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Assessment of Heavy Metal Contents of Oyster (*Crassostrea virginica*) and Associated Health Risks in Rivers State

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Abstract
The health risks associated with the consumption of Oyster (Crassostrea virginica) sourced from three different communities in Rivers State (Bille, Okirika and Abonnema) were investigated. The collected samples were brought to the laboratory and processed further for analysis. The Oyster was scrubbed and cleaned with double distilled water. The soft tissue of each Oyster was brought out from its shell, rinsed with double distilled water and dried in an oven at 70^0C to a constant weight. The dried sample was acid digested and an aliquot aspirated into an Atomic absorption spectrophotometer (PG instrument AA500) to determine the concentrations of Zn, Cd, Cr, Cu and As which was then used for calculating the health risks accruable from its consumption. The results revealed that these metals were bio-accumulated by the Oyster at a concentration that is lower than the maximal permissible limit by FAO/WHO and showed no statistically significant difference ($p > 0.05$) at the sourced locations. Health risks analysis revealed that the EDIM and HRI were all less than unity (EDIM < 1 and HRI < 1) and indicates that no undue health issue may arise by consuming the Oyster. Similarly, the THQ and HI were all below 1 (THQ < 1 and HI < 1) and implies that there is no possibility of developing non-carcinogenic diseases or systemic problem and health hazard. The overall result has shown that the sourced Oyster can pose no health danger to the population exposed to these metals via consumption.

Keywords: Heavy metal contents, oyster, health Risks assessment.

INTRODUCTION
The edible oyster, (Crassostrea virginica) locally called 'Mgbe' is one of the common sea foods of the Kalabari riverine communities of Rivers State. It is usually picked by coastal families who remove them from their shells and market them either in dry or fresh forms as a major source of

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income and livelihood (Biswas et al., 2013). Oysters are sedentary as filter feeders in mangrove habitat found in coastal waters. This species is mostly reared in estuarine zones where natural productivity is high, thus ensuring its development. However, they can be cultured outside their habitat (Osuna- Martinez et al., 2010 & 2011; Vazquez- Boucart et al., 2014). Literature has shown that this natural habitat for Oyster species (water bodies) are being continuously exposed to pollutants including heavy metals from natural and human activities that spill out along rivers leading to the estuary (Paez-Osuna et al., 1991). Moreover, several studies indicate that anthropogenic activities such as mining (Cadena- Cadenas et al., 2009), agriculture, aquaculture (Parez-Osuna et al., 2003) and urbanization are sources of diverse heavy metals. Garcia –Rico et al (2001) revealed that agriculture contributes the highest to the heavy metal burden in the habitat of Oysters. Pare-Osuna and Osuna Martinez, (2015) also agreed that anthropogenic activities of man is one pf the main sources of heavy metal leached from soil and rocks to aquatic systems (Talaue-McMans, 2001). Urbanization and industrialization affect the flora and fauna as well as Oyster species of this region. Thus, various types of pollutants are being introduced into the coastal water of Bille, Okrika and Abonnema, among which are different heavy metals like Cd, Cu, Pb, Zn and Fe which are of great concern to the environment and human health (Pattanaik et al., 2006).

There are multifarious industries like oil and gas, chemical, plastic, pharmaceutical and food near the lower part of the estuary. The discharge of these industrial effluents, from printing, dying oil refineries, coat fouling paints at the bottom of boats, trailers and ships, also release heavy metals. These non-biodegradable heavy metals are transferred to the sediments and coastal water and accumulate in the organism living or feeding on it. Oysters also absorb heavy metals and these may enter the human system through consumption of contaminated edible Oyster leading to harmful consequences. However, Oyster is associated with numerous health benefits such as lowering homocysteine levels (which is linked to heart disease), as well as reducing the risk of diabetes, depression, osteoporosis, and some cancer-related conditions. Oyster contain large amounts of minerals including selenium which works with vitamin E as an antioxidant that fights free radicals (Jones, 1926) and contain zinc, a key nutrient in sperm production and aphrodisiac (Akinloye et al., 2011).

This bivalve organism (Oyster) has been reported to be susceptible to metal accumulation, and, therefore, are ideal sentinel for assessing environmental pollution along tropical and subtropical coasts. This view is in agreement with the opinions of Kanthai et al., (2014) and Bray et al. (2015) who reported individually the use of Oyster as biomarkers for monitoring metal contaminants in aquatic system. A similar report was given by Ochoa *et al*, (2013) and Sarong et al., (2015) after determining the presence of high levels of Pb, Cd, and Zn in the body tissue of *C. gigas* harvested from the estuary of Lamn Yong River, Indonesia. Furthermore, Berges-Tiznado et al., (2013) and Jara-Marini et al., (2013) agreed that these organisms have the potential to bioaccumulate metals. Vazquez-Boucard et al., (2014) also recorded the bioaccumulation of Zn, Cd, and Pb by these bivalve organisms to a level that exceeded maximal tolerance level recommended by a constituted authority as the legal limit for safety.

These bioaccumulated metal pollutants, when consumed by man, can cause an undue health-related problem of public health concern. Oyster can be a vector of these toxic metals for humans because it is commonly consumed raw by some people. However, in Nigeria, little or no attention has been given to heavy metal concentrations in this edible seafood as regards their source. There are few studies on the heavy metal content of some species of Oyster, which requires further studies. In other words, there is a paucity of information available on metal concentrations in this seafood. Furthermore, health risk assessment via consumption is also lacking. It is in view of the above that this study investigated heavy metal contents of Oyster and possible health risk that may arise from their consumption.

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MATERIALS AND METHODS

Sample Collection and Sampled Areas

The Oyster was collected from three different sites in Bille, Okirika and Abonnema into clean polythene bags and brought to the Pharmacy Laboratory of the Rivers State College of Health Science and Management Technology, Port Harcourt. Bille, Okirika and Abonnema are located in Degema, Walga and Akuku –Toru local government areas (LGAs) of Rivers State, Nigeria. These LGAs are the fishing hub in the State and also host numerous oil companies in Nigeria. Oil spillage, dumping of refuse and industrial effluents are common sights in these areas. Sometimes contaminated wastewater in the form of runoff empties into the rivers from which the Oyster was sourced. The estuary originating from these LGAs empties into the Atlantic Ocean through the Sombrero River.

Pretreatment and Washing of Samples

After collection, samples were brought to the laboratory and processed further for analysis. The Oyster was scrubbed and cleaned with double distilled water before the shells were broken to bring out the tissues. The soft tissue of each Oyster was rinsed with double distilled water and dried in an oven at 70^0C till a constant weight was achieved.

Acid Digestion Method (Aqua Regia)

A total of 100mL of H_2SO_4, HNO_3 and $HClO_4$ in the ratio of 40%:40%:20% (2:2:1) were mixed. 1gm of the dried tissue was accurately weighed and digested with a 2mL of the mixed acid to each of the samples in a Kjedah flask. The samples were then digested in a fume cupboard with a hot plate until white fumes appeared. After that, the solution was then cooled, filtered and transferred into a 100mL volumetric flask and made up to mark with distilled water, and an aliquot aspirated into the MP-AES Agilent 4210 machine to determine the amount of Zn, Cd, Cu, Cr and As present in the sample.

Health Risks Assessment

The potential health risks associated with the consumption of Oyster were determined based on estimated daily intake of metal (EDIM), Health risk index (HRI), target hazard quotient (THQ) and hazard index (HI).

Estimated Daily Intake (EDIM)

This was calculated based on the average concentration of the metals under investigation in Oyster and estimated daily average consumption rate of 34.5 gm for fresh fish, and an average body weight of 60 kg for an adult (Orisakwee et al., 2015).

$$EDIM = \frac{C_{metal} \times Food\ Intake\ rate}{BW_{average}} \quad \text{equation (1)}$$

Where C is the concentration of heavy metal in the tissue of Oyster, Food intake rate is the daily average intake of Oyster and $BW_{average}$ is the average body weight in Kg.

Health Risks Index (HRI)

$$HRI = \frac{EDIM}{RfD} \quad \text{equation (2)}$$

Where EDIM is the estimated daily intake of metal and RfD is the oral reference dose of each metal: Cr = 1.5, Zn = 0.300, Cu = 0.040, Cd = 0.001, and As = 0.0003 mg/kg/day (USEPA IRIS, 2006).

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Target Hazard Quotient (THQ)

This is an estimate of the non-carcinogenic risk level due to pollutant exposure and calculated by the following equation:

$$THQ = \frac{Efr \times ED \times FIR \times C}{RfD \times BW_{average} \times ATN} \times 10^{-3} \quad \text{equation (3)}$$

Hazard Index (HI)

To assess the overall potential health risk posed by more than one metal, THQ of every metal is summed up and is known as hazard index (HI). The HI can be calculated by the sum of the target hazard quotient of each metal (USEPA, 2011) using the equation:

$$HI = THQ_{Zn} + THQ_{Cd} + THQ_{Cu} + THQ_{Cr} + THQ_{As}$$

Statistical Techniques

Statistical analysis was performed using IBM-SPSS Version 23.0. A single – factor or one-way analysis of variance (ANOVA) and descriptive statistics was used to analyze the bioaccumulation of heavy metals in Oyster (*Crassostrea virginica*) from their different locations.

RESULTS AND DISCUSSION

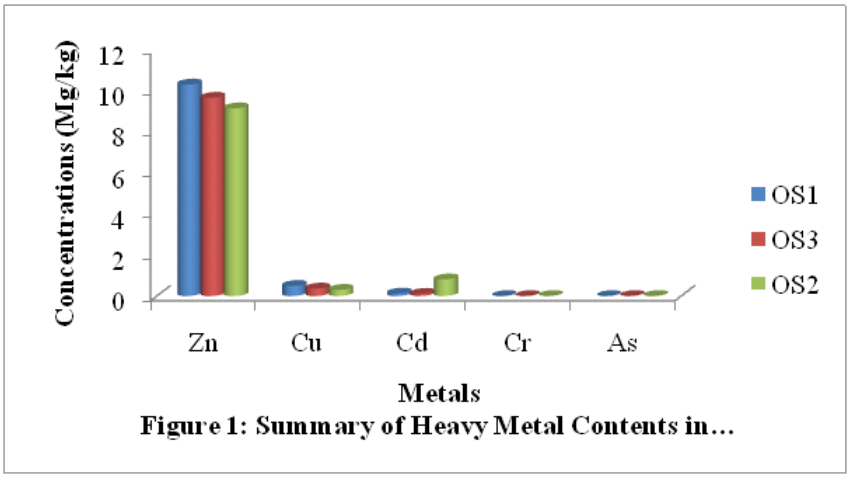

Fig. 1: Heavy Metals Content in Oyster (*Crassostrea virginica*) from Rivers State

The heavy metals content of Oyster from the three locations were determined and presented in Figure 1. The result obtained in OS1 (Bille), OS2 (Okirika) and OS3 (Abonnema) were 10.30, 0.495, 0.122, 0.001, 0.001; 9.14, 0.300, 0.081, 0.001, 0.001 and 9.655, 0.365, 0.106, 0.001, 0.001 for Zn, Cu, Cd, Cr and As respectively. This has shown that heavy metals content in the tissue of Oyster sourced from different location differ. The result also revealed that only Cr and As had a concentration of 0.001mg/kg across the location while others vary from 9.14 to 10.30, 0.81 to 0.122, 0.300 to 0.495, for Zn, Cd and Cu respectively.

It was observed that OS1 (Bille) had the highest metal concentrations, followed by OS3 (Abonnema), while OS2 (Okirika) had the lowest i.e. OS1 (Bille) > OS3 (Abonnema) > OS2 (Okirika). Generally, the Oyster (*Crassostrea virginica*) has shown bioaccumulation potential for the studied metals into their tissues to different degrees. This observation is in strong agreement with the result of Gongora-Gomez (2017) and Benard et al., (2020) who did similar work on an Oyster sourced from outside the country and in Port Harcourt Metropolis. Furthermore, these

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metals were lower than standard when compared with FAO/WHO (2011 and 2015) permissible legal limit.

Table 1: Statistical Assessment of Heavy metals in Oyster (*Crassostrea virginica*) (N = 5)

Locations	Code	Mean ± SE
Bille	**OS(1)**	2.1838 ± 2.0311
Okirika	**OS(2)**	1.9046 ± 1.8097
Abonnema	**OS(3)**	2.0256 ± 1.9085

The bioaccumulated heavy metals in the Oyster were statistically evaluated to compare the means in the different location from which the Oyster was sourced and presented in Table 1. The result revealed that the mean ± SD obtained were 2.1838 ± 2.0311, 1.9046 ± 1.8097 and 2.0256 ± 1.9085 for OS1 (Bille), OS2 (Okirika) and OS3 (Abonnema) respectively. It was also observed that Bille had the highest mean value followed by Abonnema, while Okirika has the least and was in the order: Bille (OS1) > Abonnema (OS3) > Okirika (OS2). The observed result could be attributed to location, the geology of the soil and the kind of anthropogenic activity that goes on there. This idea is in accord with different individual researchers who implicated agriculture, aquaculture and industrial activities as a major source of metallic increase in an aquatic environment (Paez-Osuna et al., (2003), Robinson et al., (2005) and Cadena-Cardenas et al., 2009). This idea has also gained the support of Kanthai et al., (2014).

The bioaccumulation potential of Oyster concerning location was analyzed through a one-way analysis of variance and presented in Table 2.

Table 2: One Way ANOVA for Heavy Metals Content in Oyster (*Crassostrea virginica*)

	Sums of Square (SS)	Degree of Freedom (df)	Mean square (MS)	Mean square Ratio (F)	Sig. (p-value)
Between Group	.196	2	.098	.005	.995
Within Group	220.852	12	18.404		
Total	221.048	14			

A one way ANOVA revealed that there was no statistically significant difference in the bioaccumulation of heavy metals by the Oyster as regards location ($p > 0.05$). This is confirmed by the mean of heavy metal contents at the three locations studied (Table 1). The mean value of the bioaccumulated metals in the tissue of Oyster recorded for the different locations were generally low and is in accord with the results obtained separately by Ochoa et al., (2013) and Biswas et al., (2013). However, higher mean value has been reported for Oysters outside the shores of Nigeria by several researchers Sarong et al., (2015) and (Gongora-Gomez et al., (2017).

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Health Risk Assessment

Table 4: Estimated Daily Intake of Metals by Oyster (*Crassostrea virginica*)

Locations	Zn	Cd	Cu	Cr	As	Remark
OS1	5.9225E-3	7.015E-5	2.8463E-4	5.75E-7	5.75E-7	EDI < 1
OS2	5.2555E-3	4.6575E-5	1.725E-4	5.75E-7	5.75E-7	EDI < 1
OS3	5.5516E-3	6.095E-5	2.0988E-4	5.75E-7	5.75E-7	EDI < 1

Source: Author's Field Survey, 2020. Key: OS1: Bille; OS2:Okirika and OS3:Abonnema.

The estimated daily intake of metals by Oyster sourced from three locations in Rivers State, Nigeria was calculated by a standard method with an appropriate formula and presented (Table 4). The metal concentration vary between 5.75E-7 to 5.9225E-3 Mg/kg/person/day; 5.75E-7 to 5.255E-3 Mg/kg/person/day and 5.75E-7 to 5.5516E-3 Mg/kg/person/day for OS1 (Bille), OS2 (Okirika) and OS3 (Abonnema) respectively. The concentrations obtained were generally low and lower than the regulatory permissible limit (Cr (0.1) and Cd (2.0) prescribed by FAO/WHO (2011 and 2015). Furthermore, the result depicted that all the EDIM was lower than unity as recommended by standards. This implies that no undue health issue of public interest will arise by being exposed to these metals via consumption. The present result agrees with that obtained by Akande and Ajayi (2007) who investigated EDIM in vegetables. A similar study with similar lower EDIM was also reported by Zhuang et al., (2009), Sharma et al., (2005) and Sridhara et al. (2007) respectively.

Table 4: Health Risks Index of Adults Exposed to Heavy Metals in Oyster

Locations	Zn	Cd	Cu	Cr	As	Remark
OS(1)	1.9975E-2	7.0150E-2	7.1158E-3	3.8333E-6	1.9167E-3	HRI < 1
OS(2)	1.7517E-2	4.6575E-2	4.3125E-3	3.8333E-6	1.9167E-3	HRI < 1
OS(3)	1.8505E-2	6.095E-2	5.2470E-3	3.8333E-6	1.9167E-3	HRI < 1

Source: Author's Field Survey, 2020. (Key: OS1:Bille; OS2:Okirika & OS3:Abonnema)

Table 4 reveals the health risk index obtained after comparing the EDIMs with their individual metal oral referral dose. HRI obtained range between 1.916E-3 to 1.9975E-2, 1.9975E-3 to 1.7517E-2 and 1.9167E-3 to 1.8505E-2 for OS1 (Bille), OS2 (Okirika) and OS3 (Abonnema) respectively. The overall result has shown that all the HRI was lower than unity (HRI < 1) and will not pose any metal toxicity to consumers of Oysters sourced from Bille, Okirika and Abonnema respectively. The HRI obtained in this study is at variance with that obtained separately by Ikeda et al., (2000) and Zhaung et al., (2009) who reported HRI > 1.

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Table 5: Target Hazard Quotient of Adults Exposed to Heavy Metals in Oyster

Locations	Zn	Cd	Cu	Cr	As	Remark
OS(1)	7.0150E-2	4.658E-2	6.095E-2	3.8333E-10	1.91666E-6	THQ<1
OS(2)	1.9639E-5	7.015E-5	7.1156E-6	3.8333E-10	1.91666E-6	THQ<1
OS(3)	1.8517E-5	6.095E-5	2.0988E-4	3.8333E-10	1.91666E-6	THQ <1

Source: Author's Field Survey, 2020. (Key: OS1:Bille; OS2:Okirika & OS3:Abonnema)

To determine if the population exposed to these metals via consumption of the sourced Oyster, the bioaccumulated amount were used to calculate the target hazard quotient (THQ) and presented (Table 5). The result ranged from 3.8333E-10 to 7.015E-2, 1.99639E-5 to 3.8333E-10 and 1.8517E-5 to 3.8333E-10 for OS1 (Bille), OS2 (Okirika) and OS3 (Abonnema) respectively. The overall result depicted that all the THQ was less than unity (THQ < 1).The result is in accord with the report of Islam et al.(2014) and Zodape et al. (2014) that THQ should not exceed 1 if it does then it is an alarm for public health concern. The THQ in this present result implies that the possibility of getting cancer or any systemic effect in one's lifetime via consumption of this Oyster will not be possible.THQ < 1 for Cu, Cd, Zn and Cr had been reported separately by Javed and Usmani (2016) and Adedokun et al. (2017) who had similar value lower than unity, but is at variance with that of Udofia et al. (2016) who had THQ > 1.

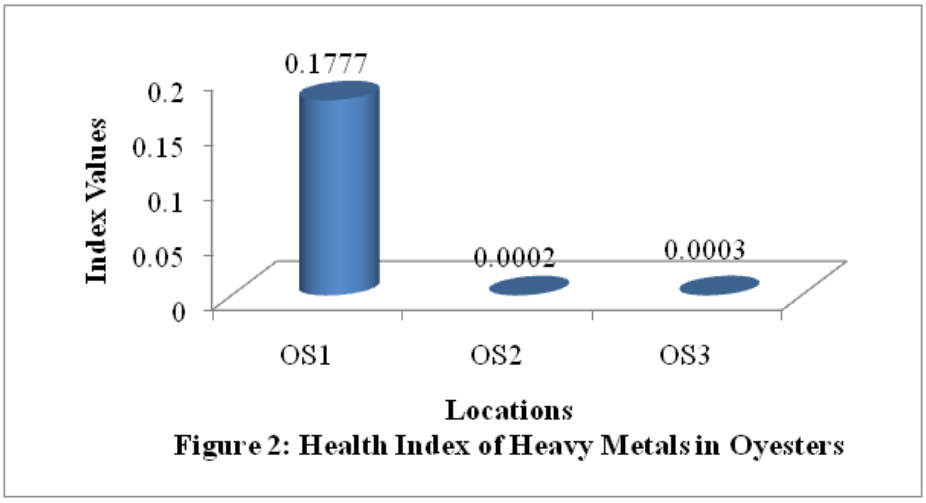

Figure 2: Health Index of Heavy Metals in Oysters

The hazard index which is derived from the combinations of the individual THQs from each metal was computed and presented in Figure 2. HI values recorded were 0.177, 0.002, 0.0003 for OS1 (Bille), OS2 (Okirika) and OS3 (Abonnema) respectively. The overall result revealed that all the HI was lower than unity (HI < 1). The result is at variance (HI > 1) with that obtained by Anani and Olomukoro (2018), who studied health risk associated with consumption of prawn and crabs contaminated with heavy metals. Similar HI > 1 was also reported by Ogbo and Patrick-Iwuanyanwu (2019) and Benard et al. (2020). Generally, the HI was not above the recommended

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threshold of (HI < 1) in these Oysters from Rivers State. Therefore, the population is not at any health risk of heavy metal poisoning or toxicity via consumption as at the time of the study.

CONCLUSION

The study has shown that Oyster sourced from Bille (OS1), Okirika (OS2) and Abonnema (OS3) can bioaccumulate heavy metals in their tissues, but not to the extent to exceed the minimum permissible limit by FAO/WHO. The bioaccumulated concentrations obtained were in the order: Bille>Abonnema>Okirika and showed no statically significant difference in the tissue of Oysters sourced from the different locations. The health risk evaluation result revealed that EDIM < 1, HRI < 1, THQ < 1 and HI < 1 respectively and indicates that no undue health issue or systemic effect to the exposed populace via consumption will occur. The result is an indication of less pollution of the rivers from which these Oysters were sourced.

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Impact Assessment of Car-Repair Activities on Non-Surface Water Bodies in Ahoada East Local Government Area, Rivers State, Nigeria

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Abstract

This study was an assessment into the impact of car-repair activities on the non-surface water (H_2O) bodies in Ahoada East Local Government Area, Rivers State Nigeria. It was carried out to assess the level of contamination and also the suitability of the non-surface H_2O for drinking. In all, three bore-holes stood analyzed for physico-chemical parameters; temperature, pH as well as electrical conductivity in addition to heavy metallic composition (lead (Pb), cadmium (Cd), iron (Fe), chromium (Cr), and zinc (Zn)). Non-surface H_2O samples were obtained from three functional boreholes within the car-repair vicinity with a control (non-surface H_2O) sample obtained far from the car-repair zone. All acquired data were compared with the World health Organization (WHO) recommended values for drinking H_2O quality. The latter showed that all assessed parameters remained within the acceptable limit set by the WHO apart from the pH whose value fall low indicating that the non-surface H_2O within the area remained somewhat acidic as the pH fluctuated from 6.0 to 6.5. Summarily, owing to the study it was concluded that the car-repair activities carried out in the area had not considerably affected the non-surface H_2O reserve. Though, the low pH specifies that the H_2O bodies involve slight treatment prior to human consumption. Periodic checking of the concentration of Fe within the non-surface H_2O reserve and other pollutants was the major recommendation.

Keywords: **I**mpact assessment, car-repair, non-surface, water bodies.

INTRODUCTION

Water (H_2O) is often considered the greatest basic need of man after air for life to function well (Nwankwoala & Omemu, 2019). It is a precondition for many biological reactions to occur within the human body systems (Ismaila et al., 2017). Consequently, humans require drinking adequate quantities of H_2O every day because the body needs it for metabolism (Jéquier & Constant, 2010). Also H_2O is valuable for numerous industrial, agricultural, recreational processes, in addition to domestic purposes which include cleaning and cooking (Winifred *et al.,* 2014). All H_2O sources (seas, oceans, rivers & lakes) adopted for the above functions must be free from contaminations. The seas, oceans, rivers and lakes are called surface H_2O bodies while bore-holes are called non-surface H_2O. Surface H_2O is freely accessible in most places, but the non-surface H_2O is typically the favored source for obtaining drinking H_2O or that adopted for manufacturing processes. Owing to the fact that non-surface H_2O is a potable source of H_2O with a less propensity of being contaminated due to its natural purification processes (Abadom & Nwankwoala, 2018). A non toxic as well as reachable source of H_2O is essential for the wellbeing of living things (Hunter et al*.,* 2010). Therefore, the quality of non-surface H_2O is of interest to public health practitioners. Knowing the significance, some persons tend to over look basic activities which occur on land

surfaces which might give rise to non-surface H_2O contamination. Typically, countless persons know the inevitability of H_2O but fail to consider the need for its freshness and purity. The standard of non-surface H_2O has being altered by geological factors, environmental recharge in addition to composition of generated wastes (Ganiyu et al., 2016). Natural as well as anthropogenic means are the two processes non-surface H_2O are contamination. While the former is not too pronounced, the latter occurs through heavy use of fertilizers, animal manure as well as metallic-based pesticides on farmlands, careless disposal of hazardous industrial wastes, abattoir wastes, sewage systems, leachate from landfills and open dumpsites, as well as indiscriminate disposal of household wastes (Peter-Ikechukwu et al*.,* 2015).

The persistent request for commercial in addition to private vehicles, which demand steady servicing in car-repair areas call for concern owing to the discharges and wastages during such services. The wastages (Cu, Pb, Cd, Zn, etc.) from batteries, panel beating, engine oil change, etc remain washed/discharged into the H_2O bodies without considering the adverse effects like liver, kidney and bone damage; heart disease, diabetics, cancer among others (Ibrahim et al*.,*2019). The latter remains unchecked owing to the fact that there is no law in operation to monitor and regulate the activities of car-repair personnel (Tchounwou et al*.,* 2012; Ibrahim et al*.,* 2019)

With the aforementioned, continuous check as well as assessing non-surface H_2O with respect to its quality is very important. Hence, this study intends to assess the impact of car-repair activities on the non-surface H_2O bodies within Ahoada East Local Government Area, Rivers State Nigeria.

MATERIALS AND METHODS

Sample Collection

The H_2O samples were collected as described by Festus et al*.,* (2016) for analysis from the regularly used bore-holes within the car-repair areas. Three non-surface H_2O samples stood obtained from separately located bore-holes and a control was obtained outside the car-repair area. Dual sampling was acquired sampling bottles washed with cleansing agent and rinsed carefully with distilled H_2O. Before each collection, the H_2O was allowed to flow for 5 minutes. Preliminary tests (temperature, pH and conductivity) were carried out *insitu* at the point of sample collection. After which droplets of trioxonitrate (V) acid was added to each sample for prevention of metallic precipitation (Kaizer & Osakwe, 2010) prior to analysis.

Analysis for Physicochemical and Heavy Metallic Species

Standard methods were adopted in the analysis of all physicochemical parameters (Reda, 2016). The H_2O samples stood digested following recommended procedures before the analysis for metallic species with the aim of destroying all organic fragments as to make the metals of interest available for analysis. Atomic Absorption Spectrophotometer (AAS) was adopted for the analysis of Pb, Cd, Fe, Cr in addition to Zn in all collected samples (Itodo et al*.,* 2011).

RESULTS AND DISCUSSION

Table 1: Result of analyzed non-surface H_2O samples

Parameter	Non-surface H2O sample				WHO (2011)
	A	B	C	Control	
Temp (˚C)	24.7	23.9	24.2	23.9	-
pH	6.0	6.1	5.9	6.0	6.5 – 8.5
EC (µS/cm)	59	25	22	19	500
Pb (mg/L)	<0.001	<0.001	<0.001	<0.001	0.01
Cd (mg/L)	<0.001	<0.001	<0.001	<0.001	0.003
Fe (mg/L)	0.270	<0.001	<0.001	<0.001	0.3
Cr(mg/L)	<0.001	0.003	<0.001	<0.001	0.005
Zn (mg/L)	<0.001	0.149	<0.001	0.122	3

Temp = temperature, EC = electrical conductivity

Table 2: Descriptive statistics of parameters evaluated in the non-surface H_2O samples analyzed

Parameter	**Minimum**	**Maximum**	**Mean**	**Standard deviation**	**Variance**
Temp (˚C)	23.9	24.7	24.174	0.211	0.11
pH	5.9	6.1	6.0	0.10	0.01
EC (µS/cm)	19	59	31.25	21.853	341.132
Pb (mg/L)	0	0	0	0	0
Cd (mg/L)	0	0	0	0	0
Fe (mg/L)	0	0.270	0.01	0.129	0.018
Cr (mg/L)	0	0.003	0.001	0.001	0.00001
Zn (mg/L)	0	0.149	0.037	0.100	0.001

Table 3: **Contamination factors and contamination load index of non-surface H_2O within the auto-car-repair shops in the area of study**

Sampling points	**Contamination factor**					**PLI**
	Pb	Cd	Fe	Cr	Zn	
A	0	0	0.943	0	0	0
B	0	0	0	0.06	0.059	0
C	0	0	0	0	0	0

Temperature

The non-surface H_2O samples' temperature within the auto-car-repair area as well as the control fall within 23.9˚C to 24.7˚C ranges (Table 1). The temperature obtained were 24.7˚C, 23.9 ˚C and 24.2˚C for points A, B and C while 23.9˚C was detected for the control sample. The results obtained were generally low and comparable to that reported by Nebo et al., (2018). Presently, no guideline values exist for drinking H_2O for comparison. Therefore, the H_2O temperature is often determined by the individual consumers even though H_2O is best taken at a low temperature without odor and taste (Edori & Kpee, 2016).

pH:

The pH of the non-surface H_2O samples analyzed showed an extreme value of 6.1 with a lowest value of 5.9 (Table 1). The acquired pH data for points A, B, and C as well as the control stood at 6.0, 6.1, 5.9 and 6.0. All data somewhat fall lower than the WHO (2011) standard value. The pH analysis results attest that non-surface H_2Oaround auto-car-repair areas were to some extent acidic, with points A and B exhibiting comparable or higher acidity than the control. The latter may be credited to uncritical discarding of battery-operatedH_2O in addition battery washing solvents which are wastes often dispensed bare and infiltrate through the soil polluting the non-surface H_2O within the area. Assessment of pH is usually aimed at the determination of acidity or alkalinity degree of a solution. The observed pH values of 5.9–6.1 (Table 1) in all our analyzed samples designates that the H_2O samples remained somewhat acidic. The acquired pH data for this study slightly varies from that reported by Duru et al*.,* (2017) in an evaluation into borehole H_2O quality at Orji car-repair area at Imo state. The latter reported pH values of 5.51–6.07. Continuous usage of low pH H_2O could lead to irritation of the eyes, skin in addition to mucous membrane (Duru et al*.,* 2019).

Electrical Conductivity:

The electrical conductivity is usually employed to evaluate the capability of a solution to conduct an electric current due to the existence of dissolved charged species within the solution (Reda, 2016). The latter is an ancillary evaluation of the quantity of liquefied solids existing in a solution. Electrical conductivity differs equally in the ionic strength as well as in the sorts of ionic species within a solution (Davendra et al*.,* 2014). The electrical conductivity of all analyzed H_2O samples remained low which was below the allowable limit of 500µS/cm approved by WHO (Table 1). The figures obtained were 59µS/cm, 25µS/cm, 22µS/cm and 19µS/cm for points A, B, C plus the control H_2O analyzed separately. The conductivity values for A, B and C were higher to that of the control. Observed variation in the electrical conductivity amid the analyzed non-surface H_2O samples within the car-repair area plus the control maybe due to the lesser pH values. The acquired conductivity values in this study were lesser compared to WHO 500µS/cm limit and varied the values (192.33±5.51-263.67±1.53µS/cm) reported in Adewoyin et al*.,* (2013) involving evaluation of the effects of auto-car-repair shops on non-surface H_2O within Ibadan megalopolis. Knowing that conductivity is directly proportional to the concentration of ionic species as well impacts the taste of H_2O, our observed low conductivity values denote lack of an repugnant sensitivity in the H_2O samples analyzed (Sokpuwu, 2016).

Metallic Pb and Cd Concentration:

The metallic Pb and Cd concentration in our analyzed non-surface H_2O samples not excluding the control stood at<0.001mg/L (lower than detection basis). The latter is in conformity with the report of Nebo et al., (2018) about Cd concentration in non-surface H_2O at Elekahia car-repair neighborhood which lower than detection level. The metallic Cd is of public health concern owing

to its cancer causing potentials in addition to bone defects plus reproductive defects (Tchounwou et al., 2012). However, the concentration of Pb was somewhat dissimilar as documented. The metallic Pb remains most poisonous specie within the transition element family without recognized advantage in living systems (Njar at al*.,* 2012). Continuous contact with Pb may give rise to health cases of high blood pressure, liver and kidney damage, etc. (Edori & Edori, 2012).

The metallic Fe concentration in samples from points B, C as well as the control remained<0.001mg/L, however, the sample from point Agave value of 0.270mg/L, that was greater than the control sample value but somewhat lesser than recommended WHO maximum value of 0.3mg/L for drinking H_2O. The concentration values acquired differed from literature value of 0.23±0.41mg/L–10.90±10.31mg/L on non-surface H_2O in auto-car-repair areas within Ibadan, Oyo State (Adewoyin et al*.,* 2013). The high metallic Fe concentration detected at point A can be attributed to leachates from rusted metallic leftovers (Edori & Edori, 2012). Though the only known health effect of 'Fe'is its obnoxious taste, color plus odour it impacts on drinking H_2O (Njar et al*.,* 2012; Winifred et al*.,* 2014).

Metallic Cr is a certainly existing element. The concentration of the latter within the environs may be amplified through carefree dumping Cr bearing substances. The Cr^{3+}remains an indispensable nutrient needed at micro-quantities for better living systems. However, prolonged contact with Cr^{6+}gives rise to poisonousness as Cr^{6+} compounds are associated with harmful health impacts like lung cancer, ulcer, renal injury plus asthma (Tchounwou et al*.,* 2012). The Cr level in samples from points A, C plus the control remained lower than detection limit (<0.001mg/L) whereas, the H_2O sample from point B had Cr concentration of 0.003mg/L. The metallic Cr level in all analyzed non-surface H_2O samples within the car-repair area including the control remained lower than the tolerable WHO limit of 0.005mg/L (Duru et al*.,* 2019). The Cr configuration of all non-surfaces H_2O detected could not be damaging to individual consumers as it appears within satisfactory limit of WHO.

Within sampling points A and B, the metallic Zn concentration was observed to be lower than the detection limit. The extreme values of 0.149mg/L and0.122mg/L were acquired for B and the control samples which fall below 3.0mg/L maximum acceptable limit of WHO set for drinking H_2O.The metallic Zn level in the control H_2O sample surpassed that observed in samples of points A and C nonetheless remained lesser compared to that of point B sample. The value acquired for the control sample may be arising from weathering of bedrocks. Metallic Zn permeates non-surface H_2Oin areas of auto-car-repair among many processes through the breakdown of Zn adopted for galvanizing steel/iron employed in making various motor parts that are vulnerable to corrosion (Owoso et al*.,* 2017). This research outcome differs from literature reports (Duru et al., 2017). In all, the acquired PLI data for all H_2O samples remained zero, signifying no contamination.

CONCLUSION

This study titled 'evaluation of the impacts of car-repair activities on the non-surface water (H_2O) bodies in Ahoada East Local Government Area, Rivers State Nigeria was carried out. The findings showed that the non-surface H_2Oat the auto-car-repair areas displayed slight acidity due to pH observed within 6.0–6.2 range. The latter similarly attest to the detected Fe concentration of one of the H_2O samples which roughly at an extreme bearable WHO level for drinking H_2O. All acquired data were compared with the World health Organization (WHO) recommendation values for drinking H_2O quality. The latter showed that all assessed parameters remained within the acceptable limit set by the WHO. Summarily, owing to the study it was concluded that the car-repair activities carried out in the area had not considerably affected the non-surface H_2O reserve. Though, the low pH specifies that the H_2O bodies involve slight treatment prior to human consumption.

RECOMMENDATION

There should be regular checking of the concentration of Fe within the non-surface H_2O reserve and other pollutants.

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Effects of Covid-19 Pandemic on Students Learning Mathematics: Issues and Prospects

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Abstract

The study was aimed at assessing the effects of COVID-19 pandemic on students learning mathematics. The study extensively reviewed related literatures and drew conclusions from the findings of these studies. Findings revealed that COVID-19 pandemic had both positive effects on students learning mathematics. The positive effects include enhanced individualistic learning amongst the students, helped the physically challenged mathematics learners, self development, and helped the prenatal mothers to learn mathematics at their comfort home. It has enhanced conference online learning, promoted online team work amongst students, promoted team work at home, job procurement and introduction of homeschooling. There were however, some challenges faced by students learning mathematics during COVID-19 pandemic which includes; lack of finance, inadequate power supply, barriers in communication, network problems, and unavailability of digital devices among other factors. In view of the above, the study recommended that E-learning system should be established in the educational system, good percentage of the income realized by the institutions and government during the pandemic should be utilized in the procurement of the necessary materials and equipment towards achieving the state goals and objectives, All components of administration and management of mathematics department through e-learning under the effect of covid-19 pandemic should be used to achieve the expected result, Constant seminars and workshops and Educational sector worldwide should have a backup system as to withstand any kind of academic threat or crisis irrespective of the location.

Keywords: Covid-19 pandemic, issues, prospects, students learning Mathematics

INTRODUCTION

Corona Virus Disease 2019 (COVID-19) pandemic which led to the closure of Universities and Colleges around the world in anticipation that public health officials' advice on social distancing could help to reduce the spread of the infection. The risk-control decisions led millions of students learning mathematics into temporary 'home-schooling' situations, especially in some of the most

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heavily impacted countries, like China, South Korea, Italy, Iran and Nigeria. These changes certainly caused a degree of inconvenience to the learners but also prompted new educational innovations. Although it could be considered too early to judge how reactions to COVID-19 will affect education systems around the world (Bao et al., 2020). There are signs suggesting that it could have a lasting impact on the trajectory of learning innovation and digitization on mathematics when the effect of COVID-19 is represented graphically using some vital variables like age, time and population would behave same as in damage mechanics model of cancer (Oyesanya & Nkuturum, 2019). The slow pace of change in academic institutions globally is lamentable with centuries-old lecture-based approaches to learning mathematics, well-established institutional biases and outmoded classrooms on the students. However, COVID-19 has become a catalyst for educational institutions worldwide to search for innovative solutions to students learning mathematics in a relatively short period of time (Ngumsi, 2020).

Similarly, students in some schools in Lebanon and Nigeria as in many other countries began leveraging on online learning of mathematics (Lindzon, 2020). Thus, some students shot and sent over their own videos of solved problems to their teacher as homework. This pushed students to learn new digital skills as regards to typing mathematics symbols and letters. A parent remarked that, while the exercise took a few minutes, my child spent hours solving, shooting, editing and sending the video in the right format to his teacher as a new skill for students learning mathematics resulting from the COVID-19 pandemic.

