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PREVALENCE OF IMPROPER WASTE DISPOSAL PRACTICE AND AWARENESS OF HEALTH CONSEQUENCES AMONG RESIDENTS OF YENAGOA COMMUNITIES

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ABSTRACT

Background: Rapid urbanization in Yenagoa community, poses a significant environmental and community health challenge due to increased solid waste generation, necessitating proper waste disposal practices.This study aims to assess the prevalence of improper solid waste disposal methods and the awareness of health consequences among residents of Yenagoa community in Bayelsa State.

Method: A cross-sectional survey was conducted among 495 randomly selected households in Yenagoa community. Data were collected through a structured questionnaire and analyzed using descriptive and inferential statistics.

Result: The study found that majority (177, 36%)) were 30-39 years, with the "mean age" of 35 ('SD' = 10.4). Majority (276, 55.8%) were females. Majority (326, 66%) are at university level, Majority (129, 26%) are civil servants. Majority of the Participants (90%) are aware of solid waste disposal and their awareness level is high ($\bar{x} = 3.4$). Only 64% (316) of the residents are aware of the health consequences and their awareness level is fair ($\bar{x} = 2.6$). However, the prevalence of practice of improper solid waste disposal is high (94%) with 400 (81%) dumping their solid waste in open places. Major barriers to proper waste disposal included no strictly enforce laws and regulations against open dumping (250, 50%), flood prone area (100, 20%), inadequate waste collection services (60, 12%), overcrowded community (50, 10%), and Waste picking for livelihood (35, 7%). There was a statistically significant relationship between level of awareness of solid waste disposal methods, awareness of health consequences of improper solid waste disposal methods and practice of solid waste disposal method (p-value=.000).

Conclusion: Residents of Yenagoa community' awareness of health consequences of improper waste disposal methods is fair, but there's a significant gap between knowledge and practice. Enhancing public education and improving waste disposal infrastructure is recommended.

Keywords: Solid waste management, awareness, waste disposal practices, Yenagoa, community, improper, environmental health.

INTRODUCTION

Rapid urbanization and population growth in developing countries, particularly in the Yenagoa community in Nigeria, have led to increased solid waste generation, posing environmental degradation, flooding, and public health risks, including waterborne diseases[1]. Globally solid waste generation is projected to rise by 73% by 2050 to 244 million tons of waste annually impacting rural development, social, political, and economic transformation, and posing environmental challenges beyond ecological perspectives [2,3,4]. Human activities, driven by our survival struggle, have consistently overwhelmed the environment. Dump sites, often located on urban outskirts, can harbor contaminants and disease transmitters, potentially breeding diseases like cholera, malaria, fever, and typhoid, affecting human health [5].

Solid waste refers to garbage, refuse, sludge, and other discarded materials from industrial, commercial, mining, agricultural, and community activities, resulting from nearly every activity [6]. It includes a wide range of items such as household garbage, industrial waste, construction debris, discarded furniture, food scraps, and packaging materials. Solid waste can be categorized into several types based on its source and composition, such as **municipal solid waste**, which are wastes generated from households, offices, and public spaces (e.g., food waste, paper, plastics). **Industrial waste**: Waste produced by manufacturing processes (e.g., scrap metal, chemicals). **Hazardous waste**: Solid waste that risks human health or the environment (e.g., batteries, medical waste). **Agricultural waste**: Waste from farming activities (e.g., crop residues, manure). **Construction and demolition waste**: Debris from building and infrastructure projects (e.g., concrete, bricks) [6]. Proper management of solid waste is essential to prevent pollution, conserve natural resources, and protect public health.

Improper solid waste disposal is a pervasive issue in many urban areas, particularly in developing countries like Nigeria. Understanding proper disposal methods is essential for improving public health and environmental sustainability. Effective solid waste disposal methods relevant to the community context include Land filling which involves burying waste in designated areas, where it is layered with soil to minimize environmental impact. Modern landfills are designed to prevent contamination of soil and groundwater, making them a common method for disposing of non-recyclable waste[7][8]. Incineration**:** This method involves burning waste at high temperatures, significantly reducing its volume and generating energy in the process. While incineration can effectively manage waste, it requires advanced technology to control emissions and prevent air pollution[8,9]. **Composting**: Composting is an environmentally friendly method that transforms organic waste (like food scraps and yard waste) into nutrient-rich soil through natural decomposition processes. This method not only reduces the amount of waste sent to landfills but also enriches the soil, promoting sustainable agriculture[8]. **Recycling**: Recycling involves collecting and processing materials such as paper, glass, and plastics to create new products. This reduces the demand for raw materials and minimizes landfill use. Communities can enhance recycling efforts by providing accessible collection points and educating residents on recyclable materials[9]. **Biogas Generation**: Biodegradable waste can be processed in anaerobic digesters to

produce biogas, which can be used as renewable energy. This method effectively manages organic waste while generating energy and reducing methane emissions from landfills[9]. **Community Engagement and Education:** Effective solid waste management also relies on community participation and awareness programs. Educating residents about proper disposal practices and the benefits of recycling and composting can lead to more responsible waste management behaviors[7][8]. Implementing these proper solid waste disposal methods can significantly improve environmental conditions and public health in developing countries should focus on enhancing infrastructure, providing educational resources, and encouraging community involvement to foster sustainable waste management practices.

Research highlights that improper disposal methods are alarmingly common in most communities in developing countries where a significant portion of the population disposes of their waste improperly, with 6.3% burning it, 5.0% throwing it into rivers or on roads, and 2.1% keeping it in backyards[10]. The prevalence of such practices can lead to severe consequences, including pollution, disease transmission, and degradation of living conditions. The lack of organized waste collection services exacerbates this issue, leading to the accumulation of waste in public spaces and increasing health risks for the community[11]. A review indicated that almost half of the world's population still lives in rural areas and an adequate Solid Waste Management is crucial in reducing environmental and health threats [12].

The health implications of improper solid waste disposal are severe. Residents living near dumpsites are particularly vulnerable to various health issues, including gastrointestinal diseases and vector-borne diseases such as malaria[13]. Studies have reported that 39.31% of respondents living close to dumpsites experienced malaria symptoms, highlighting a direct correlation between poor waste management and public health risks[13]. Additionally, the presence of hazardous materials in improperly disposed waste can contaminate water sources and air quality, further endangering community health[14]. In addition to attracting rodents and other animals, improper management of solid waste, which includes waste from both human and animal activity, releases chemicals into landfills and greenhouse gases, which pollute the environment and cause respiratory illnesses and plastic waste [13].

Awareness level of proper waste disposal methods and health consequences has been implicated for the prevalence of improper solid waste disposal in communities. A study indicated that people from rural communities often lack the proper awareness and tools to manage solid waste appropriately and turn to dangerous practices such as open burning or waste dumping [12]. Another study indicated that while approximately 95.4% of residents are aware of proper waste management practices, many still resort to improper disposal methods such as open burning and dumping waste in unauthorized location Education is one of the essential tools to create awareness among people, particularly in developing countries [13][17]. Low environmental knowledge among residents of a community can lead to a shift in attitudes towards sustainability, while those with more education are more concerned about the environment and actively participate in political decisions to protect it. However, a study conducted in Ghana indicated that while most individuals are aware of solid waste management strategies, they often lack the knowledge and commitment to implement them effectively [14][16]. However, another study indicated that despite the high level of awareness

regarding waste management practices among residents, there remains a significant gap in understanding the health consequences associated with improper disposal methods. Many residents do not recognize the potential risks posed by hazardous materials found in solid waste or the long-term effects on their health and environment[15][13]. This lack of awareness indicates a critical need for targeted educational campaigns to inform residents about the importance of proper waste management and its impact on public health.

Methods

Study Area

Yenagoa community also doubles as the capital city of Bayelsa State, Nigeria. Bayelsa state lies central and southernmost on the Nigerian Map. Yenagoa is located on latitude 4º 49N and 5º 23'N and longitude 6º 10'E and 6º 33'E with a projected population estimate of over 524,400 as at 2022. Since attaining the status of a state capital in 1996 its urbanization and population density have since accelerated appreciably. Yenagoa is a flood plain that forms part of the wetland in the Niger Delta, it is characterized by shallow aquifer and several networks of creek lets linked to a parent creek called Epie Creek. Consequently, the major river which connects all Municipal runoffs is the Epie Creek, which basically empties into the Nun River, which lies central and flanked to the west and East by Rivers Focardos (Delta State) and Orashi (Rivers State) respectively [18].

In Yenagoa community in Bayelsa State exemplifies the challenges associated with municipal solid waste management (MSWM). The study seek to investigate the prevalence of improper solid waste disposal method and the awareness of its implication among residents of Yenagoa community [13]. The successful management of solid waste depends largely on the awareness and participation of the public. Understanding the knowledge and practices of residents regarding waste disposal is crucial for developing effective waste management strategies. This study seeks to investigate the prevalence of improper solid waste disposal methods, the level of awareness of its health consequences among residents of Yenagoa and identify the barriers to proper waste disposal.

Study design

This cross-sectional study was conducted in Yenagoa, Bayelsa State. Data were collected from April to June 2025. The study targeted residents of Yenagoa, with a focus on household heads.

Study population

The study population are all those who resides in Yenagoa community. The population is estimated to b**e** 524,400 people as of 2022 projection [24].

Sample size calculation

A sample size of 500 respondents was obtained using the Taro Yamane sample size estimation formula from the projected population of 524,400 [25]. A total of 500 participants was obtained using the Taro Yemane formula as follows:.

n = N / (1 + N (e) 2
n = signifies the sample size
N= signifies the population under study
e = signifies the margin error = 0.10
n = 524,400 / (1 + 524, 400 (0.10) 2
n = 524,400 (1 + 524,400 (0.2)
n = 524,400 (1 + 104,880)
n = 524,400/ 104,881
n = 499.9
= 500

Inclusion criteria

The inclusion criteria were adults aged 18 years and above who had lived in Yenagoa

community for at least one year and gave their verbal consents to participate in the study.

Exclusion criteria

The exclusion criteria are all under the age of 18 in the Yenagoa communities, Those who have lived less than one year in the communities, those who do not live in Yenagoa communities and those who do not consent to participate in the study.

Sampling Technique

A simple random sampling technique without replacement was adopted to select the five hundred (500) respondents that constituted the sample for the study.

Study instrument

Data were collected through structured questionnaire on prevalence of improper solid waste disposal methods and its health consequences conducted by trained research assistants. The structured questionnaire was designed to gather information on: **Demographics**: Age, gender, education, and occupation. **Awareness of solid waste disposal methods/management**: Knowledge of how to manage and dispose solid waste disposal. **Awareness of health consequences of improper solid waste disposal method**: Knowledge of health consequences of improper solid waste disposal. **Practices of waste disposal methods**: Methods commonly used by households to dispose of waste. **Challenges in waste disposal**: Perceived barriers to proper waste management, such as lack of infrastructure or information.

The test-retest method was done to test reliability and The Pearson Product Moment Correlation Coefficient r was used to compare the outcomes of both experiments. For the instrument to be used, a coefficient of 0.76 was obtained and considered sufficient. Face and content validation was also done by experts in the field to ensure that the questionnaire measures what should it should measure (validity). A pilot study was also conducted and all identified shortcomings were rectified.

Data analysis

Five Hundred questionnaires (500) were distributed manually to participants who met the inclusion criteria and gave their verbal consents. However, only 495 (99%) were correctly filled and returned. The data obtained were subjected to statistical analysis such as item mean analysis with a criterion means set at 2.5 to analyse the level of awareness of solid waste disposal methods/management and awareness of health consequences. The Decision rule states that any item means or grand mean equal to or greater than the criterion mean indicates good level of awareness and any item mean or grand mean less than the criterion mean indicates poor level of awareness. Descriptive statistics of frequency and percentages were used to analyse the demographic variables and the practice of solid waste disposal. Inferential statistics of multi-linear regression was used to analyse the relationship between the level of awareness of proper solid waste disposal, level of awareness of health consequences of improper solid waste disposal methods, and the practice of solid waste disposal with a statistical significance set at $p<0.05$ using SPSS version 25. Results are presented in tables, frequency, percentages and mean.

Ethical consideration

Participants were fully informed about the study's purpose, procedures, potential risks, and their right to withdraw without any repercussions. Confidentiality was strictly maintained to protect participants' personal information, especially when

discussing behaviors or health-related issues. Additionally, the study was conducted with cultural sensitivity, ensuring that questions are respectful and non-judgmental. The results will be used to benefit the community, such as through public health interventions or education, rather than for any exploitative purposes.

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Demographic Characteristics

Table 1. below indicated that 118(24%) are between 18-29years, 177 (36%) are between 30-39 years, 140 (28%) are between 40-49years, 50(10%) are between 50-59 years and 10(2%) are between 60years and above. The "mean age" of the respondents was 35 ('SD' = 10.4). that 219 (44.2%) are males and 276 (55.8%) are females. 1(0.2%) are at Primary level, 116 (23.4%) are at secondary level, 52 (11%) are at vocational training level, 326 (66%) are at university level. that 129 (26%) of the respondents are civil servants, 12 (2%) are oil and gas industry workers, 49 (10%) are Traders, 96 (19.4%) are self-employed, 60 (12%) are public servants, 39 (8%) are students and 25 (5%) are unemployed, and 85 (17%) are in other occupations.

