relationship between location and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.

Methodology

The research design adopted for this study was a descriptive research design with a population which consisted of 134,100 women of childbearing age, within 15-49 years (National Population Commission Census Projection, 2016). The sample size for the study was 440 with was selected using multistage sampling procedure. At the first stage, the simple random sampling was used to select communities in Eleme. The second stage phase involved the use of non-proportionate sampling

technique to get the number of residents to be selected from each of the ten communities that made up Eleme local government area (44 women from each of the ten communities). The third stage involved the use of simple random sampling technique to select households while the third stage involved the use of the simple random sampling technique to select the respondents in each household until the determined number in the community is completed. The instrument for data collection in this study was a structured questionnaire with a reliability coefficient of 0.718titled, "Choice of Delivery Place Questionnaire (CDPQ)". It was developed by the researcher following an extensive literature search on the subject. The data collected were analyzed with the aid of the Statistical Package for Social Sciences (SPSS) version 25.0 using percentage and Chi-square test at 0.05 level of significance.

Results

Research Question 1: What is the relationship between marital status and the choice of delivery place among women attending health facilities in Eleme Local Government?

Table 1: Frequency distribution showing the relationship between marital status and the choice of delivery place among women attending health facilities in Eleme Local Government

Marital Status	**Choice of delivery place F (%)**				
	Home	Healthcare facility	**TBA place**	**Ministry/ church**	**Total**
Single	1(2.2)	25(54.3)	20(43.5)	0(0.0)	46(100)
Married	11(4.7)	113(47.9)	112(47.5)	0(0.0)	236(100)
Separated/Divorced	7(14.0)	22(44.0)	21(42.0)	0(0.0)	50(100)
Cohabiting	2(3.2)	37(59.7)	22(35.5)	1(1.6)	62(100)
Widowed	3(23.1)	5(38.5)	5(38.5)	0(0.0)	13(100)
Total	**24(5.9)**	**202(49.6)**	**180(44.2)**	**1(0.2)**	**407(100)**

Table 1 showed the relationship between marital status and the choice of delivery place among women attending health facilities in Eleme Local Government. The result showed that most of the women 25(54.3%) who are single chose healthcare facility, 113(47.9%) of the women married chose healthcare facility, 22(44.0%) of the women who are separated/divorced chose healthcare facility, 37(59.7%) who are cohabiting chose healthcare facility while 5(38.5%) of women who are widowed chose healthcare facility and traditional birth attendant place as their choice of delivery place. Hence, the choice of health care facility for delivery was found more among women who are cohabiting and single attending health facilities in Eleme Local Government.

Research Question 2: What is the relationship between parity and the choice of delivery place among women attending health facilities in Eleme Local Government?

Table 2: Frequency distribution showing the relationship between parity and the choice of delivery place among women attending health facilities in Eleme Local Government

Parity	**Choice of delivery place F (%)**				
	Home	**Healthcare facility**	**TBA place**	**Ministry/ church**	**Total**
1-3 children	11(5.0)	116(53.0)	91(41.6)	1(0.5)	219(100)
4-6 children	8(5.3)	67(44.7)	75(50.0)	0(0.0)	150(100)
More than 6 children	5(13.2)	19(50.0)	14(36.8)	0(0.0)	38(100)
Total	**24(5.9)**	**202(49.6)**	**180(44.2)**	**1(0.2)**	**407(100)**

Table 2 showed the relationship between parity and the choice of delivery place among women attending health facilities in Eleme Local Government. The result revealed that most women

116(53.0%) with 1-3 number of children chose healthcare facility as their choice of delivery, 75(50.0%) of women with 4-6 number of children chose traditional birth attendant place as their choice of delivery place while 19(50.0%) of women with more than 6 children attending health facilities in Eleme Local Government chose healthcare facility as their choice of delivery. Hence, the choice of healthcare facility for delivery place was seen more among women with fewer number of children attending health facilities in Eleme Local Government.

Research Question 3: What is the relationship between age and the choice of delivery place among women attending health facilities in Eleme Local Government?

Table 3: Frequency distribution showing the relationship between age and the choice of delivery place among women attending health facilities in Eleme Local Government

Age	**Choice of delivery place F(%)**				
	Home	Healthcare facility	**TBA place**	**Ministry/ Church**	**Total**
15-19 years	0(0.0)	1(14.3)	6(85.7)	0(0.0)	7(100)
20-24 years	3(5.8)	35(67.3)	13(25.0)	1(1.9)	52(100)
25-29 years	6(6.1)	50(50.5)	43(43.4)	0(0.0)	99(100)
30-34 years	4(5.5)	30(41.1)	39(53.4)	0(0.0)	73(100)
35-39 years	2(3.2)	31(50.0)	29(46.8)	0(0.0)	62(100)
40 years and above	9(7.9)	55(48.2)	50(43.9)	0(0.0)	114(100)
Total	**24(5.9)**	**202(49.6)**	**180(44.2)**	**1(0.2)**	**407(100)**

Table 3 showed the relationship between age and the choice of delivery place among women attending health facilities in Eleme Local Government. The result showed that majority 6(85.7%) of the women between 15-19 years chose traditional birth attendant place as their choice for delivery, 35(67.3%) of women within 20-24 years chose healthcare facility as their choice of delivery place, 50(50.5%) of women between 25-29 years also chose the healthcare facility as their choice of delivery place, 39(53.4%) of them within 30-34 years chose the traditional birth attendant place for delivery, 31(50.0%) of the respondents within the age range of 35-39 years chose the healthcare facility as their choice of delivery place, while 55(48.2%) of women between 40 years and above chose the healthcare facility as their choice of delivery place. Thus, the choice of healthcare facility for delivery was seen more among younger women within 20-24 years attending health facilities in Eleme Local Government.

Research Question 4: What is the relationship between location and the choice of delivery place among women attending health facilities in Eleme Local Government?

Table 4: Frequency distribution showing the relationship between location and the choice of delivery place among women attending health facilities in Eleme Local Government

Location	**Choice of delivery place F(%)**				
	Home	Healthcare facility	**TBA place**	**Ministry/ Church**	**Total**
Urban	4(3.9)	45(44.1)	53(52.0)	0(0.0)	102(100)
Semi-urban	14(6.9)	106(52.2)	82(40.4)	1(0.5)	203(100)
Rural	6(5.9)	51(50.0)	45(44.1)	0(0.0)	102(100)
Total	**24(5.9)**	**202(49.6)**	**180(44.2)**	**1(0.2)**	**407(100)**

Table 4 showed the relationship between location and the choice of delivery place among women attending health facilities in Eleme Local Government. The result revealed that most 53(52.0%) of the women who reside in the urban area chose traditional birth attendant place as their choice of delivery place, 106(55.2%) of the women who live in a semi-urban environment chose the healthcare facility

as their choice of delivery place while 51(50.0%) of women who reside in the rural area also chose the health care facility as their choice of delivery place. Thus, the choice of healthcare facility for delivery place was found more among the women who resided in the semi-urban environs attending health facilities in Eleme Local Government.

Test of Hypotheses

Hypothesis 1: There is no significant relationship between marital status and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.

Table 5: Chi-square table showing the relationship between marital status and the choice of delivery place among antenatal women attending health facilities in Eleme LGA

Marital Status	Choice of delivery place F (%)								
	Home	Healthcare facility	**TBA place**	**Ministry**	**Total**	**df**	X^2- value	P-value	Decision
Single	1(2.2)	25(54.3)	20(43.5)	0(0.0)	46(100)	12	24.12	0.02	Rejected
Married	11(4.7)	113(47.9)	112(47.5)	0(0.0)	236(100)				
Separated/ Divorced	7(14.0)	22(44.0)	21(42.0)	0(0.0)	50(100)				
Cohabiting	2(3.2)	37(59.7)	22(35.5)	1(1.6)	62(100)				
Widowed	3(23.1)	5(38.5)	5(38.5)	0(0.0)	13(100)				
Total	**24(5.9)**	**202(49.6)**	**180(44.2)**	**1(0.2)**	407(100)				

***Significant**

Table 5 showed the relationship between marital status and the choice of delivery place among antenatal women attending health facilities in Eleme LGA. The result revealed that there was a significant relationship between marital status and the choice of delivery place (X^2- value = 24.12, df = 12, P < 0.05). Therefore, the null hypothesis which states that there is no significant relationship between marital status and the choice of delivery place among antenatal women attending health facilities in Eleme LGA was rejected.

Hypothesis 2: There is no significant relationship between parity and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.

Table 6: Chi-square table showing the relationship between parity and the choice of delivery place among antenatal women attending health facilities in Eleme LGA

Parity	**Choice of delivery place F(%)**								
	Home	Healthcare facility	**TBA place**	**Ministry/ Church**	**Total**	df	X^2- value	P- value	**Decision**
1 - 3	11(5.0)	**116(53.0)**	**91(41.6)**	**1(0.5)**	**219(100)**	**6**	**7.81**	**0.25**	**Accepted**
4 - 6	8(5.3)	**67(44.7)**	**75(50.0)**	**0(0.0)**	**150(100)**				
> 6	5(13.2)	**19(50.0)**	**14(36.8)**	**0(0.0)**	**38(100)**				
Total	24(5.9)	**202(49.6)**	**180(44.2)**	**1(0.2)**	**407(100)**				

***Not Significant**

Table 6 showed the relationship between parity and the choice of delivery place among antenatal women attending health facilities in Eleme LGA. The result revealed that there was no significant relationship between parity and the choice of delivery place (X^2- value = 7.81, df = 6, P > 0.05). Therefore, the null hypothesis which states that there is no significant relationship between parity and

the choice of delivery place among antenatal women attending health facilities in Eleme LGA was accepted.

Hypothesis 3: There is no significant relationship between age and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.