Amid COVID-19 spreading exponentially and rapidly across the globe, countries have taken swift and crucial actions to alleviate the development of a full-blown pandemic over its proliferation rate and damage mechanism (Nkuturum & Onwubuya, 2019; Jamerson & Mitchell, 2020). The rapid spread of COVID-19 has demonstrated the importance of building resilience to face various threats, from pandemic disease to revolutionary violence to climate insecurity and even rapid technological change (Karp & Mcgowan, 2020). The pandemic also provided an opportunity to remind experts of additional skills students need given the unpredictable global conditions such as informed decision making, creative problem solving and adaptability. To ensure those skills remain a priority for all students resilience must be built into the educational systems as well. The effects of COVID-19 across the world are unparalleled. It has kept the entire countries on lockdown, cruise ships quarantine passengers and crew members, and major technology companies are calling off events and instructing employees to work from home because of the covid-19 pandemic (Sessoms, 2020; Feuer, 2020). A pandemic simply means the worldwide spread of a new disease (Foxman, 2020). According to the World Health Organization-WHO (2020), a pandemic as an epidemic occurring worldwide or over a very wide area, crossing international boundaries and usually affecting a large number of people. The Center for Disease Control and Prevention-CDC (2020) views pandemic as an epidemic that has spread over several countries or continents frequently affecting a large number of people. A pandemic is an uncontrollable transmission of a disease throughout the world (Foxman, 2020).

A pandemic is described as an infectious disease that shows significant effect and is ongoing, spreading from one person to another in numerous countries around the world at the same time. A pandemic occurred last in 2009 with swine flu, which experts predicted that it killed hundreds of thousands of people (Walsh, 2009; Wardrop, 2009; Tedros, 2020). Pandemic also occurs if a virus is brand new, able to infect people easily and can spread in an efficient and sustained way (Markel et al., 2007).

An epidemic disease on the other hand refers to an existing, predictable and relatively stable prevalence of a disease in a particular milieu; and disease outbreak which occurs when an infection shows up in an unexpected location or there is an unexpected increase in the infected population of a

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disease such as Ebola Virus Disease (Davis et al., 2015). Outbreak is sometimes used interchangeably with epidemic, though it is typically used for more limited geographic spread and epidemic is typically used when the geographic region expands to multiple regions (Barrett, 2020; Jordan, 2020). A disease outbreak is finally labeled a pandemic when the geographic region spans multiple countries and becomes global. The most famous pandemic was the 1918 influenza outbreak which infected an estimated 500 million and killed an estimated 50 million people worldwide (Frieden, 2020; Kawano, 2015). The COVID-19 pandemic has affected students learning mathematics and educational systems worldwide leading to the near-total closures of institutions. Mainly, governments around the world have temporarily closed educational institutions in an attempt to contain the spread of COVID-19. School closure affected both students, teachers and families, but has broad economic and societal consequences (Barnum, 2020; Lindzon, 2020).

Efforts to stem the spread of COVID-19 through non-pharmaceutical interventions and preventive measures such as social-distancing and self-isolation have impelled the widespread closure of schools which has affected students learning mathematics globally. Mathematical modelling has also shown that transmission of an outbreak may be delayed by closing schools. The effect of COVID-19 pandemic is also exhibited in a mathematical modelling on predator-Prey model whereby the virus will lag as a result of lockdown and institutions which would lead to the containment of the spread of COVID-19 virus while the infected ones recuperate and some go to extinction (Nkuturum, 2016). Other pandemics that have occurred before now which affected students learning mathematics were the 1918-1919 influenza pandemic in the United States, 1957–58 outbreak (Chin et al., 1960), the United States 2009 Flu pandemic (Simon, 2020).

CONCEPT OF COVID-19 PANDEMIC

The COVD-19 pandemic is an ongoing pandemic of coronavirus disease caused by severe acute respiratory syndrome of coronavirus 2 (SARS-CoV-2). The new coronavirus is a respiratory virus which spreads primarily from one person to other through droplets generated when an infected person coughs, sneezes, saliva and discharge from the nose. Therefore COVID-19 simply means 'CO' stands for corona, 'VI' for virus, 'D' for disease and '19' stands for 2019. Before now, this disease was referred to as '2019 novel coronavirus' or '2019-nCoV' which was first detected in Wuhan, China in December of 2019, but has turn to serious global problem called pandemic (Jackson et al., 2013). The COVID-19 virus is a new virus connected to the same family of viruses such as Severe Acute Respiratory Syndrome (SARS) and some types of common cold. Coronavirus has claimed more than million lives and infect nearly 2.3 million people for the world. The World Health Organization (WHO) declared Coronavirus as COVID-19 pandemic as a global health problem on 11 March 2020. The COVID-19 is a new strain of coronavirus which has not been seen in human body. The WHO encouraged people to keep social distancing and wear nose mask in the crowed areas. This means that people should try to avoid contact with one and another especially the ones that have shown signs of COVID-19 and crowded places like bars, swimming pool, cinemas, restaurants, theatres, gym and social gathering.

Since its first cases in China, COVID-19 has spread to almost all countries worldwide. According to the World Health Organization, 9,455,853 global cases were reported including 483,217 deaths. As part of the effort to contain the spread of the coronavirus, public spaces are closing down so that people can stay at home and prevent further spread. In countries, such as China where testing and quarantine measures were observed the spread was able to level out. Measures that are taken to slow the rate of infection include social distancing, limits on event sizes and home quarantine when needed. Closing schools and offices made the students learning mathematics to limit their interactions with others and as well slow down the spread of the virus while the healthcare system copes with the pandemic (Oyefusi, 2020).

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Symptoms of COVID-19

COVID-19 takes up to five days before the symptoms begin to show but for some people it shows up early. The World Health Organization (2020) said that the incubation period last up to 14 days. In some patients if their symptoms are not too serious, then they should self-isolate themselves at home for at least seven days. This is because if a person comes in contact with those suspected to have COVID-19 or the area where the virus has spread such person has to keep self-isolation (Wheeler, 2010). The main symptoms include difficulty in breathing or shortness of breath, Fever, Coughing and sneezing, Organ failure, Pneumonia, Sore throat, Headache, Diarrhea, Loss of smell and taste and Death.

COVID-19 Spread

Many countries are suggesting various levels of containment in order to prevent the spread of COVID-19. With these fears, schools and universities are closing down and moving abruptly to online platforms and remote education as to better the study lifestyle of students learning mathematics. This sudden change has put forth the question, what is the effect of COVID -19 on students learning mathematics? According to the World health Organization, this new coronavirus (COVID -19) is a respiratory virus that spreads mainly through contact with infected person through the discharge that comes out from the person. For example, coughs, sneezes, saliva and discharge from the nose. Generally, Coronaviruses are zoonotic which means that human beings contact this virus from animals (Zumla, 2010). People that live or travel to the area where covid-19 started like Hubei, China are at risk of infection. Those infected from other countries that are among the people that travel from China or live or work closely with those travellers, like family members, co-worker and medical professional care givers for COVID-19 patient unknown to them that the patient is infected with the virus.

People at more risk of COVID-19

The older people and those with the history of medical conditions before COVID-19 (like diabetes and heart disease) they are at more risk to be seriously sick with the virus. Men are also at high risk to die from the virus pass women. Health workers that are taking care COVID-19 patients are at higher risk and must protect themselves with the correct infection preventive and control procedures (Cauchemez et al., 2009).

How to Prevention/Treatment of COVID-19

To protect yourself, clean your hands frequently with an alcohol-based hand rub or wash hands regularly with soap and water. COVID-19 has no official cure for now; although many governments have found way to manage the sickness and even cure patients to the point of testing negative.

Prospects of COVID-19 Pandemic on Students Learning Mathematics

1. It has enhanced individualistic learning amongst the students
2. It helps the physically challenged mathematics learners to learn at their own comfort home.
3. Self development: It has promoted self learning-by-questioning on the part of the learners from their home.

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4. It helps the prenatal mothers to learn mathematics at their comfort home.
5. It has enhanced conference online learning through visual and audio-visual.
6. It has promoted online team work amongst students.
7. It has promoted team work at home in which case, the parents teach their children and children teach themselves.
8. Introduction of Home schooling: Presently, Covid-19 pandemic has shifted the default in education system to home schooling. Practically all parents are doing some form of home schooling or the other whether they want to or not. But the issue is that what are the resources, supports and capacity do they have to do home schooling effectively. Most parents are struggling with having classroom in their homes. Also, parents must recognize the equity issues in the forced over reliance on home schooling so that parents will avoid further disadvantaging the already disadvantaged.
9. New learning opportunity: Students learning mathematics are currently making a switch from frontal classes to online classes may find out that a remote education actually works well for them, and may choose to take further education or degrees online. This switch is an opportunity for many students learning mathematics to try out remote education, and may make it more likely that they will engage with online classes in the future. Students being newly introduced to remote education may opt for taking a future degree online, due to the benefits of distance learning as result of covid-19 pandemic and the affordable options available.
10. More online resources: Despite the challenges posed by covid-19 pandemics on students learning mathematics, the shift in education also means that more opportunities are arising and becoming available to students online and there is easy accessibility to those resources. An emphasis is being put on online and distance education for making affordable programs more relevant and known to the public during covid-19.
11. Public and private educational partnerships grow in importance: covid-19 has brought about learning consortiums and coalitions within few months taking shape with diverse stakeholders - including governments, publishers, education professionals, technology providers, and telecom network operators; coming together to utilize digital platforms as a temporary solution to the pandemic crisis. In countries where education has predominantly been provided by the government, this COVID-19 could become a prevalent and consequential trend to future education. The consortium's intention is to continue using and maintaining the platform even after COVID-19 has been contained.

Issues of Covid-19 Pandemic on Students Learning Mathematics

1. Student factor: This implies that some students' attitudes towards the e-learning may not be serious. In this contest of covid-19, those unserious students may be concerned with getting the certificate at the end of programme without considering the achievement. This type of students will use covid-19 pandemic as a sort of excuse and showcase a laser-fair attitude towards assignment and tests which will help them to improve their skills in future. Thus, at the end these unserious students may indulge into any form of malpractice just to have their way through.
2. Lack of finance: In this covid-19 pandemic, the mathematics teachers and students need a considerable amount of money to get the e-learning off the ground in terms of data plan or data consumption. Also, much money is required for infrastructural facility, smart phones,

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palm top, laptop, computers, laboratory equipment, vehicles and so on. It is needful for mathematics department to be given enough capital to procure the aforementioned which were unavailable due to lack of fund.

3. Inadequate power supply: Covid-19 pandemic has distorted some mathematics students from connecting to the lecture time due to total lockdown of petrol station. For instance, a lecture scheduled for 9.00am using WhatsApp, zoom or on radio and television which has been running for days; some students at different locale may not have access to power supply due to one reason or the other. Sometimes unforeseen contingency may occur say connection problem or generator is bad in the case of personal supply hence the lecture is disrupted for either the teacher or student.
4. Barrier in Communication: Inadequate provision of basic communication devices such as telecommunication mask, smart phones, laptop, palmtop which are not affordable by some individuals, students and teachers hinders the success of e-learning system during covid-19 pandemic.
5. Network problem: Many business men and women to go online due to total lockdown that emanated from covid-19 pandemic. This in turn has made the network provider to fluctuate or be unstable. Here, the teacher or students may want to mail his or her response to some questions raised which requires a given time to handle but because of the network problem as well as the digital device in use the information may be distorted and what would have got to its destination within few seconds may take minutes hours thereby affecting the entire system.
6. There is no physical relationship between teachers and students.
7. There are human resource disparities between locations, schools and individual students.
8. Unavailability of digital devices such as android phones, palmtop, laptop and so on.
9. There is a bridge in learners instant classroom evaluation with team-work in terms of solving mathematics problems (class work evaluation).
10. Environmental factor: That is lack of internet facility in the rural areas.
11. Social factor: The emergence of covid-19 pandemic led the Federal and State Governments to lockdown shops and markets; even business centres that would type and print mathematics assignment and projects are also lockdown.
12. One that's most striking to me is that because schools are closed, parents and the general public have become more aware than at any time in the memory of inequities in children's lives outside of school. Suddenly we see front-page coverage about food deficits, inadequate access to health and mental health, problems with housing stability, and access to educational technology and internet. Those of us in education know these problems have existed forever. What has happened is like a giant tidal wave that came and sucked the water off the ocean floor, revealing all these uncomfortable realities that had been beneath the water from time immemorial. This newfound public awareness of pervasive inequities, we hope, will create a sense of urgency in the public domain. We need to correct for these inequities in order for education to realize its ambitious goals. We need to redesign our systems of child development and education. The most obvious place to start for schools is working on equitable access to educational technology as a way to close the digital-learning gap.
13. Challenges for low-income families: Unfortunately, many families rely on the public school

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system, not only for education, but for necessities like food and childcare. With schools closure in this covid-19 era, many children are left without proper meals, and parents are forced to take off work in order to care for their young children. Although many schools are continuing online, many students do not have access to computers or the internet in their homes. Without the proper technology, many students will be forced to miss out on their education until further solutions can be arranged.

14. Concentration difficulties: Younger children, as well as students with ADHD or other special needs, find it difficult to concentrate to full capacity with online educational tools. Young children need the assistance of in-person instruction, and may find it difficult to concentrate in a typical frontal class conducted on a computer. Students with special needs, who also rely on in-person instruction, may find it difficult especially to switch to online platforms. These difficulties may require a more unique approach to online learning, or may demand the extra assistance of parents as these students to navigate a new educational paradigm.

CONCLUSION

In the light of the issues and challenges of covid-19 pandemic mentioned above, it also has prospects on students learning mathematics if harnessed properly as a way of imparting knowledge that will be credible to the graduates for job opportunities. With efforts to prevent the spread of the covid-19, education is suddenly and rapidly moving online. New educational opportunities are being advertised and made available for students, but the switch has also pointed to the importance of the public school systems for lower-income families, and the challenges the switch presents for families, special needs students, as well as staff and students across the board. It is possible that once the COVID-19 pandemic settles down, we may see a continued increase in education systems using online platforms for study aids, as well as students embracing online education for their higher learning degree programs.

SUGGESTIONS

From the above elucidations and conclusions, this paper recommends that:

1. E-learning system needs to be established in the educational system as to combat any era of academic disruption like epidemic or pandemic. Also, it should be evaluated periodically for its relevance, needs and efficacy.
2. The teachers must be adequately motivated so that they can put in their best for the good of the programmes during pandemic and beyond.
3. A good percentage of the income realized by the institutions and government during the pandemic should be utilized in the procurement of the necessary materials and equipment towards achieving the state goals and objectives.
4. All components of administration and management of mathematics department through e-learning under the effect of covid-19 pandemic should be used to achieve the expected result.
5. Constant seminars and workshops should be organized so as to achieve a common work force that motivates both teachers and students adequately.
6. Educational sector worldwide should have a backup system if they can afford it so that they will be able to withstand any kind of academic threat or crisis irrespective of the location.

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Utilization of Electronic Record Management System among Administrators in University of Port Harcourt Teaching Hospital, Rivers State

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Abstract

This study was carried out to investigate use of electronic record management system among hospital administrators in University of Port Harcourt Teaching Hospital (UPTH). The study was descriptive in design and was guided by two specific objectives and two corresponding research questions. Data were obtained from 100 administrators working in different department in the facility. The instrument used was a 15-item self-structured questionnaire on utilization of electronic record system. The test-retest method was used to ensure reliability of the instrument which was analyzed using Pearson Products Moment Correlation (PPMC) and a reliability co-efficient index of 0.85 was obtained. Simple percentage was used to analyze data. Findings showed that majority (75%) of the respondents had made use of the electronic record management system which were used to some extent in the hospital. Also, majority of the respondents (65%) agreed that the electronic record system was very effective. The study recommended that awareness should be created to enlighten every administrator on the importance of electronic record management system in processing information relating to patients and security within the facility.

Keywords: utilization, electronic, record, management, administrators.

INTRODUCTION

One of the main challenges of hospital administration is effective record management system. With large heap of files everywhere, patients' records easily get mixed up and sometimes, classified information get to unauthorized persons during transfer of files from one place to another. Introduction of the electronic device in record keeping was to cater these challenges and improve the system (Kim, 2018). Electronic systems design is therefore the process of defining and developing complex electronic devices to satisfy specified requirements of the user (Asmita, 2013). He identified computer as a good example of an electronic machine made up of devices used for input, processing, storage and output in line with specified instructions. Thus, programmes are stored in the computer when in use so they can be executed automatically and inter-connectedly with other systems within the facility without necessarily carrying files from one table to another (Dennis, 2012). Computer comes in different shapes, sizes and types in form of microcomputer,

minicomputer, mainframe computer and supercomputer. But the institution will need to sue the microcomputer and mainframe computer for effective administration. Without the use of electronic records management system, one cannot achieve administrative effectiveness in hospitals (Kim, 2018).

A record is a document that provides objective evidence of activities performed, events occurred and results of data obtained (Business, 2012). It is to set down vital information in writing and furnish users with written evidence of useful records in an electronic management system as a tool for administrative effectiveness (Merriam-Webster, 2016). The hospital facility deals with large records that are patients-specific and other vital information that are used for the day to day running of the facility. A good and veritable information management system is therefore inevitable for the smooth operations of any big organization. The management system involves a set of policies, process and procedures used by an organization to ensure fulfillment of assigned tasks in order to achieve organizational objectives. It is a systematic framework designed to manage an organization's policies, procedures and processes and promote continual improvement within. An Electronic Records Management (ERM) system involves a computer program or set of programs designed to track and store records (Niscotland, 2017). ERM ensures that an organization has the records it needs when they are needed (Alim, 2014). Without the organization been aware and knowing the use of the electronic management system in the operation and running of their activities, it can hardly succeed. However, awareness and use of ERM system is a useful administrative tool for effective service delivery. The ERM System is closely linked with most of the daily activities of educational, health and industrial organizations among others which in turn, leads to enhanced performance and decision-making of the organizations (Bamisaye, 2012). The purpose of the study is therefore, to determine the utilization of Electronic Records Management system by Administrators in UPTH as a tool for effective service delivery.

Effective utilization of Electronic Records Management System by administrators has been a thing of concern to both staff and patients in the hospital. This has often resulted in loss of man-hour, fund, misplacement of patients' data, time wasting, poor service delivery and sometimes, avoidable loss of life in hospital. It has also led to patronage of private hospitals with less expertise against specialist hospitals due to anticipated unnecessary delays especially with regards to sorting out patients' files and baseline data. There is also inadequate documented information on the use of ERM at UPTH, hence, the need for this study.

METHODOLOGY

The study adopted the cross-sectional descriptive research design. The instrument for data collection was a validated self-structured questionnaire with a reliability index of 0.85 using the test-retest method whose results were analyzed using the Pearson's Product Moment Coefficient. Population for the study consisted of 200 record-keeping administrative staff working in different departments of the facility out of which, 100 representing 50% was sampled. Data obtained were analyzed using simple percentage presented in frequency distribution tables.

RESULTS

Table 1: Percentage analysis of Administrators Use Electronic Management System in UPTH?

S/N	Question	Options					
		Yes	No	Total	Yes %	No %	Total %
1	Do you think that administrators use the electronic management system in UPTH facilities for quick retrieval of documents?	65	35	100	65	35	100
2	Do administrators use the electronic management system in UPTH for security procedures and facilities to prevent unauthorized access and ensure physical safety?	70	30	100	70	30	100
3	Do you think administrators use the electronic management system in UPTH for classification of all documents?	75	25	100	75	25	100
4	Do administrators use the electronic management system in UPTH as tools to specify do cument work flow to suit business processes?	65	35	100	65	35	100
5	Do administrators use the electronic management system in UPTH to clearly identified repositories for all documents?	60	40	100	60	40	100

Source: Author's Field Survey, 2019

Table 1 revealed that a vast majority of the respondents (65%, 70%, 75%, 65% & 60%) make use of ERMS for quick retrieval of documents, security procedures, classification of documents, work flow and repositories respectively.

Table 2: Percentage Analysis of Effectiveness of Electronic Records Management in Administration in UPTH?

S/N	Question	Options					
		Yes	No	Total	Yes %	No %	Total %
6	Do you think the level of effectiveness of electronic records management in Administration is poor in UPTH?	70	30	100	30	70	100
7	Is the level of effectiveness of electronic records management in Administration increased in UPTH?	35	65	100	65	35	100
8	Do you think that level of effectiveness of electronic records management in administration is improved in UPTH?	40	60	100	40	60	100
9	Is the level of effectiveness of electronic records management in administration reduced in UPTH?	70	30	100	30	70	100

Table 2 revealed that ERMS is not effective in UPTH. At least 70% of the respondents think that electronic management in the facility is poor, 65% do not think that ERM has improved in the facility, 60%, think the level of effectiveness of ERM has not improved and 70% believe that the effectiveness of ERM among administrators had actually reduced.

DISCUSSION OF FINDINGS

Findings from the study revealed that majority of the respondents are aware and do make use of ERM system. This is in line with the findings of previous studies (Kim, 2018). The implication of this to practice is that they will be more favorably disposed to utilize such tools when compared with those who are not aware. However, the findings also showed that the level of effectiveness of the ERM system in the facility is not so far satisfactory. The implication of this to practice is that they may revert to the analog system if nothing is done to improve their skills in ERM systems.

RECOMMENDATIONS

In view of the above, the following recommendations were made.

1. Electronic Records Management System should be provided in adequate supply in the facility by management and other stakeholders.

2. Training and retraining programmes should be routinely organized for administrators on the use of ERM system in the facility.

3. A maintenance culture must be ensured in order to sustain Electronic Records Management System by the administrators.

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Housing and Sustainable Health Status in Rivers State

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Abstract

The study, housing and sustainable health status in Rivers State, was designed in line with the survey research. The objective of this study was to examine the relationship between housing and sustainable health status in Rivers State. The scope of this study was limited to Bori in Khana Local Government Area of Rivers State. The population consisted of all tenants (micro-unit of analysis). This study conveniently adopted a sample size of 180 respondents. The spearman Rank correlation coefficient (rho) and the mean/standard deviation were the statistical tool for testing of hypothesis and analyzing the research questions respectively using the statistical packages for social sciences (SPSS). Findings revealed that there was a significant relationship between habitability and quality of building. Freedom from crowding did not necessarily lead to disease prevention and control. The study concluded that healthy environment promotes sound health. The study recommended that there should be minimum standard requirements for landlords and tenants before habitation.

Keywords: housing, sustainable, health status.

INTRODUCTION

The nature, standard and condition of house have been very poor and of great concern to people which invariably influence human health. A tour through the villages, towns and their neighbourhoods reveals the quality of accommodation (houses) people live in. Majority of the people are ashamed to identify themselves with the accommodation and communities they come from because the houses/dwelling units are temporary, substandard, unsafe, and overcrowded, even the ancillary physical environment, social conditions, economic activities, including facilities and services essential for the development of healthy and harmonious community life are highly inadequate.

Housing is a well documented determinant of health and the burden of disease associated with inadequate housing is large (WHO, 2011). Substandard housing impacts multiple dimensions of mental health. For example, asthma is associated with improper mold abatement (Lock et al., 2002). In many communities, however, housing guidelines and codes have failed to advance and reflect the way individuals interact with their homes (Krieger & Higgins, 2002). Therefore, retrofitting housing to meet healthy housing standards can be expensive. However, costs are significantly decreased if the required elements can be incorporated during the building of new residents or during substantial rehabilitation to damaged homes and apartments.

It is against this background that the Federal Government of Nigeria now bear the burden of servicing the healthcare delivery system in the country by providing primary healthcare, and environmental sanitation in the local council areas upto servicing the secondary level care of the state by building federal medical centres in the states (Opaluwah, 2016) and also embarked on the building of low-cost housing units in all states of the federation in order to alleviate housing challenges. Globally, housing (shelter) has been universally accepted as the second most significant human need after food. Human should live in good houses, fill them, use them and enjoy them. There should be basic services and infrastructures for proper functioning of the houses so that the occupant will be happy and the environment sustainable. It is certain that the provision of housing is a tedious task and constitutes reasonable percentage of household expenditure no matter one's income status.

The universal declaration of human right affirms access to adequate housing as a vital part of human rights. Housing fulfills the basic human physical need for shelter and also satisfies social requirements. Decent affordable housing reduces stress, toxins and infections, which leads to improvement in both physical and mental health (Jeff, 2019). Housing is so significant that its multiplier effect creates employment opportunities for many professionals, mastercraftmen and businessmen. It has also left many in sadness and health complications.

However, with the launching of the first guidelines on housing and health at the 15th international conference on urban health in Kampala, Uganda by the World Health Organization (WHO), which provide evidence based recommendations on low and high indoor temperatures, injury hazards in the homes and accessibility of housing for people with functional impairments, it has become a task requiring combined effort of the people, stakeholders in both the housing and health sectors and the government to face these challenges. The prevailing rate of homelessness and poor housing has resulted in health complications and apartheid among people. This is partly because the housing and health sectors, to some extent, fail to positively plan and invest in housing development including the provision of basic infrastructures for the comfort and betterment of the people.

Housing design, materials, services and infrastructure are advancing rapidly and undergoing developmental changes but relations between housing and health is not well understood by occupants and housing managers and opportunities to reduce hazards and to adapt houses to the health needs of households are missing.

RESEARCH QUESTIONS

1. What is the influence of habitability on the quality of health among residents in Bori?
2. What is the impact of freedom from crowding on disease prevention among residents in Bori?
3. What is the effect of affordability on efficiency of health among residents in Bori?

HYPOTHESES

Ho_1: There is no significant relationship between habitability and quality of health among residents in Bori.

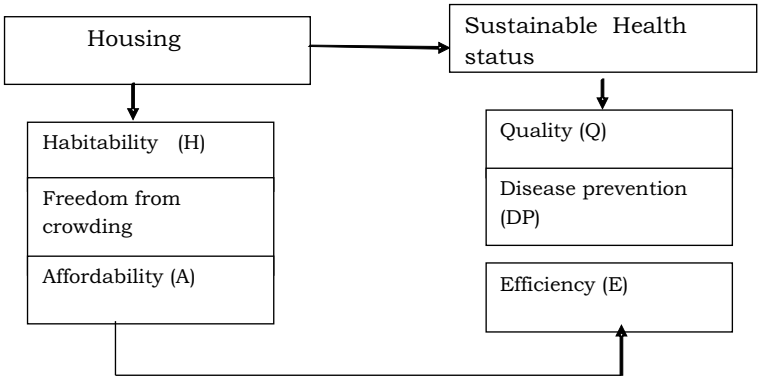
Ho_2: There is no significant relationship between freedom from crowding and disease prevention among residents in Bori.

Ho_3: There is no significant relationship between affordability and the efficiency of health among residents in Bori.

LITERATURE REVIEW

Conceptual Framework

In order to provide a concise direction to this study, the researcher adopted the framework below.



Source: Culled from Fitcher (2019); Taylor (2018)

Housing is synonymous with the physical form. The layman sees it as shelter, but generally, it is the stock of accommodations (residential, commercial, industrial, religious recreational and agricultural) available at any time (Udechukwu, 2016). In Real Estate, the term housing goes beyond the physical structure and includes the infrastructures, utilities and services that make the neighbourhood conducive and lively, such as water supply, electricity, good roads, refuse and sewage disposal, leisure, education and health facilities.

To live in an adequate shelter means more than a roof over one's head. It means to have a home, a place which protects privacy, contributes to physical well being and support the development and social integration of its inhabitants. (Xavier, 2007). Housing has different meaning to different people at different time and place. AnyaIgwe- Kaluand Chima (2006) outlined the following housing concepts:

1. Housing as Shelter: Seen as mere shelter

2. Housing as a product: A combination of the factors of production creates satisfaction in the form of structure (shelter). The product includes the design, construction facilities, etc.

3. Housing as a process: As process, it is achieved through Land acquisition, neighbourhood layout, architectural design, building material, financing, town and regional planning and public control. It also involves repairs, maintenance, remodeling or refurbishment.

4. Housing as a commodity: A commodity is something of use, value, an article of trade or commerce.

5. Housing as privacy: People need some level of privacy either by living in separate accommodation or by demarcating it for convenience. Privacy is a social concept denoting the state or quality of being hidden from or undisturbed by others.

6. Location as a concept: The relative location of accommodation to the place of work, worship, business, school etc. should be such that time and cost of transportation is minimal.

Habitability is the conformance of a residence or abode to the implied warranty of habitability (Jarvins, 2019). A residence that complies is said to be habitable, meaning that it does not have to be

an express contract, convenient or provision of a contract. Habitability is synonymous with tenantability. A house that is said to be habitable must, provide shelter with locks; heated in the winter months; not be infested with vermin, roaches, termites; provide portable water and low noise level (Jeff, 2015). Quality is the standard of something as measured against other things of a similar kind (Taylor, 2018). Substandard housing conditions such as water-leaks, poor ventilation, dirty carpets and pest infestation have been associated with poor health conditions e.g. asthma, cardiovascular events.

Infectious disease and psychological distress has been linked to crowding (Taylor, 2018). Crowding in household relates to situations where the number of people living in a household exceeds the capacity of the household to provide adequate shelter and services to the number of persons. The US Census Bureau classifies dwellings with more than one person per room as "crowded" and dwellings with more than 1.5 as "severely crowded". Also, the Canadian National Occupancy standard (CNOs), based on the number, sex and interrelationship of household members states that:

- No more than two people should share a bedroom
- Parents or couples may share a bedroom
- Children under 5year, either of the same sex or opposite sex may share a bedroom
- A 17year old child should not share a bedroom with an under 5 year of the opposite sex
- 18 year's and above single adults and unpaired children needs a separate room

Crowding in dwellings may arise for a number of reasons including cultural preference, social cohesion and accepting high occupants' density to save the negative effect on children raised in crowded houses can persist throughout life affecting their future as well as socio-economic status.

For a house to be affordable means that it is not too expensive for people of limited means. This means that the house is inexpensive and at a reasonable price. Also efficiency is the ability to avoid wasting materials, energy, resources (efforts, money and time) in doing something or in producing desired result (Jarvins, 2019). Mathematical and scientifically, efficiency is a measure of the extent to which input is well used for an extended task or function (output). It often comprise of the capability of a specific outcome with a minimum amount or quantity of waste, expenses or unnecessary effort. Efficiency simply means doing things right. Retrospectively in America in the year 2015, 18.8 million households were severely cost burdened because they spent more than 50% percent of their income on housing, with much of this burden falling on renters rather than owners. Going by the above trend if both rents and incomes rise at the rate of inflation, the number of American households that are severely cost burdened because of rent is expected to reach 13.1 million in 2025, an 11 % increase from 2015 (Taylor, 2018).

In recent time, this issue of housing affordability has taken a central position in our National discourse especially among the housing experts. That is why Raji et al. (2008) in Tony and Daniel (2017) disclosed that Nigeria is perhaps the fastest urbanizing country in the African continent one of the most important challenges facing the country is the provision of affordable housing. Sustaining and expanding healthy homes initiative at the federal state and local levels including public-private collaborative programme is a major approach that can influence sustainable healthy living in Nigeria. Good health depends on having homes that are safe and free from physical hazards. In contrast poor quality and inadequate housing contributes to health problems such as chronic diseases and injuries posing harmful effects on child development. The quality and accessibility of housing is, however, a particular appropriate area for public health involvement. An

evolving body of scientific evidence demonstrates solid relations between housing and health.

The public health community is developing, testing and implementing effective interventions that yield health benefits through involved housing quality. The public is also concerned about the quality of housing as affordable housing becomes scarcer. Elected officials and communities alike recognize that substandard housing is an important social justice issue that adversely influences health (Krieger & Higgins 2002). Therefore sustainable health is a personal commitment to maintaining and taking responsibility for your own health, through preventive (proactive) means.

Empirical Review

Muntu and Brooks (2018) in their research titled "Housing Habitability and Health: Oakland's Hidden crisis" revealed that almost one-third of the tenants (29%) who seek services from the four organizations investigated currently faces habitability problems in Oakland. Thi is because the organizations serve primarily low-income residents with habitability problems. The study concluded that the challenge of stabilizing Oakland's neighborhoods and preserving a healthy housing stock like many urban neigbourhood today relies on the capacity of city and community leaders to leverage the resources of public health and code enforcement in partnership with the community and neigbourhood organizations.

Mare and Solari (2012) in their research carried out in Los Angeles titled "Housing crowding effect on children's wellbeing, finding revealed that the degree to which children grow up in crowded housing is a neglected but potentially important aspect of social inequality". Supportive is the panel study of Income Dynamics Child Development Supplement and the Los Angeles Family and Neighbourhood survey which explore the effect of living in a crowded home revealed that several dimensions of children's wellbeing suffer when exposed to crowded living conditions particularly in Los Angeles. They concluded that the negative effects of crowded homes on children persist through out their life on both their future adult wellbeing and socio-economic status.

Abiodun and Segun (2005) in their research titled "An Assessment of Housing Status in a typical Nigerian Town carried out in Ile-Ife in South Western Nigeria revealed that the housing conditions under which people live are not too impressive. The general state of cleanliness was poor as evident from the inadequacy of waste disposal facilities in most building. Though most dwellings were not damp but were also difficult to be kept clean. The study further revealed 69% of the houses has approved plan and more than 70% of the premises have inadequate free space due to overbuilt is suggestive that some basic standards of fitness were compromised at the approval stage or better still, that unauthorized alteration of approved premises through illegal construction is a common practice in the area. The study concluded that housing status is generally poor in the town as most houses fell short of minimum standard.

Gap in Literature

- Geographical Gap: It is observed that similar study has been done in Nigeria but has not been carried out in South-South States especially in Rivers State and specifically in Khana LGA (Bori).
- Unit of Analysis Gap: Studies of this nature has not been carried at the micro-level (tenants) but has been done at the macro-level (landlords).

Theoretical Framework

The theoretical foundation underpinning this study is the Housing Needs Theory propounded by Rossi (1955) that conceptualized residential satisfaction/dissatisfaction. In this theory, Rossi (1955) posited that changing housing needs and aspirations as households progress through different life cycle stages often place households out of conformity with their housing and neighourhood situations, the "lack of fit" between their current and desired housing needs creates stress or dissatisfaction with the current residence. Households respond to such stress or dissatisfaction through migration, which brings a family's housing into lifecycle changes. Housing forms the basic unit of human needs in the built-up hierarchy of needs and also a crucial component for social development. It plays an important role in achieving sustainable health status. The social and cultural factors determine the primary requirements of housing. Financial capacity or affordability to an individual has the immediate effect of transforming this need or requirement into a sound reality. What has been known for decades is that in the case of substandard housing conditions, residents are always the subject o several housing threats.

Housing needs belongs to the safety needs hierarchy by Abraham Maslow. If an individual safety needs are relatively satisfied, their safety needs take precedence and dominate behavior. In the absence of physical safety due to war, natural disaster, family violence, childhood abuse, institutional racism etc. people may (re-)experience post-traumatic stress disorder or transgenerational trauma. In the absence of economic safety due to an economic crisis and lack of work opportunities these safety needs manifest themselves in ways such as a preference for job security, grievance procedures for protecting the individual from unilateral authority, savings accounts, insurance policies, disability accommodations, etc. This level is more likely to predominate in children as they generally have a greater need to feel safe. Safety and security needs are about keeping us safe from harm. These include shelter, job security, health, and safe environments.

METHODOLOGY

This study is designed in line with survey research using data collected from both primary and secondary sources. While the secondary source comprises of textbooks, journals, periodicals etc, the primary source came through the questionnaire administration at the micro-unit of analysis (tenants) within Bori metropolis. The sampling technique adopted was convenient whereby 180 tenants formed the sample size of this study. The likertscale (ordinal) was used in the questionnaire design leading to the application of the spearman Rank correlation coefficient (rho) for test of hypotheses plus the mean and standard deviation which were used in analyzing the research questions respectively with the aid of the Statistical Package for Social Sciences (SPSS) for easily and verifiable results.

RESULTS

Table 1: Descriptive analysis of influence of habitability on the quality of health status in Bori

S/N ITEM	N	Mean	Std. Deviation	Remark
1. My house has POP ceilings	180	1.3778	.48618	Disagreed
2. The floor of the houses are tiled	180	2.5500	1.33067	Agreed
3. There is no flooding in the compound	180	1.8500	1.12600	Disagreed
4. The roof leaks	180	2.51667	1.15580	Agreed
Total	**180**			

From Table 1, item 1 with mean score of 1.378 and STD .48618 implies that the respondents disagreed that their houses had POP ceiling. Item 2, with mean score of 2.55 and STD 1.33067 shows that the respondents agreed that their houses were tiled. Item 3 with mean score 1.8500 and STD 1.126 and implies that they disagreed that their compounds were flooded. Item 4 with mean score of 2.51 and STD .1.1518 shows that their roofs leaked.

Table 2: Descriptive analysis of impact of freedom from crowding on disease prevention

S/N ITEM	N	Mean	Std. Deviation	Remark
1. My surrounding is often occupied with people	180	1.3667	.48324	Disagreed
2 I am sick because my environment is not spacious	180	2.5944	1.14188	Agreed
3 I am sick due to the over-crowdiness of my room	180	1.1833	.38802	Disagreed
Total	**180**			

From Table 2 above, item 5 with mean score of 1.367 and STD .48324 show that the respondents disagreed that their surrounding were often saturated. In item 6, mean score of 2.59 and STD 1.14188 implies that the respondents agreed that they fell sick because their environment was not spacious. In item 7, mean score of 1.183 and STD .38802 show that the respondents disagreed that they fell sick due to the overcrowdiness of their rooms.

Table 3: Descriptive analysis of effect of affordability on efficiency of health status

S/N	ITEM	N	Mean	Std. Deviation	Remark
1	Cost of my rent is subsidized	180	2.4667	1.24802	Disagree
2	There are very expensive buildings in Bori	180	1.9111	1.13988	Disagree
3	Government housing unit are hardly maintained	180	2.0500	1.20648	Disagree
4	There is routine maintenance of my building	180	1.3667	.48324	disagree
	Total	**180**			

In table 3, item 1 with mean score of 2.47 and STD 1.24802 implies that respondents disagreed that cost of rent was subsidized. Item 2, with mean score of 1.911 and STD 1.1398 implies that the respondents disagreed that there were very expensive buildings in Bori. In item 3, mean score of 2.05 and STD 1.20648 shows that the respondents disagreed that Government housing unit were hardly maintained. In item 4, mean score of 1.367 and STD .48324 shows that the respondents disagreed that there was routine maintenance of their building.

Hypotheses

Table 4: Relationship between habitability and quality of health delivery

Correlations

			Item 1	Item 2	Item 3	Item 4
Spearman's rho	Item 1	Correlation Coefficient	1.000	.022	-.202**	.587**
		Sig. (2-tailed)	.	.771	.007	.000
		N	180	180	180	180
	Item 2	Correlation Coefficient	.022	1.000	.608**	.164*
		Sig. (2-tailed)	.771	.	.000	.028
		N	180	180	180	180
	Item 3	Correlation Coefficient	-.202**	.608**	1.000	-.218**
		Sig. (2-tailed)	.007	.000	.	.003
		N	180	180	180	180
	Item 4	Correlation Coefficient	.587**	.164*	-.218**	1.000
		Sig. (2-tailed)	.000	.028	.003	.
		N	180	180	180	180

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4, hypothesis 1 above with a significance level of .003<.05 shows there is a significant relationship between habitability and quality of health status in Bori. This implies that the respondents aligned to the fact that habitability is related to health status in Bori. The null hypothesis is therefore rejected.

Table 5: Relationship between freedom from crowding and disease prevention

Correlations

			Item 5	Item 6	Item 7
Spearman's rho	Item 5	Correlation Coefficient	1.000	.661**	-.003
		Sig. (2-tailed)	.	.000	.968
		N	180	180	180
	Item 6	Correlation Coefficient	.661**	1.000	.061
		Sig. (2-tailed)	.000	.	.418
		N	180	180	180
	Item 7	Correlation Coefficient	-.003	.061	1.000
		Sig. (2-tailed)	.968	.418	.
		N	180	180	180

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5 and hypothesis 2 above, .413>.05 shows that a there is no significant relationship between freedom from crowding and disease prevention. This implies that the null hypothesis is therefore upheld. The stance of the respondents indicate that freedom from crowding does not necessarily lead to disease control.