Table 1: Demographic Characteristics

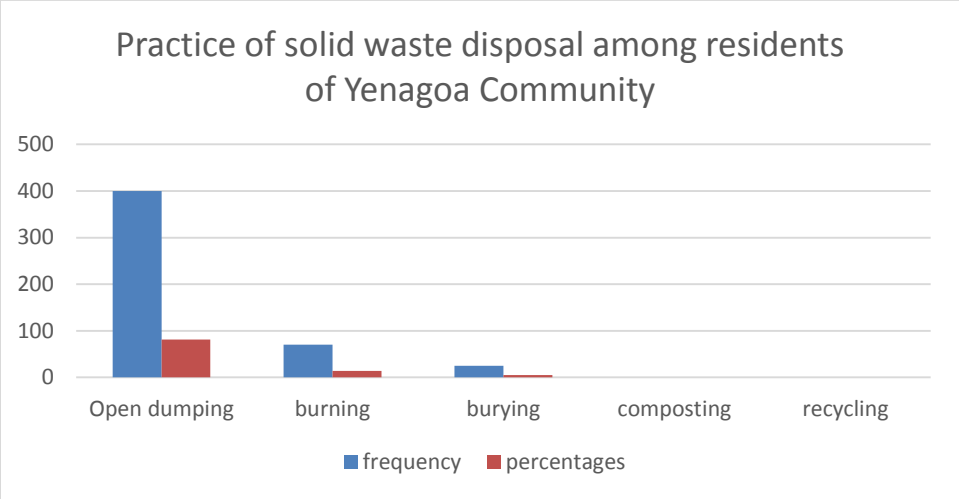
S/N	**VARIABLES**	**FREQUENCY**	**PERCENTAGES**
1	**SEX**		
	Male	219	44.2
	Female	276	55.8
	Total	495	100.0
2	**AGE**	**FREQUENCY**	**PERCENTAGES**
	18-29	118	23.8
	30-39	177	35.8
	40-49	140	28.3
	50-60	50	10.1
	61 and above	10	2.0
	Total	495	100.0
	Mean age	35('SD'= 10.4).	
3	**HIGHIEST EDUCATIONAL QUALIFICATION**	**FREQUENCY**	**PERCENTAGES**
	Primary	01	0.2
	Secondary	116	23.4
	Vocational Training	52	10.5
	University	326	65.9
	Total	495	100.0
4	**OCCUPATION**	**FREQUENCY**	**PERCENTAGES**
	Civil Servant	129	26.1
	Oil and gas industry worker	12	2.4
	Trader	49	9.9
	Self employed	96	19.4
	Public servant	60	12.1
	Ttudent	39	7.9
	Unemployed	25	5.0

	Other	85	17.2
	Total	495	100.0

PRACTICE OF SOLID WASTE DISPOSAL AMONG RESIDENTS OF YENAGOA COMMUNITY

Figure 1 below indicates that 400 (81%) participants dump their solid waste in an open place, 70 (14%) burn their solid waste, 25(5%) bury their solid waste, and none practice composting or recycling. Therefore, the prevalence of improper waste disposal is 94%.

Fig 1: Practice of solid waste disposal among residence of Yenagoa Community



Prevalence of improper waste disposal methods

Number of people involved in improper waste disposal at a point

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Total population sampled at that time

= 470/495= 0.94= 94%.

LEVEL OF AWARENESS OF PROPER SOLID WASTE DISPOSAL AMONG RESIDENTS OF YENAGOA METROPOLIS

Table 2 below indicates that majority 445(90%) of the residents are aware of solid waste disposal/management. The grand mean is ($\bar{x} = 3.4$). Using the criterion mean of 2.50, one may conclude that the residents of Yenagoa Metropolis have good awareness level on solid waste disposal/management because the Item mean and Grand mean of their awareness level is greater than the criterion mean (2.50).

Table 2: Level of Awarenesss of proper solid waste disposal among residents of Yenagoa Metropolis

S/N	Item	Strongly agree	Agree	Disagree	Neutral	TWS	Mean	Decision
1	Solid waste management involves a multi sectoral participation (Individual, community, private and Government sectors)	309 (1236)	169 (507)	14 (24)	3 (3)	1770	3.6	Good level of awareness
2	Solid waste management is the complete process of collection, transportation, treatment and disposal of solid waste.	273 (1092)	195 (585)	22 (44)	5 (5)	1726	3.5	Good level of awareness
3	Solid waste management starts from the point of generation	244 (976)	199 (597)	42 (84)	10 (10)	1667	3.4	Good level of awareness
4	Source segregation is the activity of separating your solid waste produced at home, office etc. according to the composition?	221 (884)	204 (612)	64 (128)	6 (6)	1630	3.3	Good level of awareness
5	Source segregation reduces the need for secondary segregation, and aids in promoting recycling	202 (808)	226 (678)	52 (104)	15 (15)	1605	3.2	Good level of awareness
6	Every household must have a waste bin with tight fitted cover to prevent insect infestation and emission of offensive Odor	337 (1348)	140 (420)	14 (28)	4 (4)	1800	3.6	Good level of awareness
7	Recycling is the process of converting waste materials into new materials and objects	337 (1348)	140 (420)	14 (28)	4 (4)	1800	3.6	Good level of awareness
8	Refuse, Reduce, Reuse	222	222	45	6	1650	3.3	Good level

	and Recycling are the essential principles in solid waste management	(888)	(666)	(90)	(6)			of awareness
9	Food remnants and other organic waste can be recycled	182 (728)	172 (516)	73 (146)	68 (68)	1458	2.9	Good level of awareness
10	Recyclable materials include glass, paper, cardboard, food waste, single use nylon bags, sachet water package, metal, plastic, tires, textiles, batteries, hair extensions, electronics.	237 (948)	220 (660)	22 (44)	16 (16)	1668	3.4	Good level of awareness
		2564/10 =256. 256/495 x100= =52%	1887/ 10=1 89. 189/4 95x1 00= 38%	362/1 0=36. 36/49 5x100 = 7%	137/1 0=14. 14/49 5x100 =3%	Grand mean =33.8/10 = 3.4		
		Good Knowledge = 445 (90%)		Poor Knowledge = 50(10%)		Grand mean =3.4		Good Knowledg e

Criterion Mean: 2.5

AWARENESS OF THE HEALTH CONSEQUENCES OF IMPROPER SOLID WASTE DISPOSAL AMONG RESIDENTS OF YENAGOA METROPOLIS

Table 3: below indicates that only 64% (316) of the residents are aware of the health consequences of improper solid waste disposal. The grand mean is ($\bar{x} = 2.6$). Using the criterion mean of 2.50, one may conclude that the residents of Yenagoa Metropolis have fair knowledge of the health consequences of improper solid waste disposal because the mean of six (6) out of 13 Item mean were less than the criterion mean and Grand mean of their knowledge level is slightly above the criterion mean (2.50).

Table 3: Level of awareness of health consequences of improper solid waste disposal among residents of Yenagoa metropolis

S/N	Item	Strongly agree	Agree	Disagree	Neutral	TWS	Mean	Decision
1	Burning waste releases harmful pollutants, including dioxins, furans, and particulate matter, which can cause respiratory diseases such as asthma, bronchitis, and chronic obstructive pulmonary disease (COPD).	50 (200)	65 (195)	80 (160)	300 (300)	855	1.7	Poor awareness level
2	Inhalation of toxic fumes from burning plastics and other hazardous materials can lead to acute and chronic respiratory conditions.	100 (400)	15 (45)	30 (60)	350 (350)	855	1.7	Poor awareness level
3	Improper waste disposal sites attract pests like rodents, flies, and mosquitoes, which can transmit diseases such as malaria, dengue fever, cholera, and leptospirosis.	450 (1800)	20 (60)	25 (50)	0 (0)	1910	3.9	Good awareness level
4	Contact with contaminated waste can lead to infections, including skin infections, gastrointestinal infections, and more serious diseases like hepatitis and dysentery.	370 (1480)	0 (0)	0 (0)	125 (125)	1605	3.2	Good awareness level
5	Hazardous chemicals	50	65	0	380	775	1.6	Poor

	from industrial waste, pesticides, and pharmaceuticals can contaminate water and soil, leading to poisoning and long-term health issues like cancer, reproductive disorders, and endocrine disruption.	(200)	(195)	(0)	(380)			awareness level
6	Sharp objects, broken glass, and other dangerous materials in open dumps can cause injuries such as cuts, puncture wounds, and infections.	400 (800)	95 (285)	0 (0)	0 (0)	1085	2.1	Poor awareness level
7	Spontaneous fires in open dumpsites can lead to burns and other fire-related injuries.	200 (800)	185 (555)	0 (0)	110 (110)	1465	2.9	Good awareness level
8	Liquid that drains from waste can contaminate groundwater and surface water sources with pathogens, chemicals, and heavy metals, leading to waterborne diseases and poisoning.	300 (1200)	180 (540)	0 (0)	15 (15)	1755	3.5	Good awareness level
9	Excess nutrients from organic waste can cause algal blooms in water bodies, leading to the production of toxins harmful to human health.	80 (320)	55 (165)	12 (24)	348 (348)	857	1.7	Poor awareness level
10	Crops grown in contaminated soil can absorb hazardous substances, which can then enter the food chain and pose health risks to consumers.	360 (1440)	43 (129)	30 (60)	62 (62)	1691	3.4	Good awareness level

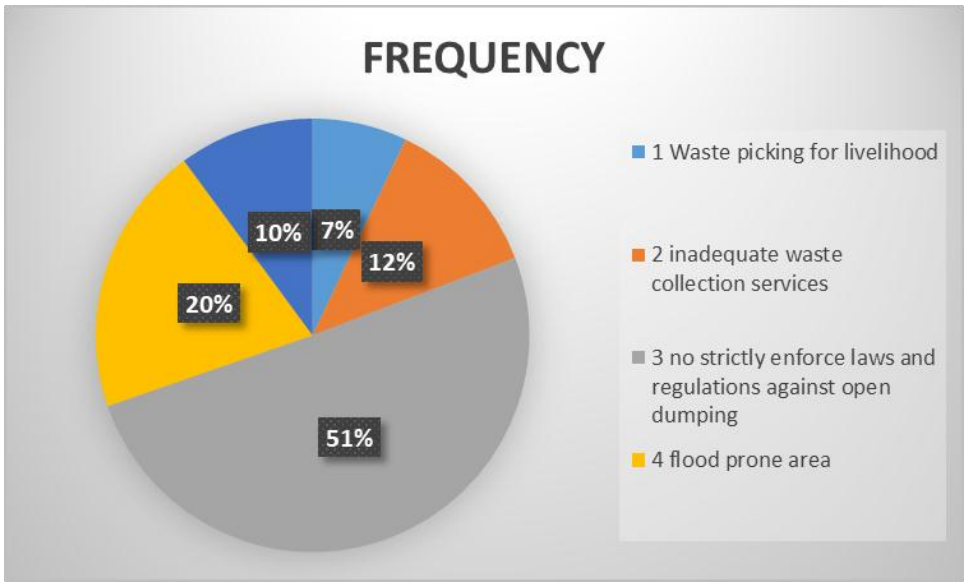
11	Chronic Conditions: Long-term exposure to air pollutants from waste burning can exacerbate chronic health conditions, reduce lung function, and increase the risk of cardiovascular diseases.	32 (128)	65 (195)	8 (16)	390 (390)	729	1.5	Poor awareness level
12	Living near improperly managed waste sites can lead to stress, anxiety, and a sense of helplessness due to concerns about health and safety	390 (1560)	100 (300)	5 (10)	0 (0)	1870	3.8	Good awareness level.
13	Communities near waste dumpsites may experience social stigma and reduced quality of life, contributing to mental health issues.	280 (1120)	150 (450)	10 (20)	55 (55)	1645	3.3	Good awareness level.
		3,062/13=236	1038/13=80	200/13= 15	2135/13=164			
		236/495x100= 48%	80/495x100=16%	15/495x100=3%	164/495x100= 33%		Grand Mean=34.3/13	
		Good Knowledge =316 (64%)		Poor Knowledge =179 (36%)			Grand Mean= 2.6	

BARRIERS TO PROPER SOLID WASTE DISPOSAL METHODS AMONG RESIDENTS OF YENAGOA COMMUNITY

Figure 2 below indicated that barriers to proper waste disposal included no strictly enforce laws and regulations against open dumping (250, 51%), flood prone area (100, 20%),

inadequate waste collection services (60, 12%), overcrowded community (50, 10%), and Waste picking for livelihood (35, 7%).

Fig 2: Barriers to proper waste disposal



Discussion

Numerous research revealed that understanding the household's demographics—which include sex, age, education level, and occupation is crucial [19].The findings of this study indicate that majority of the respondents are between the ages of 30-39 years and 55% were females. This confirms the findings of a similar study conducted in Ethiopian where respondents are between 31–45 years old and over 60% of them were women [19].

The study also revealed that the prevalence of improper solid waste disposal among the residents of Yenagoa Community is 94%. This is higher than the findings of a study conducted in Akure where 37.5% illegal dumping and open burning [20]. This means that illegal dumping of solid waste is a prevalent issue in Nigeria, affecting all states [15].

The findings of the study indicated that 90% of the residents of Yenagoa Community have good awareness level of solid waste disposal method. Unlike the findings of a study conducted in Dhaka indicated that the awareness solid waste disposal method of the community people were at a moderate level [21]. The study also revealed that 64% of the residents of Yenagoa Community are aware of the health consequences of improper wastes disposal method. This is contrary to the findings conducted in Ghana which indicated that in spite of the fact that the households reported diseases connected to environmental factors related to waste management, 87% of all the households surveyed did not believe that any member of their household had become ill due to an illness related to garbage [23].

The study revealed that while awareness of health consequences of improper solid waste disposal methods is relatively high among Yenagoa residents, this awareness does not translate into proper waste disposal practices. The predominant practice remains open dumping, which poses significant environmental and public

health risks. The gap between awareness and practice can be attributed to several factors, including no strictly enforce laws and regulations against open dumping, flood prone area, inadequate waste collection services, overcrowded community, and Waste picking for livelihood..

This study highlights the need for a multifaceted approach to improve solid waste management in Yenagoa. Public education campaigns should emphasize the importance of waste segregation and recycling, while local authorities should enforce laws and regulations against open dumping, invest in improving waste collection services and providing waste disposal facilities, such as bins and recycling centers.

Conclusion

This study has shown that there is a considerable gap between awareness and practice of solid waste disposal methods in Yenagoa. While residents are generally aware of the consequences of improper solid waste disposal methods, many continue to engage in improper practices due to no enforcement of laws and other barriers. Strengthening waste management systems, coupled with targeted public education, will be critical for addressing these issues.

Strength of the study

A strength of the cross-sectional study is its ability to provide a quick and cost-effective assessment of both the prevalence of improper waste disposal practices and the level of health awareness among a large population at one point in time. This can help identify high-risk behaviors and gaps in knowledge, providing essential data to guide immediate public health interventions. Additionally, it allows for the collection of data from diverse subgroups within the community, offering insights into the distribution of these practices and awareness across different demographic segments.

Limitations of the study

The study only provides a snapshot of the situation at a single point in time. As such, it cannot establish causal relationships between improper waste disposal practices and health outcomes or determine changes in behavior or awareness over time. Additionally, recall bias may affect the accuracy of self-reported data on waste disposal habits and health awareness, as participants may not accurately remember or may under report undesirable behaviors. Finally, the study may not account for seasonal variations in waste disposal practices or health risks.