Table 7: Chi-square table showing the relationship between age and the choice of delivery place among antenatal women attending health facilities in Eleme LGA

Age	Choice of delivery place F(%)								
	Home	Healthcare facility	TBA place	Ministry/ Church	Total	df	X^2- value	P-value	Decision
15-19 years	0(0.0)	1(14.3)	6(85.7)	0(0.0)	7(100)	15	23.53	0.07	Accepted
20-24 years	3(5.8)	35(67.3)	13(25.0)	1(1.9)	52(100)				
25-29 years	6(6.1)	50(50.5)	43(43.4)	0(0.0)	99(100)				
30-34 years	4(5.5)	30(41.1)	39(53.4)	0(0.0)	73(100)				
35-39 years	2(3.2)	31(50.0)	29(46.8)	0(0.0)	62(100)				
≥40 years	9(7.9)	55(48.2)	50(43.9)	0(0.0)	114(100)				
Total	24(5.9)	202(49.6)	180(44.2)	1(0.2)	407(100)				

***Not Significant**

Table 7 showed the relationship between age and the choice of delivery place among antenatal women attending health facilities in Eleme LGA. The result revealed that there was no significant relationship between age and the choice of delivery place (X^2- value = 23.53, df = 15, P > 0.05). Therefore, the null hypothesis which states that there is no significant relationship between age and the choice of delivery place among antenatal women attending health facilities in Eleme LGA was accepted.

Hypothesis 4: There is no significant relationship between location and the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area.

Table 8: Chi-square table showing the relationship between location and the choice of delivery place among antenatal women attending health facilities in Eleme LGA

Location	Choice of delivery place F(%)								
	Home	Healthcare facility	TBA place	Ministry/ church	Total	df	X^2- value	P- value	Decision
Urban	4(3.9)	45(44.1)	53(52.0)	0(0.0)	102(100)	6	4.97	0.54	Accepted
Semi-urban	14(6.9)	106(52.2)	82(40.4)	1(0.5)	203(100)				
Rural	6(5.9)	51(50.0)	45(44.1)	0(0.0)	102(100)				
Total	**24(5.9)**	**202(49.6)**	**180(44.2)**	**1(0.2)**	**407(100)**				

***Not Significant**

Table 8 showed the relationship between location and the choice of delivery place among antenatal women attending health facilities in Eleme LGA. The result revealed that there was no significant relationship between location and the choice of delivery place (X^2- value = 4.97, df = 6, P > 0.05). Therefore, the null hypothesis which states that there is no significant relationship between location and the choice of delivery place among antenatal women attending health facilities in Eleme LGA was accepted.

Discussion of Findings

The choice of health care facility for delivery was found more among women who are cohabiting and single. The tested hypothesis revealed that there was a significant relationship between marital status and the choice of delivery place (X^2- value = 24.12, df = 12, P < 0.05). The finding of this study gives credence to that of Dhakal et al. (2018) which revealed a significant association between occupation of spouse, and choice of place of delivery. The finding of this study is in consonance with other

studies which indicated marital status as one of the numerous demographic factors found to be related to choice of delivery place (Aremu et al., 2011; Moyer & Mustafa, 2013; Yadav & Kesarwani, 2016). The choice of healthcare facility for delivery place was seen more among women with fewer number of children. The tested hypothesis revealed that there was no significant relationship between parity and the choice of delivery place (X^2- value = 7.81, df = 6, P > 0.05). The finding of this study gives credence to that of Dhakal et al. (2018) which revealed a significant association between parity, and choice of place of delivery. The finding of this study is in consonance with other studies which indicated parity as one of the numerous demographic factors found to be related to choice of delivery place, particularly low parity (Aremu et al., 2011; Moyer & Mustafa, 2013; Yadav & Kesarwani, 2016). The finding of this study is also in line with that of Fapohunda and Orobaton (2013) who substantiated that, high-parity mothers have a tendency to fuel the practice of delivery with unskilled birth attendants or home delivery which are all unsafe delivery approaches and that, as birth order increased, the odds of delivery using skilled attendance dropped precipitously. It was further stated that, a child is less likely to be born under skilled care, with doctors and/or nurses attending, if it was a third or fourth child than if it was a first or second child. The explanation given to this was that, given the high cost of skilled care in Nigeria coupled with the limited resources and several competing responsibilities, including children who have to be clothed and fed, mothers are been compelled to select unskilled care despite their cognizance of associated risks.

The choice of healthcare facility for delivery was seen more among younger women within 20-24 years. The finding of this study is in consonance with other studies which indicated age as one of the numerous demographic factors found to be related to choice of delivery place, particularly younger maternal age (Aremu et al., 2011; Moyer & Mustafa, 2013; Yadav & Kesarwani, 2016). The choice of healthcare facility for delivery place was found more among the women who resided in the semi-urban environs. The tested hypothesis revealed that there was no significant relationship between location and the choice of delivery place (X^2- value = 4.97, df = 6, P > 0.05). The findings of the study is in line with that of Shehu et al. (2016) which showed that, the proportion of women who chose to delivered in health facilities was 65% in urban and 4.7% in rural.

Conclusion

Based on the findings of the study, it was concluded that the choice of delivery place among antenatal women attending health facilities in Eleme Local Government Area was determined by socio-demographic factors such as parity, marital status, age and location.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Health professionals should increase their campaign on maternal health with more emphasis on health facility delivery among women.
2. The State Government in their effort to improve delivery care-seeking behaviour should prioritize factors such as economic activities and income level by maternal healthcare services, particularly delivery economically accessible.
3. Community leaders should discourage early marriage by making it a norm that any female below a marriageable age should not be given for marriage by any parent or family, this will help to mend the age discrepancies among couples that weaken women's decision making power.

References

Aremu, O., Lawoko, S., & Dalal, K. (2011). Neighborhood socioeconomic disadvantage, individual wealth status and patterns of delivery care utilization in Nigeria: a multilevel discrete choice analysis. *International Journal of Women's Health, 3,* 167–174.

Dhakal, P., Shrestha, M., Baral, D. & Pathak, S. (2018). Factors affecting the place of delivery among mothers residing in Jhorahat VDC, Morang, Nepal. *International Journal of Community Based Nursing and Midwifery*, 6, 2-11.

Fapohunda, B., & Orobaton, N. (2013). Factors influencing the selection of delivery with no one present in Northern Nigeria: implications for policy and programs. *International Journal of Women's Health,* 6, 171-183.

Kifle, M.M., Kesete, H.F., Gaim, T.H., Angosom, G.S., & Araya, M.B. (2018). Health facility or home delivery? Factors influencing the choice of delivery place among mothers living in rural communities of Eritrea. *Journal of Health, Population and Nutrition, 37(22),*https://jhpn.biomedcentral.com/articles/10.1186/s41043-018-0153-1

Moyer, C.A., & Mustafa, A. (2013). Drivers and deterrents of facility delivery in sub-Saharan Africa: a systematic review. *Reproductive Health, 10,* 40-48.

Nwankwo, O.N., Ani, O.E., Akpoke, M., & Ugwe, E.A. (2019). Determinants of choice of place of delivery among women attending two referral hospitals in Kano North-West Nigeria. *Nigerian Medical Journal,* 60, 68-75.

Shehu, C.E., Ibrahim, M.T., Oche, M.O., & Nwobodo, E.I. (2016). Determinants of place of delivery: A comparison between an urban and a rural community in Nigeria. *Journal of Public Health and Epidemiology, 8,* 91-101.

Singh, K., Brodish, P., & Suchindran, C. (2014). A regional multilevel analysis: can skilled birth attendants uniformly decrease neonatal mortality? *Maternal and Child Health Journal, 18(1), https://doi.org/10.1007/s10995-013-1260-7.*

Tebekaw, Y., Mashalla, Y.J., &Thupayagale-Tshweneagae, G. (2015). Factors Influencing Women's Preferences for Places to Give Birth in Addis Ababa, Ethiopia. *Obstetrics and Gynecology International*, http://dx.doi.org/10.1155/2015/439748.

Yadav, A., & Kesarwani, R. (2016). Effect of individual and community factors on maternal health care service use in India: a multilevel approach. *Journal of Biosocial Science,* 48, 1–19.

Yahya, M.B., & Pumpaibool, T. (2019). Factors influencing the decision to choose a birth center by pregnant women in Gombe state Nigeria: Baseline survey. *Journal of Health Research, 33*(3), 228 – 237.

Yaya, S., Bishwajit, G. & Gunawardena, N. (2018). Socioeconomic factors associated with choice of delivery place among mothers: a population-based cross-sectional study in Guinea-Bissau. *http://dx.doi.org/10.1136/bmjgh-2018-001341*

pp. 226-237 https://dx.doi.org/10.4314/johasam.v7i1.28

The Judiciary and Democratic Politics in Nigeria

Udochukwu Precious Nwakodo
&
Ezindu Onyenwe Ubani
Department of Public Administration
Abia State Polytechnic, Aba
preshy1973@gmail.com

Abstract

Constrained by the unfavorable societal conditions that shape it, the record of the Nigerian judiciary in promoting democracy has been mixed at best. The judiciary is part of the state structure and shares a common political culture with other state institutions. It is dependent on them for the resources needed for its institutional development and the enforcement of its judgments. It is yet to achieve a degree of durable institutional autonomy, which can help guarantee its independence from other political actors and institutions. The study adopted a survey design and content analysis of media reportage and review of some judicial pronouncements. It was observed that the judiciary have played key role in shaping democratic politics in Nigeria. The major recommendation of the study was that the judiciary through its procurements should strength existing electoral laws rather than making new ones. Another recommendation was that the government should consider a review of the constitutional provisions on democracy and political participation in order to make adequate provisions not only for political participation but also for mobilization of the people to participate as well as democratization of the political parties.