Table 6: Relationship between affordability and efficiency of health status

Correlations

			Item 8	Item 9	Item 10
Spearman's rho	Item 8	Correlation Coefficient	1.000	.661**	-.003
		Sig. (2-tailed)	.	.000	.968
		N	180	180	180
	Item 9	Correlation Coefficient	.661**	1.000	.001
		Sig. (2-tailed)	.000	.	.418
		N	180	180	180
	Item 10	Correlation Coefficient	-.003	.061	1.000
		Sig. (2-tailed)	.000	.000	.
		N	180	180	180

**. Correlation is significant at the 0.01 level (2-tailed).

From table 6 and hypothesis 3, above .000<.05 shows a significant relationship between affordability and efficiency of health delivery. The null hypothesis is therefore rejected. The respondents' opinion is that there should be habitation affordability which leads to efficiency in health status.

Discussion of Findings

From table 1, item 1 with mean score of 1.378 and STD .48618 implies that the respondents disagreed that their houses had POP ceiling. Item 2, with mean score of 2.55 and STD 1.33067 shows that the respondents agreed that their houses were tiled. Item 3 with mean score 1.8500 and STD 1.126 and implies that the disagreed that their compounds flood. Item 4 with mean score of 2.51 and STD .1.1518 shows that their roofs leak. Table 4, hypothesis 1 above with a significance level of .003<.05 shows there is a significant relationship between habitability and quality of health status in Bori. This implies that the respondents aligned to the fact that habitability is related to health status in Bori. The null hypothesis is therefore rejected. This is supported by the findings of Muntu and Brooks (2018) on housing habitability and health in Oakland which reveals that tenants faced habitability problem due primarily to low income residents.

Table 5 and hypothesis 2 above, .413>.05 shows that a there is no significant relationship between freedom from crowding and disease prevention. This implies that the null hypothesis is therefore upheld. The stance of the respondents indicates that freedom from crowding does not necessarily lead to disease control. This brings to notice the findings by Abiodun and Segun (2005) that 70% of the premises have inadequate free space due to overbuilt and some basic standards of fitness were compromised at the approval page or better still, that unauthorized alteration of approved premises through illegal construction is a common practice. That is why the US Census Bureau classifies dwelling with more than 1 person per room as overcrowded and dwelling with more than 1.5 as severely crowded.

From table 6 and hypothesis 3, above .000<.05 shows a significant relationship between affordability and efficiency of health status. The null hypothesis is therefore rejected. The respondents' opinion is that there should be habitation affordability that leads to efficiency in health status. This is further buttresses that Nigeria is perhaps the fastest urbanizing country in the African continent and one of the most and important challenges facing the country is the provision of affordable housing.

Conclusion

Housing should be seen as a component of health sustainability. The extent one has a decent accommodation will determine the quality of one's health status. Minimum decency of human habitation should be maintained to avoid diseases. There is no health status that does not consider healthy housing; otherwise it will be undermining the health of the citizens.

Recommendation

From the findings above, the following recommendations have been reached:

1. Government should put minimum hygienic requirements for tenants and landlord before renting or habitation takes place as one of the requirements for habitation.

2. Since over-crowding does not necessarily lead to diseases, other disease prevention measures should also accompany decent accommodation.

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Hygiene Practice and its Implications on Public Health among Food Handlers in Rivers State University, Port Harcourt

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Abstract

The purpose of the study was to determine the hygiene practices among University food handlers in Rivers State University, Port Harcourt. A cross-sectional descriptive study design was adopted using 135 food handlers who were randomly selected. Data were collected using a 26-item structured questionnaire. Data were analyzed using simple percentage. Findings from this study revealed that a vast majority of food vendors were not consistent in strictly adhering to standard hygiene practices thus, predisposing consumers to various health risks. Factors adversely affecting recommended hygiene practices among food vendors include lack of basic hygiene knowledge, employment of cheap and unskilled workers and lack of training and retraining programmes for food vendors among others. The study recommended periodic food safety training sessions for food handlers to increase their awareness on food safety. The activities of the food handlers should be regularly monitored and appropriate actions taken by health officers to ensuring that food safety procedures are followed accordingly.

Keywords: hygiene, practices, implications, public health, food handlers.

INTRODUCTION

One of the greatest challenges of tertiary institutions in Nigeria is the quality and safety of food presented to the public for consumption. This is largely due to the poor sanitary conditions of vending sites and unhygienic practices observed among most vendors. Food hygiene practice is a broad term used to describe the preparation, handling and preservation of foods in a manner that ensures the food is safe for human consumption (Iloma et al., 2017). It deals with the prevention of food contamination at all stages of production, collection, transportation, storage, preparation, sale and consumption (Malcolm & Bronwyn, 2016). The World Health Organization (WHO, 2009) defines food vending as ready-to-eat foods and beverages prepared and /or sold by vendors on the streets and other public places that can be consumed right away or eaten at a later time (Aspanga, 2014).

Although the practice of food vending is not original to Africans, in recent times, nearly everyone depend on food vendors at one point in time or another due to the increased engagements of both

men and women in economic activities (Akintaro, 2012; Guangyi & Zhanh, 2014). In cooking for large populations, food passes through various hands, thereby increasing the risk of food contamination due to inappropriate handling. Deliberate or unintentional contamination of food during large production might jeopardize the wellbeing of consumers and have very serious repercussions on the community such as outbreak of disease (Amor & Baiden, 2011). Food hygiene probably put too much importance on cleanliness but food safety requires much more than a clean premises. All around the world, there is increase in concerns about food safety due to high incidence of food borne illness (Rahman, 2012; Bendect, 2013).

In Nigeria, food handling involves diverse kind of food which includes cooked beans, rice, stews, plantain, yam, soups etc. These kinds of food are relatively cheap, easily accessible and also saves time standing in the kitchen for hours, (Cebdm et al., 2013). Consumers of these foods are much more concerned about convenience than the safety, quality and hygiene status of the foods they buy (Nicolas, et al, 2009; Abdalla et al., 2009)

The food industry plays an important role in meeting the food demands of the urban dwellers. It is an industry that serves large number of population daily with relative cheaper and easily accessible varieties of food (Garode & Waghode, 2012; Tan et al., 2012). In spite of advantages of easy access and affordability, together with self-employment, there are significant reports of health problems that have been associated with these foods. Since most operators in food vending business normally depend on low capital or would at least want to maximize profit, issues of hygiene and safety are neglected, resulting too easily to disease outbreak such as cholera and diarrhea around the area of operation (Alimi, 2016; Mesias, 2018). According to Monney (2013), food handling may lead to food contaminate due to poor personal hygiene, cross-contaminating raw and processed food, as well as inadequate cooking and improper storage of food. Maintaining high food safety levels in school food services is very important.

Despite serious efforts made by the University administration to improve food hygiene and safety, the hygiene practice of food handlers has remained worrisome. Medical records from the University clinic reveal periodic food-related illness among students. Again, most food vendors in the University are often poor, uneducated and lack basic knowledge in safe food handling, environmental sanitation and hygiene, mode of food display, food services and hand washing, sources of raw materials, and use of potable waters. Consequently, vended foods are sometimes considered to be a major public health risk. This study therefore investigated hygienic practices of food handlers and its implications to public health in Rivers State University.

METHODOLOGY

The study adopted the cross-sectional descriptive research design. The population for the study was an estimated 250 food handlers in about 34 identified food preparing premises (restaurants) and 46 open food vending spots at Rivers State University, Port Harcourt which at the time of this study had about 22, 400 students from seven faculties and thirty nine departments. A total of 154 food handlers were randomly selected and used for the study which is about 61% of all identified food handlers. The instrument for data collection was a 25-item structured questionnaire served on all 154 selected food handlers out of which, 135 copies representing 88% of respondents were retrieved. Data collected were collated and analyzed using descriptive statistics of frequency and simple percentage.

RESULTS

Table 1: Showing Percentage Analysis of Hygiene practices of food handlers

S/N	Variables	Always N (%)	Sometimes N (%)	Rarely N (%)	Never N (%)	TOTAL (%)
1	I clean my environment before and after cooking	21(15.6)	109(80.7)	5(3.7)	0	135(100)
2	I wash my hands with soap after using the toilet	52(38.5)	80(59.3)	3(2.2)	0	135(100)
3	I wash my hands with soap after touching garbage, animals or chemicals such as disinfectants	32(23.7)	93(68.9)	10(7.4)	0	135(100)
4	I wear my apron properly before cooking for the public	40(29.6)	53(39.3)	33(24.4)	9(6.7)	135(100)
5	I cover my hair properly before handling public food	47(34.8)	73(54.0)	9(6.7)	6(4.4)	135(100)
6	I temporarily stop handling public food if I have open cut or boil	2(1.5)	57(42.2)	16(11.9)	60(44.4)	135(100)
7	I temporarily handling public food if I have discharges from my ear, eye or nose	10(7.4)	32(23.7)	90(66.7)	3(2.2)	135(100)
8	I remove my jewelries before handling food	41(30.4)	49(36.3)	28(20.7)	17(12.6)	135(100)
9	I chew gum or nuts while preparing and serving public food	20(14.8)	46(34.1)	26(19.3)	43(31.8)	135(100)
10	I poke my nose or touch my mouth or tongue while preparing and serving public food	81 (60)	14(10.4)	18(13.3)	22(16.3)	135(100)
11	I do not spit, sneeze or cough near food	68(50.4)	20(14.8)	17(12.6)	30(22.2)	135(100)
12	I do not serve food with used or open plates	70(51.8)	43(31.9)	12(8.9)	10(7.4)	135(100)
13	I shave my pubic hairs regularly before handling public food.	37(27.4)	68(50.4)	20(14.8)	10(7.4)	135(100)
14	I take my bath regularly before handling public food.	84(62.2)	36(26.7)	9(6.7)	6(4.4)	135(100)
15	I do not smoke or take alcohol while preparing or serving public food	78(57.8)	32(23.7)	20(14.8)	5(3.7)	135(100)
16	I use excessive make-up before handling public food	22(16.3)	21(15.6)	25(18.5)	67(49.6)	135(100)
17	I use my make-up while preparing food	24(17.8)	24(17.8)	26(19.2)	61(45.2)	135(100)
18	I go for routine medical checkups	52(38.5)	61(45.2)	10(7.4)	12(8.9)	135(100)
19	I do not handle money and food with the same bare hands	49(36.3)	50(37.0)	10(7.4)	26(19.3)	135(100)

Field Survey, (2020).

Table 1 revealed that a vast majority of the respondents do not optimally engage in hygiene practices. For instance, only 15.6% of food handlers wash their hands always before and after cooking, 38.5% alone wash their hands always after visiting the toilet and 23.7% wash their hands with soap always after touching garbage, animals or chemicals. Again, only 1.5% temporarily stops handling public food always when they have boils or open cuts while a vast majority of 60% poke their nose or touch their mouth while preparing or serving food. Only 34.8% cover their hair always while preparing or handling food, 30.4% remove jewelries always while handling food and only 38% go for routine check-up always as food handlers. This implied that the rest only engage in the

above-mentioned hygiene practices sometimes, rarely or never. This has very serious implications for the quality and safety of food for public consumption.

Table 2: Showing percentage analysis of factors affecting hygiene practices of food handlers.

S/No	Statement	Yes (%)	No (%)
1.	I do not always keep to most hygiene rules because I do not know much about practices required of a food handler	96 (71.1)	39(28.9)
2.	Poor enforcement of sanitary laws by health inspectors adversely affect our attitude towards hygiene	90(66.7)	45(33.3)
3.	There is regular training and retraining for food handlers at Rivers State University	41(30.4)	94(69.6)
4.	Most food handlers do not put on aprons because such aprons are not regularly provided by the business owners	94(69.6)	41(30.4)
5.	Most food handlers are not graduates and this adversely affects their hygiene practices while handling food	96 (71.1)	39(28.9)

Field Survey, (2020).

Table 2 revealed some factors adversely affecting the practice of hygiene among food handlers to include ignorance, poor enforcement of sanitary laws, lack of training and retraining exercises, level of academic qualification and non provision of necessary aprons for food handlers. For instance, 71.1% of the respondents do not always practice standard hygiene because they do not know much about hygiene practices required of a food handler, 66.7% show negative attitude towards hygiene because those saddled with the responsibility of enforcing relevant laws to make them comply are not doing so, 30.4% only affirm that trainings on hygiene practices are conducted for them. Again, 69.6% of the respondents do not use aprons because such aprons were not provided by the business owners while 71.1% most handlers are not graduates and that this low level of education adversely affects their hygiene behaviours.

DISCUSSION

Results from Table 1 showed that majority of the food handlers do not practice standard hygiene during the preparation and handling of food. This is in line with the findings of previous studies and could put the health of consumers at great risk due to the associated hazards of poor food handling. For instance, Nigusse and Kumie (2012) found 49.3% parasite rate of *Entamoeba histolytica* among Mekelle University students in Addis Ababa as a result of poor food handling by cafeteria vendors. They concluded that the practice of food hygiene among the study group was poor and as such, recommended improvement of hygiene among food handlers, personal hygiene, frequent medical check-up's and provision of conveniences for both the handlers and consumers. This corroborates the findings of Boeteng (2014) who assessed food hygiene practices of street food vendors and found that most of the vendors do not cover their hair, dustbins and make use of bare hands to touch food when serving most of the times.

The implication of this to practice is that most of the food served by vendors are already seriously contaminated due to poor handling and may predispose the health of public consumers. Except

something drastic is done, consumers will continue to suffer different health challenges rather than improve their health.

Results from Table 2 showed that there are several factors affecting hygiene practices of food handlers in Rivers State University such as ignorance, poor enforcement of sanitary laws, lack of training and retraining exercises, low level of academic qualification and non provision of necessary aprons for food handlers. This is in agreement with the findings of a study conducted by Haveler et al. (2013) on factors affecting hygiene practices among food handlers in Dangila town food and drink establishments, North West Ethiopia. The findings revealed that lack of hygiene knowledge, shower facility and separate dressing room were factors affecting hygiene practices of food vendors. It also found lack of proper liquid waste disposal and dish washing facilities militating factors. This also conforms to the study conducted by Liu et al. (2014). This also agrees with the findings of Mulugeta and Bayeh (2012).

The implication of this to practice is that except this trend is reversed and awareness increased on basic hygiene practices, food handlers will continue to wallow in ignorance to the detriment of the exposed public.

CONCLUSION

The sanitary conditions of the food handlers in Rivers State University were not satisfactory and this is affected by a lot of factors such as ignorance and irregular inspection by Health Officers among others.

RECOMMENDATIONS

Based on the findings from this study, the following recommendations were made;

1. Environmental and health education programmes should be periodically conducted for food handlers in order to raise awareness on food safety. This will ensure the food handlers are equipped with the basic knowledge required to serve the public.

2. The activities of the food handlers should be regularly monitored and appropriate actions taken by appropriate Health Officers to ensuring that food safety procedures are followed accordingly.

3. Regulatory bodies should strengthen and improve the frequent visit for food vending sites and concurrently providing training on hygiene and sanitation for food vendors will help to improve and/or maintain sanitary conditions.

4. Periodic food safety training sessions should be organized by the University Health Department for food handlers in order to bring them abreast with global best practice and current trend in food handling business. This can be done by bringing in experts who could use audio-visual aids and/or practical demonstration of proper food handling to pass home their message.

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Infertility as a Major Contributory Factor to Marital Disharmony among Couples of Ogoni Ethnic Nationality in Rivers State, Nigeria

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Abstract

The study evaluated the emotional reactions of couples from selected communities in Ogoni ethnic nationality. This was a descriptive study in which 500 infertile couples were selected by convenience sampling and were evaluated. 27.8% couples developed some form of marital disharmony whereas 56.2% couples' marital harmony was not affected. With regard to sexuality, only 27.8% of the couples could maintain better sexual performance, while 16.8% of the couples found no change in their sex life. Emotional reactions experienced were: shock in women (29.0%) and in men (27.2%), depression in women (31.8%) and in men (22.8%) and 14% of the men were found to show more negative interacting with the infertile wives and threat of divorce ensued to 10% females. Around 57.4% of instances of males were sympathetic. Sense of guilt and self-blame developed in 29.0% of males and 30.60% of the females. Male infertility level 80.2%, while the female was 97%. This study illuminated the emotional reactions of infertile couples. Infertile couples had high negative feelings, low self-esteem, poor social support, less freedom and less number of opportunities.

Keywords: infertility, couples, females, males, psychological, pregnancy

INTRODUCTION

Infertility is the inability of a couple to bear a child even after a year of repeated unprotected sexual intercourse (Supha et al., 2011). It primarily refers to the biological inability of a person to contribute to conception. Infertility or childlessness may also refer to the state of a woman who is unable to carry a pregnancy to full term. There are many biological causes of infertility, including some that medical intervention can treat (Makar & Tolh, 2018). It is a reproductive health problem but does not refer to a specific disorder. On the contrary, it is an umbrella term that refers to a range of disorders, some of which affect men while others specific to women or both. It is perceived as a problem across virtually all cultures and societies. Infertility varies from country to country (Neeru in Sudha et al., 2011). Infertility affects those from all socio-economic levels and racial, ethnic and cultural groups, sociocultural context is an important consideration in the meaning of and responses to infertility (Bentely & Muscie-Taylor in Sudha et al, 2011). Infertility is not the same as being sterile. Sterility is when one cannot get pregnant and cause cannot be treated (Achalu, 2013). Fifteen percent to 20% of healthy adults have fertility problems (Reedy & Reedy, 2011). A number of studies have found that infertile couples underwent high psychological distress than normal

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counterparts (Anderson et al, 2003; Chou, 2004; Zahid, 2004). Stress, marital disharmony, sense of isolation, depression, anger, tension, anxiety, guilt and frustration are emotions fueled by the infertility experience (Lakse &Vace, 1999; Merari et al. in Sudha et al, 2019). Infertility also affects individual's sexual and marital life. Traditionally, women are "blamed" as the almost as likely to be due to the men. In some African societies including Nigeria the women are often blamed for infertility. This gives the women the privilege to engage in sexual relationship outside their husband in order to get pregnant. Unfortunately, this is because less about male fertility and women infertility has been studied (Achalu, 2013). The aim of this paper was to review infertility as a major contributory factor to marital disharmony among couples in Ogoni ethnic nationality.

METHODOLOGY

The study was conducted within six kingdoms of Ogoni ethnic nationality (Eleme, Gokana, Nyokhana, Ken-Khana, Babbe and Bori urban). The research design was a cross sectional study. The study population was made up couples between 18 – 49 years living within the study area. A total population of 3,500 marital couples lived in the area.The sample size for the study was 500 couples. This sample size was determined based on the population of couples in the area. The instrument used for data collection was regular interview and questionnaire with closed response questions related to physical and psychological stressors. The couples were interviewed together as well as separately. The data were taken from different kingdoms in Ogoni including Eleme, Gokana, Bori urban, Nyokana and Babbe. The researcher served the respondents with questionnaire and retrieved their responses on the spot. All the information provided by participants was analyzed using frequency and percentages.

RESULTS

Table 1: Effects of infertility on marital harmony and sexuality

S/N	Responses	Frequency	Percentage (%)
1.	Not affected by infertility	281	56.2
2.	Disharmony due to infertility	139	27.8
3.	More harmony with infertility	80	16
	Total	**500**	**100**

The table above reveals that 281 respondents representing 56.2% were not affected by infertility and 139 respondents representing 27.8% had disharmony due to infertility while 80 respondents representing 16% were more in harmonious relationship inspite of their infertility problems.

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Table 2: Responses according to infertility and sexuality

Responses	Frequency	Percentage (%)
Decreased	58	11.6
Extra marital liaisons	60	12
Better sexual performance	139	27.8
Loss of sexual happiness	59	31.8
No change	84	16.8
Total	**500**	**100**

Table 2 shows that 58 respondents representing 11.6% had decrease frequency to infertility and sexuality, while 60 respondents representing 12% had extra marital liaisons, 139 respondents representing 27.8% had better sexual performance, 59 of the respondents (31.8%) had loss of sexual happiness due to problems of infertility among them and 84 respondents representing 16.8% had no change of infertility and sexuality.

Table 3: Infertility and different types of individual emotional reactions in males

Responses	Frequency	Percentage (%)
Shock	136	27.2
Depression	114	22.8
Sense of isolation	39	7.8
Guilty	57	11.4
Anger	70	14
Unaffected	84	16.8
Total	**500**	**100**

Table 3 shows that 136 respondents representing 27.2% indicates shock due to infertility and different types of individual emotional reaction, 114 respondents were depressed indicating 22.8% and 39 respondents representing 7.8% indicates those who had sense of isolation while 57 respondents representing 11.4% shows that they were guilty. 70 respondents representing 14% indicate anger. And 84 respondents representing 16.8% show that the people were unaffected by infertility and different types of individual emotional reactions among males.

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Table 4: Infertility and different types of individual emotional reaction in females

Responses	Frequency	Percentage (%)
Shock	145	29
Depression	159	31.8
Sense of isolation	66	13.2
Guilty	51	10.4
Anger	35	7
Unaffected	44	8.8
Total	**500**	**100**

Table 4, from the analysis above it was revealed that 145 respondents representing 29% was shocked of infertility and different types of individual emotional reaction in female, while 159 respondents, representing 31.8% indicates those that were depressed, 66 respondents representing 13.2% indicates people who had sense of isolation while 51 respondents representing 10.2% indicates females with guilty conscience and 35respondents representing 7% shows anger, while 44 respondents representing 8.8% were unaffected.

Table 5: Different types of emotional reactions among male infertile couples

Responses	Frequency	Percentage (%)
Sympathetic	253	50.6
Anger, rebuking	169	33.8
Physical assault	50	10
Threat to divorce	28	5.6
Total	**500**	**100**

Table 5 shows different types of emotions shown by infertile male couples. It was established that 253 respondents representing 50.6% were sympathetic, 169 respondents representing 33.8% were quick to anger and rebuking, 50 respondents representing 10% were physically assaulted while 28 respondents representing 5.6% were threatened to be divorced.

Table 6: Different types of emotional reactions among female infertile couples

Responses	Frequency	Percentage (%)
Sympathetic	239	47.8
Anger and rebuking	159	31.5
Physical assault	52	10.4
Threat to divorce	50	10
Total	**500**	**100**

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From the analysis, table 6 shows different types of emotions shown by female infertile couples. 239 respondents representing 47.8% were sympathetic, 159 respondents representing 31.5% showed anger and rebuking reactions, 52 respondents representing 10.4% had physical assault and 50 respondents representing 10% were threatened to be divorced.

Table 7: Reactions of parents-in-law towards infertile couples

Responses	Frequency	Percentage (%)
Sympathetic	319	63.8
nagging and intriguing	157	31.4
Considered auspicious	24	4.8
Threat to divorce	0	0
Total	**500**	**100**

The analysis from table 7 revealed that 319 respondents representing 63.8% of parents-in-law were sympathetic to the infertile couples, 157 respondents representing 31.4% faced nagging and intriguing from their parents-in-law, while 24 respondents representing 4.8% considered auspicious and none of the respondents representing 0% faced the threat of divorce.

Table 8: Reaction of social circle towards infertility couple (male)

Responses	Frequency	Percentage (%)
Sympathy	287	57.4
Ridicule	163	32.6
Ostracism	50	10
Total	**500**	**100**

From the analysis of table 8 above, 287respondents representing 57.4 % males were sympathetic, 163 respondents representing 32.6% males faced ridicule and 50 respondents representing 10% males were ostracized due to infertility.

Table 9: Reaction of social circle towards infertility couple (female)

Responses	Frequency	Percentage (%)
Sympathy	248	49.6
Ridicule	184	36.8
Ostracism	68	13.6
Total	**500**	**100**

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From the analysis, table 9 above shows that 248 respondents representing 49.6% had sympathy on infertile females, 184 respondents representing 36.8% females were ridiculed due to their infertility problem and 68 respondents representing 13.6% were ostracized as a result of their infertility status.

Table 10: Psychological problems faced by male couples

Responses	Frequency	Percentage (%)
Self blame	145	29
Blame couples about infertility	107	21.4
Fate	126	25.2
None	122	24.4
Total	**500**	**100**

Table 10 above shows that 145 respondents representing 29% of the males had self-blame, while 107 respondents representing 21.4% were faced with blaming couples about infertility, 126 respondents representing 25.2% were with fate as male couple and 122 respondents representing 24.4% were not faced with psychological and emotional problems.

Table 11: Psychological problems faced by female couples

Responses	Frequency	Percentage (%)
Self blame	153	30.6
Blame couples about infertility	90	18
Fate	121	24.2
None	136	27.2
Total	**500**	**100**

From the table 11 above, the females who faced self-blame were 153 respondents representing 30.6%. Female couples who had blame about their infertility were 90 representing 18%, female couples that were faced with fate were 121, representing 24.2% while 136 female couples representing 27.2% had no psychological problem inspite of their status.

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Table 12: Male couples who were childless forever

Responses	Frequency	Percentage (%)
Resign to fate	120	32.4
Accept as the condition	100	20.6
Due to past sins	79	15.8
Remarriage	89	17.8
Undecided	67	13.4
Total	**500**	**100**

From the analysis of table 12 above, 120 respondents representing 32.4% indicates male couples who resigned to fate, 100 respondents representing 20.6% of males accepted it as ill luck, 79 respondents representing 15.8% attributed it to past sins, while 89 respondents representing 17.8% remarriage and 67 respondents representing 13.4% were yet to take decision.

Table 13: Female couples who were childless forever

Responses	Frequency	Percentage (%)
Resign to fate	165	33
Accept as the condition	118	23.6
Due to past sins	118	23.6
Remarriage	28	5.6
Undecided	71	14.2
Total	**500**	**100**

Table 13 above revealed that 165 respondents representing 33% female couples resigned to fate, 118 respondents representing 23.6% of them accepted as ill luck, 118 respondents representing 23.6% attributed to past sins, while 28 respondents representing 5.6% were faced with remarriage as the only option and 71 respondents representing 14.2% were yet to take any decision.

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Table 14: Infertility as an important problem (male)

Responses	Frequency	Percentage (%)
Yes	401	80.2
No	99	19.8
Total	**500**	**100**

From the table 14 above, 401 respondents representing 80.2% agreed that infertility was an important problem to men while 99 respondents representing 19.8% disagreed to it and never saw it as any problem.

Table 15: Infertility as an important problem (female)

Responses	Frequency	Percentage (%)
Yes	485	97
No	15	3
Total	**500**	**100**

From the table 15 above, 485 respondents representing 97% agreed that infertility is an important problem to women while 15 respondents representing 3% disagreed.

Table 16: Magico-religious practices among infertile couples

Responses	Frequency	Percentage (%)
Invocation to God	153	30.6
Wearing of stone, threads	85	17
Tantric rites (pigas)	73	14.6
Astrology	99	19.8
None of the above	90	18
Total	**500**	**100**

Table 16 shows 153 respondents representing 30.6% which is the bulk of the couples believed in invocation to God, 85 respondents representing 17% resorted to wearing of stone and 73 respondents representing 14.6% went on tantric rites, 99 respondents representing 19.8% believed in astrology while 90 respondents representing 78% did not practice any of the religions as a means to achieve pregnancy.

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Discussion

The main indicators in this study were emotional distress, shock, anxiety, depression, marital disharmony, anger, guilt, frustration and sense of failure. All the couples in the six kingdoms of Ogoni ethnic nationality who were interviewed confirmed that they were anxious or worried about their infertility. Infertility evokes strong and significant reactions even the social circles with whom the couples interact. The friends and relatives other than in-laws were most in ridiculing the couples, or even ostracizing them from normal social interactions. From the social circle, the proportion of males (32.6%) ridicule is considerably less than that of female (36.8%). Very few couples (M.10%, F. 13.6%) faced social obstracism. As a result of all these and other implications nearly 80.2% of males and 97% of females felt infertility is an important problem in their lives.

Magico-religious practices of infertile couples in table 16 demonstrate that the bulk of the couples (82.0%) believed in availing help of the super-natural powers by practicing various forms of invocations and holding tantric rites or wearing some "stones" or "thread" for the likely cure of their infertility. "If man failed why not try God" is the typical reaction of these couples. Out of the total couples studied, about 3.0% practiced some form of rites so as to invoke the blessings of God, 17.0% couples wore some stones or thread and about 15% couples performed tantric rites. Approximately one-fifth proportion had however taken to astrological beliefs. The remaining 18% did not resort to any magico-religious practice. The prevalence of the above scenario might have been influenced by the age-led cultural practices of the community as also the deep faith of the people in ancient verdict tenets.

Infertile couples underwent higher level of psychological distress due to their fertility problem. Because of psychological distress, these couple developed certain psychological disorders which affect both physical as well as mental health. Though infertility affects both men and women, but the overall consequences and effects tend to be higher among women as compared to men. Earlier researchers (Sherrod, 2004; Zahid, 2004) revealed that infertile women exhibit a significant higher level of psychological forms of tension, anxiety, depression, self-blame and suicidal ideation.

CONCLUSION

The findings of this study revealed that infertile couples have poor wellbeing on all the dimensions as compared to normal couples. They have high negative feelings, low self-esteem, poor social support, less freedom and less number of opportunities as compared to normal couples. Infertility is not mere medical problem of the affected couples alone but it is highly influenced by the social and psychological conditions. Infertility has a profound impact on the people's life and their psyche.

Emotionally, they tend to develop sense of stress, anger, guilt and many others. The infertile couples are susceptible to physical and psychological stressors due to infertility. Remember that infertility affects couples, not just individuals. The causes of infertility are varied, but in a majority of cases a couple has done nothing "wrong".

Although there are gender differences in emotional responses, both partners "feel" the experience (Gibson & Myers, 2010, Brush, 2011; Hart, 2012). Stressed couples require professional psychological help to relieve their stress.

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Recommendations

This study made the following recommendations:

i. Advice should be given to couples about delay in conception and defining infertility to them.

ii. Consistent investigation and managing fertility problems, including reducing the risk of viral transmission of HIV or Hepatitis.

iii. Continuous health enlightenment programmes on the subject matter to avert psychological trauma attached to the condition.

iv. The government should provide fertility facilities accessible and affordable to couples at all times.

v. Health care providers should empathize with infertile couples and encourage them to seek for treatment at the designated treatment centres.

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Impact of Immunization Against Communicable Diseases among Under-Five-Year Children in Zaakpon Community, Khana Local Government Area of Rivers State

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Abstract

This research focused on the impact of immunization against communicable diseases among under-five-year children in Zaakpon Community, Khana Local Government Area of Rivers State. The descriptive study design was used in a retrospective research setting. The researchers made use of parents of under-five children as the population of response in the study to substitute for the target population (the under-5 children). The population of 1,300 parents of under-five children was purposively chosen. A sample size of 306 parents of under-five children was drawn out of it. The major instrument for data collection was a well-structured and validated questionnaire which suited the main purpose of the study. A total of 289 fully completed questionnaires were retrieved. The data obtained were tallied, summarized, coded and presented in frequency Tables and percentages. Among the results were ongoing administration of BCG (60.2%), DPT (64.7%), polio (80.6%) and measles vaccines (88.2%) at Zaakpon PHC centre. There was a good utilization of health services as seen in the increasing number of children immunized each year until the communal crisis erupted. Furthermore, this study revealed a reduction in the morbidity and mortality for the six childhood killer diseases. Reduction in morbidity was approximately 3 times between the period of 2014 and 2017. It was, therefore, recommended that more frequent health seminar be given on immunization and house to house campaign from time to time within the study area for radical health education and health promotion.

***Keywords**:* Impact, immunization, under-5 children, and Zaakpon.

INTRODUCTION

Immunization is an aspect of preventive measures against infections and outright disease conditions, a focus of preventive and social medicine. Alternatively, immunizations are aligned with the goal of public health which is to prevent infection or full-blown disease. It is noteworthy that it is much easier and more cost-effective to *prevent* a disease than to treat it. A vaccine thus prevents the onset of a disease or else reduces its severity. Immunizations protect us from serious diseases and also prevent the spread of those diseases to others, thus avoiding diseases that could cause them serious health challenges. Over the years immunizations have thwarted epidemics of once-common infectious diseases such as measles, mumps, and whooping cough. Consequently,

immunizations led to the eradication of smallpox and the near eradication of others like polio. (WebMD, 2018) In the developed countries of the world, it is necessary to ensure children are sequentially vaccinated as proof of immunization is often a prerequisite for enrollment in school or daycare.

Immunization is getting a weakened form (or a fragment) of a disease organism usually through injection or by inoculation (often regarded as vaccination). According to WebMD (2018), this measure triggers one's body immune response, causing it to either produce antibodies to that particular ailment or induce other processes that enhance immunity. It is, therefore, expected that whenever the individual again get exposed to the actual disease-causing organism, his/her immune system is prepared to fight the infection. On this premise, immunizations or vaccines can be defined as the safe and effective use of a small amount of a weakened or killed bacterium or virus or a bit of laboratory-made protein that imitate the infective agent to prevent infection by that same microorganism. Certain facts are clear to us that some vaccines need to be given only once whereas others require updates or "boosters" to maintain successful immunization and continued protection against disease. The recommended immunizations for children 0-6 years of age in the United States of America (USA) include: Hepatitis B & A; *Rotavirus*; Diphtheria, tetanus, pertussis; *Haemophilus influenzae* type B; influenza; pneumococcal; *Poliovirus*; measles, mumps, rubella; *Varicella*; and meningococcal (for the high-risk groups). For certain time past, these diseases outlined above were of serious threat to children health leading to their deaths by the thousands (WebMD, 2018; Queensland Government Department of Health, 2018). Most of the recommended childhood immunizations are 90% to 100% effective, according to the CDC (Center for Disease Control and Prevention, USA) in 2019. Children in whom the vaccine is 100% effective protect those few who have not been completely immunized -- lessening everyone's chance of exposure to the disease (WHO, 2009).

World Health Organization (WHO) reported recently that some fifteen million children under five years of age died each year, representing 30% of all the deaths in many countries. This evil trend of high childhood morbidity and mortality was addressed through the provision of Child Health Services (CHS). World Health Organization (2006) stated that CHS is a channel through which medical and health services can be organized to improve the health of the child within that family up to school age (from birth to five years), prevent diseases and promote growth and development. It had been noted that CHS is an integral part of community health services and has been adopted as Maternal and Child Health Services (MCH). The components of CHS cover the whole cycle of childbearing and rearing in the family comprising immunization services, promotion of breast-feeding, oral rehydration therapy, nutrition education, antenatal and postnatal services, treatment of minor prevalent illnesses as well as out-reach programmes.

Immunization provides a channel through which medical and healthcare services can be organized to improve the health and well-being of the child, prevent diseases and promote growth and development. WHO (2000) defined immunization as an aspect of modern health services specifically designed for health promotion, disease prevention and treatment of children under five years of age. Immunization began in Nigeria in 1956 when smallpox was severe nationwide. The national immunization later tagged “Expanded Programme on Immunization (EPI)” was meant to combat deadly childhood diseases which were regarded as the cause of high infant morbidity and mortality in the country. The Expanded Programme on Immunization (EPI), introduced in 1979 to provide routine immunization to children less than the age of two years, recorded initial but intermittent successes (Babalola & Olabisi, 2004). The diseases include poliomyelitis, measles, tetanus, diphtheria, pertussis (whooping cough), tuberculosis and yellow fever.

The optimum level was recorded in the early 1990s with the country achieving universal childhood immunization coverage of 81.5%. No sooner than later, however, negligence was thrown on such appreciable success and the nation began to witness a gradual and consistent reduction in immunization coverage. By 1996, the national data showed less than 30% coverage for all antigens, and this decreased to 12.9% in 2003 (Babalola & Olabisi, 2004). The extended programme of immunization was introduced in 2002 to provide routine immunization to children less than the age of five years. The national data showed less than 30% coverage survey figures is among the lowest in the world and explains the poor health status of children in the country. It is the worst in the West African sub-region, only better than Sierra Leone. For instance, the polio epidemic in Nigeria is the worst in the African region and constitutes a threat to other nations (Green, 2004 & Ophori et al., 2014). The above analogies remarkably inform us that no nation can be said to have a good health status without maintaining quality immunization coverage. For instance, Nigeria Demographic and Health Survey (2003) revealed that in every 1,000 children born in Nigeria 70.49% died of different kinds of communicable diseases before reaching their five years of age. In recognition of the risk faced by Nigerian children one of the important intervention services considered for coverage by public health in Nigeria is immunization. In Rivers State, the Government previously prioritized immunization coverage as health output, its ultimate effect of which was a reduction in disease incidence. Immunization coverage is a part of the disease surveillance system. They provide early warning of disease outbreak and offer information essential to the management of immunization programmes. Sensitizing and strengthening surveillance system as a part of improvement is, therefore, of vital importance toward the reduction if not outright eradication of communicable diseases among children.

Ophori et al., (2014) had x-rayed Nigeria's immunization status and EPI Policy, then stated the obvious below. The vision of EPI in Nigeria is to improve the health of Nigerian children by eradicating all the six killer diseases, which are polio, measles, diphtheria, whooping cough, tuberculosis, and yellow fever. Between 1985 and 1990, as outlined in the national health plan for that period, the objectives of EPI were to strengthen immunization, accelerate disease control and introduce new vaccines, relevant technologies and tools. In 1995 in line with the above, Nigeria became a signatory to the World Health Assembly, adopted the World Health Assembly Resolution (WHAR) and United Nations General Assembly Special Session (UNGASS) goals for all countries to achieve by 2005 (i) polio eradication, (ii) measles mortality reduction and (iii) maternal and neonatal tetanus elimination (MNTE). Nigeria also adopted the millennium development goals (MDGs) which called for a two-third reduction in child mortality from the 1990 level especially the year 2005. In addition to the above, the country ratified the United Nations General Assembly Special Session (UNGASS) goals urging Nigeria to achieve by 2010 (i) ensure full immunization of children under one year of age at 90% coverage nationally with at least 80% coverage in every district or equivalent administrative unit, and (ii) vitamin A deficiency elimination.

In 1998 following from the above, Ophori et al., (2014) further stated that Nigeria laid out the core activities of EPI policies which included the following: (i) monitoring of the performance, quality and safety of the immunization system through indicators; (ii) assessment of the current burden of vaccine-preventable diseases as well as the "future" burden of vaccine-preventable diseases in terms of sickness, death and disability, as well as the economic burden; (iii) assessment of the impact of vaccination strategies, through on-going epidemiological surveillance and reliable laboratory confirmation, as well as impact assessments in Nigeria; (iv) monitoring of the national immunization policies, particularly the vaccines used in the country and the target population for these vaccines (immunization schedules); and (v) monitoring of the overall proportion of children

and women who are vaccinated (immunization coverage) and ensuring that all districts of the country are well covered with vaccination. In 2000, following the African Regional Summit on EPI held in Harare in November 1999, the Federal Ministry of Health specifically stated its policies on the country's initial visions for EPI as follows:
(i) Immunization System Strengthening: By the year 2004, Nigeria should achieve the EPI district-focused plan and attain 80% DPT3 coverage in all the states of the federation. The specific policy also stated that the government should ensure increased funding for EPI.
(ii) Accelerated Disease Control: By the year 2004, there should be no cases of acute flaccid paralysis associated with wild poliovirus in Nigeria. As for measles, by the year 2004, the country should have reduced measles morbidity by 90% and measles mortality by 95%; while the coverage for yellow fever is expected to increase to at least 80%.
(iii) Innovations: By the year 2004, Nigeria should include vitamin A and hepatitis B (HB) in its national immunization programmes; and the vaccination coverage should not be less than 80% as with other antigens. Under the new technology drive, the country should adopt the multi-dose vial policy (MDVP) and vaccine vial monitor (VVM) and also introduce new methods for monitoring its use (Obioha et al., 2010).