Recommendations

1. **Public Health Campaigns**: Implement targeted campaigns to raise awareness about the environmental and health impacts of improper waste disposal.
2. **Waste Management Infrastructure**: Improve waste collection services and provide more waste bins and recycling centers.
3. **Government and Private Sector Collaboration**: Encourage partnerships to invest in sustainable waste management initiatives.

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Conflict of Interest

There is no conflict of interest

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ORGANISATIONAL CULTURE AND MARKET ORIENTATION AS PREDICTOR OF ACADEMIC ENTREPRENEURSHIP OF PRIVATE UNIVERSITIES TEACHING STAFF IN SOUTHWEST, NIGERIA.

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ABSTRACT

Background

Universities are faced with intense pressure to develop entrepreneurial activities to support the diversification of traditional income streams in order to achieve competitive edge within the present framework of increasing competition. Hence, this study is an investigation of Organizational culture and Market orientation as predictor of academic entrepreneurship of private universities teaching staff.

Method

The study adopted survey research design and the sample comprised one thousand, three hundred and nineteen (1,319) academic staff of private universities in Southwest selected through simple random sampling techniques. Organisational Culture Questionnaire (r=0.96), Market Orientation Scale (r= 0.92) and Academic Entrepreneurship Scale (r= 0.92) were the major instruments used for data collection in the study. Data were analysed using Multiple Regression Analysis.

Result

Results showed that Organisational culture and market orientation predicted academic entrepreneurship of teaching staff at private universities (R =.100; R2 =.010; Adj. R2 =.008; F (2, 1095) = 5.514; p.05). It also showed that there is significant relative contribution of Organisational culture (β=.038; t = 2.336; p =.020) and market orientation (β=.052; t = 2.47; p =.013) to academic entrepreneurship of teaching staff of private universities.

Discussion

The study concluded that there is significant combination and relative contribution of Organisational culture and market orientation to academic entrepreneurship of teaching staff of private universities. The study recommended that Private universities in the Southwest should work with industries, businesses, the government, and non-governmental organisations to develop fresh, relevant, and sustainable entrepreneur curricula.

Keywords: Academic Entrepreneurship, Organizational Culture, Market Orientation, Private universities.

Introduction

In order to boost economic competitiveness, numerous governments all over the world have implemented laws aimed at facilitating and encouraging commercial exploitation of university research. This implies that all organisations, both for-profit and non-profit, can benefit from entrepreneurship because, it is a key and wellspring of creativity involving both the development of new organisational structures and business models for existing businesses. Private universities spring out of entrepreneurial mindset either by individual, group of individuals or religious and the source of funding are mainly shouldered by the owners. It is imperative to state that academic entrepreneurship will be apt to solve the financial problems facing some of these private universities.

Entrepreneurship is essential for economic growth, eradication of poverty and jobs creation (Carl and Agboola, 2012). Continuous debate and contribution of entrepreneurship have led to breakthrough of its different forms. However, all forms of entrepreneurship from sole proprietorship, corporate ventures, necessity- and opportunity-driven ventures, social entrepreneurship, academic ventures, and so forth, are interconnected within a larger framework of the identical idea, showing a shared knowledge of entrepreneurship (Mwatsika et al., 2018).

Academic entrepreneurship is a money-making endeavour which can be characterised as a taking of risks, knowledge- and smaller businesses focused on technology that stabilises the academic institutions in which it operates. It has to do with turning academic research into a profit enterprise, thus the process by which academia markets its research developments as "products" and "sells" them at conferences in a manner akin to other commercial enterprises. Academic entrepreneurship has been related to commercialising academic activities, including teaching, research, and university-community-industry collaborations (Siegel & Wright, 2015; Adisa et al., 2023). Universities employ Academic entrepreneurship as a strategy to grow and have a beneficial effect on the economy and society (Mirani & Yusof, 2016). The endeavours include industry-university partnerships, start-ups by academics, faculty dual appointments in businesses and academic institutions, consulting, licensing, and patent applications.

Academic entrepreneurship can occur at the level of individuals or groups acting on their own or in concert with other university system members to launch new businesses, spur innovation or renewal inside or outside of the university through science and technology parks, university-owned businesses, or research centres. Academic entrepreneurs who start their own small firms aim to use their accumulated abilities, skills, and "insider" knowledge in addition to their purely scientific experience. Through their work, they are able to transfer knowledge, information, expertise, and skills from the academic world to business or from the outside world to the local market (Riazi, 2018).

The university benefits society through disseminating information by educating students who go on to work in a variety of fields, hold conferences, consulting and considering both public and private interests, publishing research findings. Intellectual property (IP) that professors patent and licence to industry a kind of knowledge transfer that is generally ignored yet has significant societal and economic ramifications to private enterprise (Styhre, 2012). Along with teaching, the research publications are also the important source of new knowledge

created within the universities. These publications should be the sources of ideas for new businesses in the society. With the introduction of the third mission of universities (Etzkowitz, 2003) that requires universities to commercialise the research and knowledge created, the universities are playing active role in commercialization activities, which also contributes to the Gross Domestic Product of a nation (Siegel &Wright, 2015). Academic entrepreneurship was traditionally justified on the grounds of commercialisation of academic research would be enhanced and provide an income stream for the institution. There have been questions expressed concerning the ability of academics in African universities, particularly those in Nigeria, to interact effectively and constructively with business, the community, and the government as well as to contribute pertinently to issues facing the real world. (Bogoro 2015; Sá 2014; Athreye et al.,2023). The pressure from policymakers who see the commercialization of research as a vital factor in boosting national competitiveness and shrinking university finances are the driving forces behind the academic entrepreneurial inclination (**Ambos** et al., 2008). Entrepreneurial behaviour among academic staff helps the institution to react to and flow with economic and environmental changes like; actions of competitors, preferences of the parents or guardians and technological advancements. Athreye (2023) assert that Nigeria has a culture of academic research, but the country's higher education sector lacks innovation and entrepreneurial skills at the individual and organizational levels, and commercialization rates are low). In order to thrive, obtain a competitive edge over rival institutions, and deliver superior performance, universities must adopt entrepreneurial behaviours and create a supportive organisational culture (Otache & Mahmood, 2015).

The creation of a new culture based on the driving forces behind the establishment of university with an entrepreneurial spirit is entrepreneurial values (Mkrtychyan, 2016). According to Aydin (2018), culture determines what is viable or unworkable, significant or unimportant, right or incorrect, and acceptable or unsuitable. Thus, the nature of organizational culture in universities could affect Academic entrepreneurship.

Organisational culture affects how people of the organisation set their own personal and professional goals, carry out their jobs, manage and administer their resources to achieve them (Huyghe and Knockaert, 2015). Organisational culture provides the fundamental ideals, convictions, and guiding principles underpinning for any organisational practices and procedures (Idiegbeyan-ose et al., 2018). The structure (organisational boundaries) must foster the administrative mechanism which concepts are assessed, picked, and put into practise (Hornsby et al., 2002).

According to Esther et al. (2018), a sort of organisational culture known as "market orientation" is one where all employees are committed to continually providing superior customer value or as a series of marketing initiatives that boost productivity. Market orientation forces a company to increase value for customers in order to create a long-lasting competitive advantage (Narver & Slater, 1990). Abidemi et al. (2018) claim that market-oriented institutions put their clients and stakeholders at the core of their operations by providing services that meet their needs and expectations in order to increase client satisfaction. Therefore, one of the key factors that promotes the growth of competitive advantage is the development of market orientation, creativity, and innovation. To compete in the global economy, entrepreneurial colleges must develop sustainable competitive advantages (Wasitowati,

2017). Market orientation has potentials to improve performance within the university system. It is also believed to give psychological and social benefits to the academia, staff/faculty members, and management in the form of greater pride and sense of belonging, as well as greater commitment to the university (Renwarin, 2017). By producing jobs, inventing or developing new products and services for an enhanced quality of life, and strengthening the economy, research-based entrepreneurial activities in Nigeria can benefit the country more. As they educate sizeable segments of the population and produce information, universities play a key role in modern civilizations. From the foregoing, the objective of the study was to use organisational culture and market orientation to predict academic entrepreneurship of private universities teaching staff in southwest Nigeria.

The Statement of the Hypotheses

1: There is no significant composite influence of organisational culture and market orientation on academic entrepreneurship of private universities' teaching staff in Southwest Nigeria.

2: There is no significant relative influence of organisational culture and market orientation on academic entrepreneurship of private universities teaching staff in Southwest Nigeria.

Methodology

Research Design

This study used a descriptive survey design**.** This method gives the opportunity to obtain data without manipulating any of the study's variables of interest. Thus, the researchers chose this method as it allows respondents to say exactly what they felt about variables understudy.

Study Setting

The study used private university owned by individuals out of entrepreneurial mindset. In Southwest of Nigeria, teaching staff is present in all private universities (NUC 2018).

Study Population

The population consisted of the four thousand, three hundred and seventy-seven (4,377) teaching staff in Southwest of Nigeria.

Sample Methodology

The sample comprised One thousand, three hundred and nineteen (1,319) academic staff members of private universities in Southwest. Simple random sampling techniques was used to select three states for this study (Lagos, Ogun, and Oyo States). Also, 50% of the private universities in each of the selected states were picked using proportionate stratified sampling techniques; Lagos (3), Ogun (6), and Oyo (3) while 60% of teaching staff was used as the sample size from the selected private universities in southwest. This equal to 417 for Lagos, 626 for Ogun and 267 for Oyo which make up the total of one thousand, three hundred and nineteen (1,319) private universities teaching staff.

Study Variables

. The dependent variable for the study is academic entrepreneurship consisting of (organisational creation, organisational innovation and organisational renewal) and the independent variables are organisational culture with all its various dimensions consisting of (management support, reward system and work discretion) and market orientation and its components (Competitor orientation, customer orientation, coordination across functional lines, intelligence gathering, intelligence sharing, and response)

Study Instrument

For the purpose of information gathering, primary data which is a closed ended formal questionnaire was used for the study. The questionnaire consisted of section A which deal with demographic data while section B comprises of three (3) sub sections which are: Organisational Culture Questionnaire, Market Orientation Scale and Academic Entrepreneurship Scale. Organisational culture Questionniare (OCQ), was adapted from Donald et al (2013). It comprises 35 items. It employed a Likert scale with four possible outcomes. (Strongly Disagree, Disagree, Agree and Strongly Agree). The scale's psychometric characteristics were assessed using three consecutive steps: exploratory analysis, confirmatory analysis, and reproducibility was reported. According to their findings, the completion average was 97%, while the overall response rate was 80%. With a worldwide, 0.70 for the Cronbach's alpha coefficient, and a Goodness of Fit (GoF) criterion of 0.79, the metrological results showed outstanding external model quality. The repeatability was assessed using a test-retest procedure which showed 0.962 using Pearson Product Moment Correlation. Market Orientation Scale (MOS) was developed by Narver and Slater (1990) and Kohli and Jaworski (1990). It is used to evaluate market orientation of teaching staff in the universities on a scale of twenty five. The questionnaire was adapted for the purpose of this study. The Market Orientation Scale employs a Likert scale with four possible responses (strongly disagree, disagree, agree, strongly agree). A sample of thirty academics were given the scale to test its reliability, and the same group of participants were given the same questionnaire two weeks later. Pearson Product Moment Correlation was used to analysed the result showing a high reliability coefficient of 0.902 using test-retest reliability technique. The Academic Entrepreneurship Scale (AES) was adopted from Zahra's (1996) measure for corporate entrepreneurship, this study expanded based on the category of academic entrepreneurship aspects of enterprise within a corporation. It consists of 21 elements and its used to assess academic entrepreneurial behavior of lecturers. The academic entrepreneurship scale is based on a Likert scale (strongly disagree, disagree, agree and strongly agree). In order to verify content validity, the questionnaires were also given to other researchers for adequate review. For reliability purpose, test-retest method was adopted and the result showed 0.92 reliability coefficient.

Data collection

Two research assistants assisted the researcher and were instructed on the goals of this research project and how to go about administering the instruments. The instrument was administered on each participant physically.

Data analysis

Regression analysis was utilised to assess each hypothesis at 0.05 level of significance.

Ethics and Permission

To conform with research ethics, the researcher sought authorization from the authorities of the various universities visited. The participants were verbally briefed and consent was sought by the researcher regarding the objective of the instruments, the importance of providing honest and sincere responses to the items, and the promise that any information they provided would be kept confidential. Data provided by the participants were kept safe and used for academic purpose only.

Result

Hypothesis One: Organisational culture and market orientation do not have a significant composite influence on academic entrepreneurship of teaching staff at private universities in Southwest, Nigeria**.**

Table 1: Multiple Regression Analysis of Composite of Organisational culture and Market Orientation on Academic Entrepreneurship of Private Universities Teaching Staff

Source of variation	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P*
Regression	489.005	2	244.502	5.514	.004[a]
Residual	48553.520	1095	44.341		
Total	49042.525	1097			

R = .100; Multiple R = 0.010; Multiple R^2 (Adjusted) = 0.008;
Stand error estimate = 6.658

a. Predictors: (Constant), Market Orientation, Organisational Culture
b. Dependent Variable: Academic Entrepreneurship

According to Table 1 findings, organisational culture and market orientation, which were all predictor factors in the regression model, together predicted academic entrepreneurship among academic staff at private universities (R =.100; R2 =.010; Adj. R2 =.008; F (2, 1095) = 5.514; p.05). This demonstrated that the predictor variables together explained 1% of the variance in academic entrepreneurship among Academic personnel in Southwest Nigerian private universities. Therefore, the results of this investigation, hypothesis one is rejected.

To determine the combined effect of organisational culture and market orientation on academic entrepreneurship of private institutions' teaching staff in Southwest Nigeria, a stepwise multiple regression analysis was used. The outcomes as seen in Table 2

Table 2: Model overview of the Stepwise Multiple Regression Analysis of Organisational Culture, Market Orientation on Academic Entrepreneurship of Private Universities Teaching Staff.