Keywords: judiciary, democracy, politics, elections, judicial pronouncements

Introduction

The presence of an autonomous judiciary is widely seen as an essential component of a democratic system. The power of the legal spirit can be attributed to the influential legacy of British idea of justice, which has shaped the unique characteristics of English institutions. Simultaneously, the functionality of democratic institutions in Nigeria, such as the cabinet, parliament, and political parties, exhibited significant deficiencies and encountered substantial challenges under both direct and indirect governance (Ghous & Anjum, 2014). However, the judiciary institutions in Nigeria have demonstrated a commendable track record. The judiciary has been accorded a certain degree of respect even by the military authorities. Similarly, numerous justices of the Supreme Court and High Court have exhibited bravery and resolute commitment in upholding the principles of the legal system. The presence of an autonomous judiciary is vital in safeguarding the constitution, upholding the principles of the rule of law, and so promoting societal order and democratic governance. The lack of an independent judiciary ultimately results in societal chaos. The Nigerian judiciary has demonstrated commendable performance in challenging conditions. The establishment of a legal framework has been crucial in upholding the principles of justice, safeguarding the fundamental rights of individuals, and enabling their active participation in the democratic process by means of political party affiliation and engagement (Ikram, 2011).

It would be an unsound assertion to claim that the judiciary in Nigeria has consistently exercised its utmost authority to prioritize the welfare of the State over that of its citizens. Throughout a significant portion of its existence, the country has been under the governance of the military, which has had influence on many policies and individuals, both explicitly and implicitly. The entity in question exerted influence over the country's economic state during the 1970s, navigating through multiple periods of turmoil that persisted throughout the late 1970s and 1980s (Ghous & Anjum, 2014). However, it remains burdened by several significant and debilitating events from its historical trajectory. This particular organization has actively supported and, in numerous instances, facilitated and advanced elements of hostility and intolerance throughout society.

Nevertheless, recent occurrences in Nigeria indicate that the judiciary has not demonstrated sufficient strength in addressing instances of constitutional infringement or departure. On numerous instances,

when individuals in positions of authority have disregarded or temporarily halted the implementation of constitutions in order to achieve their political objectives, it did not place undue pressure on the constitution (Mian, 2014). The invocation of contradicting and irregularly dubious beliefs, such as the notion that achievement in achieving a goal confers authenticity, either accepted or lent validity to these practices. The influence of the higher judiciary on democratic growth is seen in its impact on the absence of opposition parties, primarily through the deliberate or unintentional postponement of judgements on significant matters. The judiciary of Nigeria has exhibited a mixed record in its support for democracy, primarily due to the constraints imposed by unfavourable common events that have influenced its development. The Judiciary is often perceived as failing to uphold the principles of the rule of law and adhere to democratic norms, despite its remarkable efforts in navigating challenging situations (Ghous & Anjum, 2014).

However, this work attempts to understand the judiciary and democratic politics in Nigeria. The paper provides an insight to the understanding of the legal cases in which the imposition of martial laws and dissolution of assemblies has been challenged before judiciary in Nigeria. The aforesaid judgments of the superior courts have played a decisive role in setting the political history of Nigeria towards democracy.

The Concept of Democracy

The concept of democracy is regarded as one of the elusive notions within the realms of social and political sciences, since it lacks a universally agreed-upon definition that is endorsed by any individual or specific organisation. Dahl (1976) cited in Asaju (2015) defines democracy as a "political framework characterised by the broad distribution of decision-making participation among adult citizens." According to Joseph Schumpeter, democracy can be defined as a political system wherein individuals gain the authority to make choices through a competitive effort for the support of the electorate (Kaur, 2012). Dahl discusses the concept of "Poliarchy," which encompasses two explicit dimensions. Firstly, there is the aspect of competition, which entails structured contention through periodic elections that are both free and fair. Secondly, there is the element of participation, which denotes the entitlement of nearly all adult individuals to exercise their voting rights and engage in electoral campaigns for elective positions. Furthermore, the concept of civic liberty emerges as a significant aspect and maybe the third dimension within the framework of poliarchy, as discussed by Samuel (2011) and Kaur (2012).

The term "democracy" may be traced back to its etymological origins in ancient Greek, where it is derived from the combination of two words: "demos," which refers to the people, and "kratos," which signifies rule or governance. Consequently, the term "democracy" can be understood as denoting a system of governance in which the people have the authority to rule (Wikipedia). Democracy may be understood as a form of governance that prioritises the interests and welfare of the people. This concept was eloquently articulated by Abraham Lincoln, the 16th President of the United States, who defined democracy as a system of government that is characterised by the active participation and representation of the people, ultimately serving their needs and aspirations (Procter, 1978, as cited in Ololobou, 2014). According to Chaji (n.d.), democracy can be defined as a system of governance in which the power and authority reside with the people. Therefore, democracy may be succinctly characterised as a form of governance that involves the active involvement and participation of the general populace, namely, the people. The concept of democracy that places emphasis on the well-being and agency of individuals is a significant obstacle to the practise of democracy. The governance of any political system is contingent upon the authority vested in the populace. However, a fundamental inquiry arises as to the precise definition and composition of the term "the people." According to Kaur (2012), it is contended that no state or city has ever existed where the term "the people" encompasses every citizen within that state or city. In the context of the Athenian City, it is important to note that the concept of direct democracy did not include universal participation in decision-making by all individuals inside the city.

According to Kari (2013), democracy may be understood as a collection of values and practises that have developed and are implemented by a collective body of individuals. These concepts serve as the foundational premises on which democracies are based. These principles exhibit a high degree of uniformity or strong similarity across several locations. Among the most prevalent

principles are freedom, equality, public participation, and choice, among others. This refers to a system of government that enables a wide population to participate in the selection of their leaders, while also ensuring the provision of a diverse set of civil rights and benefits. According to Agbo (2018), the future of Nigeria's democracy is contingent upon the establishment of a proficient electoral system that can effectively drive it, similar to the advanced democracies of Britain and the United States of America. According to his perspective, it is necessary for the system to possess robustness and adaptability in order to effectively navigate the intricate nature of the federation. Additionally, it should exhibit fairness in order to adequately accommodate the unique characteristics of Nigeria's diverse population. The implementation of such a system would instill optimism among minority groups and provide reassurance to the majority, emphasizing Nigeria's commitment to inclusivity and equitable representation for all stakeholders. In the nascent framework, a substantial proportion of eligible voters would exhibit a strong inclination to participate in the election process due to their trust in the integrity of the system and recognition of the significance of their individual ballots. All of these factors are contingent upon effective governance (Agbo, 2018; Kari, 2013).

The Concept of Judiciary

The judiciary is a critical pillar of a country's democratic system, responsible for upholding the rule of law, protecting individual rights, and ensuring justice is dispensed fairly and impartially. Nigeria's judiciary plays a pivotal role in the nation's governance, and its structure and functions are deeply rooted in the country's legal history and constitutional framework. Over time, a combination of indigenous customary laws, Islamic law (Sharia), and British colonial legal traditions have influenced Nigeria's legal system and judiciary. The introduction of British common law during colonial rule left a lasting impact on Nigeria's legal system (Edubirdie, 2022). This rich blend of legal traditions laid the foundation for the modern Nigerian judiciary. The Constitution of the Federal Republic of Nigeria established and governs the Nigerian judiciary, according to Efobi and Ekop (2021). The Constitution, which is the supreme law of the land, provides for the separation of powers among the executive, legislative, and judicial branches of government. This separation of powers is crucial to ensuring checks and balances within the government. However, the Nigerian judiciary is organised into several tiers, each with its own specific functions and jurisdiction:

The Supreme Court: This is the highest court in Nigeria and serves as the final court of appeal. It primarily deals with constitutional matters, disputes between states, and appeals from lower courts on significant legal issues.

The Court of Appeal: Below the Supreme Court is the Court of Appeal, which hears appeals from the High Courts, Sharia Courts of Appeal, and Customary Courts of Appeal. It is divided into divisions, each responsible for specific regions of the country.

The Federal High Court: This court deals with matters relating to federal laws, including issues concerning human rights, citizenship, and federal agencies.

The State High Courts: Each of Nigeria's 36 states has its High Court, which handles civil and criminal cases within the state's jurisdiction.

Sharia Courts of Appeal and Customary Courts of Appeal: In some northern states, Sharia and Customary Courts of Appeal exist to administer Islamic and customary laws, respectively, alongside the regular legal system.

Magistrates' Courts and Area Courts: These lower courts handle fewer complex cases, including small claims, minor offenses, and customary law matters (Efobi & Ekop, 2021).

Furthermore, one of the fundamental principles of Nigeria's judiciary is its independence from the other branches of government. The judiciary is expected to interpret and apply the law impartially without interference from the executive or legislative branches. This independence is crucial in upholding the rule of law and protecting citizens' rights (Wade & Bradley, 2015).

A Synoptic Analysis of the Judiciary and Democracy

As previously mentioned, the notion of the judiciary serves as a fundamental cornerstone within any democratic society. The judiciary assumes a vital role in all other conceptual frameworks. The absence of a judiciary raises concerns regarding the democratic nature of society. There exists a correlation between the concepts of judiciary and democracy. Indeed, there exists a certain level of

interconnectedness among them, a fact that has been acknowledged by several international instruments. The two components form the integral foundations of a progressive and enduring democratic governance structure.

The Judiciary and Democracy as a Fundamental Civil and Political Structure

The connection between the Judiciary and Democracy is inherently interdependent, as the existence of a functioning judiciary is essential for the establishment and maintenance of a democratic system. The presence of this correlation is not novel, as it is explicitly outlined in various international human rights treaties. According to the Universal Declaration of Human Rights (UDHR), every individual possesses the entitlement to participate in the governance of their nation, either directly or by means of representatives of their own choosing (Agbor, 2015). Additionally, it is specified that the right to equal access to public service within one's nation is affirmed. Furthermore, it states that the authority of the government shall be derived from the will of the people, which shall be expressed through regular and authentic elections. These elections shall be conducted through universal and equal suffrage, ensuring that all individuals have the right to vote without discrimination. Moreover, the voting process shall be conducted through secret ballots or other comparable methods that guarantee freedom and fairness (Stokes, 2016).