Nigeria was estimated to have a population of 167 million at the end of 2011 (NPC & ICF Macro, 2009). The typical African or developing/under-developed countries population structure is pyramidal in nature. This implies that any such populations have younger age groups at the base and are of higher size. But the under-five years' children had been stated as 20% of the then Nigeria 140 million populations (NPC & UNICEF, 2001). Despite the proofs and evidence of the effectiveness and positive results of immunization on communicable diseases, some individuals, communities and sometimes the government tend to neglect is based on certain factors. The researchers did observe some parents of under-five children in Zaakpon Community who find it difficult to take their children to the health centre for immunization most especially during the post-natal period. Consequent upon the high mortality rate of the under-five children in Nigeria and the Federal Government intervention between 2001 and 2013 (13 years earlier) the researchers desire to evaluate the impact of such interventions through immunization against communicable diseases among children less than five years in Zaakpon Community within four years from 2014 to 2017.

SPECIFIC OBJECTIVES

The specific objectives of the study were:

1. To determine the immunization services provided for children less than five years old in Zaakpon Community.
2. To identify the utilization level of immunization services at the Primary Healthcare (PHC) facility at Zaakpon Community between 2008 and 2017.
3. To verify the outcome of overall immunization utilization on under-five-year children morbidity and mortality in Zaakpon Community between 2014 and 2017.

RESEARCH QUESTIONS

The following research questions guided the study:

1. What types of immunization services are provided to the under-five children in Zaakpon Community?
2. To what extent have immunization services at the PHC facility at Zaakpon Community been utilized between 2008 and 2017?
3. Has the overall immunization utilization any resultant effect on under-five-children morbidity and mortality in Zaakpon Community between 2014 and 2017?

METHODOLOGY

A descriptive survey research design was used in a retrospective perspective. The respondent population comprised all the parents of under-five children in Zaakpon Community in 2018. The investigators used purposive sampling technique to choose a population of 1,300 since there was no exact population figure for the specific parent group concerned. In further applying multi-stage sampling procedure systematic sampling intervals were maintained during the simple random sampling for respondents. Zaakpon Community was grouped into five sections according to kindred settlement by stratified random sampling. The researchers had adopted Taro Yamane's formula to derive a sample size of 306. A pre-tested, structured questionnaire was used to collect data. A total of 306 copies of the questionnaire were produced and administered but retrieved 289 as 17 were either incorrectly filled or not collected back. The data obtained were coded, presented in frequency Tables and percentages with further application of averages in some for clarity. The study was retrospectively extended to 2008 to compare with the last four years as the focus of the research. The response-options were based on agree, disagree and don't know.

RESULTS

The results are herein stated in Tables 1-3. A comparison of total morbidity and mortality in Table 3 shows a clear difference between 2010 and 2013 (67 & 7) compared to 2014 and 2017 (26 & 3). For morbidity proportion: (20+15+18+14): (11+9+5+1) = 67: 26 → 2.6:1. Reduction in morbidity was approximately 3 times by the period from 2014 to 2017.

Table 1: Types of vaccines given at Zaakpon Community Primary Healthcare Centre.

VACCINE AND VITAMIN A ADMINISTRATION	RESPONSE		
	Agree (%)	**Disagree (%)**	**Don't know (%)**
BCG vaccine	174 (60.2)	11 (3.8)	104 (36.0)
DPT vaccine	187 (64.7)	50 (17.3)	52 (18.0)
Polio vaccine	233 (80.6)	12 (4.2)	44 (15.2)
Measles vaccine	255 (88.2)	22 (7.6)	12 (4.2)
Hepatitis B & C vaccine	86 (29.8)	51 (17.6)	152 (52.6)
Yellow fever vaccine	92 (31.8)	31 (10.7)	166 (57.5)
Vitamin A administration	101 (35.0)	64 (22.1)	124 (42.9)

Source: *Researchers' Fieldwork, 2018*

Table 1 revealed the types of vaccines administered at the health facility in the community by the respondents. The result has shown that 174 (60.2%), 187(64.7%), 80.6%), 88.2), 29.8%), 31.8%) and 34.9%) respectively agreed BCG, DPT, Polio, Measles, Hepatitis and Yellow fever vaccines were administered to children during the periods investigated. However, 11 (3.8), 50 (17.3), 12 (4.2) 22 (7.6), 51 (17.6), 31 (10.7), and 64 (22.1) respondents disagreed that the aforementioned vaccines were given during the period investigated.

Furthermore, the remaining respondents reported that they don't know the actual types or if vaccines were administered in the health facility (Table 1).

Table 2: Extent of immunization against under-five childhood communicable diseases in Zaakpon Community from 2008 and 2017.

YEAR	NO. OF U-5 CHILDREN IMMUNIZED
2008	413
2009	440
2010	675
2011	828
2012	937
2013	1019
2014	1283
2015	1429
2016	971
2017	786

Source: *Zaakpon Community PHC centre, 2018*

Table 2 showed the extent of immunization against communicable diseases as seen in Zaakpon Community PHC centre health records during the period under review. The result revealed that there was a steady increase in the number of immunized children as the years increased (2008 to 2015), however, above 2015, a steady decrease was observed from 2016 through 2017. Furthermore, the awareness created on immunization had increasingly beefed up its utilization level at the centre. But the last two years witnessed reduction following communal conflicts during those periods.

Table 3: Under-five children morbidity and mortality from the immunization preventable childhood communicable diseases in Zaakpon Community from 2008 to 2017

YEAR	NO. OF U-5 SICK	NO. OF U-5 DEATH
2008	21	3
2009	17	2
2010	20	2
2011	15	1
2012	18	3
2013	14	1
2014	11	2
2015	9	0
2016	5	1
2017	1	0

Source: *Zaakpon Community PHC centre, 2018*

Table 3 depicted that the number of sick children was more than those that died in all the years investigated. Furthermore, the years 2008 and 2010 was observed to have the highest sick rates of 21 and 20, followed by 2012 (18), 2009 (17), 2011 (15), 2013 (14), 2014 (11), 2015 (9), 2016 (5) and 2017(1) respectively. Generally, the result has shown that the sick rate was highest from 2008 to 2015, while it was minimal between 2016 and 2017.

DISCUSSION

This project found that similar immunization schedule and services being offered in Nigeria generally were on-going in Zaakpon Community Primary Healthcare (PHC) centre. Increasing immunization level per year during a period of 2008-2017 being reviewed to determine the impact of immunization against under-five childhood communicable diseases was noted. The increasing number of individual children immunized per year was an indication of health services utilization (Tables 1 and 2). There was a reduction in 2016 and 2017 because of increasing communal conflicts. The level of utilization of immunization services though not optimal could be judged commendably good. The result of this study is at variance with the report of Ogunmekan and Bracken (2018) position.

Ogunmekan and Bracken (2018) determining the extent of immunization utilization in Lagos State even though focused on individual vaccines noted a generally low level of utilization of immunization services. This low level had been reported to be detrimental to the well being of children in Nigeria especially in the rural area and Northern part as leading to low tetanus toxoid immunization rates which consequently led to a high prevalence of neonatal tetanus (Njokanma & Olarenwaju, 2014).

Again, the impact of immunization either through its awareness campaign or actual receipt of the vaccine doses as appropriately scheduled has led to a comparable reduction in mortality and morbidity from communicable diseases among the under-five in Zaakpon Community in the last four years (2014 to 2017) being reviewed compared with earlier four years (Table 3). The total number of under-five members of the community with the ailment from communicable diseases in four years (2010 to 2013) was 67 compared to 26 during the last four years (2014 to 2017). Reduction in morbidity was approximately 3 times by the period between 2014 and 2017 (67/26). Similarly, the total number of deaths during the period between 2010 and 2013 was seven (7) compared to three (3) between 2014 and 2017. This is a positive impact and in the right direction resulting most probably from increase level of immunization services utilization in Zaakpon Community. This could be attributed to the application of an improved referral system to Bori General Hospital which was being expanded and getting better rendering of health services. This idea was strongly buttressed separately by NPC and UNICEF (2001) and UNICEF (2009).

Furthermore, the UNICEF added that in the dearth of adequate and accessible health services, immunization is the most child survival intervention. Similarly, Aliyu and Dahiru (2017) had emphasized the importance of early antenatal care (ANC) in maternal health services leading to the delivery of healthy children whose immunity could be re-enforced with immunization.

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Perception of Noise Pollution Effects on Human Health in Rumueme Community, Obio/Akpor Local Government Area of Rivers State

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Abstract

This study was undertaken to determine the perception of noise pollution effects on human health resident in Rumueme community, Obio/Akpo Local Government Area of Rivers State. The study employed a descriptive research design. The population was 61109 and sample size of 611 derived thereof. The instrument for data collection was a self-structured, validated questionnaire. A multi-stage sampling procedure was used in the community survey. All respondents in alternate households were selected. The properly filled copies of the questionnaire retrieved were 351 out of 380 issued given cautious physical contact during COVID-19 pandemic. Data obtained was summarized, and then presented in frequency tables and percentage. The majority (41.88%) perception was on the presence of high noise intensity in Rumueme Community. The affirmative mental health effects of noise pollution found included annoyance (49.29%), reduced comprehension and memory (55.84%), and hearing impairment (44.73%). Among its social adverse health effects perceived were undermined community security (44.73%) and increased crime rate (46.72%). The physical untoward health effects noted included violence proneness from quick anger (55.55%), injury from the fight (60.68%), and abnormally high blood pressure (46.15%). The study recommended further enlightenment campaign on the danger of effects of noise pollution to human health, the authority to consider the protection of the populace from noise pollution as an integral part of their policy on environmental protection, enacting legislation to reduce sound pressure levels with existing legislation being enforced as a matter of necessity, and individuals and governments promoting the use of noiseless machinery and automobiles to reduce noise generation.

Keywords*:* Perception, noise pollution, effects, human health, Rumueme Community

INTRODUCTION

The perception of sounds in day-to-day life is of major importance for human well-being. In modern society, many human dwellings are replete with diverse levels of sounds both day and night. Worse still are those situated in towns and cities due to increasing urbanization with its attendant activities including springing up of industries with their functional factories. Conversely, the very rural dwellings, e.g. hamlets may be tranquil. But some rural communities have rare factories of certain industries located, coupled with various birds and other creatures could produce intrusive sounds even in odd hours that become unwanted, hence noise tending to state of pollution from the perception of some persons.

Noise pollution, also known as environmental noise or sound pollution, is the propagation of noise with ranging impacts on the activity of human or animal life, most of them harmful to a degree. Furthermore, Noise pollution is an unwanted or excessive sound that can have deleterious effects on human health and environmental quality (Berg, 2020). It refers to sounds in the environment that are caused by humans and have the effect of being annoying, distracting, painful, or physically harmful (Conserve Energy Future, 2020). In a nutshell, any sound that disturbs your peace is noise, regardless of whether or not you are used to it (Elezaj, 2019) adding that any noise that dwarfs normal conversation between two persons is most probably above 60 decibels. The intensity of human speaking average is 50 dB and decibels are used for ease to express sound on a compressed, logarithmic scale (Anees et al., 2014). Encyclopaedia Britannica (2020) posited that although environmental pollution can be caused by natural events such as forest fires and active volcanoes, use of the word "*pollution"* generally implies that the contaminants have an anthropogenic source. It has also been noted that a sound might be unwanted because it is loud, unpleasant or annoying, intrusive or distracting, for noise consists of sound, which is transported by air.

Some of the main sources/causes of noise in residential areas include loud music, transportation (traffic, rail, aeroplanes, etc.), lawn care/maintenance, construction, electrical generators, explosions, and people. Communication through speech sounds from playing children, music, natural sounds in parklands, parks and gardens are all examples of sounds essential for satisfaction in everyday life. Household equipment such as vacuum cleaners, mixers and some kitchen appliances are noisemakers of the house.

The main sources of man-made noise pollution in Nigeria are electricity generating plants, vehicular traffic noise, construction/industrial noise, machinery/engine noise and pressure horns, noise from religious worship centres, institutions and household noise. (Pelumi et al., 2019; Shahid & Bashir, 2013; Conserve Energy Future, 2020 and Anees et al., 2014)

Pollution can take the form of chemical substance or energy, such as noise, heat or light. The response to noise may depend on characteristics of sound, including intensity, frequency complexity of sound, duration and the meaning of the noise (Berg, 2020). The author also stated that noise levels generally vary with time, so noise measurement data are reported as time-averaged values to express overall noise levels. He further added those electronic sound-level meters used to measure noise levels take into account the variations of perceived loudness with pitch. Frequency filters in the meters serve to match meter readings with the sensitivity of the human ear and the relative loudness of various sounds.

Two basic classifications of noise pollution are artificial/man-made and environmental/natural (Conserve Energy Future, 2020). The man-made ones are hard to get rid of; the backbones of man-made pollution are the human population and technology (Doege, Harish & Christian 2012). Four types of noise (physical, physiological, psychological and semantic) based on interference with communication have been outlined (Norris, 2016). He earlier informed, "Noise is *anything* that interferes with communication, and podcasting is an act of verbal communication".

The potential health effects of noise are numerous, persistent and medically and socially significant. Noise produces direct and cumulative adverse effects that impair health and degrades residential, social, working and learning environment with corresponding real (economic) and intangible (well-being) loses. It interferes with sleep, concentration, communication and recreation (Anees et al., 2014). The level of annoyance is dependent on the noise and its type, the time at which it occurs

(Getzner & Zak, 2012). Even during sleep, noise can be picked by the ear and this constitutes a danger to the person perceiving it, for the body reacts to noise with a flight and fight response, with resultant nervous, hormonal and vascular changes that have far-reaching consequences (WHO, 2017). Housley and Burgess (2017) had alluded to the WHO team use of noise pollution effects, e.g. cardiovascular disease, sleep disturbance, tinnitus, cognitive impairment in children, and annoyance to calculate the disability-adjusted life-years or DALYs (basically the healthy years of life lost to 'unwanted' human-induced dissonance).

Transport noise is linked with production losses caused by an inability to focus at work. The National Geographic Society (2019) asserted that the most important effect is noise-induced hearing loss (NIHL). Hearing loss is very probable after 50% of tiny, very delicate, hair follicles that send signals to the brain whenever sounds enter the ear are gone (Elezaj, 2019). Medical sciences have given lots of time and hard work to treat health hazards and checkmate risks (Anees et al., 2014). Countries in particular which are developing in general have established their noise control standards, which are followed and implemented to protect their people (Zannin & Bunn, 2014). Government, industry and institutes can help in reducing noise pollution by providing funding to research institutes to form methods of monitoring noise caused by seismic blasts. It is necessary to decrease the destructive explosive (even of seismic blasting) and help to save marine species with added economic growth of underwater areas (Jacobsen et al, 2014).

Conserve Energy Future (2020) noted that the vulnerable groups to the effects of noise pollution include infants, children, the elderly and those with mental and physical illnesses. The organization summarized seven categories of the adverse health effects viz. hearing impairment, interference with verbal communication, sleep disturbances, cardiovascular problems, mental health disturbances, impaired task performance, and negative social behaviour and annoyance reactions. The presence of major roads with their intersections, furniture makers and other businesses in Rumueme has in no small measure brought about noise in this urban area. The investigators thus resolved to ascertain the "perception of noise pollution effects on human health in Rumueme community".

SPECIFIC OBJECTIVES

The specific objectives of the study include:

1. To assess the perceived intensity of noise pollution among residents of Rumueme.
2. To determine the resultant mental health effects in residents of Rumueme.
3. To ascertain the attendant social health effects in human and his society of Rumueme.
4. To identify the noise pollution effects on physical health of inhabitants in Rumueme.

RESEARCH QUESTIONS

The following research questions will guide this study.

1. What is the perceived intensity of noise pollution among residents of Rumueme?
2. What are noise pollution effects on the mental health status of residents in Rumueme?

3. What are the noise pollution effects on the social health of residents in Rumueme?
4. What are the noise pollution effects on physical health of inhabitants in Rumueme?

METHODOLOGY

The investigators used a descriptive survey in the study which fieldwork took place in late June 2020. The community population projection by 2020 is 61,109 (NPC, 1991). The researchers regarded the 10 sub-communities as being in their strata but assumed disproportionate stratified random sampling to divide the population by 10 to have a population of 6,111 per stratum. The sub-communities include Oro-Owo, Rumuchida, Rumukpakani, Federal Housing Estate, AGIP Estate, Mgbosimini, Ahiagologo Waterside, OroAzi, OroAgbolu and Eligbam. By simple random sampling, the sub-community of Federal Housing Estate was chosen. A sample size of 611 representing 10% of the study population was used in this study (Smith, 2013; Dilman, 2007). A validated and pre-tested self-structured questionnaire was the main instrument for data collection. A systematic random sampling technique was applied to select buildings; then a simple random sampling technique was used to choose households to study. Three hundred and eighty (380) copies of the questionnaire were served but 351 copies were retrieved. This gave a retrieval rate of 92.4%. Data were summarized by tallying and coding, and then presented in frequency tables and analyzed with weighted mean. Keys to abbreviations in Tables 1-4 are SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree) and ND (Not Decided).

A sample size of 611 was arrived at but we were able to reach 380 respondents in view of difficulty contacting persons during SARS-CoV-2 pandemic code-named COVID-19. Some residents even avoided meeting a visitor.

RESULTS

Tables 1-4 contained these results. The information in these Tables was in response to research questions 1-4 and subsequently attempted to ensure the achievement of specific objectives 1-4.

Table 1: Noise pollution and its intensity in Rumueme Community

Variable	**Response frequency**						
	SA	**A**	**D**	**SD**	**ND**	**Total**	**Mean**
Noise as mere unwanted	201	77	22	19	32	**351**	**4.13**
sound	5	13	87	199	47	**351**	**2.23**
Noise as titillating music	41	95	101	105	9	**351**	**3.15**
Low intensity noise in Rumueme	111	162	50	18	10	**351**	**3.99**
Medium intensity noise in Rumueme	94	147	71	33	6	**351**	**3.83**
High intensity noise in Rumueme	35	85	107	90	34	**351**	**2.99**
Very high intensity noise in Rumueme							
Grand Mean							**3.39**

The perception of inhabitants of Rumueme on prevailing noise pollution and its intensity has been stated in Table1. The criterions mean for Table 1 and subsequent three other ones are 3.0 but for the basis of decision making in this work, the researchers have set it at 3.25. As a supposedly enlighten

community, the respondents knew meaning of noise with a mean of 4.13. The 32 undecided individuals might probably be among the primary education level. The low noise intensity has item weighted mean (3.15) slightly below the decision criterion, hence there was marginal perception affirmation for it. Medium (3.99) and high (3.83) intensity noise were affirmed in the community.

Table 2 : *Mental health effects of Noise pollution in Rumueme Community*

Variable	Response frequency						
	SA	**A**	**D**	**SD**	**ND**	**Total**	**Mean**
Annoyance	62	173	91	8	17	**351**	**3.73**
Reduced comprehension and memory	87	196	43	11	14	**351**	**3.94**
Smooth reading and assimilation	21	51	142	98	39	**351**	**2.76**
				40	13	**351**	
Headache as a worry	38	109	153	67	6	**351**	**3.36**
Anxiety common in community	19	58	201	7	36	**351**	**3.05**
Mood changes in neighbourhood	37	75	196	10	4	**351**	**3.20**
Restless nights uncommon	89	68	180	20	28	**351**	**3.65**
Stress/tension	48	77	178	31	16	**351**	**3.28**
Hearing impairment	157	98	49	90	18	**351**	**3.99**
Other mental disturbances	53	73	114				**3.13**
Grand Mean							**3.41**

Table 2 showed the mental health effects from noise pollution as perceived by respondents in this study. Criterion mean for decision making has been set at 3.25. The mental health effects with clear affirmation by the respondents included annoyance (3.73), reduced comprehension and memory (3.94), headache (3.36), uncommon restless nights (3.65), stress (3.28) and hearing impairment (3.99). By the perception of some respondents the mental health effects disagreed upon were smooth reading and assimilation, commonness of anxiety and mood changes in neighbourhood. The grand items weighted mean was 3.41. Furthermore, higher undecided respondents are herein noted on smooth reading and assimilation (39), mood changes in neighbourhood (36) and tension/stress (28). Perception on these three variables are quite controversial, hence the high response frequencies of undecided individuals.

Table 3: *Adverse social health effects of noise pollution in Rumueme Community*

Variable	Response frequency						
	SA	**A**	**D**	**SD**	**ND**	**Total**	**Mean**
Undermined community security	92	157	41	30	31	**351**	**3.71**
Nil effect on crime rate	29	15	173	134	0	**351**	**2.83**
Increased crime rate	103	164	52	12	20	**351**	**3.91**
Grand Mean							**3.48**

Table 3 showed adverse social health effect of noise pollution in Rumueme Community. The respondents perceived undermined community security (3.71) by noise pollution. They also felt noise pollution engender increased crime rate (3.91). The respondents frankly rejected the notion that noise pollution has no effect on crime rate (2.83) which is below 3.25 criterion weighted mean for decision-making. There were some of them who could not take stand yet on noise pollution undermining community security (31) and increasing crime rate (20).

Table 4: *Physical health effects of noise pollution in Rumueme Community*

Variable	**Response frequency**						
	SA	**A**	**D**	**SD**	**ND**	**Total**	**Mean**
Violence-prone from anger	81	195	42	10	23	**351**	**3.86**
Injury from fight	50	213	31	22	35	**351**	**3.36**
Suicide possibility	56	91	177	9	18	**351**	**3.45**
Abnormally high blood pressure	105	162	41	12	31	**351**	**3.85**
Grand Mean							**3.63**

Table 4 showed the physical health effects of noise pollution in Rumueme Community. The criterion mean remained 3.25 for decision-making. Respondents had perceived violence-prone from anger (3.86), injury from fight (3.36), and abnormally high blood pressure (3.85) as well as suicide possibility side-effects of noise pollution.

DISCUSSION

Exposure to prolonged or excessive noise has been shown to cause a range of health problems. Among the aspects of health effects is mental, social and physical well-being. The extent of noise intensity had been found to affect certain aspects of health as adverse outcomes consequent upon large prevailing high noise intensity. The results that scaled the criterion of item weighted mean (3.25) included Medium (3.99) and high (3.83) intensity noise in the community. To utter surprise of the researcher, medium intensity noise was perceived more than high intensity noise. But the grand item weighted mean of 3.39 was closer to mean of 3.83 for high noise intensity, hence the majority perception would be for high noise intensity. Alternatively, the parts of the community near key road junctions might automatically experienced high noise intensity while the distant parts experienced medium intensity noise. Taking the average for the agreed and disagreed respondents' view/perception proportionally on high noise intensity we have (94+147)/2 : (71+33)/2 = 120.5:52 =120:50 = 2.4:1. So, more than twice the number of respondents was in support of prevailing high noise intensity in the area. In the same vein, proportionally comparing very high noise intensity we have (35+85)/2 for agreed respondents and (107+90)/2 for those who disagreed. This implies 60:98.5 = 20:33 = 2:3. Therefore, approximately 60% (3/5) were not in support that very high noise intensity prevailed in the community whereas 40% (2/5) of them were in the affirmative. So with a good pointer to accepting presence of high noise intensity along with sizeable number affirming prevailing very high noise intensity, then one could say large majority support prevailing high noise intensity in Rumueme Community. The present study found that a large majority of respondents support prevailing high noise intensity in Rumueme Community and the main cause being transportation. It is similar to Pelumi, Hilary and Oluwole (2019) work which found that the main noise level in the morning was 90.78% which is higher than (though very close to) that of afternoon and evening (90.6% and 90.72%) respectively when residents of the city were

going to or returning from work. They posited that noise pollution poses a perceived threat to public health of the populace.

This study on noise pollution effect on human health in Rumueme Community noted on mental health effects that annoyance, reduced comprehension and memory, restlessness at nights, headache, stress and hearing impairment were perceived by the people. These findings were in line with Woolner & Hall (2010) who concluded by their findings that noisy conditions have direct negative effects on learning, particularly language and reading development, as well as causing indirect problems to learners through distracting or annoying them. Furthermore, the effects of environmental noise on health are strongest for annoyance, sleep and cognitive performance in adults and children.

The present study found perceived undermining of community security and noise pollution engendering increased crime rate as the local security outfit could not easily detect which direction that hoodlums might be operating. This view was strongly supported by Hammer, Swinburn and Neitzel (2014) who investigated 'Developing an Effective Public Health Response to Environmental Noise Pollution in the United States' adding that federal leaders can focus on lowering noise at its source, and states can prioritize altering the built environment. The authors also pointed to local governments to adjust their procurement policies and encourage building approaches that reduce community noise.

The researchers found that respondents perceived violence-prone from anger, injury from a fight, and abnormally high blood pressure as well as suicide possibility side-effects of noise pollution. Zannin and Bunn (2014) had in their study of industrial noise among the workers of textile industries in the industrial sites of Pakistan found that noise pollution was a major mess, for noise frustration among the workers of textile industries (due to noise exposure) was the main problem in workers. They added that noise pollution levels were being linked with a more negative response such as increased ageing, excitement, anger, and distraction. The present work is in line with this project except that the aspect of the anger likely escalating for possible suicide ideation. The present work thus found that more of high noise intensity resulting in mental, social and physical adverse side-effects on health a certain duration of time. Individuals with heightened anger easily leading fighting might be worsened by a sort of transferred aggression.

RECOMMENDATIONS

The following recommendations were considered appropriate:

1. Governments should consider the protection of the general populace from noise as an integral part of their policy for environmental protection.
2. Governments should include noise pollution as an important issue when assessing public health matters and support more research related to the health effects of noise exposure.
3. Legislation should be enacted to reduce sound pressure levels, and existing legislation should be enforced.
4. Efforts should be made towards educating the populace on the danger of the effects of noise pollution on human health.
5. Governments should invest more in production or importation of noiseless machinery and automobiles to reduce noise generation.
6. Individuals should embrace new technologies in any equipment or instruments they acquire and use to avoid being sources accumulated high noise production.

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Prevalence and Attitude Towards Drug Abuse Among Commercial Motor Drivers in Port Harcourt Metropolis, Rivers State

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Abstract

This study investigated the Prevalence and Attitude towards Drug Abuse among Commercial Motor Drivers in Port Harcourt Metropolis, Rivers State. The research design used was descriptive survey. The population for this study was 500 registered commercial motor drivers (CMDs). A sample size of 300 drivers was purposively taken for the study. A validated self-structured questionnaire was used to collect data for the study. Analysis of the data was done using a frequency table, percentage and analysis of variance for test statistics. Findings were that 185 (67.5%) of the CMDs accepted using drugs to aid driving in Port Harcourt metropolis while only 89 (32.5%) of them did not. There was a significant difference in the attitude of commercial motor drivers on drug abuse based on age ($F_{3, 270}=17.127$, $p<.05$), educational qualification ($F_{3, 270}=29.493$, $p<.05$) and on years of experience ($F_{3, 270}=16.925$, $p<.05$) respectively. This study is expected to create new research areas on drug abuse and its effects. It was, therefore, recommended that commercial motor drivers should be advised to minimize the rate at which they use drugs to aid driving. The CMDs should not take alcohol shortly before and while driving. Public health workers and Road Safety Corps officials should regularly embark on enlightenment campaign against misuse of drugs by CMDs.

Keywords*:* Attitude, commercial motor drivers, drug abuse, prevalence, Port Harcourt Metropolis.

INTRODUCTION

The use of drugs on individuals and society has aroused a great deal of concern in Nigeria. Production, sales and use of drugs occupy the centre stage among the list of contemporary social problems in Nigeria. The extent and concern for this problem are indexed by drug prohibition agencies such as National Drug Law Enforcement Agency (NDLEA), National Agency for Food and Drug Administration and Control (NAFDAC), put in place to enact prohibition policies to regulate and control the importation, manufacture, exportation, sales and the use of drugs. A drug is any chemical substance which when taken into the body of an organism modify one or more of its functions (Osa-Edoh & Egbo-Chukwu, 2012). It is also considered as a substance that modifies perceptions, cognition, mood, behaviour and general body functions. According to Achalu (2005), a drug which includes medicines, non-prescribed drugs, illegal drugs, alcoholic beverage drugs, cigarettes, food additives, industrial chemicals, even food are potential poisons.

Drug abuse is rapidly a growing global public health problem. The problem of drug abuse places a significant threat to the health, social and economic factors of the families, societies and the nations

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(Giade, 2011; Oshodi et al., 2010). From a legal perspective, drug abuse refers to any use of an illicit drug such as Indian hemp, cocaine, heroin, etc. It also refers to the use of a licit drug by those prohibited by the norms of a group or society. For instance, children within a particular age bracket are prohibited from drinking alcohol. World Health Organization (2009) described drug abuse as a maladaptive pattern of substance use leading to clinically significant impairment or distress as manifested by one or more of the following occurring within 12 months: recurrent substance use failing to fulfill major roles like obligations at work, school or in the home; recurrent substance use in a situation in which it is physically hazardous, for example driving the automobile when impaired by substances used; recurrent substance use related to legal problems; and continued substance use despite recurrent social and interpersonal problems.

Almost every country in the world is affected by one or more drug being abused by its citizens according to the United Nations Office on Drugs and Crime (UNODC, 2007). The increase of drugs abused globally has brought problems such as an increase in violence and crimes, increase in HIV/AIDS with other diseases, and collapse in the social structure (UNODC, 2007; Oshodi et al., 2010). The most commonly abused drugs are the psychoactive drugs or mind-altering drugs that affect our thinking, feelings and behaviour. Payn et al., (2009) classified them as follows: (1) Stimulants, e.g. cocaine, amphetamine, etc.; (2) Depressants, e.g. barbiturates, benzodiazepines (like Ativan), etc.; (3) Hallucinogen, e.g. mescaline, payote and other designer drugs; (4) Cannabis, e.g. marijuana, hashish oil; (5) Narcotics e.g. opium, heroin, morphine and codeine; and (6) Inhalants, e.g. aerosols, solvents, petroleum products, etc. Abuse of stimulants causes harmful nervous exhaustion. High dose of amphetamines, for example, can cause violent behaviours and mental illness such as psychosis. Other hazards of stimulants are heart problems, convulsions, respiratory paralysis and death, infections, malnutrition, ulcer, among others (Achalu, 2005). The impact of drug abuse among Nigerians has been a feature of a morally bankrupt, corrupt and wasted generation and loss of our societal values and ideals. According to Giade (2011), any nation being used by drug barons as a transient route has the potentials of becoming a drug abuser consumer's country; drug abuse threatens the security of every nation, tearing apart our societies, spawning crime, spreading diseases such AIDS, and killing (Jacob, 2012).

Some 200 million people or 5 per cent of the world's population aged 15 – 65 years have used drugs at least once in the last 12 months. About 15 million more than the previous years in all nations has increased in recent years. This report goes on to note that the increasing availability of drugs to an ever-widening socio-economic spectrum of consumers is disconcerting, although the main problem at global level continues to be opiates (notable heroin) followed by cocaine (Ekpenyong, 2012). From the records of drugs abused in Nigeria, the Northwest has a statistics of 37.4% of the drug victims in the country, while the Southwest has been rated second with 17.32%, the Southeast has been rated third with 13.5%, and North-central has 11.71%, while the Northeast zone has 8.54% of the drug users in the country (Akannam, 2008). In Nigeria, the estimated lifetime consumption of cannabis among the population is 10.8%, followed by psychotropic substances like benzodiazepines and amphetamine-type of stimulants 10.6%, heroin 1.6%, and cocaine 1.4%, in both urban and rural areas. Drug abuse appears to be common among males with 94.2% and females 5.8%, and the age of first use is from 10 to 29 years. The use of volatile organic solvents is 0.53% and is widely spread among the street children, in-school youths and women. Multiple drug use happens nationwide with 7.88% to a varying degree (UNODC, 2007). Worldwide, the number of people killed in Motor Vehicle Accidents (MVAs) each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million. Causes of MVAs are varied and multifactorial and the use of psychoactive substances is likely to play a major role. Studies in

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Nigeria and other countries have shown a high prevalence of use of psychoactive substance among various categories of drivers. The use of these substances has been associated with the occurrence of MVAs. (Adekoye et al., 2011).

Based on observations of authors and researchers the commonly abused drugs by Commercial Motor Drivers (CMDs) can be broadly categorized as natural products and gateway drugs. They are easily obtainable legal or illegal drugs such as alcohol, tobacco, marijuana, nicotine, codeine and steroids, whose use may be preceded by the use of harder drugs or less common illegal drugs. Naturally-occurring drugs include the use of leaves, seeds, roots etc. Some of these CMDs use these drugs in a way that is different from what society accepts. For instance, pawpaw leaf is traditionally appreciated for its medicinal value in the cure of fever and general weakness of the body. However, some commercial motor drivers especially in South-Western Nigeria exploit its dried leaves by either smoking it alone or roll it with cigarette or marijuana; its effect on the mood is said to be higher than a cigarette but milder than marijuana (Uzorka, 2014). Commercial motor drivers' abuse alcohol and tobacco and they all have short term and long-term consequences (Uzorka, 2014). According to Fayemi (2014), cannabis is now as common as sachet water can be easily purchased on the streets, bars and night clubs. Any quick visit to the pharmacy will confirm that the craze for cough syrup is high. This is not because there is a cough outbreak, but the stimulating effect of codeine in these cough syrups. Codeine which is derived from the opium poppy and is related to morphine and heroin is being abused by Nigerian CMDs at an alarming rate.

Some causes making young people vulnerable to drug abuse in Nigeria include curiosity and desire (Experimental Basis), peer-group influence, promotion (Media Impact), availability, self-medication, pathological family background (Inherited Vulnerability), ignorance of dangers of illegal drug use, and community standard (Oshodi et al., 2010; Igwe et al., 2009; Abudu, 2008; Desalu et al., 2010 and Ajibulu, 2011). Other reasons why commercial motor drivers often indulge themselves in drug abuse of alcohol beverages and tobacco are boredom and anti-social behaviour. In light of the above, the researchers resolved to investigate "Prevalence and Attitude towards Drug Abuse among Commercial Motor Drivers in Port Harcourt Metropolis, Rivers State".

SPECIFIC OBJECTIVES

The specific objectives of the study were:

1. To investigate the prevalence of drug abuse among Commercial Motor Drivers in Port Harcourt Metropolis.
2. To determine the attitude of Commercial Motor Drivers towards drug abuse based on Age.
3. To determine the attitude of Commercial Motor Drivers towards drug abuse based on educational qualification.
4. To ascertain the attitude of Commercial Motor Drivers towards drug abuse based on years of experience.

NULL HYPOTHESES

The following hypotheses were formulated and tested at a level significant of 0.05:

1. There is no significant difference in the attitude of commercial motor drivers on drug abuse based on age.

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2. There is no significant difference in the attitude of commercial motor drivers on drug abuse based on educational qualification.

3. There is no significant difference in the attitude of commercial motor drivers on drug abuse based on years of experience.

METHODOLOGY

The research applied a descriptive survey design. It was a retrospective study that took place in 2015. The study targeted a population of 500 registered commercial motor drivers from all parts of Port Harcourt Metropolis. Taro Yamane's formula: $n = \frac{N}{1 + N(e)^2}$ was used to derive a sample size of 222. This was purposively increased to 300. Nwankwo (2010) posited that it is advisable to use the sample size higher than the minimum estimate given by the formula. Proportionate stratified random sampling technique was used to select the numeral (300 commercial motor drivers). A validated and pre-tested, self-structured questionnaire was used as the instrument for data collection. With the help of two research assistants, a total of three hundred (300) copies of the questionnaire were administered. Two hundred and seventy-four copies of completed copies of the questionnaire were retrieved representing 91.3% retrieval percentage. Frequency count and percentages were used to present the data to obtain the result for the prevalence of drug abuse among Commercial Motor Drivers in Port Harcourt Metropolis. Analysis of variance (ANOVA) was used to test the hypotheses at a significant level of 0.05. The name of the instrument was mean and standard using SPSS (Statistical Package for Social Science).

RESULTS

Tables 1 - 4 contained the results showing the prevalence of drug abuse among Commercial Motor Drivers (CMDs) in Port Harcourt Metropolis, and statistical analysis results for the attitude of CMDs towards drug abuse based on age, educational qualification and years of experience respectively. These were all in the affirmative.

Table 1: Prevalence of Drug Abuse among CMDs

Item	Response	N (%)
Ever used drug to aid driving	No	89(32.5%)
	Yes	185(67.5%)
Total		**274(100%)**

Table 1 showed that 185 of the CMDs representing 67.5% accepted using drugs to aid driving in Port Harcourt metropolis while only 89 representing about 32.5% did not accept using drugs to aid driving in Port Harcourt.

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Table 2: Summary of ANOVA on the difference in the attitude of drug abuse among commercial motor drivers based on age

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.873	3	2.291	17.127	.000
Within Groups	36.114	270	.134		
Total	42.987	273			

Key: P < 0.05 is significant

Table 2 showed that there is a significant difference in the attitude of commercial drivers on drug abuse based on age (F3, 270=17.127, p<.05). Since the alpha value obtained (0.000) is less than o.o5, the null hypothesis was rejected and the alternative of yes there was a significant difference accepted.

Table 3: Summary of ANOVA on the difference in the attitude of drug abuse among commercial motor drivers based on educational qualification

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.610	3	3.537	29.493	.000
Within Groups	32.377	270	.120		
Total	42.987	273			

Key: p < 0.05 is significant

Table 3 showed that there is a significant difference in the attitude of commercial motor drivers on drug abuse based on educational qualification (F3, 270=29.493, p<.05). Since the alpha value obtained (0.000) is less than 0.05, we reject the null hypothesis and accept the alternative that a significant difference occurred.

Table 4: Summary of ANOVA on the difference in the attitude of drug abuse among commercial motor drivers based on experience

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.804	3	2.268	16.925	.000
Within Groups	36.183	270	.134		
Total	42.987	273			

Key: p < 0.05 is significant

Table 4 showed that there is a significant difference in the attitude of commercial motor drivers on drug abuse based on years of experience (F3, 270=16.925, p < .05). Since the alpha value obtained (0.000) is less than 0.005, the null hypothesis was rejected and accept the alternative that a significant difference occurred.

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DISCUSSION

The finding from the study showed that 67.5% accepted using drugs to aid driving in Port Harcourt Metropolis while only 89 representing 32.5% did not accept using drugs to aid driving in Port Harcourt. The present finding is inconsistent or at variance with the findings of Oshikoya and Alli (2006), which established that 33.3% of their respondents were currently taking one or more drugs of abuse, as revealed by the population of the study.