Model	R	R^2	Adj. R^2	SE	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.070[a]	.005	.004	6.67463	.005	5.449	1	1095	.020
2	.099[b]	.010	.008	6.66109	.005	5.457	1	1094	.020

1. Predictors: Market Orientation (constant).
b. Predictor: (Constant) Market orientation, Organisational Culture

According to Table 2 findings, there was a considerable contribution to the prediction of academic entrepreneurship of private universities' teaching staff in Southwest, Nigeria, when market orientation was added to the regression model as the first predictor variable based on the strength of its relationship with organisational culture. (R=.070; R2 =.005; Adj R2 =.004; F (1, 1095) = 5.449; P<.05). In light of this, market orientation less than 1% of the difference in academic entrepreneurship among teaching staff at private universities in Southwest Nigeria. Market orientation and organisational culture were included in the regression model as additional predictor variables, and this combination significantly affected the academic

entrepreneurship of teaching staff at private universities in Southwest Nigeria. (R=.099, R2 =.010, Adj R2 =.008, F (1, 1094) =5.457, P<.05). As a result, it was shown that 10% of the academic entrepreneurship of teaching staff at private universities in Southwest, Nigeria was due to organisational culture and market orientation combined. This proved that organisational culture could boost academic staff predictions of entrepreneurial behaviour at private universities in Southwest Nigeria by less than 1%. This suggests that organisational culture and market orientation together predict the academic entrepreneurship of private universities in Southwest, Nigeria.

Hypothesis Two: There is no significant relative influence of organisational culture and market orientation on academic entrepreneurship of private universities teaching staff in Southwest Nigeria

Table 3: Relative contribution of Market orientation and organisational culture's on Academic Entrepreneurship of Private Universities Teaching Staff in Southwest

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	Beta	Std. Error	Beta		
(Constant)	61.685	2.690		22.935	.000
Market Orientation	.052	.021	.075	2.477	.013
Organisational Culture	.038	.016	.070	2.336	.020

1. Dependent Variable: Academic entrepreneurship

The findings in Table 3 demonstrated the degree to which the predictor variables caused the criterion variable. Market orientation is the most effective predictor of academic entrepreneurship in Southwest, Nigeria among the academic staff of private universities (β=.052; t = 2.47; p =.013), followed by organisational culture (β=.038; t = 2.336; p =.020). This result refutes the notion that organisational culture and market orientation have no significant relative influence on the academic entrepreneurship in Southwest, Nigeria of teaching staff at private universities was rejected by this finding.

Discussion of findings

The finding implies that the academic entrepreneurship of teaching staff at private universities in Southwest, Nigeria have been significantly influenced by organisational culture and market orientation. Market orientation was found to be the strongest predictor of the two factors. This outcome demonstrates how substantially the two factors contributed to the study's dependent variable. It also implies the necessity of fostering an entrepreneurial spirit with a market orientation such that new products or services are constantly needed to meet the requirements and preferences of consumers. Let the particular findings from your research be stated while comparing and contrasting them with findings from other published studies. Similar findings were reported by Faroque et al. (2021), Morgan and Anokhin (2020) and Octavia et al. (2020). Because of this, companies that combine market orientation with entrepreneurial development perform better than those that

do not (Atuahene-Gima & Ko, 2001). It also supports Shehu and Mahmood's (2014) study, which discovered a solid and favourable connection between market orientation and entrepreneurial activities. Aloulou (2018) provided additional evidence to back up the conclusion that market orientation results in the ability to leverage current resources, particularly in the integration process, acquire, reconfigure, and release resources that are enabling businesses to act rapidly on new opportunities. The conclusion was further supported by Oplatka and Hemsley (2007), who were cited in Niculescu et al. (2013). They stated that applying market orientation in university settings has several advantages, including fostering a student-centered environment. They also stated that values such as competitor orientation and inter-functional coordination can aid administrators and teachers in better comprehending and structuring the educational environment.

The study also finds significant relative prediction of organisational culture and market orientation on the academic entrepreneurship in Southwest, Nigeria of teaching staff at private universities. This supports the findings of Ireland et al. (2009), who confirmed that the robustness of cultural norms supporting entrepreneurship is positively connected with the level of support for it among organisational members. Earlier research by Ireland et al. (2003) suggested that "effective entrepreneurial culture is one in which new ideas and creativity are expected, risk taking is encouraged, failure is tolerated, learning is promoted, product, process, and administrative innovations are championed, and continuous change is viewed as a conveyor of opportunities. Additionally, past studies (Kirby, 2006; Rothaermel et al, 2007; Luke et al., 2010) highlighted how company cultures could benefit entrepreneurs. According to Todorovic et al. (2011), local cultures inside an organisation have a considerable impact on how university performance and reward schemes are perceived and implemented. Guerrero-Cano et al. (2006) assert that the development of entrepreneurial activity within universities depends heavily on the university culture.

The research by Franklin et al. (2001) also revealed that institutions that had launched numerous start-ups and those that had been less active in the field of academic entrepreneurship had quite different attitudes and behaviours. The outcome also emphasised the implementation of policies that are culturally and informationally conducive to entrepreneurship, indicating that organisational culture and market orientation have a big impact on academic entrepreneurship. The study also supports Joseph and Francis' (2015) analysis, which showed that organisational performance variations are greatly and favourably impacted by culture. It has been determined that the relationship between organisational culture and performance is moderated by a market orientation.

This finding is in line with Souitaris' (2015) research, which used a multilevel approach to assess the relative significance of individual, subunit, and organisational effects on entrepreneurial intentions in academia and to examine specific components of the subunit effect and how they interact with other levels. According to organisational culture literature, the department's adhocracy culture, which is distinguished by flexibility and an external orientation, has been demonstrated to be positively connected with academic entrepreneurs' activities.

Include strength and limitations of study study

The finding of this study would enable the repositioning of university system in Nigeria for economic growth and entrepreneurial drive for job creation,

wealth generation, and graduates' global competitiveness.

This study focuses on the prediction of market orientation and organisational culture on academic entrepreneurship of teaching staff at private universities in Southwest, Nigeria. It was delimited to teaching staff from private universities at the three randomly selected states of accredited private universities in Southwest, Nigeria which are; Ogun, Lagos, and Oyo State.

Conclusion and Recommendations

This study focused on influence of organizational culture and market orientation on academic entrepreneurship of private universities teaching staff in Southwest, Nigeria. It was concluded that organizational culture and market orientation significantly predict academic entrepreneurship of private universities teaching staff in Southwest, Nigeria. The study recommended that Private universities in the Southwest should work with industries, businesses, the government, and non-governmental organisations to develop fresh, relevant, and sustainable entrepreneur curricula. Also, private universities should invest on research and development.

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ASSESSMENT OF WATER SANITATION AND HYGIENE PRACTICE OF TSANGAYA SCHOOLS IN MAIDUGURI AND ENVIRONS

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ABSTRACT

Background

Water Sanitation and hygiene practice is of paramount to pupils (Almajirai) boarding Tsangaya schools within Maiduguri and environs. As the population of Maiduguri and environs increases, the number of children attending Tsangaya education is drastically increasing. The sanitation and hygiene practice of the school (Tsangaya) and the children is devastating. This situation is more worrisome as the whole world is emphasizing on the sustainability of WASH services for all.

Method

The research design of the research was descriptive survey research design. The area of research was Maiduguri metropolis and environs and the population of the research are pupils, parents and teachers of Tsangaya schools. A sample size of 388 were randomly selected from 21 wards of Maiduguri and environs. A self-constructed questionnaire was translated to (Hausa and Kanuri) where necessary and administered to 388 respondents, where 382 was retrieved. The data obtained was analyzed using Microsoft Excel 2019.

Results

The research findings depict about 90% of the respondents opted that the WASH challenges bedevilling informal schools (Tsangaya) are enormous and can lead to diseases outbreak, stunted growth, hinder future skills generation, poor learning ability, and it may as well factor to social rejection. The findings also indicated 90% responses of the respondents decided that restructuring of the Tsangaya system with adequate infrastructure, provision of adequate safe water supply, adequate WASH facilities, awareness sessions on the importance of safe WASH practice via all possible channels and adequate funding by both government and relevant stakeholders.

Conclusion

The current WASH practices at Tsangaya schools in Maiduguri and environs is upsetting. The study recommended government to re-strategize and restructure the Tsangaya system of education, by profiling the number of pupils, teachers, and infrastructure, address the unhygienic situation of the pupils, enforce parents to enroll their children to primary schools, allocate reasonable budget and adequate WASH facilities and support sanitation and

hygiene awareness programs via all possible medium across Maiduguri and environs.

Key words: Tsangaya, Almajirai, Hygiene Practice, WASH.

INTRODUCTION

Access to basic water, sanitation and hygiene (WASH) facilities is fundamental to health and the general public at large. It appears that in most developing countries, very little progress has been made in upgrading WASH approaches towards individual health and the general public (Adewole, 2020). Safe WASH practice plays a greater role in human development and is the foundation for a sustainable growth and development (Ssemata *et al.*, 2023). The impact of WASH practice among children is of highly significance to an extend lack of it usually led to outbreak of disease and school absenteeism (Singh, 2020). Proper WASH management at schools (Tsangaya) helps children in achieving goals, human development and it is only possible through adequate provision of safe WASH practice and education, by so doing, levels of quality and productivity are enhanced (Abdulkadir, 2021). Every developed nation directly or indirectly invests heavily on water sanitation and hygiene so as to ensure not only healthy population growth but to an extend safe environment sustainably (Matta, *et al.*, 2022).

Childhood development is the key to a full and productive future progress of a nation, and is a critical stage of human development that forms the foundation for children's future well-being, development and learning (Okoh *et al.*, 2020). Research has shown that half of a person intellectual capacity is developed before the age of six and early water sanitation and hygiene interventions can have a lasting effect on intellectual capacity, personality and social behaviour (Okoh *et al.*, 2020). Biologically, a child is generally any individual that is between birth and puberty (Hornby, 2022). The outcome of lack of adequate WASH practice to any form of school formal or informal are obvious for children and the general society as well as the environment. Children boarding schools with poor WASH facilities, hygiene, sanitation and lack of adequate water supply are usually exposed to deadly diseases (Roszkowska, 2020).

In spite of the associated benefits of adequate WASH provision in schools, available studies have shown that a significant proportion of schools globally and especially in developing countries lack adequate WASH services (Ohwo, 2019). For example, global baseline report on drinking water, sanitation and hygiene in schools, revealed that an estimated 570 million, 620 million and 850 million, children worldwide lacked a basic service and had either limited or no drinking water, sanitation and hygiene services at their school, respectively (UNICEF, 2019). Sub-Saharan Africa is the region with the highest proportion of schools with no water service (47%) and less than 50% coverage of basic sanitation and hygiene, which has the capacity to slow down learning outcomes of children in sub-Saharan African schools (Poague *et al.*, 2022).

The essential WASH component revolves around treatment and safe storage of water at the point of use, ideal hand washing (method and timing), Safe sanitary disposal of human faeces at the household and community level, which include collection, transports, disposal, treatment and reuse (Poague, 2022). This practice will ensure the availability of adequate clean water supply not drinking, but also

for food production such as crops, horticulture, poultry, livestock and income generating activities, healthy individual, healthy environment and will encourage school attendance (Dickin *et al.,* 2023). Proper management of the components will also require changing behaviours related to feeding and child care, and having access to and correctly using safe drinking water, hygiene, and sanitation services (Medlicott, 2020).

The standards for WASH in schools were used as the guiding principles to evaluate the adequacy of the various WASH components (UNICEF, 2011). Even though, effort has been made by government agencies, local organizations and NGOs to increase access to safe water supply and sustainable sanitation in major informal schools in Maiduguri; by supporting the provision of improved water sources and sanitation facilities (Dickin *et al.,* 2023). Nevertheless, large numbers of both formal and informal schools still lack access to adequate WASH facilities such as water supply, latrines and hand washing facilities. School sanitation and hygiene education have been given prominence in the Total Sanitation Campaign, which recognizes the role of children in absorbing and popularizing new ideas and concepts (Aniruddh *et al.,* 2021). Globally, it is recognized as a key intervention to promote student's right to health and clean environment which would influence a change in health promotion, behaviour and attitudes (UNICEF, 2018).

The curriculum of tsangaya education can be traced back to the Timbuktu Islamic education system (Rohman *et al.,* 2025). The Tsangaya system of education has three sessions; in the morning, afternoon and evening (Rohman *et al.,* 2025). The school week usually begins on Saturday and ends Wednesday, while School goes on break in Ramadan, the 9th month of the Hijr (Islamic) Calendar and on the Eid Adha and Eid Fitr "religious holidays celebrated by Muslims worldwide" (Rohman *et al.,* 2025). According to studies conducted by Hussaini on Role of Qur'anic Recitation Competition in Promoting the Study of Qur'anic Sciences in Nigeria: Reflections on Bauchi Metropolis, there are two forms of Qur‟anic schools nowadays: modern Qur‟anic and traditional Qur‟anic Tsangaya" (Hussaini, 2020). The latter is a day school which runs classes for a fixed time in a school-like building and the former a boarding school whose focus is purely Qur‟anic instruction (Hussaini, 2020).

The Federal Government kicked off the „Almajiri‟ educational system in various parts of Nigeria, but official figures and available facts show a yawning gap in the level of implementation and generation of the schools (Idriss *et al.,* 2017). The regulator of the sector, the Universal Basic Education Commission (UBEC) declared that the new education concept, which integrates Qur‟anic and Western Models of Education had successfully taken off in no fewer than 22 states of the Federation (Idriss *et al.,* 2017). It was learnt that some of the schools listed under the scheme by UBEC were Arabic or Islamic Schools, which preceded the Almajiri schools (Idriss *et al.,* 2017). Although, some of the schools have been completed, they were yet to begin full academic activities, leading to the massive infrastructure put in place lying idle (Idriss et al., 2017). The Tsangaya schools in Borno State are yet to start full operation, as the state Government and the SUBEC said the Tsangaya schools operate under three (3) Models in the State (Idriss *et al.,* 2017). The first model one, which has to do with existing „Tsangaya‟ that have accepted to be integrated, and these include the one in Mashimari, Maiduguri and Shehuri-north, each of the Tsangaya are said to have more than 200 children (Idriss *et al.*, 2017).

In most Nigerian cities Maiduguri included, the effects of poor access to improved safe water supply, adequate sanitation and hygiene facilities are enormous, especially in majority of the formal and informal (Tsangaya) schools. Apart from disease burden usually associated with poor access to sanitation and hygiene, there are a lot of pressures on the existing social services particularly water supply which are often stretched beyond design capacities leading to increased overhead costs for operation and maintenance and eventual failure of the systems (UNICEF, 2020). Similarly, Insufficient safe WASH services negatively affect children's boarding informal schools' health and well-being, increase the rate of school absenteeism, poor cognitive performance and growth retardation (Matta, *et al.*, 2022). Generally, inadequate WASH services in schools often times lead to dehydration, diarrhea, worm and urinary infections. Diarrhea and worm infections are the major health burdens amongst school children, which have been associated with poor WASH services (Matta, *et al.*, 2022).