The relationship mentioned above is once again addressed in the International Covenant on Civil and Political Rights (ICCPR). According to the ICCPR, it is stipulated that all individuals possess the entitlement and the ability to engage in the management of public matters, either by direct involvement or by selecting representatives of their own volition. Furthermore, the document explicitly references the entitlement to "participate in elections and run for office in authentic, regular intervals, with voting rights extended to all individuals on an equal basis, ensuring the confidentiality of the ballot, and safeguarding the unrestricted manifestation of the electorate's preferences" (Agbor, 2015).

The acknowledgement of the connection between the judiciary and democracy extends beyond the borders of Nigeria. Furthermore, some regional inter-governmental organisations have explicitly identified the establishment of a strong connection between the court and democracy as one of their key objectives. The Inter-American Democratic Charter (IADC), which was declared by the General Assembly of the Organisation of American States, asserts that the populations of the Americas possess an entitlement to democracy, and it is the responsibility of their respective governments to actively foster and safeguard this democratic system (Agbor, 2015). Furthermore, the text reinforces the connection between the judiciary and democracy by asserting that democracy is essential for the efficient implementation of fundamental freedoms and human rights, which are universal, indivisible, and interdependent. These principles are incorporated within the institutions of states. These diverse instruments, encompassing both global and regional contexts, offer compelling evidence of the universal recognition and affirmation of the right to democratic governance worldwide (Franck, 2012).

The presence of an effective judiciary is a prerequisite for the establishment and functioning of a democratic system. For instance, individuals would be unable to engage in unfettered electoral processes unless they possess the ability to partake in the functions of the court, which safeguards their entitlements (Ogerie, 2017). The regulation and preservation of these rights, at the very least, are governed by laws that must be duly observed. The establishment and expression of popular sovereignty, along with the selection of individuals to represent the populace, are safeguarded and upheld through legally binding statutes. The principle of the rule of law is considered a fundamental human right, as it serves as a crucial foundation for the functioning of democratic systems. Nevertheless, the establishment and manifestation of the will of the populace in a democratic society necessitate more than mere legal safeguards for rules and rights. Once authority is bestowed onto individuals through the democratic process, it becomes their responsibility to execute the desires and preferences of the populace. The implementation of this will, or exercise of power, is likewise subject to regulation through legal processes.

The centrality of political rights is paramount to the establishment of a genuine democracy. The core values universally recognised in democratic governance include respect for minority rights, the freedom of individual thoughts, the formation and dissemination of opinions without fear of

reprisal, and legal and political equality in state institutions and processes (Spagnoli, 2013). In order for a democracy to be considered legitimate, it is imperative that it incorporate mechanisms and establishments that acknowledge the significance of these ideals, which are widely seen as globally essential. Furthermore, it is crucial to recognise the intrinsic connection between democracy and human rights. According to Franck (2012), it can be argued that democracy is a virtue that is universally desirable.

The Role of the Judiciary in a Democracy

In a democratic society, the judiciary plays a pivotal role in upholding the rule of law, safeguarding individual rights, and maintaining the balance of power. The judiciary, often referred to as the third branch of government, acts as a crucial check on the executive and legislative branches, ensuring that the principles of democracy are upheld. However, below are the vital roles of the judiciary in a democracy, drawing on both historical and contemporary perspectives.

Interpretation of Laws: One of the primary functions of the judiciary is to interpret laws. In a democracy, laws are enacted by elected representatives in the legislature. However, these laws may not always be clear or may have ambiguous provisions. The judiciary steps in to interpret these laws, ensuring that they are applied consistently and in line with the constitution. Constitution interpretation by the judiciary helps in the shaping of government and its processes in a democratic setting (Adegboruwa, 2021). This role is essential for maintaining the rule of law and preventing arbitrary interpretations by other branches of government.

Protection of Individual Rights: Another critical role of the judiciary in a democracy is the protection of individual rights and liberties. Democracies are built on the foundation of individual freedoms, and it is the judiciary's responsibility to ensure that these rights are not infringed upon by the government or other individuals. In short, the judiciary is inadvertently translated to an agent of human rights enforcement by ensuring that the contents of human rights instruments, applicable in that country, are used as sources of law in the settlement of human rights disputes in particular, and other disputes in general (Agbor, 2015). Judges act as impartial arbiters, adjudicating disputes and cases involving issues such as freedom of speech, religion, and privacy.

Judicial Review: Judicial review is a fundamental power held by the judiciary in a democracy. It allows the courts to review the constitutionality of laws and government actions. This power serves as a crucial check on the legislative and executive branches, preventing them from overstepping their constitutional limits (Jillani, 2018). Through judicial review, the judiciary can strike down laws that are inconsistent with the constitution, thereby ensuring that the government operates within the confines of democratic principles.

Ensuring Accountability: Accountability is a cornerstone of any democratic system. The judiciary plays a role in ensuring accountability by investigating allegations of government misconduct, corruption, and abuse of power (Goodluck, 2020). Courts have the authority to hold public officials accountable for their actions, ensuring that they are answerable to the people they serve. This accountability helps maintain the trust of citizens in their democratic institutions.

Resolving Disputes: In a democracy, disputes are inevitable, whether they involve individuals, businesses, or government entities. The judiciary serves as a forum for the peaceful resolution of these disputes through a fair and impartial legal process. This role contributes to the stability and functioning of a democratic society by providing a legal avenue for addressing conflicts.

Protection of Minority Rights: One of the core principles of democracy is the protection of minority rights. In a system where the majority rules, the judiciary serves as a safeguard against the tyranny of the majority (Sandalow, 2016). Judges are tasked with ensuring that minority groups are not marginalized or discriminated against, even when their views or interests are not aligned with the majority.

Upholding the Constitution: The judiciary is the guardian of the constitution in a democracy. It is responsible for ensuring that all government actions, laws, and policies conform to the constitution's principles and values. This role is essential for preserving the integrity of the democratic system and preventing the erosion of constitutional rights.

The judiciary's roles in a democracy are diverse and interconnected, serving as a bulwark against tyranny, an enforcer of individual rights, a guardian of the constitution, and a check on the powers of

other branches of government. Through its interpretation of laws, protection of individual rights, judicial review, accountability mechanisms, dispute resolution, protection of minority rights, and upholding of the constitution, the judiciary plays a vital role in ensuring that democratic principles thrive and endure. Without a robust and independent judiciary, the very essence of democracy is at risk, making it imperative that we continue to recognize and support the judiciary's pivotal role in democratic governance.

Constitutional Functions of the Judiciary in Nigeria

The judiciary is a vital pillar of any democratic society, tasked with the responsibility of upholding the rule of law and ensuring justice prevails. In Nigeria, a nation with a rich and diverse cultural heritage, a well-defined constitutional framework establishes the judiciary's functions and powers. The following are the constitutional functions of the judiciary in Nigeria, including:

Electoral Dispute Resolution: The judiciary plays a crucial role in Nigeria's electoral process. It has the authority to adjudicate disputes arising from elections, including gubernatorial, legislative, and presidential elections (Okoli, 2018). This function contributes to the credibility and stability of Nigeria's democracy.

Preservation of Separation of Powers: Nigeria's Constitution establishes the principle of the separation of powers among the executive, legislative, and judicial branches of government. The judiciary serves as the guardian of this principle, ensuring that each branch operates within its constitutionally defined limits.

Promotion of Legal Certainty: The judiciary's interpretation and application of laws provide legal certainty, which is essential for economic and social development. Investors and individuals need to have confidence in the legal system for economic growth to occur.

Interpretation of the Constitution: One of the most fundamental functions of the Nigerian judiciary is to interpret the constitution. Article 6(2) of the 1999 Constitution (as amended) affirms the supremacy of the Constitution, and it is the responsibility of the judiciary to ensure that all laws, policies, and actions are in line with it (Anifalaje & Ojo, 2017). This power enables the judiciary to act as a check on the legislative and executive branches.

Protection of Fundamental Rights: The judiciary plays a critical role in safeguarding the fundamental rights of Nigerian citizens. The Constitution, in Chapter IV, guarantees various rights, including the right to life, liberty, and fair hearing. Courts have the authority to hear cases related to violations of these rights and provide remedies to the aggrieved parties (Ogwu, 2019).

Review of Administrative Actions: The judiciary in Nigeria has the power of judicial review, allowing it to review the actions and decisions of the executive and other government agencies to ensure they are lawful. This function is essential in preventing abuse of power and ensuring accountability in the government.

Guardianship of Federalism: Nigeria's federal system of government necessitates a strong judiciary to adjudicate disputes between the federal and state governments. The judiciary ensures the maintenance of a delicate balance between federal and state powers as outlined in the Constitution (Oyewo, 2020).

The Nigerian judiciary is a crucial institution in upholding the rule of law, protecting citizens' rights, and promoting justice in the country. Its constitutional functions provide a framework for ensuring that the principles of democracy are upheld and that Nigeria continues to progress as a nation. However, the challenges it faces, including corruption and inadequate resources, must be addressed to strengthen its capacity to fulfill its constitutional mandate effectively. A robust and independent judiciary is essential for Nigeria's continued growth and development as a democratic nation.