The findings of the study further showed that attitude of the respondents towards drug abuse was positive, for the statistical test results respectively indicated that there is a significant difference in the attitude of Commercial Motor Drivers (CMDs) on drug abuse based on age, educational status and years of experience. The present finding is consistent with the findings of Adebowale (2015) which indicated that respondents had a positive attitude using illegal drugs because the drugs are accessible and affordable. Most commonly abused drugs among commercial motor drivers were kola nut/bitter kola, snuff, tobacco and Indian hemp as this was inconsistent with earlier findings of Sofela et al (2013) who established that 22.6% and 10% of their respondents mostly abused Indian hemp and cannabis and other stimulants respectively. It was also found out that the respondents had no good knowledge of drug abuse which was inconsistent with the findings of Embleton et al. (2012) which established that the respondents were not knowledgeable about drug abuse as some of the substances they took were as pleasure. In the same vein, the attitude of the respondents (CMDs) was positive in this study.

RECOMMENDATIONS

Based on the findings of the study the following recommendations were made:

1. Commercial Motor Drivers (CMDs) should be advised to minimize the rate at which they use drugs to aid driving. They should not drink while driving.

2. Health workers should be made to go and train the CMDs on the dangers of using drugs while driving as this could go a long way to reduce the prevalence of drug abuse among commercial motorists.
3. Health education with specific preventive measures such as screening programmes to detect alcoholism syndrome need to be carried out.
4. Drug and alcohol education should be put in the curriculum and taught in schools during drug abuse days.
5. Legislation guiding sales of the drug should be enforced.
6. The public should be educated and the sale of the drug should be monitored.

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Socio-Cultural Factors Associated with Menstrual Waste Practices among Female Adolescents

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Abstract

This study examined the socio-cultural factors associated with menstrual waste management practice among female students in Rivers State College of Health Science and Management Technology. Four research questions guided the study. The descriptive survey design was adopted. The population of the study consisted of 770 female students residing in the college. The simple random sampling technique was used to select a sample size of 100 students. A standardized questionnaire with a reliability coefficient of 0.70 was used. Data analysis was done with the aid of the statistical package for social sciences (SPSS) version 23.0 and descriptive statistical tools such as percentage and frequency count. The result shows that 15(19%) of the students agreed that lack of money forced them to use a piece of wrapper as tissue paper to manage their menses while 65(8%) disagreed. 60(75%) of the students agreed that they used tissue paper during your menses while 20(25%) disagreed. Further findings showed that 70(88%) of the students bag menstrual waste material in polythene bags after us, while 10(12%) did not. Also, 79(98.75%) of the students thought that improper disposal of waste material can be unsightly to neighbours within the immediate environment, while 1(1.25%) did not think so. It was concluded that the students displayed a good attitude towards the management and disposal of menstrual waste. It was recommended that government should recognize and include menstrual waste management in the national sanitation policy and action plan to beam the limelight on the issue and create opportunity for national conversation and correction action on the issue.

Keywords: socio-cultural factors, menstrual waste, menstruation, adolescent girls, waste, disposal.

INTRODUCTION

Menstruation is a discharge of blood, secretion and tissue debris from the uterus that recur in non-pregnant breeding age, primate females at approximately monthly intervals and that is considered to represent a readjustment of the uterus to the non-pregnant state following proliferative changes accompanying the preceding ovulation. Menstruation is a normal process of the body and if proper knowledge is given regarding its onset, management and problem, it can be handled like all other body functions. However, many girls in developing countries lack appropriate knowledge and sufficient information regarding menstruation and its management (Olayinka, 2004). Some

information should address the practical concerns that puberty brings such as new hygiene needs (e.g. menstrual periods, body odour). In order for girls to live healthy reproductive and dignified life, it is essential that they are able to manage menstrual bleeding effectively (Ahmed & Yesmin, 2008). Management of menstruation deals with the special health care needs and requirement like choice of absorbent used, how often and when to change the absorbent used, washing of hands and undergarments, bathing, care of vulva and proper disposal of menstrual waste. Therefore, menstruation as a regular process needs hygienic management. If poorly managed, menstrual period may be accompanied with discomfort, reproductive tract infections, body odour and embarrassment among others (Dasgupta & Sarkar 2008).

Menstruation wastes are the wastes that are generated by a female in her reproductive years; these wastes are produced during menstruation commonly known as menses, periods or mostly bleeding cycle (Campbel, 2007). The menstruation commonly known as menses has three phases, that is, follicular phase (proliferative), ovulation phase, and luteal phase (secretory). Menstruation is regulated by hormones, in this process, endometrium, lining of uterus gradually thickens and sheds off and causes bleeding that normally lasts for 3-5 days and occasionally up to 7 days. Menstruation sheds two-thirds of the endometrial lining. In addition to blood, menstrual fluid contains mucus and vaginal secretions (Nwankwo, 2009). The menstrual flow varies from female to female and maybe more or less at the beginning of the menses or may change throughout the cycle. The colour of the menstrual fluid varies between red, bright red, and dark brown to black. Menstrual fluid may or may not have unpleasant colour especially when it comes in contact with air. Menstrual flow or duration also changes before menopause or during gynecological cancers. Under the condition of hormonal imbalance, fibroids, polyps, and endometriosis menstrual flow increase and excessive loss of blood through menstruation can lead to anaemia.

Menstruation and menstrual practices still face many socio-cultural and religious restrictions which are a big barrier in the path of menstrual hygiene management. In many parts of the country especially rural areas, girls are not prepared and aware about menstruation so they face many difficulties and challenges at home, school, and work places. Girls (adolescent) and women have very less or no knowledge about reproductive tract infection caused due to ignorance of personal hygiene during menstruation time. Adolescents have little knowledge about the types and method of sanitary practice and are unable to afford them due to high cost. Therefore, they mostly rely on reusable cloth pads which the wash and use again.

According to World Health Organization (2018), a person aged 10-19 years is considered as an adolescent. The transition period between the childhood and adulthood is called adolescence which is marked with the growth and development of the child. It is recognized as a special period in a girl's life cycle which requires special attention. Menarche is an important biological milestone in a woman's life.

Menstrual hygiene practices are affected by cultural norms, parental influence, personal preference, economic status and socio-economic pressure. Menstrual beliefs refer to misconceptions and attitudes towards menstruation within a given culture or religion. Menstrual beliefs, knowledge and practices are all interrelated to the menstrual hygiene management (practice). This study therefore sought to determine how the female students in Rivers State College of Health Science and Management Technology handled menstrual wastes.

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RESEARCH QUESTIONS

1. What are the **socio-cultural factors that influence** menstrual waste disposal among female students of Rivers State College of Health Science and Management Technology?
2. What are the materials used to manage menstrual waste among female students of Rivers State College of Health Science and Management Technology?
3. What are the methods used to manage menstrual waste among female students of Rivers State College of Health Science and Management Technology?
4. What is the effect of improper disposal of waste materials among female students of Rivers State College of Health Science and Management Technology?

METHODOLOGY

This study was a descriptive research. Data collection involved the use of questionnaire and oral interviews. The target population for this study comprised female adolescent students residing in Rivers State College of Health Science and Management Technology. There were seven hundred and seventy (770) female adolescent students. The sample size for this study was 100. The simple random sampling technique was employed to select the respondents to be studied.

A standardized questionnaire titled, 'Socio-Cultural Factors associated with Menstrual Waste Practices among Female Adolescent Students in Rivers State College of Health Science and Management Technology was used as the instrument for the study. A total of 100 copies of the questionnaire were administered to the respondents, while 80 copies were retrieved and used for the analysis. The data gathered were collated, coded and analyzed using frequency and percentages.

RESULTS

Research Question 1: What are the **socio-cultural factors that influence** menstrual waste disposal?

Table 1: Socio-cultural factors

SN	Items	Yes		No	
		N	%	N	%
1	Does la ck of money force you to use a piece of wrapper as tissue paper to manage your menses?	15	19.0	65	81.0
2	Does the material used by your mother and peer group detect your choice of material?	60	75.0	20	25.0
3	Does the scanty or heavy flow influence your choice of material to be used?	30	37.7	50	62.5
4	Does the environment you find yourself such as classroom, hostel or home influence the material you use in managing your menses?	40	50.0	40	50.0
5	Does the duration of your menses influence the choice of material you may use?	50	62.5	30	37.5
	Grand mean	**39**	**48.8**	**41**	**51.2**

Table 1 above shows the responses given by the students on the influence of socio-cultural factors on menstrual waste disposal. From the table above, 39(48.8%) of the students gave a positive response to the items listed in the survey while 41(51.2%) of the students gave a negative response. The highest and the lowest response to the items derived from the survey was "Does lack of money force you to use a piece of wrapper as tissue paper to manage your menses?" where 15(19.0%) responded yes to the item and 65(81.0%) responded no to the item; and "Does the material used by your mother and peer group detect your choice of material?" where 60(75.0%) responded yes to the item and 20(25.0%) responded no to the item.

Research Question 2: What are the materials used to manage menstrual waste?

Table 2: Materials used to manage menstrual waste

SN	Items	Yes		No	
		N	%	N	%
1	Do you use materials such as old pieces of condemn ed cloth to manage menses?	75	93.75	5	6.35
2	Do you use tissue paper during your menses?	60	75.0	20	25.0
3	Do you use sanitary pad to manage your menses?	80	100	-	-
4	Do you use handkerchief to manage your menses?	-	-	80	100
5	Do you use cotton wool or sterile gauze to manage your menses?	70	88.0	10	12.0
	Grand mean	**57**	**71.3**	**23**	**28.7**

Table 2 above shows the responses given by the students on the materials used to manage menstrual waste. From the table above, 57(71.3%) of the students gave a positive response to the items listed in the survey while 23(28.7%) of the students gave a negative response. The highest and the lowest response to the items derived from the survey was "Do you use sanitary pad to manage your menses?" 80(100.0%) responded yes to the item and 0(0%) responded no to the item; and "Do you use handkerchief to manage your menses?" 0(0%) responded yes to the item and 80(100.0%) responded no to the item.

Research Question 3: What are the methods used to Manage Menstrual Waste?

Table 3: Methods used to manage menstrual waste

SN	Items	Yes		No	
		N	%	N	%
1	Do you bag waste mate rial in polytene bags after use?	70	88.0	10	12.0
2	Do you dispose the materials at the general waste bin directly without bagging them?	-	-	80	100.0
3	Do you fling the waste material into a nearb y bush?	10	12.0	70	88.0
4	Do you fling the waste material into a nearb y field?	75	93.75	5	6.25
5	Do you bury the waste material in the soil?	68	85.0	12	15
	Grand mean	**44.6**	**55.8**	**35.4**	**44.2**

Table 3 above shows the responses given by the students on the methods used to manage menstrual waste. From the table above, 44.6(55.8%) of the students gave a positive response to the items listed in the survey while 35.4(44.2%) of the students gave a negative response. The highest and the lowest response to the items derived from the survey was "Do you fling the waste material into a nearby bush?" 75(93.75%) responded yes to the item and 5(6.25%) responded no to the item; and "Do you dispose the materials at the general waste bin directly without bagging them?" 0(0%) responded yes to the item and 80(100.0%) responded no to the item.

Research Question 4: What is the effect of improper disposal of waste materials?

Table 4: Effect of improper disposal of waste materials

SN	Items	Yes		No	
		N	%	N	%
1	Do you think throwing waste material used in managing menses indiscriminately can breed rodent and flies?	78	97.5	2	2.5
2	Do you think improper disposal of waste material can be unsightly to neighbo urs within your immediate environment?	79	98.75	1	1.25
3	Do you think improper disposal of waste material can increase the chance of infectious diseases such as cholera, diarrhea etc?	77	96.25	3	3.75
4	Do you think burying or burning of used material is the proper way of disposing waste materials?	65	81.25	15	18.75
5	Do you flush the waste material in the toilet?	10	12.0	70	88.0
	Grand mean	**61.8**	**77.3**	**18.2**	**22.7**

Table 4 above shows the responses given by the students on the Effect of improper disposal of material waste materials. From the table above, 61.8(77.3%) of the students gave a positive response to the items listed in the survey while 18.2(22.7%) of the students gave a negative response. The highest and the lowest response to the items derived from the survey was "Do you think improper disposal of waste material can be unsightly to neighbors within your immediate environment?" 79(98.75%) responded yes to the item and 1(1.25%) responded no to the item; and "Do you flush the waste material in the toilet?" 10(12%) responded yes to the item and 70(88%) responded no to the item.

DISCUSSION OF FINDINGS

Findings from the research revealed that 39(48.8%) of the students gave a positive response to the questions on the socio-cultural factors that influence menstrual waste disposal while 41(51.2%) of the students gave a negative response. Fifteen (9.0%) of the respondents responded yes when asked if lack of money force them to use as piece of wrapper, tissue paper to manage their menses while 65(81.0%) responded no to the question. Further discoveries from the research revealed that 57(71.3%) of the students responded positively to the items listed in the survey on the materials used to manage menstrual waste while 23(28.7%) of the students gave a negative response. This shows that the students are well aware of the materials which are used to manage menstrual waste. On use sanitary pad to manage your menses, 80(100.0%) responded positively when asked about what they used to manage their menses, while no respondent gave a negative response to the question. This corresponds with the findings of Dasgupta and Sarkar (2008) who studied the belief, conception and source of information regarding menstruation among adolescent girls. They discovered that 78(48.75%) girls knew the use of sanitary pad during menstruation. For cleaning

purposes, 156 (97.5%) girls used both soap and water. It also corresponds with the findings from the research by Adhikari *et al.* (2007) who reported that 94% of rural adolescent girls in Nepal use pads during their menstruation period.

This study also showed that 44.6(55.8%) of the students gave a positive response to the questions on the methods used to manage menstrual waste where 35.4(44.2%) of the students gave a negative response. This shows that the students possess proper practice and knowledge towards menstruation waste management.

CONCLUSION

This research work was carried out in Rivers State College of Health Science and Management Technology Port Harcourt on socio-cultural factors associated with menstrual waste practice among female adolescents. The study has revealed that the students displayed a good attitude towards the management and disposal of menstrual wastes.

RECOMMENDATIONS

In order to totally eliminate on the negative effects of socio-economic factors on the management of menstruation, the researcher presents a few recommendations.

1. Organizing a meeting of all education managers for the dissemination of research findings. This can be conducted at the national, zonal and state levels. The purpose of this is to highlight the key findings in relation to knowledge, practices and attitudes and scope of waste sanitation and socio-challenges faced by female adolescents during menstruation.
2. Advocacy visit and sensitization at school and community levels by NGOs. This will be targeted at schools, traditional leaders, mothers and fathers, youths to dialogue on the belief, perception, myths and taboos associated with menstruation and it will go a long way to correct and debunk some negative attitudes.
3. Advocating to government to recognize and include menstrual waste management in the national sanitation policy and action plan to beam the limelight on the issue and create opportunity for national conversation and correction action on the issue.

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Effective Contact Tracing as a Means of Mitigating Community Transmission of Covid-19 among Exposed Persons in Developing Countries

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Abstract

Contact tracing is one of the public health interventions used to combat community spread of communicable diseases, by tracing and encouraging contacts of persons who have been diagnosed with an infectious disease in order to examine and treat anyone who has contacted the disease or quarantine those who had contact but do not show signs and symptoms of the disease. This paper reviews strategies to achieving effective contact tracing as a means of militating community spread of COVID-19 in developing countries. Contact tracing involves a systematic approach beginning with the identification of the index case, defining the effective contact, determining the time frame during which new infection would have occurred, interviewing the index case, locating effective contacts, isolate or quarantine and analyzing contact tracings and contacts' network. In developing countries, this procedure is however impeded by some challenges such as difficulty in locating contact persons, contact persons' unwillingness to provide reliable information, stigmatization of infected persons, insufficient follow-up of contacts, managing contact tracing personnel, inadequate manpower, community misperception regarding COVID-19 and poorly equipped treatment centers. To overcome these challenges, effective health education and sensitization, efficient management of contact tracing personnel, proper mapping, naming of streets and house numbering and improving manpower status will pave way for effective contact tracing as a means of mitigating community spread of COVID-19.

Keywords: Contact tracing, mitigation, community-transmission, COVID-19, developing-countries.

INTRODUCTION

Corona viral disease began as an epidemic in Wuhan, China in November 2019 and within three months the disease became a pandemic and as at the time of this review 213 countries and territories around the world have been affected (Worldometers.info, 2020). The name COVID-19 was coined from the fact that the disease-causing micro-organism is a virus called Corona which emerged in the year 2019; thus Co-Corona; Vi-Virus; D-Disease; 19-2019. The disease is also referred to as Severe Acute Respiratory Syndrome Related Coroavirus-2 (SARS-CoV-2) according to Redfield in Lee (2020). The disease has placed huge financial, social and economic burden on individuals and countries. The health facilities and the health workers are also overwhelmed as the number of daily infected case and deaths continues to increase. The disease has no barrier. It is not a respecter of age, gender or race. Mortality rate is more predominant among the elderlies and those with underlying ailments like diabetes, hypertension, cancer, kidney problems and many others. Most people recover without hospital treatment (because their immune system could simply overwhelm the virus), some require hospital treatment which is usually symptomatic as there is no available cure for now, while others who have developed severe symptoms could die. More worrisome is the fact that the natural

history and features of transmission is yet unknown and new symptoms are still being observed. In the month of May 2020, six (6) signs and symptoms such as chills, repeated shaking with chills, muscle pain,, loss of taste or smell, diarrhea and sore throat were added to the previous ones (dry cough, fever). Also signs like itchy, swollen, red or purple toes described collectively as COVID toes have also been observed in children according to Dermatologists. Statistical data available as at time of this review has it that 40,532 COVID-19 cases have been recorded with 858 deaths (NCDC, 2020), and worldwide 16,440,754 million cases have been recorded with 652,593 deaths (Worldometer, 2020). These figures are only the reported cases. Therefore it will not be mere assumption to say that many community deaths could be as a result of COVID-19. This is because many sick persons do not report to the health facilities and contacts of reported cases are not identified due to enormous difficulties.

Like other pandemic diseases such as cholera, influenza, HIV/AIDS, SARS, Ebola and many others, the spread of COVID-19 is truncated by rapid movement of persons from place to place, state to state and country to country by land, air and sea routes this resulted to the global closure of those routes for human movement except for essential travels and movement of essential goods as the disease is transmitted through spread of droplets from nose and mouth of an infected person when he sneezes, coughs or speaks, hence physical distancing from person to person of 5ft or 2 meters apart is advocated among other non-pharmaceutical interventions such as hand washing with soap under running water and use of hand sanitizers have been advocated as preventive measure (WHO, 2020). Globally the travel restrictions are gradually being eased off.

Contact-tracing is one of the public health community-based services provided by health personnels and the aim is to trace and encourage contacts of persons who have been diagnosed with an infectious disease to be examined and treated if they have contacted the disease. According to WHO (2017) contact tracing is a monitoring process which involves watching the contacts closely after exposure to an infectious disease, the process enables the contacts get care thus preventing further transmission of the disease. Greiner et al. (2015) observed that delayed and ineffective contact-tracing contributed to the extensive transmission of Ebola virus disease in some parts of the world between 2014 and 2015. Similarly, Hellewell et al. (2020) asserts that long delay between appearance of symptoms to period of isolation of cases would decrease the probability of control of COVID-19 because fewer cases would be traced while the infection is being transmitted before the unset of symptoms and thus concluded that rapid and highly effective contact tracing with case isolation could contribute to lowering the overall proportion of the outbreak and bring it to control for a long period of time.

Cases of COVID-19 are under-reported across the globe simply because of poor contact-tracing as a result of so many challenges faced by the personnel involved in this activity. Many developing countries are masked with multiple cultural, religious and political diversities. Cause of death is still attributed to traditional means even when it is obviously medically related, some religious leaders have indoctrinated their followers to believe that covid-19 is non-existence, some individuals attribute it to political gimmicks and so on.

Redfield in Lee (2020) reporting for American Centre for Disease Control (ACDC), noted that covid-19 case recognition, isolation and contact tracing are the fundamentals to continue to implement to keep the nation open. Thus Lee (2020) itemized the following steps for effective contact tracing as part of a test-trace-isolate strategy:

Step 1. Identify the index case: An index case of a disease is the first person that tested positive to the disease. Identifying the index case will also help to find out who had infected the index case apart from those the index case has infected. This is also known as backward tracing i.e. infectee to infector (Klinkenberg, 2020).

Step 2. Define the effective contact: An effective contact is a person or persons whom the index case must have had close contact with and this depends on the mode of transmission of the disease. On the other hand, an effective contact is one who has been transmitted by the disease pathogen. According to Redfield in Lee (2020) transmission of pathogen depends on the infectious disease and how it is specifically transmitted. For covid-19 effective contact is wider because it has multiple means of transmission such as having physical closeness of less than 6ft with the index case by way of hand shake, touching the same items, hugging and many more. It is important to note here that since the mode of transmission of COVID-19 is still unclear, it becomes difficult to actually define the yard stick for detecting effective contacts.

Step 3. Determine the time frame during which new infection would have occurred. This is done by calculating how long the index case could have contacted the pathogen before infecting others. Knowledge of the incubation period is one way of calculating this, also determining how long the index case presented with symptoms is another means. However the fact that some persons are asymptomatic makes this calculation difficult.

Step 4. Interview the index case in order to get all the contacts.

Step 5. Locate potential effective contacts

Step 6. Isolate or quarantine all the effective contacts: During this period the contacts are monitored for signs and symptoms of the disease. For COVID-19 this is for fourteen (14) days. Isolation is for those who show symptoms of the disease while quarantine is for those who do not show symptoms but had contacts with the infected cases (Sundar et al., 2014**)**

Step 7. Store, integrate and analyse the contact tracings and contact network: This is achieved by gathering different contact tracings done in the area to establish their relationship. The above steps if religiously carried out will achieve a great deal in preventing community transmission of the disease. However many challenges have impaired the efficient adoption of the steps in contact tracing. These challenges are as follows:

1. Difficulty in locating contact persons: This has been a challenge because most persons in Nigeria live in areas that are difficult to reach due to poor street naming and house numbering. This is a very teething challenge seen in most rural and sub-urban areas in the country. Buildings are haphazardly cited and many streets are not named. This is because most rural and sub-urban areas do not have mapped out streets; individuals build houses without consideration of numbering the houses or naming the streets in most rural communities, thus it becomes difficult to locate contacts.

2. Contact persons' unwillingness to provide reliable information: This could be associated with fear of such information being made public. Although confidential handling of patient information is very important in the health profession, however for a contagious disease, health personnel are trained to know the limit to which information provided by affected person is disclosed.

3. Stigmatization of infected persons: Many people find it difficult to report to the test centers to ascertain their COVID-19 status. Some would rather avoid testing in centers close to their residential areas and rather move far away to where they are not known, to have the test done. Fear of being stigmatized has resulted to individuals providing wrong addresses, this is because it is believed that even when a person recovers from the disease, he could still transmit the virus. However, it has been proven that recovered cases of COVID-19 can no longer transmit the virus, therefore a lot of sensitization has to be carried out in this area.

4. Insufficient follow-up of Contacts: Follow-up may be difficult because of contact's refusal to admit the health personnel in his home. One reason for refusal is fear of stigmatization.

5. Managing contact tracing personnel: There are basic logistics required by personnel for effective contact-tracing such as vehicles, test kits, personal protective equipment and adequate remuneration. Lack of these will result to ineffective contact-tracing.

6. Inadequate manpower: The manpower needed to carry out contact tracing is quite inadequate to cover the large geographical area in urban and sub-urban areas.

7. Community misperception regarding COVID-19: Most people still do not believe the reality of covid-19. In most rural and sub-urban communities, disease presentation is still linked to traditional beliefs such as witchcraft attacks, curses from the gods and so on. Some also believe COVID-19 issues are politicized. Therefore, it becomes difficult for people to own up to their disease status or mention contacts of infected persons.

8. Poorly equipped treatment centers: Poorly equipped treatment centers could expose patients to risk of contracting other infections. Knowledge of ill-equipped treatment centers will hinder individuals from disclosing their COVID-19 status.

To minimize the challenge, the following are advocated:

1. Effective health education and sensitization: Health education impacts knowledge of mode of transmission and preventive measures. When people gain knowledge of COVID-19 transmission behaviour, stigmatization and community misperception will be prevented. Individuals will readily provide information to aid contact tracing.

2. Efficient management of contact tracing personnel: This involves provision of the necessary materials needed for effective contact tracing such as vehicles, test kits, personal protective equipment, and proper remuneration.

3. Proper mapping, naming of streets and house numbering: This will ensure easy access to members of the community and identification of contacts. It also makes home visiting easy for health personnels.

4. Improve manpower status: Personnel for COVID-19 contact tracing include professional health personnel, non-health professionals. Non health professionals could function as counselors, recorders, town announcer and many other functions. These categories of personnel should be recruited to carry out different functions for effective contact tracing.

5. Installation of Electronic Contact tracing applications in mobile phones: This may not be a perfect solution to contact tracing, but it could go a long way because, the application can only be downloaded in android mobile phones and most people in rural and sub-urban communities do not have android phones. The application will only work with data, therefore, where data is unavailable it becomes inaccessible. Thirdly only those who are willing or who are motivated will be willing to download the application.

In conclusion, contact-tracing still remains the most efficient means of curtailing and containing community transmission of COVID-19. One of the principles of contact-tracing is that "time is of essence". This implies that contact tracing should not be delayed by all means to prevent rapid spread of COVID-19. Effective contact tracing can only be achieved in rural and sub-urban communities if there is coercive and massive sensitization, awareness and health education on the causes and preventive measures for COVID-19. This will curb the problem of stigma. Also, proper mapping, naming of streets and house numbering to facilitate accessibility because most rural areas are hard-to-reach is of necessity.

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Microbial Load Determination, Isolation and Characteristics in Unripe Plantain Flour and Food Made from Unripe Plantain Flour

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Abstract
In the determination of microbial load, isolation and characteristics in oven-dried and sun-dried plantain flours, and plantain flour porridge; the flours were prepared by sun-drying and oven drying before grinding and sifting, while the porridge was prepared by boiling. The flour samples were sent to the laboratory for analysis after three weeks of preparation of the flours, whereas the porridge was sent for analysis immediately after preparation. The laboratory analysis showed that the sun-dried flour has the largest microbial loads of 5.6×10^3 Total Heterotrophic Bacterial Count (THBC), 4.1×10^3 Total Coliform Count (TCC), 1.8×10^3 Salmonella Shigella Count (SCC) and, 6.2×10^3 Total Heterotrophic Fungal Count (THFC); and the highest organisms' isolates: Bacillus spp., Staphylococcus aureus and Salmonella spp. (Bacterial isolates), Aspergillus fumigatus and Aspergillus flavus (fungal isolates); whereas the plantain flour porridge has the least microbial loads of 1.2×10^3 Total Heterotrophic Bacterial Count (THBC) and, 0.2×10^3 Total Heterotrophic Fungal Count (THFC); with the least organisms isolates: Bacillus spp.(Bacterial isolate) and Penicillium spp.(Fungal isolate). This shows that microbial loads and organisms' isolates in food are easily destroyed by the application of heat, which is the most widely used method of killing or destroying spoilage and pathogenic microorganisms in foods. Therefore, foods should be properly cooked to reduce or eliminate microorganisms' infestation, to avoid foodborne infections and diseases.

Keywords: Microbial loads, Isolates, pathogenic.

INTRODUCTION
Plantain (Musa paradisicas) is a staple food crop found in Nigeria and some other West African countries. In Nigeria, it is found in abundance between September to February each year. This view is in accord with Idoko (2013), who affirmed that plantain is mostly harvested in surplus between September to February each year. However, the surplus is wasted because the crop can not be stored for a longer period. This has prompted the food crop to be processed into several edible products. Plantain is a starchy food cooked either by boiling or frying methods before is consumed. Lii et al. (2011) reported that the starchy food substance could be converted to reducing sugars and sucrose when ripened.

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Apart from starch, it also contains more fibre needed in our diet as prescribed by American Dietary Guidelines (2000). According to the guideline, individuals needed an increased intake of whole grains and fibres for normal well being. This view was corroborated by Hayes et al. (2015) who reported that dietary practice with food containing more fibre has helped in the reduction of the risk of getting high blood pressure, coronary heart diseases and diabetes respectively. Another health benefit of plantain especially the unripe one, is in the management of weight loss/obesity and diabetes practice by traditional medicine. This benefit was confirmed by the study of Ojowole et al. (2003) who showed that unripe plantain had hypoglycemia action in experimental animals. Furthermore, unripe plantain contains minerals and some secondary metabolites with some anti-oxidants potential.

Eleazu et al. (2010) reported that the therapeutic effects of the products are a function of intrinsic minerals and secondary metabolites found in the plantain. And this product has been used to successfully manage diabetes mellitus and other disease condition by traditional medicine practitioners in Nigeria. This idea was strongly buttressed by Price et al. (1987) who reported that plantain contained some phytochemicals with significant qualities of saponins, flavonoids, alkaloids and tannins. According to them, saponins are known to possess beneficial properties that can lower high cholesterol level in the body.

In Nigeria, plantain has been processed into flour which could either be oven-dried or sun-dried and later cooked into porridge. Plantain flour porridge is easy to prepare and could be served for breakfast meals for both children and adults. The processing of plantain is to prevent wastage (Idoko, 2013) and its conversion to reducing sugars and sucrose (Li et al., 2011) to prevent diabetes. However, processed plantain flour could be a major source of microbial contaminate of food, without the consumer of the final product knowing. Again, there is a paucity of informed on the regard and the determinant of microbial load, isolates and their characteristics in unripe plantain flour. Furthermore, the result of this study will benefit farmers and add to the scarce literature regarding this study. Moreover, it will serve as reference material. There is, therefore, need to assess the microbial, loads isolates and their characteristics in unripe plantain flour and food prepared from unripe plantain flour. The study also assessed and compared the microbial load and organism isolates in the unripe plantain flour exposed to oven-drying

MATERIALS AND METHODS

Materials

Unripe plantain, crayfish, seasoning, palm oil, onions and ground pepper was obtained from a local market in Rivers State, South-South, Nigeria. These ingredients and the plantain were used without further processing before being used.

Collection of Unripe Plantain and Preparation of Flour

The unripe plantain used in this study was purchased from a plantain market in Port Harcourt Metropolis, Rivers State, Nigeria and brought to the food science laboratory in the University of Uyo. The plantain was peeled and the fruit sliced into 2mm thick discs and placed on a mesh tray under the sun for about 8hours daily until it became very dry and crunchy. Another fruit sliced into 2mm thick discs was placed in an oven at a temperature of about 135^0C-180^0C for about about 2 to 3 hours to obtain a constant weight. The exposed unripe plantain chips were then brought out from the source of heat, allowed to cool completely before ground. The chips were then blended or milled using a powered glass blender in small batches into powdered form. The flour was then packed into

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air-tight containers and labelled with the method of drying (i.e. sun-dried or oven-dried) and stored in a dark cool place until when needed for further experiment.

Preparation of Plantain Flour Porridge
Accurately weighed 20g of plantain flour was transferred into a 240ml of boiling water in a metal pot. The mixture was simmered until it was evenly mixed to form a paste, followed by the addition of the ground crayfish, onions and pepper with continuous simmering until all were properly mixed in the paste. The palm oil and seasoning were then added and simmered while cooking was continued for about five minutes before bringing down the pot. This method was also applied for both sun-dried and oven-dried plantain flour.

Determination of Microbial Load Count
The flour samples were subjected to laboratory analysis after 3 weeks of preparation and storage, while the plantain flour porridge was subjected to laboratory analysis immediately after preparation. The plate count method given by Miles and Misra (1938) was used. In this method, the nutrient agar plate was used to grow the bacteria on the food substrate and incubated aerobically at 37^0C for 24 hours. The isolated bacteria were then identified based on colony morphology and gram staining reaction using Bergy's method (1994) and recounted.

RESULTS

Table 1: Total Viable Count

Sample	THBC	TCC	TFCC	SSC	THFC
Oven-dried Plantain Flour	$2.1x10^3$	-	-	-	$2.5x10^3$
Sun-dried Plantain Flour	$5.6x10^3$	$4.1x10^3$	-	$1.8x10^3$	$6.2x10^3$
Plantain flour Porridge	$1.2x10^3$	-	-	-	$0.2x10^3$

The result in Table 1 revealed that different bacterial and fungal counts were observed in the three different plantain flour prepared for this study. For the oven-dried plantain flour total heterotrophic bacterial count (THBC) and total heterotrophic fungal counts (THFC) were 2.1×10^3 and 2.5×10^3 respectively. A similarly, total heterotrophic bacterial count and total heterotrophic fungal count of 2.1×10^3 and 0.2×10^3 counts was observed in plantain flour porridge. However, more counts were observed in the sundried plantain flour. The total heterotrophic bacterial count (THBC), total coliform count (TCC), *Salmonella Shigella* count (SSC) and total heterotrophic fungal counts (THFC) were recorded as $5.6x10^3$, $4.1x10^3$, $1.8x10^3$ and $6.2x10^3$ respectively. Thus, implies that the sun-dried plantain flour has the highest number of microbial counts, while sun-dried and plantain flour porridge has an equal number of two in this study. It was also revealed that none of the plantain flour gave any *salmonella shigella* count (Table 1).

Table 2: **Organisms Isolates**

Sample	Bacterial Isolates	Fungal Isolates
Oven-dried Plantain Flour	Bacillus spp.	Yeast spp.
	Actinomyces spp.	Penicillium spp.
Sun-dried Plantain Flour	Bacillus spp.	Aspergillus fumigatus
	Staphylococcus aureus	Aspergillus flavus
	Salmonella spp.	
Plantain Flour Porridge	Bacillus spp.	Penicillium spp.

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Keys: Total Heterotrophic Bacterial Count (THBC), Total Coliform Count (TCC), Total Faecal Coliform Count (TFCC), *Salmonella Shigella* Count (SCC) and Total Heterotrophic Fungal Count THFC.

Table 2 has shown that five different organisms were isolated from the colony namely: *Bacillus Spp*., *Staphylococcus aureus*, *Salmonella Spp*., *Aspergillus fumigates* and *Aspergillus flavus* in sun-dried plantain flour. Four organisms namely: *Bacillus Spp., Actinomyces spp. Yeast spp*., *Penicillium spp*., and *Bacillus spp*., and *Penicillium spp*. for Oven-dried and plantain flour porridge respectively. Furthermore, the highest number of bacterial and fungal isolates was found in the sun-dried plantain flour, followed by oven-dried, while the least was found in plantain flour porridge.

DISCUSSION

Sample One: Oven-dried plantain flour:

(a) **Total viable count** (microbial count):

(i) Total Heterotrophic bacterial count (THBC) -$2.1X10^3$

(ii) Total Heterotrophic fungal count (THFC) - $2.5X10^3$

(iii) There was no total coliform count (TCC), total Faecal coliform count (TFCC) and Salmonella Shigella count (SSC) seen in this sample.

The organisms isolated from this sample were:

(i) Bacterial Isolates – Bacillus spp. and Actinomyces spp.

(ii) Fungal isolates – Yeast spp. and Penicillium spp.

Characteristics of the isolated organisms:

(i) Bacillus spp. Causes bacillus infection with the following symptoms: nausea, vomiting, diarrhoea and abdominal pain. It has an average time before the onset of symptoms, ranging from 1-16 hours. This organism is got from cooked products, pasta, fried rice and dried milk. It could be prevented by sanitary handling of food and rigid temperature control (Ahmed et al., 1995).

(ii) Actinomyces spp. This is a gram-positive human commensal flora organism normally found in the mouth, digestive and genital tracts. It is responsible for an infection called Actinomycosis which could affect the mouth and dental tissues, genital, pulmonary cervico, facial and central nervous system. Maintenance of a high standard of personal hygiene could prevent Actinomycosis (Heymann, 2008).

(iii) Yeast and penicillium are moulds that are capable of producing mycotoxins and are important in the food industries. The mycotoxin produced by Penicillium spp. is patulin and foods usually involved are Apples and Apple products. They enter foods directly through the growth of mould in food or indirectly through the use of contaminated materials or ingredients in food processing, or from the consumption of foods contaminated by mycotoxins residues. Prevention of mycotoxins from foods is by preventing the growth of moulds at all levels of foods processing.

Sample Two: Sun-dried plantain powder:

(a) Total viable count (microbial count):

(i) Total heterotrophic bacterial count (THBC) – 5.6×10^3

(ii) Total coliform count (TCC) -4.1×10^3

(iii) Salmonella Shigella count (SSC)-1.8×10^3

(iv) Total Heterotrophic fungal count (THFC)-6.2×10^3

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(v) There was no total Faecal coliform count (TFCC) seen in this sample.

The organisms isolated from this sample were:
(i) Bacterial isolates- Bacillus Spp. Staphylococcus aureus, salmonella spp. and Shigella spp.
(ii) Fungal isolates - Aspergillus fumigatus, and Aspergillus flavus.

Characteristics of the isolated organisms:
(i) *Bacillus spp.* Causes bacillus infection with these symptoms-nausea, vomiting, diarrhoea and abdominal pain. The incubation period ranges from 1-16 hours. The food sources of this organism include cooked products, pasta, fried rice and dried milk.
Prevention is by sanitary handling of food with rigid temperature control.
(ii) *Staphylococcus aureus* – causes *staphylococcus* (foodborne) infection, with nausea, vomiting and abdominal cramps due to gastroenteritis as its symptoms. The incubation period is 2-6 hours and is got from these foods: custard and cream-filled pastries, potato salad, dairy products, ham, the tongue of animal and poultry.
Prevention is by pasteurization, proper refrigeration and sanitation of susceptible foods.
(iii) *Salmonella spp*. Causes salmonellosis with these symptoms –nausea, vomiting, diarrhoea abdominal pain and cramps, chills and headache. The incubation period is 8-72 hours and is got from the insufficiently cooked or warm-over meal, poultry, eggs, and dairy products. The preventive measures for this organism are sanitation and a high standard of hygiene of food handlers and equipment, also pasteurization, proper refrigeration and packaging of foods.
(iv) *Shigella spp.* Causes bacillary dysentery with nausea, vomiting, watery Stoll (diarrhoea), abdominal pain and cramps, chills and headache. Its incubation period is between 1-7 days, and it is got from foods handling by those involved in food processing and handling.
(v) *Aspergillus fumigatus* and *Aspergillus flavus* are moulds capable of producing mycotoxins that are toxics and have some adverse biological effects on humans and animals, especially the Aspergillus flavus which produces aflatoxins which are acutely toxic causing gross liver damage with intestinal and peritoneal haemorrhage resulting to death. This organism is found on cereals, grains, flour, bread, com meal, popcorn, peanuts and butter.
Prevention is by preventing the growth of moulds on foods and food processing materials.

Sample three: **Plantain flour porridge**
(a) Total viable count (microbial count):
(i) Total Heterotrophic bacterial fungal count (THFC) - 1.2x103
(ii) Total Heterotrophic fungal count (THFC) -0.2X10^3
(b) The organisms isolated from the sample were:
(i) Bacterial Isolates-*Bacillus spp*.
(ii) Fungal isolates–*penicillium spp*.

Characteristics of isolated organisms:
(i) Bacillus spp. Causes bacillus infection with nausea, vomiting, diarrhoea and abdominal pain as its symptoms. The incubation period of the organisms is 1-16 hours and is got from coked products, pasta, fried rice and dried milk.
Its prevention is by sanitary handling of food with rigid temperature control.
(ii) Penicillium spp. – This is a mould that produces mycotoxins which is toxic to the human and is got from foods such as apples and apple products.
Prevention is by inhibiting the growth of moulds on food.