This calls for greater attention to WASH services beyond the household, including institutional settings such as formal and informal schools (Tsangaya) included. Global efforts towards education for all recognize the role that WASH in schools plays an improving access to education and learning outcomes (Ridge, 2019). Tsangaya schools in Maiduguri and environs were suspected to be in an unhygienic state, looking at the fact that the children boarding the school were always in an unhygienic condition. In view of the above challenges this research assessed the WASH gaps in informal schools (Tsangaya) in Maiduguri metropolis, Borno State Nigeria, to ascertain the scale of the problem so that workable intervention can be developed to tackle the challenges sustainably.

As the population of Maiduguri and environs increases, the number of out of formal school children is drastically increasing ICRC, 2021). The sanitation and hygiene practice of the pupils boarding informal schools (Tsangaya) is devastating (Lateefat *et. Al.*, 2019). The children were often sighted going about in an unhygienic state. This situation is more worrisome as the world is emphasizing on the sustainability of WASH service for all. It is against this backdrop that this research seeks to investigated the sanitation and hygiene practice of informal school (Tsangaya) in Maiduguri and environs.

In view of the forgoing, the research seeks to address the questions; what are the level of knowledge of consequences of poor hygiene practice of Tsangaya schools? the factors responsible for poor sanitation and hygiene practice? And the the possible solution to the WASH challenges among Tsangaya schools children in Maiduguri and environs? The research aims to examine the level of knowledge of consequences of poor hygiene practice, the factors responsible for poor sanitation and hygiene practice and ascertain the possible solution to the WASH challenges distressing Tsangaya schools children in Maiduguri and environs.

Methods

Study Area

The area of research was Maiduguri metropolis and environs, Borno State, Nigeria. The word "Tsangaya" is espoused from Sangaya in Kanuri which simply means "educational institution" (Yahya , 2018). Yahya opined that Sangaya is the original name but due to Hausa adulteration of the term, it became Tsangaya (Yahya, 2018). Tsangaya is also commonly referred to as Almajiri Education System. As aforementioned, tsangaya is a Qur"anic schooling system that is predominant amongst the Muslim of Northern Nigeria. Tsangaya education is

an Islamic based system of education, where the history of Qur‟anic schools were traced back to the earliest days of Islam (Yahya, 2018). Traditionally, the pupils of tsangaya are called almajirai. Almajirai (students boarding Tsnagaya Schools) are classified into three namely "Kolo; an infant of age 2 -11 years, Titibiri; an adolescent of age 12 -18 years and Gardi; an adult of age 18 and above (Abdulkadir, 2021). Tsangaya system of education is informal; however, it has its distinct "formal code for recording religious learning" (Hussaini, 2020). This format includes Babbaku (alphabet reading), Farfaru (word formation), Haddatu (memorization), Sauka (completion), Satu (writing on a slate), and Rubutu (writing on paper)" (Hussaini, 2020).

Research Design

The research design of the research was descriptive survey research design. Descriptive survey research, design is used to obtain information concerning the current status of the phenomena and to describe what exists with respect to variables or conditions in a situation (Choiriyah, 2022).

Research Population

The population of a study refers to the entire set of individuals or objects, having some common characteristics (Krishnan, 2025). The population of the research are pupils boarding in tsangaya school (males) within the ages of 5-16 years, parents and teachers of Tsangaya schools in Maiduguri and environs.

Sample Size Calculation

A sample size of 388 were randomly selected from 56159 population of 21 wards of Maiduguri and environs using Microsoft excel 2019 random number system of calculation (Primary Health-Care Unit MMC and Jere LGA, 2023).

Inclusion and exclusion Criteria

The names of the schools (Tsangaya) visited were anonymous due to lack of approval by the school's heads to reflect in the research. The research considered the inclusion of students, teachers and parents boarding Tsangaya schools. Tsangaya students roaming the streets of Maiduguri and environs were excluded due to lack of actual identity of the schools (Tsangaya) they belong to.

Sampling Techniques

Simple random sampling is a widely utilized sampling method in quantitative studies with survey instruments. It is asserted that simple random sampling is favourable in homogeneous and uniformly selected populations. In this selection method, all the individuals have an equal opportunity to participate in the research where the selection process is entirely based on luck. The simple random sampling has benefits and drawbacks associated with it. It ensures unbiased, representative, and equal probability of the population; on the other hand, it can be cumbersome, rarely supported with readily available list of population, and challenging when population is heterogeneous and widely dispersed. Therefore, Simple random sampling technique was adopted and utilised using Microsoft excel randomization number (Noor, 2022).

Research Instrument

A self-constructed questionnaire was used as an instrument of data collection. The questionnaire was administered to the 388 comprising children, parents and teachers of Tsangays schools in Maiduuri and environs. The questionnaire is written in English and translated to the two major public language (Hausa and Kanuri) where necessary at the point of administration.

The instrument comprises of four sections from A-D, containing questions related to demography of the respondents, consequences of poor hygiene practice, factors responsible for the poor sanitation and hygiene practice and on the possible solutions to the WASH challenges at Tsangaya schools in Maiduguri and environs. Out of 388 administered questionnaires within a week Monday to Friday, 382 was retrieved.

Data Analysis

The data obtained was analysed using Microsoft Excel 2019 by means of frequency counts, percentage and description of the demographic characteristics of respondents.

Ethical Consideration

This research adhered to all ethics by ensuring all sources were cited appropriately. Heads of Tsangaya schools and respondents were briefed on the significance of the research before data collection. Permission was granted by the heads of Tsangaya schools visited and the respondents. The data obtained was used solemnly for the purpose of the research and were handle with utmost confidentially.

Results

The presentation of the data is built on the responses of the respondents and the data are all tabulated in percentage for basic interpretation. Below are the tables and their interpretation accordingly.

Table 4.1 depicted majority of the respondents were children (n=189, 63%) followed by teachers (n=137, 36%) and parents (n=56, 15%). The results further showed reasonable number of the respondents were within the age-bracket 5 to 16 (n = 207, 54%), 18 to 25 (n = 58, 15%), 30 to 45 (n =74, 19%), and 45 and above (n =43, 11%). The outcome also showed reasonable number of the responded were male (n=302, 79%) and (n = 80, 21%) were female. The findings further showed (n=263, 69%) of the respondents were singles, (n=73, 19%) happens to be widows, (n=39, 10%) married and (n=7, 2%) divorced. The academic qualification of the respondents where (n=334, 87%) Islamic Education, (n=27, 7%) Secondary, (n=11, 3%) NCE/Diploma, (n=7, 2%) Degree/HND and (n=3, 1%) masters and above.

Table I: Socio-demography of the respondents

S/n.	Items	Responses	Sum of Frequency	Average of Percentage
1.	Status	Parent	56	15%
		Teacher	137	36%
		Child	189	63%
	TOTAL		**382**	**100%**
2.	Gender	Male	302	79%
		Female	80	21%
	TOTAL		**382**	**100%**
3.	Age	5-16	207	54%
		18-25	58	15%
		30- 45	74	19%
		45- and Above	43	11%

	TOTAL		**382**	**100%**
4.	Marital Status	Single	263	69%
		Married	39	10%
		Divorced	7	2%
		Widow	73	19%
	TOTAL		**382**	**100%**
5.	Academic Qualification	Islamic Education	334	87%
		Secondary	27	7%
		NCE/Diploma	11	3%
		Degree/HND	7	2%
		Masters and Above	3	1%
	TOTAL		**382**	**100%**

This section table 2 was on the consequences of poor hygiene practice of Tsangaya schools in Maiduguri and environs, where the respondents view was obtained. The views of (n=367, 96%) of the respondents agreed that the implication of poor hygiene practice at Tsangaya schools would lead to diseases outbreak while only (n=15, 4%) disagree. Also, (n=344, 90%) respondent yes that poor hygiene practice will results to stunted growth and development of children, while (n=38, 10%) disagree. Similarly, (n=346, 91%) responded yes that inadequate hygiene practice would likely hinder well skills future generation where (n=36, 9%) only responded negative. Improper hygiene practice may as well affect learning ability, about (n=373, 98%) agreed to that where only (n=9, 2%) disagree. Furthermore, on social rejection, low self-esteem (n=359, 94%) of the respondents answer yes while (n=23, 6%) respondents disagree.

Table 2: Knowledge of Consequences of poor hygiene practice of Tsangaya schools in Maiduguri and Environs

S/N	**Items**	**Response**	**Sum of Frequency**	**Average of Percentage**
1	Diseases outbreak	YES	367	96%
		NO	15	4%
	TOTAL		**382**	**100%**
2	Stunted Growth and Development	YES	344	90%
		NO	38	10%
	TOTAL		**382**	**100%**
3	Lack of Adequate and Appropriate Manpower in the Future.	YES	346	91%
		NO	36	9%
	TOTAL		**382**	**100%**
4	Lack of Adequate Learning ability	YES	373	98%
		NO	9	2%
	TOTAL		**382**	**100%**
5	Social Rejection, Low confidence and Low Self-esteem	YES	359	94%
		NO	23	6%
	TOTAL		**382**	**100%**

Table 3 showed section C which is on what are the factors responsible for the poor sanitation and hygiene practice of Tsangaya schools in Maiduguri Metropolis in Maiduguri and environs. The respondents view on Lack of WASH facilities and poor infrastructure, (n=372, 97%) response was yes while (n=10, 3%) response was negative. Again, on Poor WASH awareness (n=339, 89%) agreed while (n=43, 11%) disagree. Over population of pupils as a factor (n=369, 97%) agreed and (n=13, 3%) disagree. On Lack of funding by government and parents (n=379, 99%) response was yes while (n=3, 1%) response was no. Additionally, on inadequate water supply the answers to the respondents depicted (n=341, 89%) agreed while (n=41, 11%) response was disagree.

Table 3: factors responsible for poor sanitation and hygiene practice among Tsangaya School children

S/N	Items	Response	Sum of Frequency	Average of Percentage
1	Lack of WASH facilities and poor infrastructure	YES	372	97%
		NO	10	3%
	TOTAL		**382**	**382**
2	Poor WASH awareness	YES	339	89%
		NO	43	11%
	TOTAL		**382**	**382**
3	Over population of pupils	YES	369	97%
		NO	13	3%
	TOTAL		**382**	**382**
4	Lack of funding by government and parents	YES	379	99%
		NO	3	1%
	TOTAL		**382**	**382**
5	Inadequate water supply	YES	341	89%
		NO	41	11%
	TOTAL		**382**	**382**

Table 4 relates on the possible solutions to the WASH challenges at Tsangaya schools in Maiduguri and environs. Where on Provision of adequate WASH facilities at all the Tsangaya schools as solution (n=367, 96%) responded yes while (n=15, 4%) said never. The respondents view on Provision of adequate safe water supply (n=349, 91%) response was yes and (n=33, 9%) disagree. The view on awareness sessions on the importance of safe WASH practice via all possible channels, the response showed (n=373, 98%) agreed while (n=9, 2%). Also, on restructuring of the Tsangaya system with adequate infrastructure (n=287, 75%) response was yes and (n=95, 25%) was no. furthermore, on adequate funding by both government and parents should be enforce the respondents view was (n=329, 86%) while (n=53, 14%) responded views depicted disagree.

Table 4: the possible solution to WASH challenges among Tsangaya schools children in Maiduguri and environs.

S/N	Items	Response	Sum of Frequency	Average of Percentage
1	Provision of adequate WASH facilities at all the Tsangaya schools	YES	367	96%
		NO	15	4%

	TOTAL		**382**	**382**
2	Provision of adequate safe water supply	YES	349	91%
		NO	33	9%
	TOTAL		**382**	**382**
3	Awareness sessions on the importance of safe WASH practice via all possible channels	YES	373	98%
		NO	9	2%
	TOTAL		**382**	**382**
4	Restructuring of the Tsangaya system with adequate infrastructure	YES	287	75%
		NO	95	25%
	TOTAL		**382**	**382**
5	Adequate funding by both government and parents should be enforce	YES	329	86%
		NO	53	14%
	TOTAL		**382**	**382**

Discussion

The outcome of the research revealed 54% of the respondents were within the age of 5-16 and the highest which indicate that the children were the most affected by the sanitation and hygiene challenges. The findings also showed 69% of the respondents were single and opportunely, about 3% of the respondent had attended secondary education, 2% with NCE/Diploma and 1% with masters and above. However, 87% of the respondents settled for Islamic education and did not attend western education. This also indicated the low western educational attendance that is very important in this 21st century.

The research findings on the knowledge of consequences of poor hygiene practice of Tsangaya schools in Maiduguri and environs showed majority of the about respondents agreed that the implications of poor hygiene practice are enormous and can lead to diseases outbreak 96%, 90% will lead stunted growth, 91% will hinder future skills generation, 98% will lead to poor learning ability and 94% will may as well factor to social rejection with. This finding is not surprising because majority of the schools visited lack basic sanitation and hygiene facilities and most importantly there is a serious challenges of inadequate water supply. The findings corresponded with research conducted by (Cheurfa *et al.*, 2020) on Cost-effectiveness of Water, Sanitation and Hygiene (WASH) promotion approaches used in basic schools in Ghana which revealed about 75% of the secondary schools lack adequate water supply, sanitation and hygiene facilities forcing the pupils and teachers to practice open defecation outside or on the floor of the toilets. Similar research conducted by Cronk, (2021), on the factors associated with water quality, sanitation, and hygiene in rural schools in 14 low-and middle-income countries indicated 52% of surveyed schools used closes water quality compliant with WHO guidelines for E. coli.; while 73% of the schools were in a state of poor hygiene practice. According to (Dakhode *et al.*, 2021) Safe drinking water, sanitation and hygiene beyond the household, and particularly in the school setting, are crucial to the health and education of children. Accordingly, if the challenges of water sanitation and hygiene happening in formal schools that are being funded and well-structured by government is worsening. Then, the situation in informal schools especially Tsangaya that has less government presence will be worse than the formal. Therefore, the findings of the research at table 2 are of highly health consequence not only to the children but to the general public at large.