Legal and Institutional Mechanisms Safeguarding Democratic Politics in Nigeria

In Nigeria, a nation with a complex history that has experienced periods of authoritarian rule and political instability, democratic politics are a pillar of government. In order to secure and sustain democratic practices, Nigeria has developed a range of legal and institutional mechanisms. This paper explores these mechanisms, highlighting the importance of their role in safeguarding democratic politics in Nigeria, including:

i. Constitution of the Federal Republic of Nigeria

The Nigerian Constitution, first adopted in 1999, lays the foundation for democratic governance in the country. It establishes the principles of democracy, defines the powers of government institutions, and safeguards fundamental rights and freedoms. Chapter II of the Constitution outlines the Fundamental Objectives and Directive Principles of State Policy, which include principles such as social justice, equality, and the protection of minority rights. Hoffmann & Wallace (2022) added that the constitution also guarantees Nigerians freedom of religion, expression, movement, and assembly and protects them from discrimination based on sex, religion, origin, or political opinions. These principles underpin the democratic ethos of the nation.

ii. Electoral Commission (INEC)

The Independent National Electoral Commission (INEC) is responsible for organizing and overseeing elections in Nigeria. INEC conducts various elections, including presidential, gubernatorial, and legislative elections. It is mandated to ensure that elections are free, fair, and transparent. INEC's commitment to these principles was evident in the 2015 and 2019 general elections, which witnessed significant improvements in the credibility and transparency of the electoral process (Lekorwe, 2016).

iii. The Judiciary

The Nigerian judiciary serves as a vital check on the executive and legislative branches. It interprets the Constitution, resolves disputes, and upholds the rule of law. The Supreme Court of Nigeria, as the highest court in the land, has the ultimate authority to determine legal and constitutional matters, including election disputes. The judiciary's independence is crucial in safeguarding democratic politics, as it ensures that the rights of citizens are protected and that the government operates within the confines of the law (Jillani, 2018).

iv. Political Parties Act

The Political Parties Act regulates the formation, registration, and operation of political parties in Nigeria. It sets out the criteria for party registration, financial transparency requirements, and guidelines for the conduct of primaries and internal party affairs (Jiya, 2014). This legislation helps prevent the proliferation of frivolous political parties and promotes the development of strong, ideologically-driven political organizations.

v. Anti-Corruption Agencies (ACAs)

Nigeria has established several anti-corruption agencies, such as the Economic and Financial Crimes Commission (EFCC) and the Independent Corrupt Practices and Other Related Offences Commission (ICPC), to combat corruption within the government and society at large. Corruption is a significant threat to democracy, as it undermines the integrity of institutions and erodes public trust. These agencies play a crucial role in investigating and prosecuting corrupt practices, thereby safeguarding democratic values. Khaitan (2021) also added that ACAs are believed to play indispensable roles in safeguarding democracy and are often dubbed the fourth branch or the guarantor institutions. They often possess greater expertise, integrity, and accountability than the deficient judicial and executive institutions embedded in the status quo political system.

vi. Human Rights Commissions

The National Human Rights Commission (NHRC) is tasked with promoting and protecting human rights in Nigeria. It investigates human rights violations, educates the public about their rights, and advocates for legal and policy reforms. Ensuring that citizens' rights are respected is fundamental to upholding democracy, and the NHRC serves as a watchdog in this regard.

vii. Media and Freedom of Information Act

A free and independent media is essential for holding the government accountable and providing citizens with unbiased information. Nigeria's Freedom of Information Act grants citizens access to government records and promotes transparency. Additionally, laws protecting journalists and their rights are crucial for ensuring that the media can operate without fear of censorship or persecution (Oso, 2013).

viii. Civil Society Organizations

Civil society organizations (CSOs) in Nigeria play an active role in advocating for democratic reforms, monitoring government activities, and mobilizing citizens. They serve as a bridge between the government and the people, promoting dialogue and ensuring that the government remains responsive to the needs and aspirations of the citizens.

ix Security Forces Oversight

The Nigerian military and police are vital institutions for maintaining law and order. However, there have been concerns about human rights abuses and excessive use of force by security forces. Mechanisms for civilian oversight, such as the Police Service Commission and the National Human Rights Commission, are essential in addressing these issues and ensuring that security forces operate within the boundaries of the law.

Relationship between Judiciary and Rule of Law in Safeguarding Democracy

The judiciary and the rule of law are fundamentally interconnected. The aforementioned interconnection is seen in certain documents that establish intergovernmental groups. The establishment of a robust legal culture is vital for the effective safeguarding of democracy, as it facilitates the provision of procedural mechanisms for assigning accountability in cases of human rights infringements. Within a robust legal framework, individuals tend to interpret events and circumstances through a lens informed by legal principles, viewing each action and inaction as a possible legal conflict that can be addressed through litigation (Okoye, 2014). The indispensability of the rule of law in the enhancement of respect for and promotion of human rights within democratic societies is widely acknowledged.

Based on the preceding discourse concerning democracy, judiciary, and rule of law, it is possible to assert the following with confidence: firstly, the primary objective of a democratic system is the full realisation of all fundamental human rights and liberties; secondly, the extent of a democracy's effectiveness is largely gauged by its ability to advance and safeguard human rights to a significant degree; and thirdly, the presence of the rule of law is essential for upholding and safeguarding the principles of democracy.

Nevertheless, the establishment and manifestation of the collective desires of the populace in a democratic society necessitate more than just adherence to legal safeguards and fundamental rights. Once authority is bestowed on individuals through the democratic process, it becomes their responsibility to execute the desires and preferences of the electorate. The implementation of this will, or the exercise of authority, is likewise subject to legal regulations. The assumption that power derived from the populace is inherently advantageous does not hold true universally. In order to ensure the responsible exercise of such powers, it becomes imperative to impose constraints based on the principles of the rule of law and human rights, akin to any other kind of authority. The distinction between the state and society is crucial, particularly due to the societal origin of power. Emphasizing this distinction is essential, and it can only be achieved through the establishment and enforcement of legal frameworks (Mbunda, 2014).

Judicial Review and the Promotion of Judiciary and Democracy

The concept of judicial review, as commonly understood in legal terminology, pertains to the authority vested in the courts to adjudicate upon the lawfulness (specifically, constitutionality) of an administrative action or legislation (regardless of its source, whether it the legislature or executive branch), as well as to ascertain its conformity with fundamental principles of fairness and equity. The purpose of this clause is to guarantee that the actions of the different organs are in accordance with the provisions outlined in the constitution. The doctrine of judicial review confers upon the courts the authority to adjudicate instances involving disputes on the exercise and extent of governmental powers. It is possible that an administrative body has acted outside its legal authority or is unwilling to fulfill a prescribed obligation (Agbor, 2015). The power in question is commonly employed by judicial bodies to oversee and supervise the activities of other branches of government, thereby guaranteeing a certain level of compliance with the provisions outlined in the fundamental laws of the nation with the majority of nations, the authority to exercise this power is vested with the highest courts possessing appellate jurisdiction.

The lack of judicial independence and the presence of constitutionalism that fosters the principles of checks and balances, separation of powers, and judicial review are significant constitutional deficiencies in Nigeria. The repercussions of these factors are evident in the lack of progress in Nigeria's democratic system and the persistent cultivation of a societal environment that disregards fundamental human rights. In order to provide a solid foundation for Nigeria's governance,

it is imperative that democracy, the rule of law, and the protection of human rights are prioritised. The analysis of the law necessitates approaches that promote the constitutional goals, ideals, and values of the nation, including but not limited to democracy, the protection of human rights, and the preservation of fundamental freedoms (Ghutto, 2012). The responsibility to interpret and enforce the law includes the authority to oversee the conduct and choices of government officials when they infringe upon the rights and freedoms of individuals or are in conflict with any constitutional provision or contrary to the principles upheld within it. The power of judicial review, derived from the mandate to interpret and enforce the law, is seen in the authority of courts to examine the compatibility of legislation, judgements, or actions of government officials with the legal framework of a nation. Judicial review serves as a democratic process employed to safeguard against unwarranted infringements of an individual's rights. The court assumes the role of evaluating the legality of decisions and actions undertaken by government officials.

The judiciary exercises its authority of judicial review to safeguard and enforce the relevant laws of the nation. Furthermore, it is important to note that this mechanism also serves to scrutinise administrative deficiencies and abuses, as individuals who have been adversely impacted by the actions of public authorities are granted the opportunity to contest these acts through legal means. Within the framework of a constitutional democracy, the judiciary assumes the crucial responsibility of serving as impartial arbiters and ultimate guardians of individual rights. Furthermore, these entities contribute to the enhancement of democratic values by upholding the principle of legal equality and establishing a platform for the scrutiny and contestation of instances of power abuse. Courts are entrusted with the responsibility of interpreting and enforcing laws, enabling them to assess the legitimacy of executive and legislative actions. This ensures that these branches of government not only adhere to their constitutional mandates, but also actively promote the democratic principles and goals outlined in the Constitution (Barber, 2011). The power of judicial review, which is intrinsically embedded in the constitutional authority of judges, grants them the ability to assume a prominent and essential position in the promotion and safeguarding of a democratic ethos. The primary functions of this institution include assessing the legitimacy of decisions and actions undertaken by individuals holding public office, acting as a mediator to resolve various types of conflicts, and most significantly, overseeing and preventing the misuse of governmental authority. The authority of judicial review is not only applicable within the context of Nigeria's democratic society, but also serves as a crucial mechanism for advancing and safeguarding human rights, democracy, and the principles of the rule of law.