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CONCLUSION

From the laboratory analysis, it is seen that heat application has been the most widely used method of killing spoilage and pathogenic bacteria in foods. It is a way to cook food products and destroy spoilage and pathogenic microorganisms. This is shown in plantain flour porridge specimen with the least number of isolated organisms and microbial load, showing that food products subjected to heat kill most pathogenic organisms responsible for food-borne diseases; whereas food products exposed to the atmosphere attracts microorganism's infestation and multiplication as shown in the sun-dried plantain flour with the highest number of isolated organisms and microbial loads. Other methods of microbial destruction in foods include the use of chemical (although this is not appropriate for foodstuffs) radiation, pasteurization and pulsed light.

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School Characteristics and Students' Academic Performance in Chemistry in Public and Private Senior Secondary Schools in Rivers State

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Abstract

The study examined school characteristics and students' academic performance in Chemistry in public and private senior secondary schools in Rivers State. The study evaluated the influence of teacher qualification and instructional material on students' academic performance in Chemistry. Descriptive survey research method was used in this study. Two research questions and two research hypotheses were used to guide the study. The sample size was three hundred and ninety (390) senior secondary (Chemistry) students in Rivers State. School Characteristics Inventory **(SCI) (.80)** and Chemistry Achievement Test **(CAT) (.75)** were used for data collection. Mean and standard deviation were used to analyze research questions and two-way Analysis of variance (ANOVA) was used to analyze the research hypotheses. From the findings of the study, teacher qualification (Df, 3 = 116.403, P< 0.05 and instructional materials (Df, 3 = 13.43, P<0.05) significantly influenced students' academic performance in Chemistry. The study recommended that teachers should utilize the available opportunities to improve themselves with the current technological trends such as computers, internet and other electronic systems.

Keywords: School characteristics, students' academic performance, Chemistry, public and private senior secondary schools.

INTRODUCTION

Chemistry as a science is described as a study of nature and its environs. Chemistry given its importance in science and technological development world over, its teaching and learning is cardinal for societal survival and should be given priority attention hence the economic and political strength of any country depends on the products of Chemistry. It is a wide subject with several branches such as petroleum chemistry, analytical chemistry, organic chemistry, physical chemistry and biochemistry among others. Despite the relationships that exist among these branches of Chemistry, it also relates with other science subjects like Agricultural Science, Biology,

Mathematics and Physics amongst others. This is why Chemistry finds usefulness in several specializations like medicine, pharmacy, food production and processing industries, biotechnology, engineering, agriculture and horticulture, environmental protection, etc.

Besides, the majority of the available data on this topic are theories and opinions of individuals hence; this work was carried out to resolve the disparities in academic performance between public and private schools and to compare significant difference of the variables; teacher qualification, instructional material, school environment, school type and students' academic performance in Chemistry. Students' academic performance in chemistry has been an area of intensive research over the past years. It has become an issue of standards and quality in education as judged by the performance of students in external examinations.

In academic environments, success is adjudged by academic performance or how well students deal with their studies, how they accomplished different tasks given to them by their teachers, and the extent to which a student, teacher, or institution has achieved educational goals (Babatunde & Olanrewaju, 2014). As a product of education, academic performance is the capacity to perform when they are tested on what is taught which relates to academic performance or scholastic functioning (Otoo, 2007). Babatunde and Olanrewaju (2014) stated that students' academic performance at secondary school level is not only a pointer to the teachers' effectiveness in teaching-learning activities but a major determinant of the future of students in particular and country in general (Aremu & Sokan, 2003). The study is envisaged and anchored on the school and learners' characteristics. Therefore, the theories that deal with the characteristics of the variables as it relates to this study are the theories of Piaget and Gagne.

Zeichner in Akinfe (2012) reported that starting teachers with intensive preparation in pedagogy and guidance, teaching is most likely to be fruitful in the area of subject mastery. Shamim et al. (2013) observed that conventional pre-service teacher preparation programmes have been under serious critique for being too often described as fragmentary and debilitated pedagogy. He concluded that teachers' with content knowledge attain a higher percentage of students' performance than teachers without such experience. In-field preparation relates to the knowledge of subject matter a teacher acquires during training. Many research studies have shown significant relationship between teachers' readiness in knowledge of subject matter they teach and students' academic performance. Shamim et al. (2013) revealed that there is a significant correlation between content knowledge and students' academic performance. Shamim et al. affirmed that pedagogical studies help teachers to coordinate the cerebrum and feelings of their students in the classroom which results to higher academic performance. Researchers have proved that teachers' knowledge of the specific subject matter at secondary school level is a good predictor of students' academic performance. Teacher qualification is a possible determinant of students' academic performance hence a significant relationship exists between teachers' qualification and students' academic performance (Akinfe, 2012). The perceived crisis in science education is the failure of the teachers' training institution to provide the type of qualification that pre-college teachers need to teach science justifiably but not the number of years spent for pre-service education (McDermott, in Aina 2015). Duncan (2010) further stated that if teaching is and should be one of our most venerated professions, teacher qualification programmes should be one of the university's most important responsibilities. Duncan (2010) affirmed that teachers with prerequisite qualification are better prepared to teach assigned subject matter than those with little or no qualification.

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Instructional material improves the memory level of the learners therefore; the teacher uses it to enhance teaching and learning process more detailed and interesting (Abdullahi 2010). He went forward to note that instructional materials are tools or drive to facilitate teaching and learning activities. Obanga (2005) sew instructional materials as things which are used to make enormous improvement of intellectual impact on students' academic performance. The need to highlight on the importance and the use of instructional materials in any teaching and learning environment cannot be underrated. For any significant learning to thrive, teachers have to put together instructional materials that will enable them to teach effectively.

The method of teaching the teacher uses in teaching may depend on the type of instructional materials. It is wildly accepted by both teachers and school administrators that despite the chalkboard and textbooks which are often available for the teachers to use, there are other materials that are capable of favorable to teacher's effort in teaching and learning process and these materials are commonly known as instructional materials. One reason why students in secondary schools often find it uneasy to understand instantaneously what is being taught by the teacher is the non-use of instructional materials to easily communicate the objective of the lesson to the students. Ofuani (2014) affirmed that teaching aid is the guidance of learning process that a teacher uses to motivate and arouse student's interest to learn. The effectual use of instructional materials plays different roles for students who attend school in the rural or urban areas. A skilled teacher must consider the location of a school before choosing the type of instructional materials to be used in teaching and learning activities. The reason is that sophisticated instructional materials are costly and are not easily found in some locations.

Researchers have been investigating several ways in which students' academic performance can be improved but it seems no acceptable conclusion has been arrived at. For instance, Apara (2014) studied the comparative effects of two problem-solving teaching approaches on senior secondary school students' attitude and students' academic performance in practical chemistry and found that Hands-on and Minds-on problem-solving approach had more impact than laboratory problem-solving approach on students' attitude in chemistry. But the study failed to consider school type as a probable variable that could affect the performance of students offering chemistry, hence this study hoped to fill this gap.

Two research questions were answered in this study:

1. How does teacher qualification influence students' academic performance in Chemistry in public and private schools in Rivers State?

2. What is the influence of instructional materials on students' academic performance in Chemistry in public and private schools in Rivers State?

Two null hypotheses were answered in this study:

1. Teacher qualification does not make any significant influence on students' academic performance in Chemistry in public and private schools in Rivers State.

2. There is no significant influence of instructional materials on students' academic performance in Chemistry in public and private schools in Rivers State.

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METHODOLOGY

Descriptive survey research design was used in this study to find the influence of the variables under investigation and academic performance in chemistry in public and private senior secondary schools in Rivers State. The study was made up of three hundred and ninety (390) senior secondary students. Two hundred and five (205) students from public schools (101 males and 104 female) and one hundred and eighty-five (185) from private schools (88 males and 97 females). The students were purposively selected from public and private schools in Rivers State. Two instruments developed by the researcher were used to collect data for this study: School Characteristics Inventory **(SCI) (.80)** and Chemistry Achievement Test **(CAT) (.75)**. School characteristics inventory were made up of twenty (20) items: section A elicits bio-data of the respondents while section B elicits information on respondents' disposition towards school environment. Chemistry achievement test were made up of thirty (30) items. The researcher visited ten public and ten private schools in Rivers State and sought the permission of the Chemistry teachers of the schools visited for administration of the school factor inventory and chemistry achievement test to the students. Data collected were subjected to mean and standard deviation and two-way Analysis of variance (ANOVA).

RESULTS

Table 1: Achievement Score Mean and Standard Deviation of Teachers' Qualification and Students' Academic Performance in Chemistry in Public and Private Schools

Teacher qualification	School type	Mean	Std. Deviation	N
NCE	PUBLIC	69.4118	16.54939	17
	PRIVATE	60.9091	10.24885	22
	Total	64.6154	13.84237	39
FIRST DEGREE	PUBLIC	67.5976	13.32127	169
	PRIVATE	63.8686	14.02562	137
	Total	65.9281	13.74456	306
MASTER'S DEGREE	PUBLIC	67.3684	12.45530	19
	PRIVATE	67.0476	11.92676	21
	Total	67.2000	12.02391	40
PhD	PRIVATE	55.2000	6.57267	5
	Total	55.2000	6.57267	5
	PUBLIC	67.7268	13.47487	205
	PRIVATE	63.6432	13.34094	185
	Total	65.7897	13.54899	390

Table 1 revealed that the mean performance of students taught by Master's degree holders is highest **(M=67.20, Std. =12.02).** Followed by the mean performance of students taught by first degree holders **(M=65.93, Std. =13.74)**. The mean performance of students taught by NCE holders

(M=64.62, Std. =13.84) is higher than the mean performance of students taught by Ph.D holders performed least **(M=55.20, Std. = 6.57).** Furthermore, the table revealed that the students taught by teachers in public schools performed better than their counterparts in private schools.

Table 2: Achievement Score Mean and Deviation of Instructional Materials and Students' Academic Performance of Public and Private School Students in Chemistry

Instructional material	School type	Mean	Std. Deviation	N
INSTRUCTIONAL MATERIAL USED	PUBLIC	71.4211	11.86059	76
	PRIVATE	66.2941	12.78649	68
	Total	69.0000	12.52913	144
INSTRUCTIONAL MATERIAL NOT USED	PUBLIC	65.5504	13.93117	129
	PRIVATE	62.1026	13.46732	117
	Total	63.9106	13.79293	246

The Table 2 revealed that the mean performance of students taught using instructional material is higher**(M= 69.00, Std. =12.53)** than the mean performance of students in whose teachers did not use instructional material**(M=63.91, Std. =13.79)**. When compared with school type, it was found that the mean performance of public school students is better than their counterparts from private schools.

Table 3: Summary of Two-Way Analysis of Variance (ANOVA) of Significant influence of Teacher Qualification on Students' Academic Performance in Chemistry in Public and Private School.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2113.435[a]	4	528.359	2.935	.021
Intercept	253102.684	1	253102.684	1406.180	.000
Teacher qualification	49421.833	3	16473.944	116.403	.006
School type	1413.525	1	1413.525	7.853	.005
Error	69297.324	385	179.993		
Total	1759444.000	390			
Corrected Total	71410.759	389			

a. R Squared = .030 (Adjusted R Squared = .020)

Table 3 shows that there is a significant influence of teacher qualifications on students' academic performance in chemistry in public and private schools (Df, 3 = 116.403, P< 0.05 i.e. at the Df 3 gives F3 of 116.403 at probability level of 0.05), teacher qualifications is also significant on school type and students' academic performance (Df, 1 = 7.853, P< 0.05 i.e. at the Df 1 gives F1 of 7.853 at probability level of 0.05).Therefore, null hypothesis 1 is rejected and the alternative retained.

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Table 4: Summary of Two-Way Analysis of Variance (ANOVA) of Significant Influence of Instructional Material on Academic Performance of Public and Private Schools Students in Chemistry

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	3961.582[a]	2	1980.791	11.365	.000
Intercept	1595370.643	1	1595370.643	9153.684	.000
Instructional material	2339.979	1	2339.979	13.426	.000
School type	1608.855	1	1608.855	9.231	.003
Error	67449.177	387	174.287		
Total	1759444.000	390			
Corrected Total	71410.759	389			

a. R Squared = .055 (Adjusted R Squared = .051)

Table 4 shows that there is a significant influence of instructional materials on students' academic performance is significant on students' academic performance in chemistry (Df, 3 = 13.43, P<0.05) i.e. at the Df 3, gives F2 of 13.43 at probability of level of 0.05). It also shows that there is a significant influence of school type and students' academic performance in chemistry in public and private schools (Df, 3 = 9.23, P< 0.05 i.e. at the Df 1, gives F1of 9.23 at probability of level of 0.05). Therefore, null hypothesis 2 is rejected and the alternative retained.

DISCUSSION

The study finding showed that the mean performance of students taught by master's degree holders is higher followed by the students taught by first degree holders. Similarly, the finding of the study also revealed that students taught by master's degree teachers in public schools performed better than their counterparts in Private Schools. Again, the summary of the two-way analysis of variance (ANOVA) of influence of teacher qualification on students' academic performance in Chemistry in Public and Private schools in Rivers State shows that there is significant difference between teacher qualification and students' academic performance in Chemistry.

The finding of this study is in consonant with the study of Adepoju (2000). According to Adepoju, there is a significant difference that exists between teachers' professional qualification in education and the learning outcomes of Secondary School Students. Similarly, the studies of Fakeye (2012), Aghamwhe (2013), Boyil (2008) and Ndukwu (2002), affirm the position of this study on the significant difference of teacher qualification on students' academic performance. Their studies on teacher qualification found a significant difference of teacher qualification on students' academic performance.

Again, the finding of this study is in tandem with the works of Darling-Hammond (2000), Clotfelter (2006) and Nevgi et al. (2004) that certificated teachers' influences academic gains. The result of this study also confirms the study of Akiba (2007) who submitted that teacher qualification is a crucial driving force for improving students' academic performance. The studies of Goldhabar and Brewer (2000) which reported a positive significant difference between teacher qualification and students' academic performance also supports the finding of this study.

The implication of this is that there are more qualified teachers in public schools than private schools in Rivers State. Most proprietors {owners of private schools}engage non graduates' teachers to teach their students, sometimes, a Biology teacher is made to teach all the science subjects in private schools which leads to students' poor academic performance. Again, there are more qualified teachers, good school environment in urban schools than rural schools in Rivers State. Teachers in rural schools are not residence in their place of work as a result, they are not regular in class to cover their scheme of work, this also affected students' academic performance of the rural students. Therefore, government should ensure special allowance and better working conditions for teachers in rural schools in Rivers State.

The finding also revealed that there is a strong influence of instructional materials on students' academic performance in chemistry based on the mean performance of students in both public and private schools in Rivers State. The finding also shows that the mean performance of public schools was better than students in private schools.

Similarly, the summary of two-way analysis of variance (ANOVA) of the significant influence of instructional materials on students' academic performance in public and private schools in Rivers State showed significant influence of instructional material on students' academic performance in Chemistry in public and private schools in Rivers State. It also shows that instructional materials are significant on the school type in favour of public school

The finding of this study supports the assertions of Obanya (2004), and Adbu-Raheem (2011) that non availability and inadequacy of instructional materials are major causes of ineffectiveness of the school system and poor academic performance of students in both public and private schools. The result of this study equally confirms the position of Ogbondah (2008) that it is very important to use instructional aides for instructional delivery to make students acquire more knowledge and to promote academic standard.

Similarly, the finding of this study supports and confirms the observations of Olumorin et al. (2010). In their studies on the significant difference of instructional material, they observed that instructional materials help teachers to teach conveniently and help learners to learn easily without problem. They also stated that instructional materials have direct contact with all the sense organs. Kachar (2012) supports the result of this study; Kachar reported in his study that instructional materials are very significant learning and teaching tool.

Again, Akinleye (2010) and Esu et al. (2004) collaborates with the finding of this study. They attested that effective teaching and learning require a teacher to teach the students with instructional material and use practical activities to make learning more vivid, logical, realistic and pragmatic and agreed that instructional materials are indispensable to the effective teaching and learning activities.

Instructional materials are one reason for improved students' academic performance since learning is enhanced and students participate fully when teacher improvise teaching aids. Students learn and remember when they see what is been described than mere hearing of it. Teachers should try as much as possible to make teaching practical than discussion in the classroom especially science subjects like chemistry should be taught in the laboratory.

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CONCLUSION

Generally, it was seen from the findings of this study that a qualified teacher is central to any teaching and learning process that will improve students' academic performance and achieve educational goals. This is why it is important to ensure that every teacher is academically and professionally qualified and equipped with the right skills and mastery of subject matters before they can be allowed to teach. It was discovered that instructional material was significant on students' academic performance. The students who performed better are those who were taught with instructional materials. The skills of understanding description on charts positively enhanced students' concentration and improve their performance academically. Therefore, there is a statistical difference between the academic performance of Chemistry students and the use of instructional materials in teaching-learning activities.

Government should reform teacher education in all the teacher training institutions in Nigeria in order to put up strategies of checking the proliferation of colleges of Education in the country to ensure the standard of teachers are not compromised. School authorities and Government should be providing teachers' training and retraining programmes, workshops and other forms of incentive to encourage the teachers to give their best to students. Teachers should utilize the available opportunities to improve themselves with the current technological trends such as computers, internet and other electronic systems to improve on their mastery level because no teacher that can teach what he or she does not know.

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Study Habit and Peer-Group Influence as Predictors of Senior Secondary School Students' Learning Outcome in Chemistry in Rivers State

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Abstract

The study evaluated peer-group influence and study habit on students' learning outcome in Chemistry in Rivers State. The research method adopted in this study was ex-post facto research design (after effect). The population of the study was 20,658 Chemistry students made up students in public and private schools in Rivers State. Multi-stage sampling method was used for the study. Simple random sampling was used to put the students into three senatorial zones; proportional stratified sampling was used to obtain 130 students from each senatorial zone (stratum) while stratified sampling was used to select 195 science students each from public and private schools. Again, proportional sampling technique was used to select six (6) senior secondary schools in Rivers State; one public and one private school in each stratum while intact classes were used. The sample size of 390 students was drawn from the population of the study using Taro Yamane's formula. Two research instruments, Student Study Habit Inventory (SSHI) r = .80), Peer-Group Inventory (PGI) r =.85) and Chemistry Achievement Test (CAT) (r = .73), were used for data collection. The research questions were answered using mean and standard deviation while the null hypotheses were tested using analysis of variance (ANOVA) at 0.05 significance level. Study habit was significant on students' academic performance in Chemistry. Students with positive peer influence performed better than the students while urban students performed better than the rural students. Peer group influenced academic performance of students in Chemistry in Rivers State. School authorities, parents and government should encourage children to adopt good study habits through provision of developmental programmes that will help students build efficient and effective study habit towards learning in an early stage of their studies.

Keywords: Study habit, peer-group influence, predictors, students, learning outcome.

INTRODUCTION

Peer group is the pivot of social change and during interaction with peers, the child`s life is transformed from the helpless child into matured adult. Bankole and Ogunsakin (2015) stated that

peer group is a small group of similarly aged; fairly close friends, sharing the same activities. In general, peer groups or cliques have two to twelve members, with an average of five or six. Peer groups as cited in the work of Bankole and Ogunsakin provide a sense of security and they help adolescent ask questions relating to social identity theory such as "who am I" and "what do I want out of life"? Given that adolescents spend twice as much time with peers as with parents or other adults, it is important to study the influence of peer group influence on chemistry students' academic achievement in secondary schools. Many peer groups can exert a positive influence on their friend. It is thought that intelligent students do help their peers bring up their academic performance. Likewise, girls with good friends who are considered intelligent tend to do better in school; all attributable to the fact that they share a common team of similar aspiration.

Bankole and Ogunsakin (2015) studied the influence of peer group on the academic performance of secondary school students in Ekiti State with sample size of 225 secondary school students which were randomly selected from five secondary schools. The instrument used in the study is the Peer Group and Adolescent's Academic Performance (PGAAP) questionnaire and the reliability of the instrument was determined through test-re-test method. The findings showed that peer-group relationship influenced academic performance of secondary school students. The peer group is a source of attachment, compassion, understanding, and experimentation. It is possible for parents to talk with school teachers and professionals to help out in the problem of peer group influence. Allen et al. (2015) reported that adolescents who are liked by several peers show high level of self-esteem and security as well as better interactions with their best peers. Wentzel (2004) found that relating with students who have a positive spawn toward improved students' personal satisfaction with school while relating with peers who have a negative spawn toward school decreased it. From a social perspective, it is most likely that students who have difficulty in proving themselves in a peer group might have academic difficulties in school while the differences are more noticed between adolescents that are neglected and those who are rejected.

Study habits are seen as adequately planned designs that have consistency on students' studies toward understanding academic subjects. It may be explained as a designed programme of subject mastering. Crow and Crow (2007) stated that the major purpose of study habit is to develop understanding that may be useful in interpretations of situations, ideas, making judgments, for creative thinking and ideal skills that could lead to successful performance in any academic activities. Sometimes students' poor academic performance in school may be simply because they lack good study habit. In several circumstances, students may not know how and where to begin while those in higher schools that succeed well usually study alone and follow a study pattern that has been worked out by them that incorporates desirable procedures. Good health, sufficient sleep, appropriate exercise and nutritious diet are essential to achievement of good study results. Study conditions that are unfavorable include inadequate lighting, extremes of temperatures, humidity, poor posture, subnormal physical conditions and emotional disturbance. Although habits differ from person to person, some general principles can be derived about studying efficiently. Here are some good study habits that lead to better academic performance; attending classes regularly, taking down notes during teaching, concentrating on study, studying with aim of getting meaning not cramming, preparing a time table, following a time table, having proper rest periods, facing the problems regarding home environment and planning, facing the challenges posed by school environment, keeping daily survey of work done. Good study habits rest on the attitudes towards work and sense of responsibilities.

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Researches on study habit had shown that learning can be improved through deliberate action of learners' attributes towards design and delivery of the instruction (Dziuban, 2004; Fearing & Riley, 2005). Thus, learners focus on facts, data, or procedures in engaging with theories and mathematical models which are appropriate. Whereas some learners may use visual information such as pictures, diagrams in simulating to understand better while others can get theirs from oral and written information. Kolb and Kolb (2005) and Sun (2008) argued that study habits equally function as a useful pointer to possible learning performance. Coffield et al. (2012) presented an in-depth report that involves almost 71 studying habit models. The models have some components of each related to the extent that they may change over time for learners. According to Coffield et al., study habits may change due to time and situation. Fleming's (2001) VARK Inventory which includes visual, audio, read-write, and kinesthetic perception style are good examples deduced from the models above. Terrell (2002) found that most of the students were either concentrated or assimilated in the comparison of two hundred and sixteen (216) students' rate of graduating in learning style; this comparison was not statistically significant. Akkoyunlu and Soylu (2008) revealed that students' opinions on the combined learning process differ with respect to their learning styles.

Poor performance in academics is likened to the location of schools in various research studies. Different researches linked student's poor academic performance on the walking distance students trek to their various schools. In the study of Njombe (2015), investigation of school location and students' academic performance, Njombe found that the length trekked by students from home to school significantly influenced academic performance of the students. Adeboyeje et al. (2003) identified the distance of home-school location through involvement of stakeholders as one of the causes of poor performance of students in external examinations. Onderi et al. (2014) in their studies indicated that students who are trekking a long length to school highly get to school with empty stomachs which may influence students' academic performance negatively. Galabawa (2002) in another research reported that when schools are located far off from home, student's academic performance is affected since many learners may remain with little time to concentrate on their studies due to the far walking distance they trek to their respective schools. Even though a school may not change its location, school location may perhaps have precipitated on how good a student study in the school.

This study is envisaged and anchored on Kolb's learning theory and social contagion theoretical review which are relevant to this study.

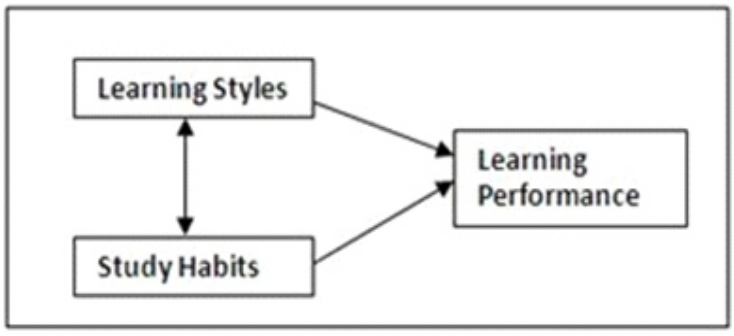

Figure 2. Study framework.

(Kolb & Kolb, 2005).

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Social Contagion theory explains how peers influence academic performance. Adolescent behaviours are grounded in an "epidemic" or "contagion" theory in which students studying their peers (Christakis & Fowler, 2013). For example, if peers are high performers who engage in academic oriented habits like reading and doing their homework completely, then students who interact with these peers may adopt those habits and achieve better academically (Harris, 2010). The contagion model suggests that these habits may be absorbed without explicit modeling from peers. This process also implies differential benefits whereby more disadvantaged students gain more from peers who are stronger academically; while peers who struggle academically may lower a student's own scores (Justice et al. 2014).

Research objectives

1. To investigate the influence of study habits on students' learning outcome in Chemistry in urban and rural schools in Rivers State.

2. To investigate the significant influence of peer-group influence on students' learning outcome in Chemistry in urban and rural schools in Rivers State.

Research questions

1. What is the influence of study habit on students' learning outcome in Chemistry in urban and rural schools in Rivers State?

2. What is the influence peer-group on students' learning outcome in Chemistry in urban and rural schools in Rivers State?

Research hypotheses

HO1: There is no significant influence of study habit on students' learning outcome in Chemistry in urban and rural schools in Rivers State

HO2: There is no significant influence of peer-group on students' learning outcome in Chemistry in urban and rural schools in Rivers State

METHODOLOGY

The population of the study was 20658 chemistry students made up students in public and private schools in Rivers State. Taro Yamane's formula was used to select a sample size of 390 students from the population of the study. The research method adopted in this study was ex-post facto research design (after effect). Multi-staged sampling method was used for the study. Three research instruments, Student study Habit Inventory (SSHI) r = .80), Peer-Group Inventory (PGI) r =.85) and Basic Science Achievement Test (BSAT) (r = .73) was validly and reliably developed by the researcher was used for the study. The researcher visited six (6) secondary schools in Rivers State; three public and three private schools. The data were subjected to mean and standard deviation for the research questions and two-way analysis of variance (ANOVA) was used for the hypotheses at 0.05 significance level.

RESULTS

Table 1: Achievement mean score and standard deviation of study habit and students' learning outcome in Chemistry of urban and rural school

Study habit	School location	Mean	Std. Deviation	N
GOOD STUDY HABIT	Urban	68.7619	12.26747	105
	Rural	64.8454	12.60236	97
	Total	66.8812	12.55261	202
MODERATE STUDY HABIT	Urban	68.1818	15.71738	44
	Rural	65.4667	14.61160	30
	Total	67.0811	15.23582	74
POOR STUDY HABIT	Urban	65.4286	13.71775	56
	Rural	60.6897	13.61399	58
	Total	63.0175	13.81098	114

Table 1 revealed that the mean performance of students with good study habit performed better **(M=66.88, Std. = 12.55)** then those students with moderate study habit **(M=67.08, Std. =15.23)** while those with poor study habit performed least **(M=63.01, Std. =13.81)**. Also, when compared together with school location (urban and rural), the mean performance of urban school students is better than the mean performance of their contemporaries from rural schools.

Table 2: Shows achievement score mean and standard deviation of peer group and learning outcome of urban and rural school students in Chemistry

Peer group influence	School location	Mean	Std. Deviation	N
POSITIVE INFLUENCE	Urban	70.8387	12.09500	93
	Rural	63.1959	14.49902	97
	Total	66.9368	13.88030	190
NEGATIVE INFLUENCE	Urban	65.1429	14.05706	112
	Rural	64.1364	11.99922	88
	Total	64.7000	13.16879	200

Table 2 revealed that the mean performance of students with positive peer group influence performed better **(M=66.94, Std. =13.17)** than negative peer group influence **(M=64.70, Std. =13.17)**. Also, when compared with school type, the table further revealed that the mean performance of urban schools' students with positive peer influence performed better than their counterparts from rural schools.

HO1: There is no significant influence of study habit on students' learning outcome in Chemistry in urban and rural schools in Rivers State

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Table 3: Summary of two-way analysis of variance (ANOVA) of influence of study habit on students' learning outcome in Chemistry in urban and rural schools

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2739.917[a]	3	913.306	5.134	.002
Intercept	1412636.795	1	1412636.795	7940.456	.000
Study habit	1118.315	2	559.157	3.143	.044
School location	1499.785	1	1499.785	8.430	.004
Error	68670.842	366	177.904		
Total	1759444.000	400			
Corrected Total	71410.759	399			

a. R Squared = .038 (Adjusted R Squared = .031)

Table 3 shows that there is a significant influence of study habit on students' learning outcome of urban and rural students in basic science **(Df, 3 = 3.14, P< 0.05)**, i.e. at the Df 3, gives F1 of 3.14 at probability of significant level of 0.05, it also revealed significant influence of school location on students' academic performance **(Df, 3 = 8.43, P< 0.05** i.e. at the Df 1, gives F2 of 3.14 at probability of significant level of 0.05). Hence, the null hypothesis 1 is rejected.

HO2: There is no significant influence of peer-group on students' learning outcome in Chemistry in urban and rural schools in Rivers State

Table 4: Summary of two-way analysis of variance (ANOVA) on influence of peer group on students' learning outcome in Chemistry of urban and rural schools

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2245.851[a]	2	1122.925	6.283	.002
Intercept	1678850.636	1	1678850.636	9393.712	.000
Peer group influence	624.248	1	624.248	3.493	.062
School location	1758.334	1	1758.334	9.838	.002
Error	69164.908	397	178.721		
Total	1759444.000	400			
Corrected Total	71410.759	399			

a. R Squared = .031 (Adjusted R Squared = .026)

Table 4 shows that there was a significant influence of peer group influence on students' learning outcome of urban and rural students in core science subjects **(Df, 3 = 3.49**, P< 0.05 i.e. at the Df 3, gives F1 of 3.49 at probability of significant level of 0.05), there is significant influence of school location on students' academic performance in chemistry **(Df, 3 = 9.84, P< 0.05** ie at the Df 1, gives F1 of 9.84 at probability of significant level of 0.05). The null hypothesis 2 is rejected.

DISCUSSION

The findings revealed that the mean performance of students with good study habit is higher than those with moderate study habit and those with poor study habit. The table shows that the mean performance of urban school students is better than the mean performance of rural school students. Again, from the summary of two-way analysis of variance (ANOVA) on significant influence of study habit on students' learning outcome in Chemistry in urban and rural schools in Rivers State shows that there is significant influence of study habit on students' learning outcome. The finding collaborates with the finding of Sawar (2009) on study orientation of high and low academic performance in secondary school. Sawar stated that the high achievers had better study habit, better study attitude than low achievers. Again, the finding of this study equally supports the report of Bolling (2000), that developing a good study habit in school will help students to succeed in class and achieve educational goals. Similarly, Bolling (2000) asserts that good study habit through planning helps students prepare and accomplish their academic goals. The finding of this study again affirms the opinion of Mark and Howard (2009). They opined that the most common challenge to the success of students is lack of effective (goal) study habits and with good discipline, they are bound to perform remarkably well in their academic pursuits. Furthermore, the opinion of Ashish (2013) and the view of Agba (2013) on study habit confirm the finding of this study. Ashish opined that if students must ensure academic success throughout the entire year, it is important to ditch bad study habit and establish good ones. Agba in his view reported that unserious students do study anyhow without specific technique and he submits that such students are most likely to start performance from homework. Good study habit is the key to academic excellence as seen in the findings of this study. Students that fail to plan planned to fail as evidenced in the difference in mean performance of students with good study habit, moderate study habit and poor study habit.

Table 2 shows the influence of per-group on students' learning outcome of urban and rural school students in Chemistry. The table revealed that the mean performance of students with positive peer-group influence was better than those with negative peer-group influence. The table also revealed that urban school students with positive peer-group influence performed better than their counterparts from rural schools. However, hypothesis testing of peer group influence in table 4 shows significant influence of peer group influence on students' learning outcome in Chemistry in urban and rural schools in Rivers State. This finding agrees with the study of Bankole and Ogunsakin (2015). They investigated influence of peer-group on the academic performance of secondary school students in Ekiti State and found that there was significant influence of peer-group on academic performance of secondary school students. The finding of this study is also in tandem with the finding of Sacerdote (2000). Sacerdote examined classroom level peer group influence and found high proportion of the female classmates improve both boys' and girls' academic performance. The studies of Allen et al. (2015) also affirms the finding of this study. They investigated peer-group source of affection, sympathy, understanding and place of experiment and found that associating with students who have a positive effect toward enhanced students' own satisfaction with school whereas associating with friends who have a negative effect toward school decreased. Furthermore, the studies of Bankle et al. (2015) collaborate with the finding of this study. Bankle et al. investigated the influence of peer-group on academic performance of secondary school students in Ekiti State and found that positive peer-group significantly influenced academic performance of the students.

Parents, teachers and other stakeholders in education should consider negative peer-group influence as necessary precursor to poor academic performance. Membership in any negative peer-

group is a powerful force during teaching and learning process; these groups provide an important developmental point of reference through which students gain an understanding of the environment outside of their families. Failure to develop close relationships that will lead to positive peers with age mates often results in a variety of problems for the students; from delinquency and substance abuse to psychological disorders and subsequent result is poor academic performance.

CONCLUSION

Good study habit enhances academic performance of the students in Chemistry. Learning does not occur only in the classroom or in isolation but through interaction with one another. From the findings of this study, it is therefore deduced that a student's interaction with his or her peers will definitely affect learning. Although, there was no significant difference in the interaction of school type and study habit. The extent to which the peer group determines the academic performance of students had been investigated in this study which revealed that some dull students may become study inclined when he or she associates in a positive peer group that encourages effective learning.

RECOMMENDATIONS

1. School authorities, parents and government should encourage children to adopt good study habits through provision of developmental programmes that will help students build efficient and effective study habit towards learning in an early stage of their studies.

2. Engaging students in educationally purposeful activities that will result in high level of learning and personal development for all students should be encouraged by parents and teachers.

3. Parents and teachers should ensure the students are well monitored and should be encouraged to have peers that would impact positively on their learning both at home and at school. Positive peer influence is a very important consideration in learning so, parents, teachers and students alike should ensure that it is effectively used to improve learning.

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HEALTH IMPLICATIONS OF COVID-19 ON MATHEMATICS STUDENTS

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Abstract

The study titled health implications of COVID-19 on mathematics students reveals that COVID-19 pandemic has negative effects on the well being of mathematics students in the sense that it has affected the following areas such as health services for non-communicable diseases, service disruptions, reassignment of staff and postponing of screening, implementation of alternative strategies for continuing care, psychological, behavioral, interpersonal, children, gender-based violence, health services, cash transfers and food assistance, clinical guidance on pregnancy, intra-partum care and breast feeding, contraception and family planning, violence against women and self-care interventions. In all, this paper recommends that governments should prioritize services preventing and responding to violence and deem them as essential services during emergency, there should be public health foundation for all network, world health organisation recommends that sexual and reproductive health, science-based responses, public health interventions should look at how to promote health equity and reduce inequality, there should be intensive testing and contract tracing, isolation of infected individuals, enforcement of isolation and wide use of face masks for the mitigation of COVID-19 pndemic and governments must ensure education response plans are gender and age responsive and reflect the lived realities of girls, children with disabilities and other marginalised children throughout the life cycle of education and schools should be supported to prevent and control the spread of COVID-19 with attention paid to protect students and staff from discrimination and stigma associated with the infection.

Keywords: COVID-19 symptoms, spread and risks, pandemic, health implications, Mathematics students, predictions.

INTRODUCTION

Coronavirus (COVID-19) is an infectious disease that is characterized by severe acute respiratory syndrome known as SARS-CoV-2 (WHO, 2020). The disease was first identified in Wuhan in China in December 2019 and has since been spreading globally resulting in a pandemic. The disease is presented with difficulty in breathing, sore throat, fever, cough and sneezing (Nigeria Centre for Disease Control (NCDC, 2020). Corona virus was first confirmed in Nigeria on the 27th February 2020 in an Italian citizen in a virology laboratory test of Lagos State University Teaching Hospital. Since then the disease has been on the increase from one confirmed case to 9,455,853 global cases

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and about 483,217 deaths and 10,152 recoveries in almost all the states in Nigeria and Rivers State inclusive (WHO, 2020).

In order to contain the impact of COVID-19, schools were closed and there was total lockdown of every system which also has some implications on the health of the citizens including Mathematics students (NCDC, 2020). Since the emergence of COVID-19 in December, 2019 the whole world economy and live have been crippled and affected due to lockdown and wearing of face and nose mask. So many people have come up with health challenges ranging from psychological problem, mental issues and physical health challenges and some could not access health services in the process as a result of COVID-19 lockdown.

Bash in Ngumbi (2020) is of the belief that the implication of health issue is not only on economy, but also on learners. He opined that it is only healthier Mathematics students that learn well and participate in teaching and learning Mathematics. Kelvin in Davis et al. (2015) also is of the view that in order to address the issue of health disparity and academic achievements of Mathematics students, adequate investment has to be channeled to their health to keep them fit for learning Mathematics.

According to Maria et al. (2019) on asthma and learning outcome and absenteeism, the study revealed that Mathematics students with asthmatic attack may not be regular in the class. This situation is also applicable to the COVID-19 crisis as victims of this coronavirus infection may not attend classes until they fully recover from the disease. This may also affect their performance in all courses including Mathematics (Nkuturum & Onwubuya in Nkuturum, 2020). To ensure that the academic performance of Mathematics students do not lag, there are some skills that should remain a priority for all students and that is resilience must be built into the educational system, Chin et al in Nkuturum (2020). Other Mathematics skills the pandemic has brought to the student's mind which are needful in this erratic world are informed decision making, creative Mathematics problem solving and adaptability (Nkuturum, 2020; Nkuturum & Oyesanya, 2019). Thus, the effect of COVID-19 pandemic across the world is unparalleled as it has to do with students' health.

Similarly, Derek and Shandell (2010) examined the well-being and academic performance of Mathematics students. The study revealed that productivities are determined by regular class attendance and active participation in teaching and learning session which is impossible with any student who contracted COVID-19 virus. Lauren in Barredo (2020) stated that one of the highest and early implication of COVID-19 was the wide spread of the disease by asymptomatic patients which now led to the enforcement of intensive testing, temporary or total lockdown and compulsory wearing of face mask which resulted in both psychological, social and physical health crisis among citizens.

COVID-19 is the worst health crisis of a generation that is challenging the world. The concern is about how COVID-19 will affect the most vulnerable populations, reduced infrastructure and healthcare provisions make the COVID-19 pandemic harder to control. Globally, care must be taken to ensure the world's most vulnerable children and young people get the support needed during this crisis. International plan for fund raising should be established as to protect some of the world's most vulnerable children and their communities from the impact of COVID-19 (Nkuturm, 2020).