The outcome on Table 3 is indicating about 90% of the respondents were of the view that that inadequate water supply 89% couple with lack of WASH facilities and poor infrastructure 97%, lack of WASH awareness sessions 89%, over population of pupils 97%, and lack of funding by government and parents 99% will have a great impact on the children health as well as their teachers and to an extend to their parents and the general public as well. The findings are similar to research carried out in public secondary schools in Maiduguri metropolis, which shows more worrying coverage of hygiene practice by the school children where 70% of the schools had a limited hygiene service (Lateefat *et. Al.*, 2019). Another similar disquieting research carried out by (Abubakar, 2023) on Assessment of WASH Program in Public Secondary Schools in Maiduguri metropolis revealed (75%) of the schools were overcrowded and with very poor hygiene practice, especially the toilets. Many of the pupils in public secondary schools visited were not enlightened on the importance of hygiene education and attitudes towards regular practices concerning water, sanitation and personal hygiene (Abubakar, 2023). Correspondingly, according to Poague (2022), the absence of standard toilets with functional doors that can be closed when the toilet is in use means that girls are unable to use those toilets in ways that are dignified, the pit latrine is dark and foreboding, with a musty smell that clung to everything, very scary place which many students avoid at all costs (Poague, 2022). This is a clear indication that lack of proper hygiene practice in both formal and informal education system has a great negative impact on the future generation health and will bring about learning difficulties and absenteeism.

The findings on Table 4. depicted that 96% of the respondents decided that provision of adequate WASH facilities at all the Tsangaya schools will ease the WASH challenges, 91% agreed on the provision of adequate safe water supply as factor, 98% go for awareness sessions on the importance of safe WASH practice via all possible channels, 75% settled for restructuring of the Tsangaya system with adequate infrastructure and 86% agreed on Adequate funding by both government, non-governmental organizations, civil society organizations and relevant bodies will help in addressing the WASH issues in the Tsangaya schools. The findings to questions indicated that all the items were factors on the possible solutions to the WASH challenges of Tsangaya schools in Maiduguri and environs.

These identified challenges are possible reasons for the poor state of WASH in the informal schools (Tsangaya) which can be link to lack of implementations of the regulations guiding the affairs of the Tsangaya Schools, puberty, displacement of persons of concerns due to insecurity, poor parental care, poor budget allocations from government. The WASH sector is given less consideration by government at all level with weak monitoring systems, limited evidence-based data collection and documentation which are important for improving the WASH programs. Therefore, to maximize the potential of pupils (Almajiri) as the most vulnerable child, it is necessary to provide informal schools (Tsangaya) pupils and teachers, with adequate WASH facilities and educate them properly on the challenges and negligence of the WASH to their health and the general public. Adequate WASH services in schools are a precondition for creating a healthy environment for children. Since students spend the majority of their time at school, safe WASH services can improve their overall health by preventing waterborne and infectious diseases (WHO, 2023). Additionally, WASH services can improve academic performance by reducing absenteeism due to illness and allowing students to focus on their studies without

distractions related to hygiene concerns (Pieters, 2023). In view of the above wide-ranging findings of the research which shows the water sanitation and hygiene challenges of the informal schools (Tsangaya) in Maiduguri and environs is in a critical state. Government at all level in synergy with teachers and parents must take serious measures by addressing the identified gaps so as to put an end to WASH challenges and for a better upbringing of future generation.

Conclusion

In conclusion, the present state of WASH facilities in all the informal schools Tsangaya in Maiduguri and environs are in a devastating situation mainly due to poor educational structure, inadequate water supply, lack of sanitation and hygiene awareness session. The research findings on the consequences of poor hygiene practice of Tsangaya schools in Maiduguri and environs indicated about 90% of the respondents agreed that the implications of poor hygiene practice are enormous and can lead to diseases outbreak, stunted growth, hinder future skills generation, poor learning ability, and it may as well factor to social rejection. The research outcome showed the consequence of poor hygiene practice in Tsangaya schools in Maiduguri and environs.

The findings also indicated the possible solutions to the WASH challenges bedevilling informal schools (Tsangaya), where about 90% respondents agreed on restructuring of the Tsangaya system with adequate infrastructure, provision of adequate safe water supply, adequate WASH facilities, awareness sessions on the importance of safe WASH practice via all possible channels and adequate funding by both government and relevant stakeholders. The water sanitation and hygiene challenges of the informal schools (Tsangaya) in Maiduguri and environs is in a life-threatening state. Government, teachers and parents must take serious measures and may as well implement the recommendations made so as to put an end to WASH challenges and for a better upbringing of future generation.

Strength of the Research

The research focuses on the water sanitation and hygiene challenges in Tsangaya informal schools in Maiduguri and environs and findings were made as well as recommendations which if implemented will address the identified WASH gaps sustainably.

Limitation of the Research

This research is limited to water sanitation and hygiene challenges in Tsangaya informal schools and the students, teachers and parents of the Tsangaya informal schools within Maiduguri Metropolis and environs, Borno State, Nigeria.

Recommendation

Based on the findings of the research, the following recommendations were made.

- Government at all level should re-strategize and restructure the Tsangaya system of education, especially on profiling the number of pupils, teachers, and infrastructure similar to how it is been done to western education system in Maiduguri and environs.
- Government in synergy with relevant stakeholders should enforce parents to enroll their children and ward to primary schools in conjunction with the Tsangaya education.
- Government at all level should allocate reasonable budget and adequate WASH facilities at all Tsangaya schools in Maiduguri and environs.
- Governments should liaise with relevant stakeholders, such as parents, teachers, civil society organizations, non-governmental organizations, security, WASH sector in addressing the unhygienic situation of pupils (Almajirai) of Tsangaya

school rooming the streets, begging alone junctions and motor packs and defecting openly.

- Government should support sanitation and hygiene awareness programs via all media stations and reach out to Tsangaya schools across Maiduguri and environs.

Conflict of Interest

We declare no conflict of interest regarding the publication of this research paper titled "Assessment of Water Sanitation and Hygiene Practice of Tsangaya Schools in Maiduguri and Environs."

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PREVALENCE AND PATTERN OF DRUGS ABUSE AMONG YOUTHS IN JOS NORTH LOCAL GOVERNMENT AREA, PLATEAU STATE, NIGERIA: A 2025 CROSS-SECTIONAL STUDY.

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ABSTRACT

Background: Drug abuse among youths in Nigeria has become a significant public health concern, particularly in urban areas like Jos North LGA, Plateau State. The study aims to investigate the prevalence and patterns of drug abuse among youths aged 11-45 years in Jos North LGA, Plateau State, Nigeria.

Method: A cross-sectional descriptive survey design was employed, involving a random sample of 274 youths from six selected communities within Jos North LGA, chosen through a multi-stage sampling technique. Data were collected using structured questionnaires and subsequently analyzed using SPSS. Bivariate analysis was conducted to examine the relationship between socio-demographic characteristics and drug abuse.

Results: The study found a moderate prevalence rate of drug abuse at 39.1%. Interestingly, a slightly higher proportion of females (39.1%) engaged in moderate drug or substance abuse compared to males, although this difference was not statistically significant (P-value = .995).

Conclusions: The study concludes that the prevalence of drug abuse among youths in Jos North LGA is moderate, with a slightly higher rate among females. Additionally, awareness of the health risks associated with drug use and parental drug use significantly influence the likelihood of drug abuse in this population. It is recommended that targeted public health interventions be developed to increase awareness of the dangers of drug abuse, particularly among young females

Keywords: Drug abuse, Youth, Prevalence, Patterns, Public health, Jos North LGA, Plateau State, Nigeria.

INTRODUCTION

Drug abuse is a significant public health concern with far-reaching consequences, affecting individuals and communities across the globe. The United Nations Office on Drugs and Crime (UNODC) [1] reports that drug abuse not only undermines health but also disrupts social and economic structures, making it a pressing issue worldwide. In Nigeria, the abuse of drugs among youths has escalated into one of the most troubling health-related phenomena, contributing to a range of mental health issues, social dysfunctions, and educational setbacks [2-4]. This alarming trend underscores the importance of understanding the specific factors driving drug abuse among Nigerian youths, particularly in regions like Jos North Local Government Area (LGA) of Plateau State. Empirical studies highlight the severity of drug abuse among youths and its long-term consequences. For instance, research indicates that many adolescents who engage in drug abuse are at a heightened risk of developing substance dependence in adulthood, leading to significant morbidity and mortality [5-8]. This transition from occasional use to chronic dependence is a critical period that warrants focused study, particularly in areas where drug abuse is prevalent. In Nigeria, the situation is exacerbated by socio-economic challenges, which often leave youths more vulnerable to the lure of drug use as a coping mechanism [9-12]. Understanding these dynamics is crucial for developing effective interventions that can mitigate the impact of drug abuse in this population. The prevalence of drug abuse among youths in Jos North LGA is particularly concerning. Existing data, though limited, suggest that drug abuse in this region is not only widespread but also growing, contributing to a host of social and health problems

Despite the wealth of data on drug abuse at the national and global levels, there are significant gaps in our understanding of how these trends manifest in specific localities like Jos North LGA. Most studies have focused on broader national trends, leaving a void in localized research that can offer insights into the unique socio-cultural and economic factors influencing drug abuse in this area. Filling this gap is essential for developing interventions that are not only effective but also culturally and contextually relevant. This study aims to bridge that gap by providing a detailed analysis of the prevalence and patterns of drug abuse among youths in Jos North LGA. The economic and social burden of drug abuse is profound, not just globally but also at the community level. According to the UNODC, the global costs associated with treating drug abuse are staggering, amounting to hundreds of billions of dollars annually. In Nigeria, the financial impact of drug abuse is similarly severe, straining already limited healthcare resources and exacerbating poverty and social inequality. The costs are not just financial; the human cost is equally devastating, with drug abuse leading to increased rates of mental illness, violence, and premature death [1, 13 -16]. These challenges are particularly acute in regions like Jos North LGA, where socio-economic disparities make the population more vulnerable to the adverse effects of drug abuse. The rationale for this study is rooted in the need to address these pressing issues at a localized level. By focusing on the youths of Jos North LGA, this research seeks to uncover the specific factors that contribute to drug abuse in this region

Study Area

The study was conducted in Jos North Local Government Area (LGA), Plateau State, Nigeria. Jos North is one of the 17 LGAs in Plateau State, characterized by a diverse population and a mix of urban and semi-urban settlements. The area is known for its multi-ethnic and multi-religious communities, which contribute to the socio-cultural complexity of the region. The LGA is subdivided into 20 political wards, each comprising several settlements, with varying levels of access to education, healthcare, and other social amenities.

Study Design

A cross-sectional survey design was employed for this study. allowing for the analysis of multiple variables at once, such as demographic factors, types of drugs abused, and the socio-economic status of the respondents.

Study Population

Jos North LGA according to National Population Commission (population Census, 2006) is 439,217. Out of this population, the total population of male 220,856 and 216,361 females) The study population comprised youths aged 11-45 years residing in Jos North LGA. This age range was selected because it encompasses the critical periods of adolescence and early adulthood, during which individuals are most susceptible to engaging in drug use and abuse.

Inclusion and Exclusion Criteria

Inclusion criteria for the study required participants to be within the age range of 11-45 years and to have resided in Jos North LGA for at least six months prior to the study. Exclusion criteria included individuals outside the specified age range, those who were non-residents of Jos North LGA, and individuals with cognitive impairments that could interfere with their ability to understand and respond to the questionnaire.

Sample Size Calculation

The sample size for the study was calculated using the Taro Yamane formula [28] for sample size determination. A sample size of 400 was estimated as presented below:

$$n = \frac{N}{1 + N(e)^2}$$

Where N = Population size = 1001,155; e = level of significance = 0.05

$$n = \frac{1001155}{1 + 1001155(0.05)^2}$$

$$n = \frac{1001,155}{1 + 1001155(0.0025)}$$

$$n = \frac{1001155}{1 + 2502}$$

$$n = \frac{1001155}{2503}$$

$n = 399.982$

Hence, the sample size was approximated to 400.

Four hundred was settled for, as the sample size for the study. The sample size was considered adequate for the study.

Sampling Techniques

A multistage sampling technique was utilized to select the study participants. In the first stage, six political wards were randomly selected from the 20 existing wards in Jos North LGA using a simple random sampling technique (balloting method). The selected wards were Tafawa Balewa, Angwan Rogo/Rimi, Gangare, Kabong, Tudun Wada, and Naraguta "B."

In the second stage, one settlement was randomly chosen from each of the selected wards, ensuring that the sample was representative of the different socio-economic and cultural backgrounds within the LGA. Finally, in the third stage, 67 youths were randomly selected from each of the six settlements, resulting in a total of 402 respondents.

Study Instrument

The primary instrument for data collection was the Prevalence and Pattern of Drug Abuse Questionnaire (PREPATDAS). The questionnaire included sections on demographic information, types of drugs used, frequency and duration of use, and perceptions of drug-related risks. It was pre-tested in a pilot study conducted in a neighboring LGA to ensure its reliability and validity.

Data Analysis

The collected data were entered into Microsoft Excel and subsequently exported to the Statistical Package for Social Sciences (SPSS) software for analysis. Descriptive statistics, including arithmetic means and percentages, were used to summarize the findings, while frequency distributions and charts were employed to present the data visually. A chi-square test was conducted to determine associations between categorical variables, such as socio-demographic characteristics and drug abuse patterns, with significance set at the 5% level. This analytical approach allowed for a comprehensive understanding of the factors associated with drug abuse among youths in Jos North LGA and provided the statistical rigor necessary to support the study's conclusions.

Ethical Approval

Ethical approval for the study was obtained from the Ethics Committee of the Plateau State Ministry of Health. This approval ensured that the study adhered to ethical standards, including respect for participants' rights, confidentiality, and informed consent. Written informed consent was obtained from each participant prior to their inclusion in the study. For participants under the age of 18, consent was also obtained from a parent or guardian.

Results

The response rate was above 60%, however, out of the 402 copies of the questionnaire administered, 274 copies representing 68.2% were retrieved and found useable. All results of data analyzed were based on the retrieved questionnaire. Hence, table 1 below shows the socio-demographic characteristics of the study participants, which provide a detailed understanding of the population under investigation, which comprised 274 respondents. The distribution of age groups revealed that the majority of the participants (42.0%) were aged between 18-24 years, followed by those aged 25-34 years, who constituted 35.8% of the sample. A smaller proportion of participants were under 18 years old (11.7%), while those aged 35 and above made up 10.6% of the sample. the sample was predominantly male, with 68.2% of the respondents being male and 31.8% female. Educational background varied among the participants, with the majority (55.1%) having attained secondary education. Those with tertiary education and primary education each accounted for 16.4% of the sample, while 12.0% had no formal education. Regarding employment status, the largest group of respondents were unemployed (40.5%), followed by self-employed individuals (32.5%). Public sector employees made up 17.2% of the sample, while private sector employees constituted 9.9%.