Relationship between the Judiciary and Democracy in the Political System of Nigeria

The relationship between the judiciary and democracy is a fundamental aspect of any democratic political system. In Nigeria, a country that has experienced both military rule and democratic governance, this relationship has been a topic of significant debate and scrutiny. The Nigerian judiciary plays a crucial role in upholding the principles of democracy, ensuring the rule of law, and safeguarding citizens' rights. According to Chukwuma (2018), in a democratic system like Nigeria, the judiciary serves as one of the three pillars of government, alongside the executive and legislative branches. Its primary function is to interpret and apply the law, resolve disputes, and protect the rights and freedoms of citizens. The judiciary acts as a check on the powers of the other branches, ensuring that they adhere to the constitution and respect the rule of law. This separation of powers is essential for the functioning of a healthy democracy. However, the independence of the judiciary is crucial for maintaining a vibrant democracy. Judges must be free from political interference and influence to make impartial and fair decisions. In Nigeria, the Constitution guarantees the independence of the judiciary, but this independence has often been threatened by political pressures and corruption. The appointment and removal of judges, as well as their conditions of service, can impact their independence. To strengthen democracy in Nigeria, it is essential to ensure that the judiciary remains independent and immune to political manipulation (Ozohu-Suleiman, 2020).

One of the key functions of the judiciary in a democracy is judicial review. In Nigeria, the judiciary has the authority to review and invalidate laws and actions of the executive and legislative branches if they are found to be unconstitutional. This power is vital for protecting the rights of citizens and ensuring that the government acts within the bounds of the constitution. The judiciary's

ability to check the actions of the government is a cornerstone of democratic governance in Nigeria (Okonkwo, 2019). Nonetheless, elections are a fundamental aspect of democracy, and their integrity is essential for a democratic system to thrive. The Nigerian judiciary plays a crucial role in resolving electoral disputes, which have been a recurring issue in the country's democratic history. The judiciary's impartiality and effectiveness in adjudicating election-related cases are critical for ensuring that the will of the people is upheld and that elections are free and fair. However, the relationship between the judiciary and democracy in Nigeria is a complex and dynamic one. While the judiciary plays a vital role in upholding democratic principles and protecting citizens' rights. A strong and independent judiciary is essential for the consolidation and advancement of democracy in Nigeria, ensuring that the country continues on the path of democratic governance.

Conclusion

It is noteworthy that democracy and human rights have become universally recognized legal entitlements. It is crucial to acknowledge that the fundamental principles and values of human rights and democracy have been explicitly articulated in various international instruments. The judiciary, as per constitutional mandate, should embrace a more expansive and inclusive understanding of the term 'law' to encompass international legal principles. Furthermore, it is imperative for judges to adopt a strong stance by incorporating human rights concepts into their rulings, particularly in a democratic society where constitutionally accepted democratic norms should serve as their guiding framework. Nevertheless, the preservation of a robust democracy heavily relies on the autonomy of the judiciary, as it assumes a pivotal function in the resolution of election conflicts, a persistent concern throughout the nation's democratic trajectory. Therefore, it is imperative that judges maintain independence from political intervention and influence in order to render unbiased and equitable judgements. The application of judicial review extends beyond the confines of Nigeria's democratic society, encompassing a vital instrument for the promotion and protection of human rights, democracy, and the ideals underpinning the rule of law.

Recommendations

1. The paper therefore recommends a redefinition of the countries philosophies and values that will be suitable and be in consonance with the peculiarity of Nigeria environment. There is the need for re-alignments of the divergent interest into a common political values and culture that would be generally accepted by all Nigerians. That is, the people of Nigeria must develop a code of conduct or governance for both private and public office holders at all levels of government. This should be in form of democratic values and ethos that will be in line with the accepted political values and cultures in Nigeria.
2. The establishment of an independent and incorruptible and virile political institution that would be responsible for formulating and implementing and monitoring the re-definition and realignment of Nigeria’s divergent political values into a common unit acceptable by all. Government must stop meddling into the affairs and running of these institutions while the umpires must apply global best practices in running the affairs of these institutions. In addition, the right structures and people must be put in place.
3. For democracy to thrive, Nigerian judges should be competent to embrace the concept of judicial activism. This requires moving away from the antiquated and out-dated practice of defining their role technically and narrowly. They should interpret the Constitution and other relevant human rights laws so as to promote justice, rule of law, judiciary and democracy in the country.
4. Government should consider a review of the constitutional provisions on democracy and political participation in order to make adequate provisions not only for political participation, but for mobilization of the people to participate as well as democratization of the political parties.

References

Adegboruwa, E. O. (2021). Role of judiciary in development of democracy. The Guardian. Pp. 3

Agbo, A. (2018). Giving Strength to Democracy, Tell Magazine. Special Edition, Pp. 6 – 7.

Agbor, A. (2015). The Role of the Judiciary in the Promotion of Democracy and Human Rights in Cameroon. *African Journal of Legal Studies*, 8(1-2), 145-173.

Anifalaje, S. O., & Ojo, M. (2017). The Judiciary and Nigeria's Democracy. In The Palgrave Handbook of African Philosophy (pp. 355-371). Palgrave Macmillan.

Asaju, K. (2015). Democratic governance, federal character principlesand national development in Nigeria. *Review of Public Administration and Management*, 4(8), 172-187.

Barber, N. (2011). Prelude to the Separation of Powers. *Cambridge Law Journal*, 60, 59–88,

Chukwuma, I. (2018). The Role of the Judiciary in a Democratic Polity: A Focus on Nigeria. International Journal of Humanities and Social Science, 8(7), 1-11.

Edubirdie (2022). British Imperialism in Nigeria and Its Impact on the Nigerian Legal System.Edubirdie, https://edubirdie.com/british-imperialism-in-nigeria-and-its-impact-on-the-nigerian-legal-system/

Efobi, N., & Ekop, N. (2021). Legal systems in Nigeria: overview. Thomson Reuters, UK Practical Law. https://uk.practicallaw.thomsonreuters.com/

Franck, T.M. (2012). The Emerging Right to Democratic Governance. *American Journal of International Law*, 86, 46–91.

Ghous, G. & Anjum, Z.B. (2014). Judiciary and Democratic Process in Pakistan: A Study of Supreme Court Judgments (1988-2000). *Asian Journal of Humanities and Social Sciences (AJHSS)*, 2(3), 26 – 34.

Ghutto, P. (2012). The Rule of Law, Human and Peoples' Rights and Compliance with Regional and International Agreements and Standards by African States. African Forum for Envisioning Africa, Nairobi, Kenya, 26–29.

Goodluck, J. (2020). The judiciary as a pivot for good governance. FCT High Court of Justice, Abuja, pp. 1-19

Hoffmann, L., & Wallace, J. (2022). Democracy in Nigeria. Chatham House Publishers, The Royal Institute of International Affairs

Ikram, A. (2011). Pakistan 1998-2003. Islamabad: Pakistan Futuristic Foundation.

Jillani, T. H. (2018). Judicial review and democracy. *The Supremes*, 44(2), pp. 50-53

Jiya, G. (2014). Strategies for (Re) Building Democratic Institutions to Achieve Credible Elections in Nigeria. *Elsevier*, 19, 2512287

Kari, A.G.U (2013). The role of youth in sustaining democratic values in Nigeria. Leadership. http://leadership.ng/news/role-youth-sustainingdemocratic-values-nigeria

Kaur, S. (2012). Challenges of democratic sustenance in Nigeria. Retrieved from http://www.cdd.org.uk/resources/.../nigeriandemocraticsustenance.htm

Khaitan, T. (2021). Guarantor Institutions. *Asian Journal of Comparative Law*, 16, S40–S59.

Lekorwe, M. H. (2016). The role and status of the Independent Electoral Commission. *Journal of African Elections*, 5(2), 62-80.

Mbunda, L. (2014). Securing Human Rights Through the Rule of Law in Tanzania. In Tiyambe Zeleza, P. and McConnaughay, P.J. (Eds). *Human Rights, The Rule of Law, and Development in Africa*. Philadelphia, pa: University of Pennsylvania Press, pp. 144–156.

Mian, A. (2004). A judge speaks out. Karachi: Oxford University Press.

Ogerie, S.O. (2017). *Fashioning the constitution of federal democratic system.* Pitman

Okonkwo, A. C. (2019). Judicial Review in Nigeria: A Critical Appraisal. *International Journal of Law and Legal Studies*, 7(1), 43-52.

Okoye, A.O. (2014). The Rule of Law and Sociopolitical Dynamics in Africa. In TiyambeZeleza, P. and McConnaughay, P.J. (eds), *Human Rights, The Rule of Law, and Development in Africa*. Philadelphia, pa: University of Pennsylvania Press, chapter 4, p. 72.

Ololobou Y.S.P (2014). Man and his Political Life, in Bosimo, G.Gotep, M.G.Zwalchir, R. and Obanya, O.A. (Eds) Current Trends in Social Studies Education. Pankshin Jos: Academic Trust Fund

Ozohu-Suleiman, Y. I. (2020). The Independence of the Nigerian Judiciary and Its Impact on Democracy. *African Journal of Law and Criminology*, 3(1), 1-16.

Okoli, F. C. (2018). The Role of the Judiciary in Nigeria's Democracy. Journal of African Law, 62(2), 217-235.

Ogwu, C. (2019). Judicial Independence and Democracy in Nigeria: Problems and Prospects. International Journal of Humanities and Social Science Research, 5(2), 1-9.

Oyewo, S. O. (2020). The Rule of Law, Democracy, and the Judiciary in Nigeria. Journal of Social Science for Policy Implications, 8(1), 1-9.

Oso, L. (2013). Media and democracy in Nigeria: A critique of liberal perspective. *New Media and Mass Communication*, 10, 13-23

Samuel, A. (2011). Democratic challenges in Nigeria and steps towards achieving the vision. *Kubanni Journal of Arts & Social Science*, 1(1), 14-22.

Spagnoli, F. (2013). Homo Democraticus – On the Universality and the Not So Universal Possibility of Democracy and Human Rights. Cambridge: Cambridge Scholars Press.

Stokes, S. (2016). Political parties and democracy. *Annual Review of Political Science*,12(9), 243-267.

Sandalow, T. (2016). Judicial protection of minorities. *Mich. L. Rev*., 75, 1162-95.