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Concept of COVID-19

The COVD-19 is an ongoing pandemic of coronavirus disease caused by severe acute respiratory syndrome of coronavirus 2 (SARS-CoV-2). The new coronavirus is a respiratory virus which spreads primarily from one person to another through droplets generated when an infected person coughs, sneezes saliva and discharge from the nose. Therefore, COVID-19 simply means 'CO' for corona, 'VI' for virus, 'D' for disease and '19' stands for 2019. Before now, this disease was referred to as '2019 novel coronavirus' or '2019-nCoV' which was first detected in Wuhan, China in December of 2019, but has turned to a serious global problem called pandemic (Jackson et al in Jordan, 2020). The COVID-19 virus is a new virus connected to the same family of viruses such as Severe Acute Respiratory Syndrome (SARS) and some types of common cold. COVID-19 has claimed more millions of lives and infected nearly 2.3 million people in the world. The World Health Organization (WHO) declared Coronavirus as COVID-19 pandemic as a global health problem on 11 March 2020. The COVID-19 is a new strain of coronavirus which has not been seen in human body. The WHO encouraged people to keep social distancing and wear face mask in crowded areas. This means that people should try to avoid contact with one another especially the ones that have shown signs of COVID-19 and crowded places like bars, swimming pool, cinemas, restaurants, theatres, gym and social gathering.

Since its first cases in China, COVID-19 has spread to almost all countries worldwide. According to the World Health Organization, 9,455,853 global cases were reported including 483,217 deaths. As part of the effort to contain the spread of the COVID-19, public places are closing down so that people can stay at home and prevent further spread. In countries, such as China where testing and quarantine measures were observed the spread was able to level out. Measures that are taken to slow down the rate of infection include social distancing, limits on event sizes and home quarantine when needed. Closing schools and offices made the Mathematics students to limit their interactions with others and as well slow down the spread of the virus while the healthcare system copes with the pandemic (Oyefusi & Lauren in Lindzon, 2020).

Symptoms of COVID-19

COVID-19 can cause a range of symptoms of wildly varying severity in people. Some might be asymptomatic or have mild symptoms, while others are sick enough to need hospitalisation, supplementary oxygen and the use of a ventilator (Zumla, 2010). Broadly, as a respiratory virus, COVID-19 causes breathlessness, fatigue and muscle ache. As the pandemic has evolved and documented clinical case histories have accumulated, a new symptom began to emerge in partial or total loss of the sense of taste and smell (Bao et al in Karp & McGowan, 2020). This in itself is not unusual for a respiratory viral infection, but what is unique here is that people had this symptom without any form of the other usual symptoms of infection (Barnum in Jamerson & Mitchell, 2020). It is now clear that the COVID-19 does not just attack the respiratory system, but some people have reported gut issues and problems with their kidneys. Severe COVID-19 patients have experienced what is called a cytokine storm in which the body's immune system goes into a potential fatal overdrive and leads to multi-organ failure (Kawano & Kakehashi in Barrett, 2020). This has also been seen with influenza, SARS and MERS-CoV. COVID-19 takes up to five days before the symptoms begin to show but for some people it shows up early. The World Health Organization (2020) said that the incubation period lasts up to 14 days. In some patients if their symptoms are not too serious, then they should self-isolate themselves at home for at least seven days. This is because if a person comes in contact with those suspected to have COVID-19 or the area where the virus has spread such person has to keep self-isolation (Wheeler in Sessoms, 2015). The main symptoms

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include difficulty in breathing or shortness of breath, fever, coughing and sneezing, organ failure, pneumonia, sore throat, headache, diarrhea, loss of smell and taste and death.

Pandemic

A pandemic is described as an infectious disease that shows significant effect and is ongoing, spreading from one person to another in numerous countries around the world at the same time. A pandemic occurred last in 2009 with swine flu, which experts predicted that it killed hundreds of thousands of people (Walsh & Wardrop in Tedros, 2020). Pandemic also occurs if a virus is brand new, able to infect people easily and can spread in an efficient and sustained way (Markel et al., 2007), while an epidemic is uncontrollable transmission of a disease throughout the world, Foxman (2020). Thus, there are two other stages of disease: endemic disease which refers to an existing, predictable and relatively stable prevalence of a disease in a particular locale (example: malaria in Africa) and disease outbreak occurs when an infection shows up in an unexpected location or there is an unexpected increase in the infected population of a disease (example: Ebola, at various points in time).

WHO (2020) defined the phases of different levels of a pandemic.

Phase 1: No animal viruses circulating have been reported to cause infection in humans.

Phase 2: An animal virus in domestic or wild animals has been reported to cause infection in humans.

Phase 3: An animal or human-animal virus has caused "sporadic cases or small clusters of disease in people." Limited human-to-human transmission may occur in certain circumstances.

Phase 4: sustained human-to-human spread and community outbreaks.

Phase 5: human-to-human transmission in at least two countries within a single WHO region.

Phase 6: The actual pandemic phase, wherein there is human-to-human spread in at least one country outside of the two in the initial infected WHO region.

Health Implication of COVID-19 on Mathematics Students

The implications of COVID-19 on students cannot be over emphasized in that it makes them to be unable to take part in digital learning, food insecurity, homelessness, as well as access to childcare and health care, internet, and disability services are not available due lockdown. The effect of this pandemic was more severe for disadvantaged students and their families causing interrupted learning, compromised nutrition, childcare problems, consequent economic cost to families who could not work, academic downstream, inaccessibility to technology, self-isolation, lockdown, wearing of face mask, quarantine for 14 days, conduct a test as to confirm the status, hospitalization, treatment commenced under severe cases, the infected may die, lack of access to the same preventive measures in the community, education is interrupted, economic stress, Increase in the standard of living for the refugees and internally displaced people (displacement camps and settlements), Loss in the traction for immunization programs, Lack of access to primary health care due lockdown, Limited access to hospitals and special care, Increased gastrointestinal (GI) symptoms in positive patients.

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Widespread Disruption of Health Services for Non-communicable Diseases

Generally, prevention and treatment services for non-communicable diseases (NCDs) have been severely disrupted for students learning Mathematics since the COVID-19 pandemic began, (WHO, 2020). The survey, which was completed by 155 countries during a 3-week period in May, confirmed that the impact of COVID-19 is global, but that low-income countries are most affected. This situation is of significant concern because students living with NCDs are at higher risk of severe COVID-19 related illness and death (Feuer in Frieden, 2020). This implies that many students learning Mathematics who need treatment for diseases like cancer, cardiovascular disease and diabetes have not been receiving the health services and medicines as needed since the COVID-19 pandemic began. It is vital that countries find innovative ways to ensure that essential services for NCDs continue, even as the fight against COVID-19 is still ongoing (UNESCO, 2020). The main finding is that health services have been partially or completely disrupted in many countries. More than half (53%) of the countries surveyed have partially or completely disrupted services for hypertension treatment; 49% for treatment for diabetes and diabetes-related complications; 42% for cancer treatment, and 31% for cardiovascular emergencies. Rehabilitation services have been disrupted in almost two-thirds (63%) of countries, even though rehabilitation is key to a healthy recovery following severe illness from COVID-19 (Derek & Shandall in WHO, 2020).

Reassignment of Staff and Postponing of Screening

In the majority (94%) of countries responding from ministry of health staff working in the area of NCDs were partially or fully reassigned to support COVID-19. The postponement of public screening programmes, for example breast and cervical cancer was also widespread in more than 50% of countries. This was consistent with initial WHO recommendations to minimize non-urgent facility-based care whilst tackling the pandemic. But the common reasons for discontinuing or reducing services were cancellations of planned treatments, a decrease in public transport available and a lack of staff because health workers had been reassigned to support COVID-19 services due to shortage of medicines, diagnostics and other technologies. This showcased a correlation between levels of disruption to services for treating NCDs and the evolution of the COVID-19 outbreak in a country. Thus, services become increasingly disrupted as a country moves from sporadic cases to community transmission of the COVID-19.

Implementation of Alternative Strategies for Continuing Care

Encouraging findings of the survey were that alternative strategies have been established in most countries to support the people at highest risk to continue receiving treatment for NCDs. Among the countries reporting service disruptions, globally 58% of countries are now using telemedicine (advice by telephone or online means) to replace in-person consultations; in low-income countries this figure is 42%. Triaging to determine priorities has also been widely used, in two-thirds of countries reporting (*Cauchemez, et al in* Brunnier & Hirris, 2020). Presently, it is not only the people or students with NCDs are more vulnerable to becoming seriously ill with the COVID-19, but many are unable to access the treatment they need to manage their illnesses. It is very important to build back better and strengthen the health services so that they are better equipped to prevent, diagnose and provide care for NCDs in the future, in any circumstances.

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Psychological, Behavioral, Interpersonal Effects and Clinical Implications for Health Systems

The best way to prevent and slow down transmission is to be well informed about the COVID-19 virus, causes and how it spreads. Generally, there should be self Protection and from infected persons by washing your hands or using an alcohol-based rub frequently and not touching your face. The practice of physical distancing where possible, avoidance of unnecessary travel and to stay away from large group of people should be upheld. More also, stay at home if you feel in poor health.

Children

Disease outbreaks affect girls and boys, women and men differently. While children's health appears less impacted by COVID-19 than older adults, children's education will be interrupted, protective structures disrupted and their families and communities placed under stress by health and economic burdens. Children are also at risk of psychological distress at times of crisis as well as increased risk of violence, abuse, exploitation and neglect. Essential ongoing support and case management for vulnerable and at-risk children may be blocked by social distancing measures, quarantine situations and some communities facing restrictions on movement.

Gender-Based Violence

Disease outbreaks increase girls' and young women's duties caring for elderly and ill family members, as well as for siblings who are out of school. Girls, especially those from marginalised communities and with disabilities may be particularly affected by the secondary impacts of the outbreak. Economic stress on families due to the outbreak can put children and girls in particular at greater risk of exploitation, child labour and gender-based violence. Quarantine measures should be accompanied by support for affected households. Governments must include measures to address gender-based violence and child protection in COVID-19 response and recovery plans, and ensure that plans are gender and age responsive and multi-sectorial. Girl- and youth-led groups should be safely and meaningfully involved in the development of plans, and plans should assess and monitor the risk and prevalence of violence.

Health Services

The past epidemics indicated that resources are often diverted from routine health services to limited access of many female students who have right to use the sexual and reproductive health services as well as maternal, new-born and child health services, training community health workers and to ensure that people living with HIV have continued access to treatment through the help and support of local health and government authorities. The COVID-19 pandemic must not be used as an excuse to restrict or rollback girls and women's access to essential sexual and reproductive health rights which must be prioritized, funded and recognized as lifesaving. The health and wellbeing of care workers in which majority of them are women must be a core part of the response to the disease outbreak or pandemic. Women and girls suffer most during emergency or crisis. Thus, there is need for response to tailor towards the most vulnerable communities as to supply some of the social amenities such as water, sanitation and hygiene with the intention to contain COVID-19 pandemic. There should be installation of hand washing facilities, distribution of hygiene and menstrual kits sharing at age-appropriate, gender-aware health, hygiene information and provision of disinfectant to sanitize public places.

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Cash transfers and food assistance

The COVID-19 pandemic made families lose their income without cash distributions by the government to ensure that essential needs are met during lockdown. Where access to food is unaffordable or inaccessible, there should be provision for food assistance by the government as a form of palliative which is a way of mitigating COVID-19.

Clinical guidance on pregnancy, intra-partum care and breastfeeding

WHO (2020) published interim guidance on the clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected. This guidance includes information on caring for pregnant women with COVID-19 as well as information on caring for infants and mothers with COVID-19, intra-partum care (IPC) and breastfeeding. Considerations for pediatric patients and pregnant women are vital (WHO, 2020). This guidance is not meant to replace clinical judgment or specialist consultation but rather to strengthen clinical management of these patients and to provide up-to-date guidance. Best practices for infection prevention and control (IPC), triage and optimized supportive care are also included.

Contraception and family planning

During COVID-19, access to effective contraception is one of the most cost-effective interventions to reduce maternal mortality through preventing unintended pregnancy, thereby protecting an individual's physical and mental health and it is important for people to be able to continue to access contraceptive information and services during the pandemic. Ensuring that people have access to the contraceptive services the need also reduces avoidable pressures on the health system to manage the consequences of unintended pregnancy as well as HIV and antiretroviral.

Violence against women

Violence against women remains a major global public health and women's health threat during emergencies.

Self-care interventions

During the COVID-19 pandemic, the world is experiencing an unprecedented demand on individuals to play a greater role in protecting their own health. For prevention and protection of COVID-19, specific self care measures such as physical distancing, good respiratory hygiene and hand washing and other areas especially for sexual and reproductive health, in which people may play an important role in protecting their own health. Self-care is the ability of individuals, families and communities to promote health, prevent disease, maintain health, and cope with illness and disability with or without the support of a health- care provider (WHO, 2019). The purpose of this guidance is to provide people-centred, evidence-based guidance to support individuals, communities and countries with quality health services and self-care interventions, based on public health strategies, comprehensive essential service packages and keeping people firmly at its centre. The guideline addresses a wide range of issues including: Antenatal care, chilldbirth, postartum and newborn care, family planning and issues of fertility, safe abortion, sexually transmitted infections, including HIV and promoting sexual health.

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Prediction of COVID-19 Pandemic on Mathematics Students

1. Introduction of Homeschooling: Presently, COVID-19 pandemic has shifted the normal setting in educational system to homeschooling. Basically, all parents are doing some form of homeschooling or the other whether they want to or not. But the issue is that what are the resources, supports and capacity do they have to do homeschooling effectively. Most parents are struggling with having classroom in their homes. Also, parents must recognize the equity issues in the forced overreliance on homeschooling so that parents will avoid further disadvantaging the already disadvantaged.

2. Parents teach the child: School regions can be helpful by giving parents guidance on how to constructively use this era of COVID-19 pandemic. Once more, there are extensively variable capacity in the families and school systems. In some families, they have their parents at home all day while other parents have to go to work. Some school systems are holding their classes online all day long and the students are fully participating, engaged and have lots of homework to do and the parents do not need to do much. In some other cases, virtually nothing is going on at the school levels and everything falls to the parents. Finally, parents have to strike a balance between what children need and what families can do, and how they maintain some kind of work-life balance in the home environment.

3. Philanthropic and Organizations Assistance: In this interim of COVID-19 pandemic, lots of philanthropists and organizations are springing up, offering different kinds of resources such as handbooks and curriculum outlines while many school systems are coming up with guidance documents to help parents create a positive learning environment in their homes by engaging children in challenging activities so as to keep learning which will help families to get rid of some myriad challenges they are facing now.

4. Introduction Paradigm shift at educational setting: The best that can come of this covid-19 pandemic is a new paradigm shift in terms of the way in which education is perceived, because students' well-being and success depend on more than just schooling. Hence, the students' entire lives need to be looked upon holistically. In order for mathematics students to come to school and be ready to learn, they need a wide array of essential supports and opportunities outside of school. These education prerequisites go far beyond the poor view of school systems, but rather are the responsibility of communities and society at large. In order to learn, students need equal access to health care, food, clean water, stable housing, and out-of-school enrichment opportunities, to mention but a few preconditions. With this, we have to reconceptualize the whole job of child development and education, and construct systems that meet students where they are and give them what they need, both inside and outside of school, in order for them to have a genuine opportunity to be successful in life.

5. New learning opportunity: Students learning mathematics are currently making a switch from frontal classes to online classes may find out that a remote education actually works well for them, and may choose to take further education or degrees online. This switch is an opportunity for many students learning mathematics to try out remote education, and may make it more likely that they will engage with online classes in the future. Students being newly introduced to remote education

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may opt for taking a future degree online, due to the benefits of distance learning as result of COVID-19 pandemic and the affordable options available.

6. More online resources: Despite the challenges posed by COVID-19 pandemic on students learning mathematics, the shift in education also means that more opportunities are arising and becoming available to students online and there is easy accessibility to those resources. An emphasis is being put on online and distance education for making affordable programs more relevant and known to the public during COVID-19.

7. Public and private educational partnerships grow in importance: COVID-19 has brought about learning consortiums and coalitions within few months taking shape with diverse stakeholders - including governments, publishers, education professionals, technology providers, and telecom network operators; coming together to utilize digital platforms as a temporary solution to the pandemic crisis. In countries where education has predominantly been provided by the government, this COVID-19 could become a prevalent and consequential trend to future education. The consortium's intention is to continue using and maintaining the platform even after COVID-19 has been contained.

Challenges of COVID-19 Pandemic on Mathematics Students

1. Mathematics teacher factor: Online teaching in its nature and scope requires team of teachers performing different tasks at different levels to accomplish maximum goals of the institution. Thus, all mathematics teachers requires orientation and training in this COVID-19 pandemic in order to be equipped with professional knowledge, skills, attitudes and approaches that are appropriate to e-learning.

2. Student factor: This implies that some students' attitudes towards the e-learning may not be serious. In this contest of COVID-19, those unserious students may be concerned with getting the certificate at the end of programme without considering the achievement. This type of students will use COVID-19 pandemic as a sort of excuse and showcase a laser-fair attitude towards assignment and tests which will help them to improve their skills in future. Thus, at the end these unserious students may indulge into any form of malpractice just to have their way through.

3. Lack of finance: In this COVID-19 pandemic, the mathematics teachers and students need a considerable amount of money to get the e-learning off the ground in terms of data plan or data consumption. Also, much money is required for infrastructural facility, smart phones, palm top, laptop, computers, laboratory equipment, vehicles and so on. It is needful for mathematics department to be given enough capital to procure the aforementioned which were unavailable due to lack of fund.

4. Inadequate power supply: COVID-19 pandemic has distorted some mathematics students from connecting to the lecture time due to total lockdown of petrol station. For instance, a lecture scheduled for 9.00am using WhatsApp, zoom or on radio and television which has been running for days; some students at different locale may not have access to power supply due to one reason or the other. Sometimes unforeseen contingency may occur say connection problem or generator is bad in the case of personal supply hence the lecture is disrupted for either the teacher or student.

5. Barrier in Communication: Inadequate provision of basic communication devices such as telecommunication mask, smart phones, laptop, palmtop which are not affordable by some

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individuals, students and teachers hinders the success of e-learning system during COVID-19 pandemic.

6. Network problem: Many business men and women to go online due to total lockdown that emanated from COVID-19 pandemic. This in turn has made the network provider to fluctuate or be unstable. Here, the teacher or students may want to mail his or her response to some questions raised which requires a given time to handle but because of the network problem as well as the digital device in use the information may be distorted and what would have got to its destination within few seconds may take minutes hours thereby affecting the entire system.

7. There is no physical relationship between teachers and students.

8. There is a bridge in learner's instant classroom evaluation with team-work in terms of solving mathematics problems (classwork evaluation).

9. Environmental factor: That is lack of internet facility in the rural areas.

10. COVID-19 pandemic has reduced the quality of teaching and learning process through e-learning since it is new to some teachers and students despite the fact that it has been existing over the years.

11. Concentration difficulties: Younger children, as well as students with attention deficit hyperactivity disorder (ADHD) or other special needs, find it difficult to concentrate to full capacity with online educational tools. Young children need the assistance of in-person instruction, and may find it difficult to concentrate in a typical frontal class conducted on a computer. Students with special needs, who also rely on in-person instruction, may find it difficult especially to switch to online platforms. These difficulties may require a more unique approach to online learning, or may demand the extra assistance of parents as these students to navigate a new educational paradigm.

CONCLUSION

In the light of the symptoms and spread of COVID-19 pandemic mentioned above, it also has prospects and health implications on mathematics students if harnessed properly. It is the well being of a student that will determine retention when imparting knowledge that will be credible to the graduates for job opportunities. With efforts to prevent the spread of the COVID-19, a self-intervention guidance is provide for people-centred and evidence-based guidance to support individuals, communities and countries with quality health services and self-care interventions. Based on public health strategies, comprehensive essential service packages and keeping people firmly at its centre is of kin interest. This is to address a wide range of issues including: Antenatal care, chilldbirth, postartum and newborn care, Family planning and issues of fertility, safe abortion, sexually transmitted infections, including HIV and Promoting sexual health during COVID-19 pandemic.

SUGGESTIONS

1. The World Health Organisation recommends that Sexual and Reproductive Health, science-based responses, public health interventions should look at how to promote health equity and reduce inequality, and explored different services for ending isolation and returning to normal.
2. There should be intensive testing and contract tracing, isolation of infected individuals, enforcement of isolation and wide use of face masks for the mitigation of COVID-19

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pandemic. This is to ensure that testing remains widespread as people slowly begin transitions back to work and school comparative public health interventions against COVID-19.

3. It is vital that governments prioritize services preventing and responding to violence and deem them as essential services during emergency.

4. There should be Public Health Foundation for All Network, as key rules for preventing community outbreak, including staying at home 3-4 days if sick, maintaining distance from people, and washing hands and also making sure health system capacity is maintained in a long-term.

5. Governments must ensure education response plans are gender and age responsive and reflect the lived realities of girls, children with disabilities and other marginalised children throughout the life cycle of education. Schools should be supported to prevent and control the spread of COVID-19, with attention paid to protecting students and staff from discrimination and stigma associated with infection.

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Novel Coronavirus 2019: Its Emergence, Mechanism of Infection and Possible Treatment Methods

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Abstract

This paper examined the emergence of coronavirus disease of 2019 (COVID-19), its methods of spread and treatment. Data were obtained from secondary sources and were analysed qualitatively. The severe acute respiratory syndrome coronavirus 2019 (SARS-COV -2) with its typical crown-like spikes on the outer surface belongs to the β-group of the coronaviridae family. The virus causes the coronavirus disease of 2019 (COVID-19), which emerged from the Wuhan Province of China. Millions of cases and hundreds of thousands of deaths have been reported around the world. The glycoprotein spikes on the outer surface are used for attachment and entry into the host cells. The SARS- coronavirus employs angiotensin –converting enzyme 2 (ACE2) as receptor. It attacks the respiratory system particularly and most infected people develop mild to moderate illness however, severe cases may lead to death. It is mainly transmitted through contact with infected body fluids. There are no anti-viral medications or vaccines for the treatment of COVID-19. Though, some drugs and vaccines are being produced and tested presently, treatment is based mainly on symptoms displayed by infected individuals and it is normally through the administration of combination drugs. The paper suggested that potential drugs for the treatment of COVID-19 must be formulated to target specific areas in the SARS-COV-2 in order to be effective against the virus.

Keywords: Novel, COVID-19, emergence, mechanism of infection, possible treatment.

INTRODUCTION

Coronavirus belongs to the coronaviridae family in the Nidovirales order (Shereen et. al., 2020). Corona represents crown like spikes on the outer surface of the virus, thus it was named as coronavirus. Coronaviruses are minute in size (between 65 – 125 nm in diameter) and contain a single-stranded RNA as the nucleic material, which ranges from 26 – 32kbs in length. Coronaviruses can be subdivided into four groups, namely: Alpha (α), Beta (β), Gamma (γ), and delta (δ) coronavirus. Zhong et al (2003) reported that there was an outbreak of severe acute respiratory syndrome (SARS) caused by SARS-Cov in Guangdong China, in 2002. A decade later, another pathogenic coronavirus, known as Middle East Respiratory Syndrome Coronavirus

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(MERS-COV) caused an endemic in the Middle East region (Wang et. al. 2013). Few months to the end of 2019, the Wuhan Province of China experienced an outbreak of the novel coronavirus which infected over seventy thousand individuals and killed more than eighteen hundred within the first fifty days of the epidemic. The virus was claimed to be a member of the β group of coronavirus. The novel virus was named as Wuhan coronavirus or 2019 novel coronavirus (2019–nCov) by the Chinese researchers. The International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-COV-2 and the disease as COVID – 19 (Cui et al., 2019; Lai et al., 2020; WHO, 2020). It was reported that SARS –COV (2003) infected 8098 individuals with 9% mortality rate across 26 countries in the world while the novel coronavirus (2019) infected 19,541,216 individuals with 3.7% mortality rate across 188 countries and territories around the world. It shows that the transmission rate of SARS-COV-2 is higher than that of SARS-COV and the reason could be attributed to genetic recombination at the site of the S protein in the receptor – binding domain (RBD) region of SARS-COV-2 which enhances its transmission. In this review, we discuss the novel coronavirus 2019, its emergence, mechanism of infection and possible treatment method.

EMERGENCE AND SPREAD OF CORONAVIRUSES

In 2003, the Severe Acute Respiratory Syndrome (SARS) Virus infected thousands of people in the Guangdong Province of China. The Virus was reported to be a member of the Beta –coronavirus sub group and was named SARS –COV (Peiris et al., 2004; Pyrc et al., 2007). The infected individuals exhibited symptoms of Pneumonia with diffused alveolar injury which led to acute respiratory distress syndrome (ARDS). Therefore, SARS initially emerged in Guangdong, China and then spread rapidly around the world with more than eight thousand (8000) persons infected and seven hundred and seventy-six (776) deaths recorded.

A decade later, in 2012 another coronavirus infection was reported in Saudi Arabia, a country in the Middle East. The Virus was confirmed as a member of coronavirus and named as the Middle East Respiratory Syndrome Coronavirus (MERS-COV). The World Health Organization (WHO) reported that MERS-COV infected more than two thousand, four hundred and twenty eight (2428) individuals and eight hundred and thirty eight (838) deaths recorded (Rahman & Sarkar, 2019). MERS-COV is a member of the beta-coronavirus subgroup and phylogenetically different from the other human-cov. The infection of MERS-COV starts with a mild upper respiratory injury then, progresses to severe respiratory disease (SRD). Similar to SARS-coronavirus, patients infected with MERS-coronavirus suffer pneumonia, followed by ARDS and renal failure (Memish et al., 2013)

Some months to the end of 2019, the Chinese government informed the World Health Organization (WHO) of several cases of pneumonia with unfamiliar etiology. The outbreak which started from the Hunan seafood market in Wuhan City of China rapidly infected more than fifty (50) persons. Animals sold at the Hunan Seafood market includes bats, frogs, snakes, birds, marmots and rabbits (Wang et al., 2020). They also stated that on the 12th of January, 2020, the National Health Commission of China released more details about the epidemic and suggested viral pneumonia. From the sequence-based analysis of isolates from the infected individuals, the virus was identified as the novel coronavirus. The genetic sequence was also provided for the diagnosis of the viral infection. Initially it was suggested that the individuals infected with the Wuhan coronavirus induced pneumonia may have visited the seafood market or used infected animals as source of food.

However, further investigations confirmed human to human transmission of the virus, which has also been reported in more than one hundred and eighty (180) countries across the world. The

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human to human transfer of the virus occurs due to close contact with an infected person, who releases or spreads the virus through coughing, sneezing or as respiratory droplets or aerosols. Aerosols can penetrate the human body (lungs) via inhalation through the nose or mouth (Phan et al., 2020; Riou & Althaus, 2020; Parry, 2020; Li et al., 2020). The study of the genomic similarity between the novel coronavirus and SARS-like bat viruses showed that bats could be the key reservoirs (Lu et al., 2020; Chan et al., 2020). Further analysis of the homologous recombination also showed that the receptor binding spike glycoprotein of the novel coronavirus is developed from a SARS-COV (COVZXC21or COVZC45) and a yet unknown Beta-Cov (Chan et al., 2020).

Table 1: Adapted from Shereen et al. (2020)

Comparative analysis of the biological features of SARS-COV and SARS-COV-2

FEATURES	**SARS-CoV**	**SARS-CoV-2**
Emergence date	November 2002	December 2019
Area of emergence	Guangdong, China	Wuhan, China
Date fully controlled	July 2003	Not controlled yet
Key hosts	Bat, Palm civets and Raccondogs	Bat
Number of countries infected	26	188
Entry receptor in humans	ACE2 receptor	ACE2 receptor
Signs and symptoms	Fever, malaise, myalgia, headache, diarrhea, shivering, cough and shortness of breath	Cough, fever and shortness of breath
Disease caused	SARS, ARDS	SARS, COVID-19
Total infected patients	8098	19,541,216
Total recovered patients	7322	12,544,479
Total deaths	776(9.6% mortality rate)	724,050(3.7% mortality rate)

Key features and mechanism of entry of the Human coronaviruses

Coronaviruses contain specific genes in the ORF1downstream regions that encode proteins for viral replication, nucleocapsid and spikes formation (Van Boheemen, 2012). The glycoprotein spikes on the outer surface are used for attachment and entry into the host cells. The receptor binding domain (RBD) is loosely connected to the virus. The entry mechanism of coronavirus depends on cellular proteases which include human airway trypsin-like protease (HAT), cathepsins and transmembrane protease serine 2 (TMPRSS2) that split the spike protein and enhance further penetration changes (Glowacka et al., 2011; Bertram et al., 2011). SARS –COV and MERS-COV recognize exopeptidases (Wang et al., 2013). MERS-coronavirus makes use of dipeptidyl peptidase 4 (DPP4), while HCoV-NL63 and SARS- coronavirus employs angiotensin –converting enzyme 2 (ACE2) as receptor (Wang et al., 2013; Raj et al., 2013).

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SARS-COV-2 possesses the typical coronavirus structure with spike protein and also expresses other polyproteins, nucleoproteins and membrane proteins such as RNA polymerase, 3-chymotrypsin-like protease, papain-like protease, helicase, glycoprotein and accessory proteins (Wu et al., 2020; Zhou et al, 2020). The spike protein of SARS-COV-2 contains a 3-D structure in the RBD region to maintain the Vander Waals forces (Xu et al., 2020). The 394 glutamine residues in the RBD region of SARS –COV-2 is recognized by the critical lysine 31 residue on the human ACE 2 receptor (Wan, et. al., 2020). Therefore, Shereen et al. (2020) concluded that the homologous recombination event at the S protein of RBD region enhanced the transmission of the Virus.

MODES OF TRANSMISSION

According to World Health Organization (WHO, 2020), the SARS-COV-2 can be transmitted through the following means:

1. Contact
2. Droplet
3. Airborne
4. Fomite
5. Faecal-oral route
6. Blood borne
7. Mother-to-child
8. Animal-to-human

CORONAVIRUS DISEASE (COVID-19) SYMPTOMS

COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without special treatment or hospitalization (WHO, 2020).

Most common symptoms:

- Fever
- Dry cough
- Tiredness

Less Common Symptoms:

- Aches and pains
- Sore throat
- Diarrhea
- Conjunctivitis
- Headache
- Loss of taste or smell
- Rashes on the skin or discoloration of fingers or toes

Serious symptoms:

- Difficulty in breathing or shortness of breath
- Chest pain or pressure
- Loss of speech or movement

It should be noted that it takes an average of 5 – 6 days for an infected person to manifest the symptoms. However, it may take up to 14 days in some cases (WHO, 2020).

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PREVENTION OF CORONAVIRUS DISEASE (COVID-19)

According to WHO (2020), to prevent the spread of COVID-19, the following measures should be strictly observed:

- Clean your hands often, use soap and water, or an alcohol-based hand-rub
- Maintain a safe distance from anyone who is coughing or sneezing
- Wear a mask when physical distancing is not possible.
- Don't touch your eyes, nose or mouth
- Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- Stay home if you feel unwell.
- If you have fever, cough and difficulty in breathing seek medical attention.

Authorities worldwide have responded by implementing travel restrictions, lockdowns, workplace hazard controls and facility closures to check the spread of the disease. Also there has been increase in establishment of testing capacities and contact tracing of infected individuals.

POSSIBLE TREATMENT METHODS

There are no specific vaccines or medicines for COVID -19. Treatments are under investigation, and will be tested through clinical trials (WHO, 2020). However, it has been reported that Remdesivir, Lopinavir, Ritonavir and Oseltamivir significantly blocked the COVID-19 infection in infected patients (Shereen et al., 2020). Injection of isolated blood plasma from clinically recovered patients of COVID-19 into infected patients also gave positive results with rapid recovery (Derebail and Falk, 2020). The combination of Hydroxychloroquine, Zinc and Zithromax has been shown to be effective against the virus. At present, some drugs are undergoing test trials with infected patients and animal models in order to ascertain their efficacy. Some vaccines are also being tested on healthy person, infected patients and animal models so as to determine their potency against the SARS-COV-2. America, United Kingdom and Russia are conducting test trials of their vaccines with the hope of getting positive results. Such vaccines must be able to induce immune response against the virus without having any side effects.

Mechanisms of Action of Potential/Possible Treatment Drugs

Drugs that will eventually be effective against the COVID-19 must be formulated to target specific areas in the SARS-COV-2. Some of these include:

1. Drugs that will target the spike glycoprotein /ACE 2 and a specific transmembrane serine protease 2 (TMPRSS 2) for the spike protein priming.
2. Drugs that will mimic or make ACE 2 non-receptive.
3. Drugs that will block/inhibit replication of the SARS-COV-2 in the cells of the host.
4. Drugs that will destroy the viral nucleocapid protein and RNA.

Suggestions

1. Potential drugs for the treatment of COVID-19 must be formulated to target specific areas in

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the SARS-COV-2 in order to be effective against the virus.

2. There is important need to improve on the testing capacity of SARS-COV-2 in order to generate accurate result quickly.
3. There is need to develop drugs and vaccines that will effectively treat the coronavirus 2019 disease.
4. The government authorities should also enforce certain guidelines to check the transmission and spread of the disease.
5. There should be surveillance system that will help to trace and monitor infected persons, other epidemic – prone diseases and areas.
6. There should be provision of adequate personal protective equipment and other materials required by health care workers
7. There is need to also train the health care workers in order to build their capacity to handle emergency health cases.
8. There is need to have enough ventilators in the intensive care units/ hospitals.

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Demographic and Institutional Factors Affecting Health Records Management Practice by Health Information Management Personnel in Selected Hospitals in Rivers State, Nigeria

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Abstract

This study investigated the influence of demographic and institutional factors on health records management practice among health information management personnel in selected hospitals in Rivers State, Nigeria. The descriptive survey design of correlational type was used for the study. The population of the study was made up of 95 health information management (HIM) 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 institution factors that affect health records management practice include access control, privacy, security and confidentiality policy, procedure and guidelines. Finally, the factors responsible for poor health records management practice include poor documentation and misfiling, mishandling of patient medical records by the users, insufficient professionally trained HIM personnel, insufficient filing space and unconducive office space. It is imperative that hospital management should address those predisposing institutional factors that affect records management practice, as well as train the existing ones to efficiently collect, preserve and promptly provide access to medical information to meet the needs of authorized users and other stakeholders in the health industry.

Keywords: Demographic factors, institutional factors, and health information management practice

INTRODUCTION

The Medical Records Department is a large and ubiquitous organ in the hospital; it is the veins and arteries that supply essential nutrients for the functioning of the various organs (departments) of the hospital system. Patient medical records constitute the swivel around which successful attainment of patient quality health care goals revolve (Abioye & Ifejirika, 2018). Patient medical records constitute corporate memory of the hospital's asset which requires proper and efficient management for easy retrieval for smooth attainment of patient's diagnosis and continuation of treatment, referral, effective planning, monitoring, evaluation and decision making by the attending physicians and other paramedical staff in the hospital (Ifejirika & Adias, 2020). The degree to which patient medical records are proficient in accomplishing the medical information needs of the attending physicians, paramedical personnel, government and its agencies and other partners in health industry is, however, anchored on the efficient health records management practice in the hospital. Indeed, medical records management practices have evolved from the ancient world to modern times. The introduction of Electronic Health Records (EHR) in the middle of the twentieth century

affected the practice of medical records management in underpinning effective patient data collection, information retrieval system, dissemination and information sharing among the contributing health care team as the hospital administrators are beguiled by the impressive characteristics of digital technology, particularly in the creation, storage and retrieval of information along with apparently reliable security features. It is essential for hospitals to have reliable and efficient record management systems for their sustainability, particularly for censorship, patient confidentiality, intelligence, security and intellectual property purposes (Cox, 2001). Popoola and Oluwole (2007) assert that the primary goal of records management programme is to monitor records throughout their life cycle. Efficient records and information management provides reliable information that may be inevitably needed for effective functioning of organizations. A well-organized medical record management enables quick retrieval of medical information which facilitates transparency, accountability and reliability for patient treatment.

The broad attainment of hospital's mission and vision is reliant on successful implementation of medical records management programme in the hospital. According to Popoola (2000), without proper records management initiatives, organizations in general and hospital in particular are likely to face problems of high paper proliferation in their offices and experience retrieval difficulties.The role of health information management personnel in medical records management practice is therefore imperative in delivery quality health care to the patients. Despite the enormous benefits of medical records management practice in quality health care delivery, hospitals are bemoaned with enormous factors constraining smooth records management practice. Ajewole (2001) asserts that the problem of records management practice is not with records and information *parse* but with those having interface and interactions with these two vital resources in the hospital. Medical record management is a fundamental activity that are invaluable in thehospital administration, which reduces chaotic records keeping associated with difficulties in accessing and retrieving the physical and intellectual contents of patient medical records in their custody, resulting from misfiling, poor classification system, poor documentation and registration, poor storage and preservation which leads to repetition of medical treatment and creation of temporary folders in the medical records department. According to Popoola (2006), information and records management practice is the bedrock of hospital activity. It is important to note that, if there is no efficient medical records management practice in the hospital, the hospital will be deviled and crippled in their routine planning for continuation of treatment and decision making processes.

Every hospital was established with the objective to render quality health care services to the patient in their custody. This objective can be achieved by utilizing the resources like the “four Ms” men, machines, materials and money. All these resources are important but out of these, the manpower is the most important. It plays vicarious role in performing tasks for accomplishing the goals of the hospital. Health information management (HIM) personnel are engaged in the hospital mainly on tasks like data collection, classifications/filling, storage, coding and indexing, hospital statistical analysis, preservation, retrieval, maintenance of records scheduled, records appraisal, disposing and archiving. All these activities are inter-related to achieve the cardinal targets. Medical records management practice could be influenced by some factors inherent in the job, which include demographic and institutional factors. The characteristics of HIM personnel like age, educational qualification, and years of work experience and job status jointly known as demographic factors are capable of affecting the effective records management practices in the hospital (Palakurthi & Parks, 2010).

The afore-mentioned demographic factors could influence the productivity of HIM personnel. For instance, age could be an impediment on the productivity of aged personnel. He may be desirous of acquiring new skills (on the use of information communication technology (ICT) on information and records handling, storage and dissemination) in this digital age but age might constitute a barrier (Skirbekk, 2003; Goebel & Zwick, 2009). However, young HIM personnel are most likely to learn and acquire such knowledge and skills with ease due to their youthful ingenuity and strength when compared with older ones. Furthermore, the influence of education on the medical records management practice cannot be over emphasized, as it's characterized by one's ability, skills and knowledge of information literacy to effectively practice with ease due to the high appreciation of educational qualification. The HIM personnel, who have acquired the needed education, knowledge and skills, would have the needed capacity to manage medical records effectively.

Job experience increases individual's productivity on the job. Information retrieval skills (experience) are crucial for retrieving patient medical records for continuation of care and decision making. Therefore, experience may be necessary to carefully and selectively retrieve the exact patient medical records stored in file shelves, code and index patient diagnosis efficiently. Moreover, experience in information retrieval may reduce the time wasted in searching for patient information. HIM personnel may require a combination of skills which include informational retrieval skill, operational retrieval and strategic retrieval skills to make the process of retrieving patient medical records a simple task.