The location of the respondents showed a higher representation from urban areas (70.8%) compared to rural areas (29.2%). Family setting and living arrangements also provided insightful data. A majority of the respondents (55.8%) came from polygamous families, while 44.2% were from monogamous families. Additionally, 66.8% of the participants were living with their families, compared to 33.2% who were not. Parental education levels varied, with 36.5% of fathers having tertiary education, and 28.5% of mothers having secondary education, reflecting a relatively educated parental demographic. However, 25.2% of the respondents reported that either or both parents used drugs

Table 1: Socio-Demographic Characteristics of Respondents

Socio-Demographic Characteristics	Frequency (n=274)	Percentages (%=100)
Age group		
<18 years	32	11.7
18-24years	115	42.0
25-34years	98	35.8
35 and above years	29	10.6
Sex		
Male	187	68.2
Female	87	31.8
Educational background		
No Education	33	12.0
primary	45	16.4
Secondary	151	55.1
Tertiary	45	16.4
Employment status		
Self-employee	89	32.5
Public sector employee	47	17.2
Unemployed	111	40.5
Private sector employee	27	9.9
Location		
Rural	80	29.2
Urban	194	70.8
Family setting		
Monogamy	121	44.2
Polygamy	153	55.8
Staying with family		
Yes	183	66.8
No	91	33.2
Father's Level of Education		
No education	40	14.6
Primary	59	21.5
Secondary	75	27.4
Tertiary	100	36.5
Mother's Level of Education		
No formal Education	57	20.8
Primary	68	24.8
Secondary	78	28.5

Tertiary	71	25.9
Either or both parents taking drugs		
Yes		
No	69	25.2
	205	74.8

Table 2 shows the data from the study. Of the 274 respondents, 58.4% reported being aware of the health implications associated with taking drugs, while 41.6% indicated a lack of awareness. When asked about their current drug or substance use, 39.1% of respondents admitted to taking drugs, whereas 60.9% stated that they were not involved in drug use. Although a majority do not engage in drug abuse, the significant proportion that does (nearly 40%) highlights the prevalence of this issue among the youth. Among those who use drugs, a significant majority (74.8%) reported using multiple drugs, while 25.2% were involved in mono or single drug abuse. Regarding the influence behind drug use, 71.0% of respondents who take drugs cited friends as the primary influence, while 11.2% mentioned parents, and 17.8% indicated that no one influenced them.

Interestingly, when asked whether they enjoyed taking drugs, 67.3% of the drug users responded affirmatively, while 32.7% did not enjoy the experience.

Table 2: The prevalence rate of youths' drug abuse

Characteristics	Frequency(n=274)	Percentages (%)
Awareness of health implication of taking drugs		
Yes	160	58.4
NO	114	41.6
Are you taking any drug or substances?		
Yes	107	39.1
NO	167	60.9
Number of drugs being use		
Mono/single drug abuse	27	25.2
Multiple drugs of abuse	80	74.8
Who influence you into taking drug/substance		
Friend	76	71.0
Parents	12	11.2
No body	19	17.8
Do you enjoy taking drug?		
Yes	72	67.3
No	35	32.7

Table 3 below displayed the results of bivariate association between characteristics of respondents and their abuse of drug or substance. From the Table, it was found that there is no significant association between nine of the respondents characteristics (age, gender, educational level, location, employment status, family setting, staying with family, mothers level of education and fathers level of education) and their abuse of drugs and substances (p-values >0.05) among youths in the study area. While there is significant association between

two of the respondents characteristics (either or both parents using drugs and awareness of health implication of taking drug or substance) and abuse of drugs or substance among youth in the study area (p-values<0.05).

Table 3: Association Between Socio-Demographic Characteristics and Drug Use

Characteristic	Taking any drug or substances?	X^2	Df	P-value	Remark
	Yes (%)	No (%)			
Age group					
<18 years	14 (43.8%)	18 (56.3%)	1.049	3	.789
18-24 years	41 (35.7%)	74 (64.3%)			
25-34 years	40 (40.8%)	58 (59.2%)			
35 years and above	12 (41.4%)	17 (58.6%)			
Gender					
Male	73 (39.0%)	114 (61.0%)	.000	1	.995
Female	34 (39.1%)	53 (60.9%)			
Educational background					
No education	14 (42.4%)	19 (57.6%)	1.263	3	.738
Primary	16 (35.6%)	29 (64.4%)			
Secondary	62 (41.1%)	89 (58.9%)			
Tertiary	15 (33.3%)	30 (66.7%)			
Location					
Rural	38 (47.5%)	42 (52.5%)	3.389	1	.066
Urban	69 (35.6%)	125 (64.4%)			
Employment status					
Self-employed	34 (38.2%)	55 (61.8%)	2.524	3	.471
Public sector employee	19 (40.4%)	28 (59.6%)			
Unemployed	47 (42.3%)	64 (57.7%)			
Private sector employee	7 (25.9%)	20 (74.1%)			
Family setting					
Monogamy	50 (41.3%)	71 (58.7%)	.470	1	.493
Polygamy	57 (37.3%)	96 (62.7%)			
Staying with family					
Yes	65 (35.5%)	118 (64.5%)	2.888	1	.089
No	42 (46.2%)	49 (53.8%)			
Mother's level of education					
No education	27 (47.4%)	30 (52.6%)	4.436	3	.218
Primary	30 (44.1%)	38 (55.9%)			
Secondary	25 (32.1%)	53 (67.9%)			
Tertiary	25 (35.2%)	46 (64.8%)			

Characteristic	Taking any drug or substances?	X^2	Df	P-value	Remark
Father's level of education					
No education	14 (35.0%)	26 (65.0%)	2.011	3	.570
Primary	25 (42.4%)	34 (57.6%)			
Secondary	33 (44.0%)	42 (56.0%)			
Tertiary	35 (35.0%)	65 (65.0%)			
Either or both parents using drugs					
Yes	48 (69.6%)	21 (30.4%)	36.078	1	.000
No	59 (28.8%)	146 (71.2%)			
Awareness of health implications					
Yes	77 (48.1%)	83 (51.9%)	13.303	1	.000
No	30 (26.3%)	84 (73.7%)			

Discussion of Findings

Prevalence of drug or substance abuse

The finding of moderate (39.1%) prevalence rate of drug abuse was discovered. The finding is in contrast with that of Odejide, A. O. (16) who found that drug abuse was high. The implication of this finding is that the low proportion of prevalence rate may be due to chance. Moreover, office of National Drug Control strategy [1]. found that mostly abused drugs are for free, usually from friends and relatives made this finding not surprising because drugs that were abused may be easily gotten without much labour and difficulty. This finding agree with the findings of NDLEA [18] that despite the efforts of various tiers of government and NDLEA to stem drug abuse tide in the country, there has been a consistent rapid rise in the number of cases especially among the young adolescents (10-24 years).

Demographic variations of drug and substance abuse

In this study, lager percentage of female respondents (39.1%) engage in substance abuse compared to male respondents (39.0%) which is steeper for those in their early age compared to other age group this is contrast with the studies of [19] who also reported that majority of drug users are male respondents in a study on systematic review on prevalence and description of tobacco control and substance abuse strategies in Sub-Saharan African countries [20]. This gender difference may be attributed to societal perception as most African communities see drug abuse as a sign of masculinity or even specific to manhood and vigor [21]and also in contrast with these submissions of [9] who reported a higher proportion of respondents were male students and this suggests that the compulsive use of drugs is associated majorly with male gender. The gender differences in drug abuse are said to have their foundation in the very first stage of drug involvement and the opportunity to use the drugs. While social values discourage such act among women. However, gender differences with regard to substance use vary widely across the literature. Age, though, shows consistent

patterns, with older adolescents participating in substance use more often than their younger counterparts, with risk increasing each year from ages 10 to 17 [12]). One review of thirty-five studies indicated that most findings consistently show that childhood maltreatment is a risk factor for earlier onset of substance use [24] This may be because victims of maltreatment use drugs and alcohol as coping mechanisms rather than purely for social reasons. Thus, their onset is less dependent on the time other adolescents begin to use substances.

Conclusion

There was moderate prevalence rate of youth' drug abuse while female abuse drug or substance than male in addition and awareness of health implication of using drug or substance is significantly associated factor to drug or substance abuse.

Strength and

One of the strength of this study is that it focusses on a novel environment which is cosmopolitan area, providing valuable insights into the prevalence and patterns of drug abuse among youths in Jos North LGA, Plateau State,

Limitation

Some limitations that should be acknowledged include firstly, the cross-sectional design of the study limits the ability to infer causality. The data were collected at a single point in time, which means that while associations between variables were identified, it is not possible to determine the direction of these relationships or establish a cause-and-effect link. This limitation could affect the interpretation of findings, particularly concerning the relationships between socio-demographic factors and drug abuse.

Recommendations

Based on the findings of this study, as well as the discussions and conclusions drawn, the following recommendations are proposed to address the issue of drug abuse among youths in Jos North LGA:

Enhancing Educational Interventions: Ensuring uninterrupted school sessions is vital, as consistent educational engagement plays a key role in educating and enlightening youths about the dangers of drug abuse. Educational institutions should integrate comprehensive drug education into their curricula, focusing on the health risks, legal consequences, and long-term impact of drug use.

Establishing Specialized Government Agencies: it is recommended that specialized agencies be established at both the state and local government levels, in addition to the existing National Drug Law Enforcement Agency (NDLEA).

Targeting Gender-Specific Interventions: The study's findings indicate that females in Jos North LGA are slightly more likely to engage in drug abuse than males, challenging traditional perceptions of drug abuse as predominantly a male issue. Therefore, it is essential to adopt a multifaceted approach to drug education, with a particular focus on young females.

Supporting Families Affected by Drug Abuse: The study revealed a significant association between parental drug use and the likelihood of drug abuse among youths, underscoring the critical role of family dynamics in the perpetuation of drug abuse behaviors. It is recommended that support programs be developed to assist families where drug use is prevalent.

Policy Development and Implementation: Policymakers in Plateau State and beyond should consider the

findings of this study when formulating drug prevention and control policies. These policies should be inclusive of gender considerations, recognizing the vulnerability of both young males and females to drug abuse. Furthermore, policies that promote collaboration between schools, healthcare providers, community organizations, and law enforcement agencies could enhance the effectiveness of drug abuse prevention efforts.

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EPIDEMIOLOGICAL ASSESSMENT OF CHILDHOOD IMMUNIZATION COVERAGE AND ITS DETERMINANTS IN UGHELLI SOUTH LOCAL GOVERNMENT AREA, DELTA STATE.

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ABSTRACT

BACKGROUND: to control the spread of disease in a society Childhood immunisation is fundamental. The low level of immunization uptake among children 0-5years highlights the need to investigate parents awareness, perception and practice about childhood immunization.This study evaluates parents' awareness, perception, and practice of childhood immunization in Ughelli South, Delta State.

METHOD: A cross-sectional survey was conducted among 420 randomly selected households with children 0-5yrs in Ughelli South Local Government Area of Delta State. Data were collected from parents through a validated and reliable structured questionnaire, which assessed various factors related to parents awareness, perception and practice on childhood immunization. Discriptive statistics of mean, frequency and percentages were used to analyze the demographic, awareness, perception and practice data. Inferential statistics of The collected data were analyzed utilizing both descriptive and inferential statistical methods to determine immunization coverage and identify associated determinants.

RESULTS: This study indicated that majority of the respondents were females (371; 88.3%), a 25–34 years (44.8%), possess SSCE certificate (156; 37.1%), and Traders (140;33.3%). Findings also indicated that Among the respondents, the majority of those aware of recommended immunization hold SSCE qualifications (118), A smaller proportion of awareness is observed among those with no education (24) and FLSC (20). Conversely, lack of awareness ("No" and "Don't know") is more prominent in lower educational groups. The chi-square statistic ($\chi 2=14.884$) with 10 degrees of freedom and a P-value of 0.0136 indicates a statistically significant association between educational qualification and immunization awareness, suggesting that higher education levels are positively correlated with greater awareness. Furthermore, majority of respondents who consider child immunization "very important", strongly agree (287) or agree (105) with the effectiveness of vaccines. The Chi-square test result ($\chi^2 = 21.863$, $df = 4$, $p < 0.0001$) indicates a highly significant association between the importance of child immunization and belief in vaccine effectiveness, highlighting a strong alignment between the perceived value of immunization and confidence in its preventive efficacy.

CONCLUSION: This study reveals that majority of parents in Ughelli South local government area have awareness of childhood immunization. It also reveals that there is significant association between educational qualification and immunization awareness, suggesting that higher education levels are positively correlated with greater awareness. So therefore, educating parents and the community about the facts and myths surrounding vaccination through healthcare professionals could substantially enhance societal awareness, perception, and vaccination practices.

KEYWORDS: Childhood immunization, Awareness, Perception. Practices, Ughelli South, Delta State, Local government area, Primary health center, Vaccination, Immunization coverage, Parental knowledge

INTRODUCTION

Childhood immunization stands is a landmark public health achievement of the 20th century, significantly contributing to the control and prevention of infectious diseases. The impact of immunization programs has been remarkable, leading to the global eradication of smallpox and substantial declines in the incidence of diseases like polio, measles, and diphtheria (WHO, 2022). Vaccines contain attenuated or inactivated microorganisms, such as bacteria, viruses, or fungi, that stimulate the immune system to produce a targeted response. This immunological response enables the body to recognize and combat specific pathogens upon future exposure, conferring long-term immunity against severe and potentially life-threatening diseases (The Lancet, 2020). The primary objective of childhood vaccination strategies is to achieve high immunity levels within the population, thereby preventing the transmission of severe childhood diseases through comprehensive immunization coverage (WHO, 2020).

Enhancing well-child visits and immunization rates is essential for safeguarding the health and well-being of young populations. By adopting evidence-based strategies, healthcare providers can optimize preventive care, mitigate the risk of disease outbreaks, and foster healthy growth and development. This underscores the critical role of well-child visits and immunizations in maintaining robust public health (Centers for Disease Control and Prevention, 2022). Vaccine-preventable diseases can be highly contagious and pose significant risks to babies and young children, who are particularly vulnerable to infection due to their underdeveloped immune systems. Timely vaccination is essential for protecting their health and well-being (American Academy of Allergy, Asthma, and Immunology, 2021).