Wade, E. & Bradley, A. (2015). Constitutional and Administrative Law. (10th. Ed.) Longman, London.

pp. 238-243 https://dx.doi.org/10.4314/johasam.v7i1.29

Antibacterial Activity of Neem (*Azadirachta indica*) on Staphylococcus Aureus

Bright Chukwudi Francis
Science Laboratory Technology Department
Delta State Polytechnic, Ogwashi-uku, Delta State
E-mail: brighto4real@gmail.com
Phone No.: 08064955110

Abstract

Plants have many bio-active compounds which are potential medicinal agents. Herbal medicines are popular in developing countries, but of recent, there has been an increase in the use of herbal medicines in the developed world. Plants provide an alternate source for the search of neem treatments. There are plenty of plants in traditional medicine which have protective and therapeutic properties. Most likely plants will continue to be valued source of neem molecules which may after possible chemical manipulation; provide new and improved drugs. Bacteria resistance to antibiotics is a major problem for clinicians and therapeutic industry and great efforts are been made to screen wide varieties of medicinal plants from the traditional system of medicine with the hope of getting some newer, safer and more effective agents that can be used to fight infectious diseases. Different parts of the neem plant have medicinal properties. The leaf, bark, oil, flower, fruit and seed exhibit great properties which include antiallergic, antifungal, antibiotic, antidermatic, antibacterial, anti-inflammatory, insecticidal, larvacidal, antimalarial, anti-ulcer and other biological activities. The neem leaf extracts where gotten by solvent extraction method while the anti-bacterial activity was tested using the Kirby Bauer sensitivity test. The ethanolic extract exhibited better and stronger anti-bacterial activity than the aqueous extract. This shows that neem plant has medicinal properties.

Keywords: neem plant, anti-bacterial activity, ethanolic extract, medicinal properties.

Introduction

Plants have many bio-active compounds which are potential medicinal agents. Herbal medicines are popular in developing countries, but of recent, there has been an increase in the use of herbal medicines in the developed world (Mogal et al., 2018). Plants provide an alternate source for the search of Neem treatments. There are plenty of plants in traditional medicine which have protective and therapeutic properties (Alzohairy, 2016). Most likely plants will continue to be valued source of neem molecules which may after possible chemical manipulation; provide new and improved drugs (Pauler et al., 2019).

Bacteria resistance to antibiotics is a major problem for clinicians and therapeutic industry and great efforts are been made to screen wide varieties of medicinal plants from the traditional system of medicine with the hope of getting some newer, safer and more effective agents that can be used to fight infectious diseases (Zingne et al., 2019).

Different parts of the Neem plant have medicinal properties. The leaf, bark, oil, flower, fruit and seed exhibit great properties which include antiallergic, antifungal, antibiotic, antidermatic, antibacterial, anti-inflammatory, insecticidal, larvacidal, antimalarial, anti-ulcer and other biological activities (Campos et al., 2016). Herrera- Calderon et al. (2019) reported that neem has great antimicrobial activity and it contains 35 biological active compounds. They also stated that the leaf juice and things are usually used to clean the teeth and also used as a tonic. It has been in report that people of India place the leaves on their beds, books, cupboards to control bugs (Banerjee et al., 2012).

Antimicrobial activity of Neem plant

The neem plant extracts and its different constituents play important roles in the inhibition of several microbes which include bacteria, fungi and viruses. Divya Kumari et al. (2019) tested the antibacterial activity of the Neem plant extracts of methanol, hexane and chloroform on *Escheria coli, proteous vulgaris, klebsiella pneumoniae, Bacillus subtilis, Micrococcus luteus, Streptococcus, faecalis and Enterococcus faecalis.* They are reported that the methanol extract was most effective chloroform was reasonable effective and hexane showed the least antibacterial activity. According to Mafou-Sonhafouo et al. (2019), the stem and back of the Neem plant showed tremendous antibacterial activity against *Klebsiella, Serratia* species and Streptococcus. Shah et al. (2019) reported in their work that the Neem plant methanolic extracts showed antibacterial activity against *vibro cholerae* while chloroform extracts had activity against *Escherichia coli*, *Bacillus subtilis*, *Enterococcus faecalis* and *Streptococcus faecalis*. The seed extracts minimum inhibitory concentration (MIC) was lower compared to the leaf extracts when they were tested against species of *Trichophyton* and *Epidermatophyton floccosum*. The antifungal activity of the neem plant has been tested on different pathogens with various neem plant part extracts with different solvents such as ethanol, water and ethyl acetone, the organisms include *Microsporum gypsum, Aspergillus terrus, Candida albicans, Aspergillus niger, Aspergillus fumigatus*, and *Aspergillus flavus* by using different concentrations of the extracts, the results showed that the leaf extracts had the best activity on the tested pathogens as shown in table 1 below. This antifungal activity increased with increase in concentration (Kalid et al., 1989; Blum et al., 2019; Ziladi et al., 2019; Singaravelu et al., 2019; Jerobin et al., 2015; Bodiba et al., 2018; Mistry et al., 2015).

Table 1: Antibacterial activity in *vitro of Azadirachta indica* reported in

Azadirachta indica	**Microorganism**	**MIC**	**MBC**
oil	Hclicobacter pylori	25 -51 ug/ml.	43-68 tig/ml.
Leaves ethanolic extract	Methicillin-resistant *Staphyhfoccus aureus* *Staphylococcus aureus* Enterococcus faecalis	31.25- 125mg/mL	250-500 mg/mL
Bark extract	Pseudomona aeruginosa Pseudomona mirabilis	500- 1000 ug/ml.	n.d.
Neem oil nanoemulsion	*Vibrium vulnificus*	6 mg/mL	n.d
Leaves ethanolic extract	*Streptococcus mutans* *Streptococcus mutans*	6.25 mg/mL 125 ug	n.d. 250 ug
Leaves methanol extract	*Enterococcus faecalis* *Staphylococus aureus* *Candida albicans*	500 ug 250 ug n.a.	1 ing 500 ug n.a.

MIC: minimum inhibitory concentration; MBC.: minimum bactericidal concentration; n.d.: not determined; n.a: no activity

Adapted from Herrera-Calderon *et al* (2019)

Biological Compounds of Neem Plant

The plant contains different bio-active compounds which exhibit different activities. These phytochemicals are listed in table 2 below.

Table 2: Bioactive compounds *of Azadirachta indica* reported in scientific literatures

No.	Compound Name	Source	Biological activity
1	Nimbidin	Seed oil	Anti- inflammatory
2	Azadirachtin	Seed oil	Antimalarial
3	Nimbin	Seed oil	Spermicidal.
4	Mahmoodin	Seed oil	Antibacterial
5	Margolone, mergolonone and isomargolonone	Bark	Antibacterial
6	Cyclic trisulphide and cyclic tetrasulphide	Leaf	Antifungal
7	Gedunine	Seed oil	Antifungal
8	Polysaccharides	Bark	Anti-inflammatory.
9	NB-2 peptidoglucan	Bark	Immunamodulatory.

Adapted from Herrera-Calderon et al. (2019)

Medicinal Properties of Neem Plant

The research work carried out by Chaudan et al. (2015) to assess the antibacterial action of the leaf, seed, bark, and fruit extracts of Azadirachta indica (Neem plant) on microbes obtained from the month of adults, showed that the leaf and bark extracts had antibacterial activities against all the bacteria isolated and tested while the fruit and seed extracts showed antibacterial actions only at greater concentrations. Dua et al. (1995) affirmed that the leaf extracts of the neem plant had the best antibacterial activity which confirmed the presence and strength of the bioactive compounds and also proved the usage of the plant in major health maintenance.

Antifungal Activity of Neem plant

Jerobin et al. (2015) tested the antidermatophytic activity of the neem leaf ethanol and aqueous extracts on dermatophytes from 88 clinical cases by using the agar dilution technique. The results showed the ethanolic extract had better activity compared to the aqueous extracts. The methanolic and the acetonic extracts of the neem plant were also tested for their antifungal activities against two fungal strains, namely; Aspergullis fumigates and Aspergillus niger by Kelmanson et al. (2000). The results showed that the methanolic extract gave a better antifungal activity compared to the acetonic extracts. They also reported that the neem plant exhibit great medicinal properties. Parts are like the leaf, flower, bark, fruit and seed contain different active chemicals which perform different functions (Alzohairy, 2016; Biswas, et al., 2002).

Some of the medicinal properties of the Neem plant are listed in table 3 below.

Table 3. Tradional uses from *Azadirachta indica* reported in research articles.

Leaf	Leprosy, diuretic, malaria, piles, pyrexia, chicken pox, smallpox and remove toxins, cleanse blood.
Root	Used as a disinfectant, antimicrobial and provocative diseases.
Seed	Mosquito coils, Rheumatism, anthelmintic, antileprotic
Seed oil	Used as an Antiseptic for ulcers and useful for skin diseases like ringworm and scabies, fever and leprosy, and for antibacterial use.
Fruit	Fruit extracts of neem beneficial for Insecticidal, diabetes, constipation and anthelmintic
Bark	Use as a cure for fever
Stembark	Anti-cancerous
Flower	Cough and non-toxic
Young branch	Used for tooth diseases

Adapted from Herrera-Calderon et al (2019)

Mechanism of action of the Bio-active compounds

Different parts of the neem plant exhibit antimicrobial activities against microbes through inhibiting the growth of the microbes by breaking down their cellular. It has also been shown that the free radical hunting action of neem is due to the presence of *Azadirachtin* and *nimbolide* (Claube et al., 2014).