Furthermore, institutional factors such as availability and implementation of health record management policy, and staff training can go a long way to enhance proper records management practices by HIM personnel in the hospital. Good records management policy is essential to the administration of any public office. The objective of the policy should be the creation and management of authentic, reliable, complete and usable records which are capable of supporting hospital functions and activities as long as they are required. The HIM personnel in conjunction with the hospital administrators should formulate and communicate its records management policy, set out the hospital's intentions on records management and identify a senior staff member(s) with lead responsibilities for records management practice. A medical records management policy should be underpinned by procedures and guidelines for compliance by staff. According to Akussah (2002), patient medical records need to be stored under controlled environmental conditions, factors such as temperature, relative humidity, light, intensity and illumination, and other forms of atmospheric pollution, need to be kept at acceptable levels in medical records library. High levels and fluctuations should be curbed if not eliminated completely. The efficient management of patient medical records is predicated on a sound policy and functional structure. The structure is therefore built within the responsibilities being carried out which tend to be split into specialists' functional areas and organised around tasks performed. The success or otherwise the collegiality of the hospital is embedded in the duties of the HIM personnel

Kanzi (2010) pointed out that for sound records management practices to take place, heads of institutions should designate or appoint HIM at senior management level to who they can delegate the responsibility of ensuring that sound records management practices are implemented and maintained. He further added that records managers should develop and implement records management policies and procedures which are endorsed by the heads of the hospital institutions which should be continuously monitored and be reviewed on an annual basis to serve as a guide to employees discharging their duties. Effective information and records management are very vital for quality existence of man, education system, good performance and national development.

Another institutional factor that could determine medical records management practice is training and development of HIM personnel as often used to close the gap between current performances and expected future performance. According to Swart et al. (2005) training is a means of dealing with skill deficits and performance gaps as a way of improving employee's performance. Education and training is a necessary adjunct to modern records management practice. Records management personnel must have the requisite knowledge and skills to collect and maintain records at every stage in their life cycle (Wamukoya, 2000; Mnjama, 1996; Ngulube, 2001). Hospital institution should establish an ongoing training programme for its staff to be abreast with adequate knowledge and skills on records management concepts, principles and practices. Katuu (2009) in his studyemphasised the need for developing countries to prioritise the education and training of records and information management professionals to tackle the challenges of records management practice in this electronic age. He further lamented the flops of hospital management to hire quacksto manage patient medical records. The resultant effect is poor records management practice associated with difficulties in accessing the physical and intellectual content of patient medical records in the hospital. At this point, the relevance of effective health records management practiceby health information management personnel is not in doubt. However, in realizing this, the influence of demographic and institutional factors needed to be put into cognizance.It is on this premise that the study aimed at unraveling the influence of demographic and institutional factors on medical records management practice by health information management personnel in selected hospitals in Rivers State.

The medical records department is a large and ubiquitous organ in the hospital, which are no doubt the veins and arteries that supplies essential nutrients for the functioning of the various organs (departments) of the hospital system. Patient medical records establish the pivot around which the successful accomplishments of patient quality health care goals revolve. Medical records management practiceis the bedrock of hospital activity, as poor records management is bound to result in information gaps and loss of patient documentary heritage in the hospital. The degree to which patient's medical records are cheerfully retrieved to meet the information needs of the attending physicians and other legitimate stakeholders and partners is, however, reliant on its records management practices which are closely linked with the demographic and institutional factors affecting health information management personnel. Preliminary assessment revealed a disordered state of patient medical records in the medical records library in selected hospitals, with resultant difficulty in having timely access to and retrieval of patient medical records for routine planning for continuation of treatment, referral, research, monitoring and informed decision making. These challenges could be traced to demographic and institutional factors. Literature has revealed that age, level of education and job experience of staff in charge of records could affect effectiveness in records management. In addition, the lack of policy and training as part of institutional factors, might also lead to lack of coordination in managing records. It is against this backdrop that the study sought to investigate the demographic and institutional factors affecting medical records management practice by health information management personnel in selected hospitals in Rivers State, Nigeria.

Objectives of the study

The main objective of this study is to investigate the demographic and institutional factors affecting records management practices by the health information management personnel in selected hospitals in Rivers State, Nigeria. The specific objectives are to:

i) find out the institutional factors affecting medical records management practice by

health information management personnel in selected hospitals in Rivers State

ii) Problems hindering effective management of medical records in selected hospitals in Rivers State.

Research Questions

1. What are the institutional factors affecting medical records management practice by health information management personnel in selected hospitals in Rivers State?

2. What are the problems hindering effective management of medical records in selected hospitals in Rivers State.

METHODOLOGY

The study adopted descriptive survey design for the study. The population of the study comprised 73 health information management personnel (HIMP) in University of Port-Harcourt Teaching Hospital (UPTH) and 35 HIMP in Rivers State University Teaching Hospital 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. Questionnaire was the instrument used for data collection. The instrument was considered appropriate because of the large number of the respondents involved. The questionnaire has 3 sections A-C. Section A dealt with the demographic information of the respondents while sections B-C were based on a 4 point rating scale, ranging from Strongly Agree (SA) to Strongly Disagree (SD). The expected mean response per item was 2.50. Data collected were analyzed using descriptive statistics, which include: percentage frequency table and percentage distribution mean.

RESULTS

Table 1: Institutional factors affecting medical records management practice by health information management personnel

STATEMENT	SA	A	D	SD	Total	$\bar{x}$	Ranking
There is a guidelines and procedure for medical records creation, storage and maintenance in the hospital	39 (41.0%)	31 (32.6%)	16 (18.8%)	9 (9.4%)	**95 (100%)**	3.05	2nd
Patient medical records are created and maintained in line with the policy governing records management practice	29 (30.5%)	26 (27.4%)	25 (26.3%)	15 (15.8%)	**95 (100%)**	2.72	7th
There is medical records access control, privacy, security and confidentiality policy in our hospital	35 (36.8%)	40 (42.1%)	12 (12.6%)	8 (8.2%)	95 **(100%)**	3.07	1st
There is general records filling system and retrieval procedure in the hospital	38 (40.0%)	32 (33.7%)	15 (15.8%)	10 (10.5%)	**95 (100%)**	3.03	3rd
There is medical records retention and disposal policy in our hospital	14 (14.7%)	16 (16.8%)	35 (36.8%)	30 (31.6%)	**95 (100%)**	2.14	9th
I have attended a formal records management training/workshop sponsored by my hospital	14 (14.7%)	26 (27.4%)	22 (23.2%)	33 (34.7%)	**95 (100%)**	2.22	8th
There is always an in-house training for both new and old HIM personnel in the department	35 (36.8%)	20 (21.1%)	28 (29.5%)	12 (12.6%)	**95 (100%)**	2.82	4th
The training covers both electronic health records and paper based records management practice	33 (34.7%)	27 (28.4%)	20 (21.1%)	15 (15.8%)	**95 (100%)**	2.82	5th
The training/workshop is for only head of department	30 (31.6%	26 (27.4%)	24 (25.3%)	15 (15.8%)	**95 (100%)**	2.75	6th
Weighted Mean = 2.73 **Criterion Mean = 2.50**							

Table 1 reveals that the institutional factors affecting health records management practice in selected hospitals in Rivers State were medical records access control, privacy, security and confidentiality policy in our hospital (N=95; $\bar{x}$ = 3.07), Guidelines and procedure for medical records creation, storage and maintenance in the hospital (N=72; $\bar{x}$ = 3.05), general records filling system and retrieval procedure (N=95; $\bar{x}$ = 3.03), training that covers both electronic health records and paper based records management practice (N=95, $\bar{x}$ = 2.82), in-house training for both new and old HIM personnel (N=95, $\bar{x}$ = 2.82) Patient medical records are created and maintained in line with the policy governing records management practice (N=95, $\bar{x}$ = 2.72), while the least response is that there is medical records retention and disposal policy in selected hospitals (N=95, $\bar{x}$ = 2.14). However, the extents to which these institutional factors affect the management of patient health records in selected hospitals were 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 2.73

Table 2: Problems hindering effective management of patient medical records

Problems/Challenges	SA	A	D	SD	Total	$\bar{x}$	Ranking
Poor documentation and misfiling of patient medical records.	40 (47.4%)	35 (36.8%)	12 (12.6%)	8 (8.4%)	**95 (100%)**	3.33	1st
Insufficient professionally trained HIM personnel in HIM department	42 (44.2%)	40 (42.1 %)	8 (7.4%)	5 (5.3%)	**95 (100%)**	3.25	3rd
Insufficient filing space and unconducive office space	40 (42.1%)	41 (43.2%)	9 (9.5%)	5 (5.3%)	**95 (100%)**	3.24	4th
Inadequate resources for the implementation of Electronic health records practice	35 (36.8%)	25 (26.3%)	24 (25.3%)	11 (11.6%)	**95 (100%)**	2.88	7th
Mishandling of patient medical records by the users in the hospital	46 (48.4%)	34 (35.8%)	9 (9.5%)	6 (6.3%)	**95 (100%)**	3.26	2nd
Lack of awareness of records preservation techniques	37 (38.9%)	40 (42.1)	12 (12.6%)	6 (6.3%)	**95 (100%)**	2.13	8th
Employment of quacks (unlicensed) personnel in HIM department	42 (44.2%)	30 (31.6%)	15 (15.9%)	8 (8.4%)	**95 (100%)**	3.11	5th
Lack of training of HIM personnel on modern records management practice	36 (37.9%)	34 (35.8%)	16 (16.8%)	9 (9.5%)	**95 (100%)**	3.02	.6th
Weighted Mean = 3.02							
Criterion Mean =2.50							

Table 2 revealed that majority of the respondents agreed that the greatest problem hindering effective management of patient medical records were poor documentation and misfiling of patient medical records (N=95; $\bar{x}$ = 3.33), followed by Mishandling of patient medical records by the users in the hospital(N=95; $\bar{x}$ = 3.26), Insufficient professionally trained HIM personnel in HIM department (N=95; $\bar{x}$ = 3.25), Insufficient filing space and unconducive office space (N=95; ,$\bar{x}$ =3.24), Employment of quacks (unlicensed) personnel in HIM department (N=95; $\bar{x}$ = 3.11), Lack of training of HIM personnel on modern records management practice (N=95; $\bar{x}$ = 3.02), Inadequate resources for the implementation of Electronic health records practice (N=95; $\bar{x}$ = 2.88) and finally, lack of awareness of records preservation techniques (N=95; $\bar{x}$ = 2,13).

DISCUSSION

The finding revealed that the main institutional factors affecting health records management practice in selected hospitals in Rivers State were medical records access control, privacy, security and confidentiality policy in our hospital, Guidelines and procedure for medical records creation, storage and maintenance in the hospital, general records filling system and retrieval procedure, training that covers both electronic health records and paper based records management practice, in-house training for both new and old HIM personnel, Patient medical records are created and maintained in line with the policy governing records management practice. However, the extent to which these institutional factors affect the management of patient health records 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 2.73. The finding is in conformity with the submission of Kanzi (2010) that posited that training of health records management personnel is not common, as it is the bedrock in achieving a modern records management practice. Moreover, other studies for example one by Swart et al. (2005) elaborate on training as a means of dealing with skill deficits and performance gaps as a way of improving records management personnel's performance.

The finding further revealed that the problems hindering the effective management of patient medical records were poor documentation and misfiling of patient medical records, mishandling of patient medical records by the users in the hospital, insufficient professionally trained HIM personnel, insufficient filing space and unconducive office space, employment of quacks (unlicensed) personnel in HIM department ,lack of training of HIM personnel on modern records management practice, inadequate resources for the implementation of Electronic Health Records practice and finally, lack of awareness of records preservation techniques. 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 organisation provides the needed tools and the right atmosphere to perform expected tasks.

CONCLUSION

There is a seeming dearth of literature on the demographic and institutional factors affecting health records management in hospitals in Nigeria. This study seems to have bridged the gap to an extent and showed the enormous factors hindering health records management practice in selected hospitals in Rivers State, which include; poor documentation and misfiling of patient medical records, mishandling of patient medical records by the users in the hospital, insufficient professionally trained HIM personnel in HIM department, insufficient filing space and unconducive office space, employment of quacks (unlicensed) personnel in HIM department, lack of training of HIM personnel on modern records management practice, inadequate resources for the implementation of Electronic health records practice and finally, lack of awareness of records preservation techniques.The study further established poor documentation and misfiling of patient medical records, mishandling of patient medical records by the users in the hospital, insufficient professionally trained HIM personnel, insufficient filing space and unconducive office space, employment of quacks (unlicensed) personnel in HIM department , lack of training of HIM personnel on modern records management practice, inadequate resources for the implementation of Electronic Health Records practice and finally, lack of awareness of records preservation techniques as major challenges hindering effective health records management in selected hospitals in Rivers State. The styles of leadership of the hospital administrators are therefore, one of the influencing factors that stimulate personnel inherent potentials, knowledge and skills to trigger efficient health records management in the hospital. The failure of hospital administrators to adopt appropriate leadership styles that are goal-oriented, and removing those bottlenecks that has been a major setback to the 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 with the performance and productivity of health information management

personnel in the hospital.

2. The finding revealed the institutional factors affecting health records management practice in selected hospitals. 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 the Medical Records Department.
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, enhancing the efficient patient's medical records management practice in the hospitals.

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Knowledge of Primary Health Care Workers towards Medical Waste Management in Model Health Care Facilities in Rivers South East Senatorial District

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Abstract

This study focused on the knowledge of primary health care workers towards medical waste management (MWM) in model health facilities in Rivers South-East Senatorial District. Two objectives, two research questions, and three hypotheses were formulated to guide the study. Descriptive survey design was adopted for the study with the sample size of 600 through multi-stage sampling procedure. The instrument for eliciting data was titled Knowledge, Attitude and Practice of Medical Waste Management (KAPMUM) with the reliability coefficient of 0.70 which was obtained using Cronbach Alpha. Data collected were analysed using SPSS version 23.0. The results showed that 501(89.5%) of the respondents had good knowledge **of MWM** while 59(10.5%) had poor knowledge. The result also showed that there was a significant difference between gender and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District (X^2-value= 34.356; df =1; p<0.05). Level of education was significant (X^2-value= 326.247; df =3; p<0.05). Work experience showed significant (X^2-value= 84.069; df =3; p<0.05) with medical waste management. It was concluded that there is need to maintain knowledge of healthcare workers towards medical waste management in model health facilities. Based on the findings, it was recommended that education and training are the best methods to manage the adverse health effects that are common in medical waste management.

Keywords: knowledge, demographic characteristics, medical waste management, primary health care workers.

INTRODUCTION

The level of knowledge of medical waste management among primary health care workers in Nigeria is quite low compared to developed countries based on the advancement of new technology (Abah & Ohimain, 2011). Many health care workers in Nigeria may not have adequate knowledge on the segregation of waste in the health care facilities this situation exposes them to hazardous waste infections around the hospital premises. This mismanagement of medical waste causes risk to the people and the environment. According to the Health Professions Council of South Africa (2008), good numbers of health care workers do not have good knowledge of the types of waste generated in the hospitals and their effect on the individual. Most primary health care workers do not have a requisite knowledge on the methods of disposal of medical waste that is consequential to their health. This is why their practices towards waste management seem to be poor in the developing countries. My personal observation reveals that most health personnel do not even segregate generated waste at the point of generation, has been regulated in the hospital waste management

policy by the World Health Organization (WHO, 2011). Studies by Azuike et al. (2015) who stated that 126 (38.1%) of workers in the hospital have the knowledge of health care waste management among the health care workers was high but the practice of waste management was not optimal. Also, this study is in line with studies by Mahmoudi et al. (2016) shows a relatively high level of knowledge of sharp waste management among nurses with no deficiency of practice of the respondents. In the same vein, the finding of this study is agreed with that of Sengodan et al (2017) which revealed an insignificant influence with gender of health personnel and knowledge of hospital waste management ($p<0.05$, $df = 1$, $X^2 = 10.124$) but not surprisingly that females as w ell as males have taken knowledge of the recent development in the area of information and communication technology and the mass media to boost their knowledge in various aspect of life which related to health. It is in line with studies by Suganya (2016), who reported that 23(77%) of respondents had adequate knowledge with 23% moderate knowledge of hospital waste management by health care workers.

One of the socio-demographic variables that could determine the level of knowledge regarding medical waste management practices is age. Age is associated with the activity level of an individual. The age of an individual sometimes determine the knowledge of that person as he might acquire more knowledge on daily basis pertaining life and other activities. The age of health personnel could sometimes determine his knowledge of hospital waste management, as he may have seen the effect of poor waste management over years of practice. According to Maina et al. (2016), age does not influence the knowledge of hospital waste management. Age does not even have a significant influence on the practices associated with hospital waste management. He further asserts that older health personnel practice better waste management compared to younger ones (Makhum, 2016).

According to Chima et al. (2011), the number of years in service, gender and age do not even have a significant influence on knowledge and practice of hospital waste management, as some old staff feel tired all the time, while young ones are always in a haste to meeting up with appointments, whereas the males do not care much about waste because the female staff are always there to manage waste. Mohammed et al. (2017) further buttressed that on the factor that determine better knowledge score among workers is gender. Maina et al. (2016) have it that, socio-demographic variables do not have significant influence on the knowledge and practice of medical waste issues. But however avert that females are more conversant with waste management than their male counterparts, which was revealed in their study. This might be true because females do more of domestic work at home than men, as a result may be similar in the hospital as well. There has been presence of preventive diseases spread due to poor handling of medical waste such as pathological waste, sharp waste etc. to health care workers ranging from medical institutions to other sectors. Over the decades, since the inception of medical institutions and implementation of primary health care services, there was conflicting issues on the management of waste that was originated.

Maina et al. (2016) assessed level of knowledge in medical waste management in selected hospitals in Kenya using a descriptive cross sectional survey design. The result showed that doctors were the most knowledgeable among other professionals. Teshiwal et al. (2019) conducted a study on knowledge, attitude, and practice of waste handlers about medical waste management in Debre Markos town healthcare facilities, Northwest Ethiopia. There was lack of personal protective devices and waste management equipment supply. Regarding knowledge, attitude, and practices, 25 (45.5%), 43 (78.2%), and 44 (80%) of the study participants had adequate knowledge, favorable attitude, and adequate practice scores, respectively. In recent times, government has raised policies, provided sophisticated equipment for disposition of waste in the model health facilities, waste

management is yet to be successful.

Research Questions

The following research questions were formulated to guide the study.

1. What is the knowledge of primary health care workers towards medical waste management in Rivers South East Senatorial District?
2. What is the knowledge of PHC workers based on gender, level of education and experience towards medical waste management in model health facilities in Rivers South East Senatorial District?

Hypotheses

The following null hypotheses were tested at 0.5 level of significance

1. There is no significant difference between gender and knowledge of medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.
2. There is no significant difference between level of education and knowledge of medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.
3. There is no significant difference between work experience and knowledge of medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.

METHODOLOGY

Descriptive survey design was adopted for the study as the research design. The population of this study was 38416 primary health care workers in Rivers State (source: Primary Health Care Management Board, 2019). The sample size of this study is 600 (maximum sample size). The sample size for the study was estimated using Taro Yamane method for a finite population. A multi-stage sampling procedure was adopted for the study. The instrument for eliciting information for this study was structured questionnaire titled Knowledge, Attitude and Practice Questionnaire on Medical waste management (KAPQMWM). Collected data were coded and analyzed using statistical package for social science (SPSS, version 21.0).

RESULTS

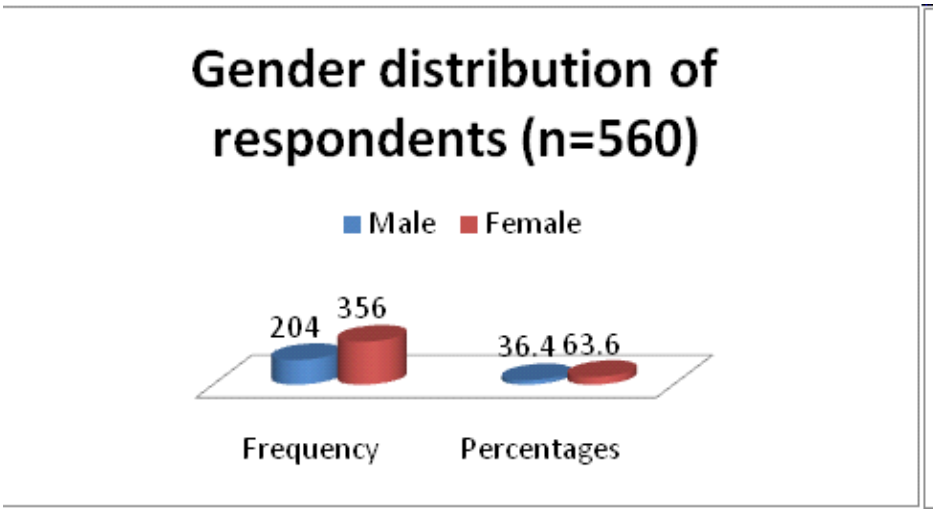


Figure 1 shows the sex distribution of respondents. The results showed that 204(36.4%) were males while 356(63.6%) were females.

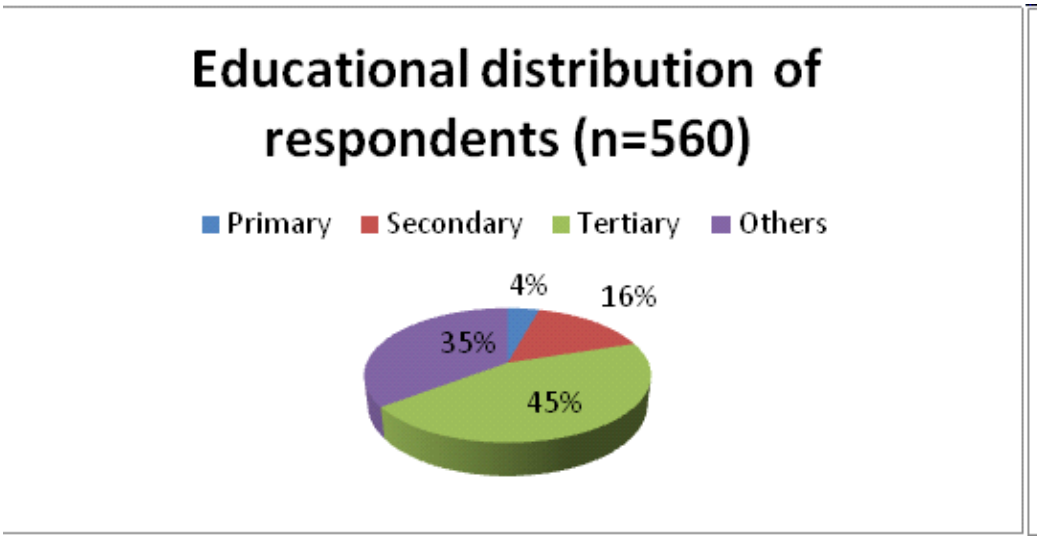


Figure 2 shows the educational distribution of respondents. The results showed that 24(4%) of the respondents had primary education, 88(16%) had secondary education, 250(45%) had tertiary education while 198(35%) had other education.

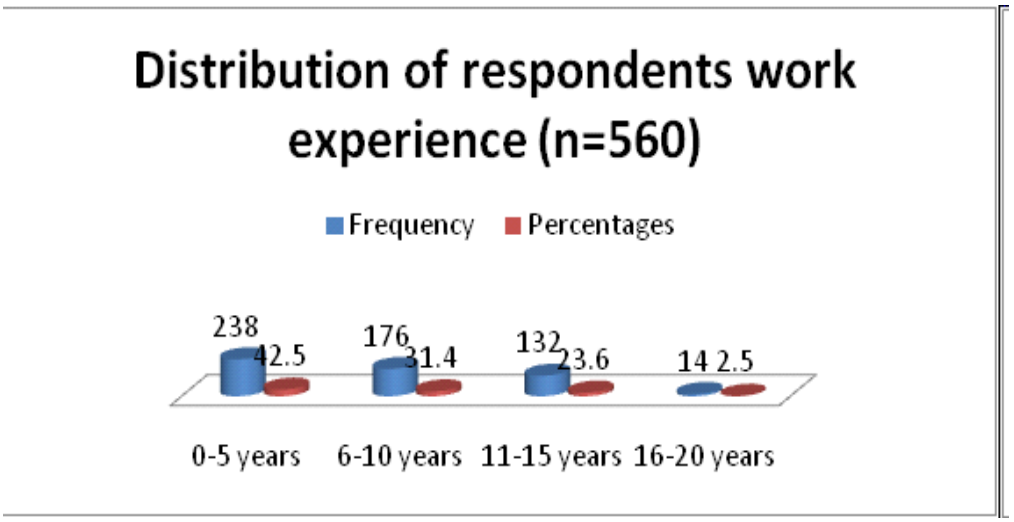


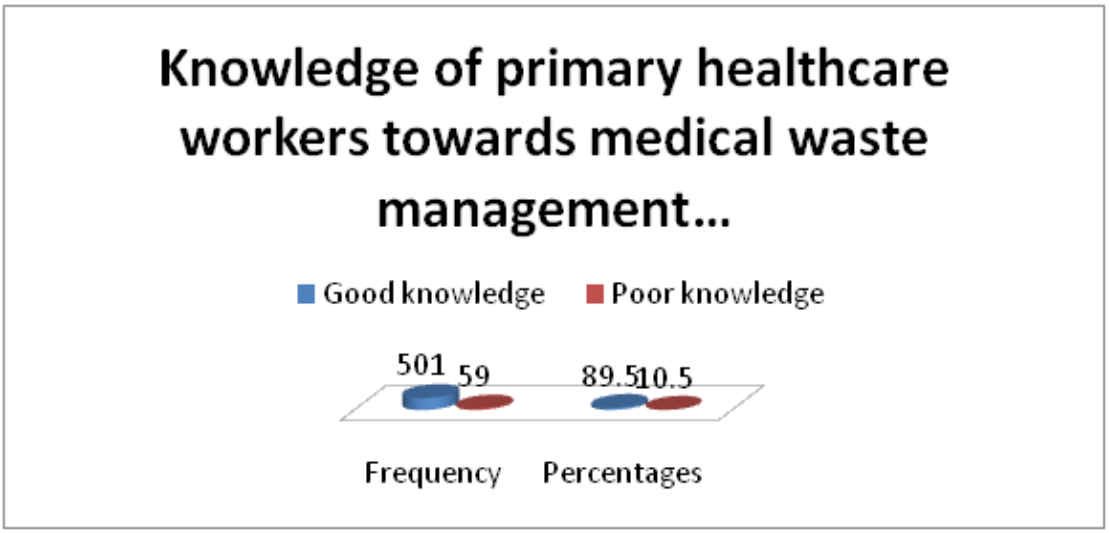
Figure 3 shows the distribution of work experiences of respondents. The results showed that 238(42.5%) of the respondents 0-5 years' experience, 176(31.4%) years, 132(23.6) years and 14(2.5) had 16-20 years' work experience.

Research question 1: What is the level of knowledge of PHC workers towards medical waste management in model health facilities in Rivers south east senatorial district?

Table 3: Knowledge of PHC workers towards medical waste management (n=560)

Variables	Frequency (F)	Percentage (%)
Do you know that medical waste management can prevent cross contamination		
Yes	560	100.0
No	-	-
Do you know that medical wastes are waste generated during medical proceedings		
Yes	559	99.8
No	1	0.2
Do you know that medical waste can be managed properly		
Yes	560	100.0
No	-	-
Do you that closed trash can is needed in all the units		
Yes	558	99.6
No	2	0.4
Do you know that medical waste can be packed separately		
Yes	560	100.0
No	-	
Are you aware that sharp objects can be disposed in closed container		
Yes	559	99.8
No	-	0.2
Are you aware liquid or fluid waste can be disposed in nylon or polyethene		
Yes	502	89.6
No	58	10.4
Are you aware that waste bins are made for different types of medical waste		
Yes		
No	560	100.0
	-	-
Are you aware that waste bins are made for different type of national waste		
Yes		
No	560	100.0
Are you aware that packaging machine waste in wrong bin is risking	-	-
Yes		
No	560	100.0
Do you know that improper disposal of national waste may lead to disease transmission	-	-
Yes	559	99.8
No	1	0.2
Do you know tha t colour code for packaging medical waste		
Yes	560	100.0
No	-	-

Table 1 shows the level of knowledge of PHC workers towards medical waste management in model health facilities in Rivers south east senatorial district. The result revealed that 560(100%) of the respondents indicated that they know that medical waste management can prevent cross contamination. 559(99.8) know that medical wastes are waste generated during medical proceedings. 560(100%) know that medical waste can be managed properly. 560(100%) indicated that closed trash can is needed in all the units. 558(99.6%) agreed that medical waste can be packed separately. 560(100%) agreed that sharp objects can be disposed in closed container. 502(89.6) agreed that they are aware liquid or fluid waste can be disposed in nylon or polyethene. 560(100%) indicated that waste bins are made for different types of medical waste. 560(100%) agreed that waste bins are made for different type of national waste. 560(100%) indicated that packaging machine waste in wrong bin is risking. 559(99.8) agreed that improper disposal of national waste may lead to disease transmission while 560(100%) indicated that colour code for packaging medical waste.



Overall level of knowledge of PHC workers towards medical waste management

Figure 4 shows the overall level of knowledge of PHC workers towards medical waste management of respondents. The results showed that 501(89.5%) of the respondents had good knowledge of medical waste management while 59(10.5%) had poor knowledge.

Research question 2: What is the level of knowledge of PHC workers based on gender, education and work experience towards medical waste management in model health facilities in Rivers South East Senatorial District?

Table 2: Cross-tabulation of level of knowledge of PHC workers based on gender towards medical waste management in model health facilities in Rivers South East Senatorial District (n=560).

		Knowledge	
Variable		Good knowledge	Poor knowledge
Gender	Male	203(40.5%)	1(1.7%)
	Female	298(59.5%)	58(98.3%)

Table 2 shows the level of knowledge of PHC workers based on gender towards medical waste management in model health facilities in Rivers south east senatorial district. The result showed that female 298(59.5%) had good knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District while males 203(40.5%) had good knowledge towards medical waste management.

Table 3: Cross-tabulation of level of knowledge of PHC workers based on their educational status towards medical waste management in model health facilities in Rivers south east senatorial district (n=560).

		Knowledge	
Variable		Good knowledge	Poor knowledge
Educational Level	Primary	23(4.6%)	1(1.7%)
	Secondary	31(6.2%)	57(96.6%)
	Tertiary	250(49.9%)	0(0%)
	Others	197(39.3%)	1(1.7%)

Table 3 shows the level of knowledge of PHC workers based on their educational status towards medical waste management in model health facilities in Rivers south east senatorial district. The result showed that those with tertiary educational level 250(49.9%) had the highest level of knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District followed by those with other educational level 197(39.3%), secondary 31(6.2%) and primary 23(4.6%).

Table 4: Cross-tabulation of level of knowledge of PHC workers based on their work experience towards medical waste management in model health facilities in Rivers south east senatorial district (n=560).

		Knowledge	
Variable		Good knowledge	Poor knowledge
Work Experience	0-5 years	180(35.9%)	58(98.3%)
	6-10 years	175(34.9%)	1(1.7%)
	11-15 years	132(26.3%)	0(0.0%)
	16-20 years	14(2.8%)	0(0.0%)

Table 4 shows the level of knowledge of PHC workers based on their work towards medical waste management in model health facilities in Rivers south east senatorial district. The result showed that those with 0-5 years' experience 180(49.9%) had the highest level of knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District with 58(98.3%) having poor knowledge followed by those with 6-10 years 175(34.9%), 11-15 years 132(26.3%) and 16-20 years 14(2.8%).

HYPOTHESES

Hypothesis 1: There is no significant difference between gender and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.

Table 5: Chi-square test showing significant difference between gender and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District.

Gender	Knowledge Good F(%)	Poor F(%)	Total	Df	X^2-value	p-value	Decision
Male	203(40.5)	1(1.7)	204(36.4)	1	34.356	.000	Rejected
Female	298(59.5)	58(98.3)	356(63.6)				
Total	501 (100)	59(100)	560(100)				

*Significant. $p<0.05$.

Table 5 shows the chi-square test of significant difference between gender and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District. The result showed that there is a significant difference between gender and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District (X^2-value= 34.356; df =1; $p<0.05$). Thus, the null hypothesis which states that there is no significant difference between gender and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District was rejected and accepted by the alternate hypothesis.

Hypothesis 2: There is no significant difference between educational level and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.

Table 5: Chi-square test showing significant difference between level of education and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.

Education	Knowledge Good F(%)	Poor F(%)	Total	Df	X^2-value	p-value	Decision
Primary	23(4.6)	1(17)	24(4.3)	3	326.247	.000	Rejected
Secondary	31(6.2)	57(96.6)	88(15.7)				
Tertiary	250(49.9)	0(0)	250(44.6)				
Others	197(39.3)	1 (1.7)	198(35.4)				
Total	501 (100)	59(100)	560(100)				

*Significant. p<0.05.

Table 5 shows the chi-square test of significant difference between level of education and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District. The result showed that there is a significant difference between level of education and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District (X^2-value= 326.247; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between level of education and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District was rejected and accepted by the alternate hypothesis.

Hypothesis 3: There is no significant difference between work experience and knowledge of Medical waste management among PHC workers in model health facilities in Rivers South East Senatorial District.

Table 6: Chi-square test showing significant difference between work experience and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District.

Work experience	Knowledge Good F(%)	Poor F(%)	Total	Df	X^2-value	p-value	Decision
0-5 years	180(35.9)	58(98.3)	238(42.5)	3	84.069	.000	Rejected
6-10 years	175(34.9)	1(1.7)	176(31.4)				
11-15 years	132(26.3)	0(0)	132(23.6)				
16-20 years	14(2.8)	0(0)	14(2.5)				
Total	501 (100)	59(100)	560(100)				

*Significant. p<0.05.

Table 4.14 shows the chi-square test of significant difference between work experience and

knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District. The result showed that there is a significant difference between work experience and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District (X^2-value= 84.069; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between work experience and knowledge of PHC workers towards medical waste management in model health facilities in Rivers South East Senatorial District was rejected and accepted by the alternate hypothesis.

DISCUSSION OF FINDINGS

Level of knowledge of PHC workers towards medical waste management

The finding of the study revealed that 560(100%) of the respondents indicated that they know that medical waste management can prevent cross contamination. 559(99.8) knows that medical wastes are waste generated during medical proceedings. 560(100%) knows that medical waste can be managed properly. 560(100%) indicated that closed trash can is needed in all the units. 558(99.6%) agreed that medical waste can be packed separately. 560(100%) agreed that sharp objects can be disposed in closed container. 502(89.6) agreed that they are aware liquid or fluid waste can be disposed in nylon or polyethene. 560(100%) indicated that waste bins are made for different types of medical waste. 560(100%) agreed that waste bins are made for different type of national waste. 560(100%) indicated that packaging machine waste in wrong bin is risking. 559(99.8) agreed that improper disposal of national waste may lead to disease transmission while 560(100%) indicated that colour code for packaging medical waste. The overall results showed that 501(89.5%) of the respondents had good knowledge of medical waste management while 59(10.5%) had poor knowledge. This shows that respondents had good knowledge of medical waste management. The finding of the study corroborates with that of Maina et al (2016) whose study reported that participants had good knowledge of medical waste management. The finding of the study also confirms the studies of Azuike et al (2015), Onoh et al (2019) and Wafula et al (2019) as there studies reported good knowledge of medical waste management among participants. The study of Teshiwal et al (2019) is also in line with the finding of the present study as it discovered that participants had knowledge of medical waste management. The similarities between the present and previous studies might be attributed to the fact that healthcare professionals handling medical waste must have been trained on how to effectively handle medical waste. However, the study of Gupta et al. (2016) disagrees with the finding of the present study as it discovered that participants had poor knowledge of medical waste management. This may be attributed to poor training on medical waste handling and poor adherence to medical guidelines.

Level of knowledge of PHC workers based on gender, educational status and work experience towards medical waste management

The finding of the study showed that female 298(59.5%) had good knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District while males 203(40.5%) had good knowledge towards medical waste management. This indicates that knowledge of medical waste management can be based on gender. The finding of the study corroborates with that of Kumar et al (2013) whose study found a relationship between gender and medical waste management. The finding of Ghareeb and Mohamed (2014) also agrees with the finding of the present study as responses showed that knowledge of medical waste management is based on gender. The finding of Mohammed et al (2017) also discovered that gender contributes to the knowledge of medical waste management. The finding of Musal et al. (2020) found out that women have knowledge of medical waste management compared to the men. The similarities

noted in the previous and present study might be attributed to the fact gender roles plays a significant impact in human daily activities. However, it may not be true for all studies that women have knowledge of medical waste management than the men or via visa but education, training and proper supervision including work experience may also play important roles.

The finding of the study showed that those with tertiary educational level 250(49.9%) had the highest level of knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District followed by those with other educational level 197(39.3%), secondary 31(6.2%) and primary 23(4.6%). This indicates that educational level plays an important role in the knowledge and management of medical waste. The finding of the study corroborates with that of Maina et al (2016) and Doylo-Alemayehu and Baraki (2018) whose studies reported that knowledge of medical waste management is based on educational level. The finding of the study also confirms that of Onoh et al (2019) whose study found a correlation between education and knowledge of medical waste management. The finding of Mohammed et al (2019) found out that education contributes to the knowledge of medical waste management among healthcare providers. The finding of Wafula et al (2019) also agrees with the finding of the present study as it discovered that those with higher education among healthcare providers tend to have better knowledge about medical waste management. Most noted are the Doctors and the nurses. This means that education exposes healthcare providers to be appropriately thought and trained on how to manage medical waste to avoid nosocomial infections.

The finding of the study showed that those with 0-5 years' experience 180(49.9%) had the highest level of knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District with 58(98.3%) having poor knowledge followed by those with 6-10 years 175(34.9%), 11-15 years 132(26.3%) and 16-20 years 14(2.8%). This shows that work experiences can actually contribute to knowledge of medical waste management among healthcare providers. The finding of the study corroborates with that of Maina et al. (2016) and Sourya and Romy (2016) whose study found that work experience is significantly related to knowledge of medical waste management among healthcare providers. The finding of the study also agrees with that of Mohammed et al (2019) and Kwikiriza et al. (2019) whose study reported that work experience contribute to knowledge of medical waste management. The finding of Sobhy et al. (2019) confirms the finding of the present study as it reported a relationship between work experience and knowledge of medical waste management among healthcare providers. This might be due to the fact that working experience contributes to a better understanding of a particular job position over a period of time. However, the finding of Shivalli and Sowmyashree (2015) differs from the finding of the present study as it discovered that work experience is not significantly associated with knowledge of medical waste management. This may be through because some providers can be on a job position for a long time and without any form of proper training and retraining to find out the modern way of handling medical waste may still not the required knowledge of medical waste management.

CONCLUSION

Based on the findings of the study, it was concluded that there is need to maintain knowledge of healthcare workers towards medical waste management in model health facilities. Socio-demographic characteristics such as gender, educational level, and years of working experience influence knowledge towards medical waste management in model health facilities in Rivers South East Senatorial District, Rivers State.

RECOMMENDATIONS

In view of the findings of this study, the following recommendations were made:

1. The government and healthcare institutions should embark on health education and awareness campaign on how to properly manage medical waste among healthcare providers. This will improve the proper storage, segregation, transportation and collection of waste for final disposal by waste disposal agencies.

2. Education and training are the best methods for the managing the adverse health effects that are common in medical waste management. Training should be given by the Government, management and relevant stakeholders in areas such as hazards, segregation, storage and risks in medical waste to healthcare workers effectively and continuously manage medical waste properly

3. Healthcare staff managing medical waste should ensure they adhere to guidelines regulating medical waste practices

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