Methodology

The leaf extracts were obtained as described by Ugwu et al., (2017), while Kirby Bauer sensitivity test was used for the antibacterial test activity of the neem plant. Traditional cultural techniques were used to culture, isolate and identify the bacterial isolates. Freshly collected neem leaves were allowed to dry under room temperature for 5 days in the laboratory after which 50grams of the dry leaves were placed in 50ml of ethanol and sterile distilled water respectively for 24hours. These were then filtered with filter paper to remove the residue. The filtrate was then placed in the water bath distillate it in order to increase the concentration of the extracts. Media used for this study is nutrient agar, it was used to culture the test organism (*Staphylococcus aureus*) obtained from the saliva samples of eight (8) volunteers. The saliva samples were collected with sterile glass bottles. After the preparation of the culture medium, it was dispensed into petri dishes containing an aliquot of the diluent sample which were then incubated for 24 hours at 37^{o}C. The pour plate method was used for culturing the bacterial species. The pure cultures were obtained by streaking the individual colonies on fresh nutrient agar plates. Morphological and biochemical tests were then carried out to identify the organism.

Filter paper discs were prepared from sterile filter paper and soaked in the neem plant leaf extracts of ethanol and sterile distilled water for 24hrs. Thereafter, fresh plate of pure cultures were prepared again to test for the antibacterial activity of the neem plant leaf extracts. The soaked filter paper dishes were placed on the agar containing the pure cultures and then incubated for 24hrs at 37°C.

Results and Conclusion

Table 4: Biochemical Test and sensitive test on Staphylococcus species

Sample	Catalase Test	Coagulase Test	Aqueous extract	Ethanol extract (Zone of inhibition) cm
A	+	-	Non	19
B	+	-	Non	23
C	+	-	Non	17
D	+	-	Non	21
E	+	-	Non	24
F	+	-	Non	2.5
G	+	-	Non	22
H	+	-	Non	25

From the results obtained from this study, it was clear that the antibacterial activity of the neem plant leaf extracts of ethanol exhibited higher zones of inhibition compared to aqueous leaf extracts which had little or no effect on the organisms. The alcohol extracts had stronger effect on the bacterial isolates. This further confirms that the neem plant contains medicinal bio-active compounds.

References

Alzohairy, M.A. (2016). Therapeutic role of *Azadirachta indica* (Neem) and their active constituents in diseases prevention and treatment. *Evid Based Complement Alternate Med*; 7382506.

Ara, I., Siddiqui, B.S., Faizi, S., & Siddiqui, S., (1989). Structurally novel deterpenoid constituents from the stem, bark of *Azadirachta indica (Meliaceae). J Chem Soc Perkin1*, 1(2), 343-5.

Banerjee, S; Kim,. Shariff, M; Khatoon, H., & Yusoff, S.M.(2012). Antibacterial activity of Neem (*Azadrachta indica*). Leaves of Vibrio spp. Isolated from cultured shrimp. *Asian J. Animal Veterinary ADV*, 3923: 1-7.

Bhargava, K.P., Gupta, M.B., Gupta, G.P., & Mitra, C.R. (1970). Anti-inflammatory activity of saponins and other natural products. *Indian J Med Res.* 58(6):724.

Biswas, K., Chaltoppadhyay., I., Banerjee, R., & Bandyopadhyay, U. (2002); Biological activities and medicinal properties of Neem (*Azadirachta indica*). *Current Science*; 82(11):1336-45.

Blum, F.C., Singh, J., & Merrel, D.S. (2019). In vitro activity of neem (*Azadirachta indica*) oil extract against *Helicobacter pylori. J Ethnopharmacol*: 236-43.

Bodiba, D.C., Prasad, P., Srivastava, A., Crampton, B., & Lall, N.S. (2018). Antibacterial activity of *Azadirachta indica, Pongamia pinnata, Psidium guajava* and *Magnifera Indica* and their mechanism of action against *Streptococcus mutans*. *Pharmacogn Mag*. 14(54):76-80

Campos, E.V; de Oliveira, J.L; pascoli, M, de lima, R., & Fraceto, L.F. (2016). Neem oil and grop protection from now to the future. *Front plant Sci*;7: 1494.

Chaube, S.K., Shrivastav, T.G. Timari, M., Prasad, S., Tripathi, A., & Pandey, A.K. (2014). Neem (*Azadirachta indica*) leaf extract deteriorates oocyte quality by inucing Ros-mediated apoptosis in mammals. *Springerplus*. 3:464.

Chauhan, S., Jindal, M., Singh, P., & Teuiari, S. (2015). Antimicrobial potential of aqueous, methanolic and ethanolic extracts of *Azadirachta indica* against bacteria pathogens isolated from urinary tract infection patients. *Int J current Microbiol App Sci.* 4(7), 211-4.

Divya Kumya, P., Khijimatgar, S., Shenoy, S.M., Chomdhury, A., Lynch, E., And Chomdhury, C.R.(2019). Antibacterial activity of new atraumatic restorative treatment materials Incorporated with *Azadirachta indica* (Neem) against *Streptococcus mutans. J Oral Bio Ganiofac Res*. 9(4), 321-5.

Dua, V.K., Nappal, B.N., & Sharma, V.P. (1995). Repellent action of Neem cream against mosquitoes. *Indian J Malarial. 32*(2), 47-53.

Herrara- calderon, O; Ejazk; Wajid, M., Shehezade, M. C., Tinco-Jayo, J.A., Enciso-Roca, E., Franco-Quino, C., Yuli-pasadas, R.A., & Chumpitazcerrate, V. (2019). *Azadirachta India*: *Antibacterial activity* of Neem against different strains of bacterial and their active constituents as preventive in various diseases. *Pharmacogn J*, 11 (11),1597-1604.

Jerobin, J. Makwana, P., Suresh Kumar, R.S., Sudaramoorthy, R, Mukherjee, A. & Achandrasekaran N. (2015). Antibacterial activity of Neem nanoemulsion and its toxicity assessment of human lymphocytes in vitro. *Int J Nanomedicine. 10*(1), 77-86.

Jones, I.W., Denholm, A.A., Ley, S.V., Lovel, H., Wood, A., & Sinden, R.E. (1994). Sexual development of malaria parasites is inhibited in vitro by the neem extract *Azadirachtin* and its semi-synthetic analogues. *FEMS Microbial Lett.* 120(3), 267-273.

Kelmanson, J. E., Jager, A.K., & Van Stadan, J., (2000). Zulu medicina plants with antibacterial activity. *J Ethanpharmscol. 69*(3), 241-6.

Khalid, S.A., Duddeck, H. & Gonzalez-sierra, M., (1989). Isolation and characterization of an antimalerial agent of the neem tree *Azadirachta indica*. *Journal of Natural products*. 52(5):922-7.

Mafou-Sonhafouo z V., Kana, J.R., & Dongmo, K. (2009). Effects of graded leaves of *Azadirachta indica* seed oil on growth performance and biochemical profiles of broiler chickens. *Vet Med Sci.* 5(3), 442-50.

Mahapatra, S., Young, C.Y., & Kohli, M. (2012). Antiangiogenic effects of and therapeutic targets of *Azadirachta indica* leaf extract in endothelial cells. *Evid Based Complement Alternat Med*., 303019.

Mistry, K.S., Sanghvi, Z., Parmar, G., SHAH, S., & Pushpalatha, K. (2015). Antibacterial efficacy of *Azadirachta indica, Mimusops elengi* and 2% CHX on multispecies dentinal biofilm. *J. Consrv Deut*.18(6), 461-6.

Moga, M.A. , Balam, A. , Anastasia, C.V. , (2018). Domienescu, O.G., Necoloiu, C.D., & Gavri, C., (2018) An overview on the anticancer activity of *Azadirachta indica* (Neem) in gynaecological cancers. *Int J Mol Sci*, 19 (12), 3898.

Paula, A.R., Ribeiro, A., Lemos, F.J.A., Silva, C.P., & Samuels, R.I.(2019). Neem oil increases the persistence of the Enthomopathogenic fungus *Metarhizium anisopliea* for the control of *Aedes aegyptic* (Diptera; culicidae) larvae. *Parasite Vectors*. 12(1), 163.

Shah, F.M., Razaq, M., Ali, A., Han, P., & Chen, J. (2017). Comparative role of Neem seed extract, moringa leaf extract and imidacloprid in the management of wheat aphids in relation to yield losses in Pakistan. *PLOS one 12*(9),0184639.

Sharma, V.N., & Saksena, K.P. (1959). Sodium-nimbidinate in vitro study of its spermicidal action. *India J Med Sci*., 13,1038.

Singaravelu, S., Sankarapilla, J., Sasidharn Chandra Kumar, A., & Sinha, P., (2019). Effect of *Azadirachta indica* crude bark extracts concentrations against Gram-positive and Gram-negative bacterial pathogens. *J Pharm Bioallied Sci.* 11(1), 33-7.

Ugwu, C. C., Ezeonu, I.M., Mbah-Omeje. K. N., Agu, C.C., & Onuorah, S.C. (2017). Evaluation of the Antimicrobial Effects of *Syzygium aromaticum* (Clove) and Garcinia kola (Bitter kola) extracts singly and in Combination, on some Bacteria. *World Journal of Pharmacy and Pharmaceutical Sciences*, 6(2),1-13.

Zichadi, M.A.H., Rahman, M., Talukder, S., Hasan, M.M., Nahar, S., & Sikder, M.H. (2019). Antibacterial efficacy of ethanolic extract of camellia and *Azadirachta indica* leaves on methincillin- resistance *Staphylococcus aureus* and shiga-toxigenic *Escherichia Coli. J Adv Vet Anim Res*, 6(2), 247-52.

Zingue, S., Kamga Silihe, K., & Fouba Bourfane, I. (2019). Potential of regular consumption of Cameroonian Neem (*Azadirachta indica*) oil for prevention of the 7,12-Dimethylben (a) anthracene induced breast cancer in high-fat/ sucrose-fed wistar rats, *Evid Based Complement Alternate Med*. 2031460.