Despite the effectiveness of vaccines, global immunization coverage remains uneven, with significant gaps in many regions (WHO, 2020). The World Health Organization (WHO) reports a significant concern, with approximately 146 million infants and children worldwide remaining unvaccinated. The majority of these unvaccinated individuals are concentrated in ten countries, including Nigeria, highlighting the need for targeted efforts to improve vaccine access and coverage in these areas (WHO, 2020).

Nigeria has experienced a worrying decline in vaccination coverage in recent years, compromising the country's ability to control vaccine-preventable diseases. The proportion of children receiving the third dose of the pentavalent vaccine (Penta 3/DPT3), a key indicator of routine immunization performance, dropped significantly from 52% in 2014 to 33% in 2016, falling far short of the WHO-recommended target of 90% (Global

Alliance for Vaccines and Immunization, 2020). In 2019, 19.7 million infants worldwide missed out on essential routine immunization services, with 60% of these unprotected children residing in ten countries, including Nigeria (WHO, 2020). Nigeria has made notable progress in vaccination coverage over the past decade, according to the 2018 National Demographic and Health Survey. The proportion of children aged 12-23 months who received all basic vaccinations increased significantly from 23% in 2008 to 31% in 2018. Additionally, the percentage of children who did not receive any basic vaccinations decreased from 29% to 19% during the same period. While this trend indicates improvement in childhood vaccination coverage, it still falls short of the Sustainable Development Goal 3 target of achieving over 90% coverage. The vaccination coverage varies widely across states, with Anambra leading at 76% and Sokoto lagging behind at 5%, while Ebonyi State's coverage ranges between 34-48% (National Population Commission, 2019).

When it comes to childhood immunization, parents' awareness, perception and practice play an important role. However, there is a dearth of information on the specific awareness, perception and practice of parents regarding childhood immunization in Ughelli South local government area. This knowledge gap hinders the development of effective strategies to improve vaccination rates and prevent Vaccine preventable diseases.

CONCEPTUAL FRAMEWORK: The Conceptual framework of this study has two primary concepts that grounds the study which are "awareness and perception" and "practices related to childhood immunization." These core ideas allow us to understand the underlying themes that shape how parents engage with immunization in the Ughelli South Local Government Area.

THEORETICAL FRAMEWORK; This study draws on two key theories: the Health Belief Model (HBM) (Glanz et al., 2021) and the Theory of Planned Behavior (TPB) (Ajzen, 2020). These theories provide insight into how parents' beliefs, attitudes, social influences, and perceived barriers shape their actions concerning childhood immunization.

METHODS

STUDY AREA: Ughelli South Local Government Area (LGA), situated in the western part of Delta State, Nigeria, serves as the focal point for this research. Created in 1996, Ughelli South LGA is one of the 25 LGAs in Delta State (according to Delta state government, 1996). Geographically, it is bounded by; Ughelli North LGA to the north, Isoko North LGA to the east, Patani LGA to the south, Udu LGA to the west. With its headquarters in Otu-Jeremi, Ughelli South LGA is characterized as a rural area, with a population comprising predominantly rural dwellers engaged in agriculture, fishing, and small-scale trading (National Population Commission, 2020). The LGA covers a total area of approximately 786 square kilometers, with a diverse terrain featuring swampy and upland regions (Federal Republic of Nigeria, 2020).

STUDY DESIGN: A cross-sectional descriptive survey was adopted and carried out in Ughelli South local government area of Delta state for this study. This is appropriate because it allows for the collection of data from a large population at one point in time, focusing on awareness, perceptions, and practices of parents who have children between the ages of 0-5years. Questionnaire were designed in English and was translated in pidgin for those that don't understand English, and data were collected between

December 2025 and January 2025. The data were analyzed using SPSS (Stand for statistical product and service solutions) version 24.

STUDY POPULATION: The population of Ughelli South LGA is approximately 213,576 people (NPC, 2020). The inhabitants are predominantly, Urhobo ethnic group (60%), Isoko ethnic group (30%) and Other ethnic groups (10%) (according to Urhobo historical society, 2020).

SAMPLE SIZE CALCULATION

A sample size of 422 respondents was obtained using the Cochran's formula. The sample size estimation formula from the projected 213,576 people (NPC, 2020).

$$n_0 = \frac{Z^2 . P. (1 - p)}{e^2}$$

n□ = minimum sample size, Z = Z-value (the number of standard deviations corresponding to the desired confidence level, e.g., 1.96 for 95% confidence), p = estimated proportion of the population (if unknown, 0.5 is often used as it maximizes the sample size), e = margin of error (desired level of precision) (Singh & Masuku, 2021).

z = 1.96, p = 0.5, e = 0.05

$$n_0 = \frac{(1.96)^2 . 0.5 . (1- 0.5)}{(0.05)^2}$$

$$n_0 = \frac{(3.8416) . 0.5 . 0.5}{0.0025}$$

$$n_0 = \frac{(3.8416) . 0.5 . (1 - 0.5)}{0.0025}$$

$$n_0 = \frac{0.9604}{0.0025}$$

$n_0 = 384.16$

Since population of 213,576 is finite, applying the finite population correction formula:

$$n = \frac{n_0}{1+ \left(\frac{n_0-1}{N}\right)}$$

N = population size (213,576), n = calculated sample size for large population (384)

$$n = \frac{384}{1+ \frac{384- 1}{(213,576)}}$$

$$n = \frac{384}{1+ 0.0018}$$

$$n = \frac{384}{383}$$
(213,576)

$$n = \frac{384}{1 + 1.0018}$$

$$n = \frac{384}{1.0018}$$

n = 383.31

10% non-response rate: 10/100 x 384= 38.4 = 38

Therefore, the final sample size is 384 + 38 = 422 participants.

Inclusion criteria: Study participants were parents/caregivers who have a child aged 0-5 years, reside in Ughelli South local government area, and parents willing to participate in the study

Exclusion criteria: Individuals excluded were parents/ caregivers who are not residents of Ughelli South local government area, who do not have a child aged 0-5 years, parents who are not willing to participate in the study, and parents with communication barriers, such as severe cognitive or mental health conditions, that would prevent effective participation in the study (Creswell & Creswell, 2023).

Sampling Technique: A simple random sampling technique was adopted to select the four hundred and twenty (420) respondents that constituted the sample for the study.

STUDY INSTRUMENTS

The primary instrument was a structured questionnaire divided into three sections and the statistical analysis that was used is Ordinal coding: Awareness: Questions assessing parents' knowledge about childhood immunization. Perception: Likert scale items exploring parents' views on the benefits, risks and necessity of immunization. Practice: Questions related to the immunization practices of parents (e.g., adherence to schedules, missed vaccinations). The questionnaire comprises two parts. Part 1: The socio-demographic characteristics of the parents, and Part 2: Data on parents' Awareness, perception and practice of parents towards childhood immunization. The parents' awareness was explored with a structured questionnaire of questions, on a three-point Likert scale, ranging from "I do not know" or "No", and "Yes". For the purpose of analysis, parents who answered "No" or "I do not know" were considered an indicator of lack of awareness, and were combined and coded with a "0" score, and "Yes" answers were coded with a score of "1". A five-point Likert scale ("Strongly Agree", "Agree", "Not Sure", "Disagree", and "Strongly Disagree") were used to assess parents' perception towards childhood immunization. Strongly agree was coded (5), Agree (4), Disagree (3), Strongly disagree (2), and not sure (1). For the purpose of analysis, the "Strongly Agree" and "Agree" were combined and "Disagree" and "Strongly Disagree" were combined and "Not Sure" will stood alone. If the statement was correct, Strongly Agree and Agree were identify the percentage of people who have the awareness of immunization. For wrong statements, Disagree and Strongly Disagree were combined for lack of awareness. At the end, mean analysis was used to make a decision. The total score of awareness, perception and practice were ranged. The threshold median score for the questionnaire was considered 2 for awareness, 3 for perception and 2 for practice of immunization. A score of ≥2 was considered good awareness, ≥3 was considered a positive perception, and ≥2 for good practice, respectively.

Reliability of study instruments was tested using Cronbach's alpha to measure internal consistency. A reliability coefficient of 0.7 or above was considered acceptable. The pilot study data was also used to test the reliability of the instrument. Test-retest reliability of study questionnaires was determined.

DATA ANALYSIS

A total of 420 questionnaires were retrieved, representing a response rate of approximately 99.5% of the initial target of 422. Descriptive Statistics was used to summarize and measure the data collected from the questionnaire such as mean, and frequencies. In Inferential Statistics, Chi-square test was used to examine relationships and differences between variables. This was done to determine whether there is a significant association between parents' educational level and their awareness of childhood immunization. Furthermore, logistic regression was applied to assess the effect of various predictors, such as socioeconomic status, on the likelihood of parents vaccinating their children. SPSS version 24 was used to analyze all data including chi-square analysis of variables. Percentage was useful for summarizing and describing the frequency of responses or the distribution of categorical data.

ETHICAL CONSIDERATION

Ethical approval and clearance certificate was obtained from the Ethics and Research Committee of the Ministry of Health Delta state hospitals management board. Participants were provided with the details of the study like the purpose of the evaluation and voluntary nature of

participation. Only those who provided verbal consent were recruited in the study. Confidentiality of participants were upheld to ensure that information shared did not passed on to third parties without their consent. Privacy of all participants were ensured. Data collected were anonymous.

RESULTS

Socio-demographic characteristics of Ughelli South parents

Table 1 presents the gender distribution of respondents, revealing a significant disparity between male and female participants. Out of a total of 420 respondents, 49 (11.7%) are male, while 371 (88.3%) are female. This indicates that females constitute the overwhelming majority of the study's respondents. The cumulative percentage confirms that 100% of the respondents are accounted for, highlighting a gender imbalance in the sample population.

4.1Demographic characteristics of Respondents

Table 4.1 below indicates that majority of the respondents were females (371; 88.3%), 25-34years (188;44.8), possess SSCE (156;37.1%), traders (140:33.3%).

Table 4.1: Socio-demographic characteristics of Ughelli South parents

	Demographic	Frequency	Percent
Gender	Male	49	11.7
	Female	371	88.3
	Total	**420**	**100**
Age	15-24 years	57	13.6
	25-34 years	188	44.8
	35-44 years	138	32.9
	45-54 years	37	8.8
	Total	**420**	**100**
Educational	No education	42	10
	FLSC	21	5
	SSCE	156	37.1
	OND	98	23.3
	HND	49	11.7
	BSC/BA	54	12.9
	Total	**420**	**100**
Occupation	Trader	140	33.3
	Business	70	16.7
	Engineer	70	16.7
	Hair dresser	47	11.2
	Teacher	47	11.2

Others	46	11
Total	**420**	**100**

4.2 Awareness about childhood immunization

Table 2 below shows parental awareness about childhood immunization. The majority of parents, 413 (98.3%) have heard of childhood immunization and 287 (68.3%), were aware of the recommended immunization schedule for children in Nigeria, of which 294 (70%) got information about childhood immunization form the hospital and health center.

Awareness items	**Yes**	**No**	**N/A**
Have you heard of childhood immunization?	413 (98.3%)	0	7 (1.7%)
Are you aware of the recommended immunization schedule for children in Nigeria?	287 (68.3%)	126 (30%)	7 (1.7%)

Where did you get information about childhood immunization	**n (%)**
Health worker	49 (11.7)
Hospital/Health clinic	294 (70)
School	21 (5)
Family/Friends	42 (10)
N/A	14 (3.3)

Table 4.3 Perception on childhood immunization

Table 3 below shows the parental perception about childhood immunization. The vast majority of the parents, 399 (95%) think that childhood immunization is very important and 413 (/98.3%), either strongly agreed or agreed that childhood immunization is effective in preventing diseases, while 238 (56.7%) of parents revealed that they are either very concerned or concerned about the safety of vaccines for their children. About 350 (83.3%) of parents think that vaccines should be made mandatory for all children. On the other hand, 378 (90%) of parents attest to the fact that their children have never had side effects after vaccination and 413 (98.3%) of the parents have not recorded childhood mortality due to vaccination. Meanwhile majority of the respondent 364 (86.7%) have not experienced challenges in accessing immunization services.

Perception items	**Yes**	**No**	**N/A**
Do you think that vaccines should be mandatory for all children?	350 (83.3%)	63 (15%)	7 (1.7%)
Have any of your children experienced side effects after vaccination?	35 (8.3%)	378 (90%)	7 (1.7%)
Have you or anyone around you recorded childhood mortality due to vaccination?	2 (0.5%)	413 (98.3%)	5 (1.2%)
Have you experienced any challenges in accessing immunization services?	35 (8.3%)	364 (86.7)	21 (5%)

Do you agree that vaccines are effective in preventing diseases?	413 (98.3%)	0(0%)	7 (1.7%)
Are you concerned about the safety of Vaccines?	238 (56.7%)	182 (43.3%)	0(0%)
Do you think childhood immunization is very important?	399 (95%)	7 (1.7%)	14 (3.3%)

4.4 Practices on childhood immunization

Table 7 shows parental practices on childhood immunization. This reveals that a larger number of parents 378 (90%) have had all their children vaccinated according to the recommended schedule and have never missed vaccination appointment. Meanwhile significant number of parents 91 (21.7%) and 98 (23.3%) respectively could remember and mention 3 or 4 type of the vaccines that their children have received. On the other hand, only 49 (11.7%) of the parents could remember and mention all the vaccines that their children have received.

Practice items	**Yes n (n%)**	**No n (n%)**	**N/A n (n%)**
Have you had all your children vaccinated according to the recommended schedule?	378 (90)	42 (10)	0(0)
Have you ever missed a vaccination appointment for your child?	35 (8.3)	378 (90)	7 (1.7)

Which vaccines have your children received that you can remember?	**n (n%)**
BCG	21 (5)
BCG, OPV	21 (5)
BCG, OPV, Pentavalent	91 (21.7)
BCG, OPV, Pentavalent, PCV	98 (23.3)
BCG, OPV, Pentavalent, PCV, Measles	56 (13.3)
BCG, OPV, Pentavalent, PCV, Measles, Deworming	21 (5)
BCG, OPV, Pentavalent, PCV, Rota 1&2, Measles, Vitamin A 1&2	14 (3.3)
BCG, OPV, PCV, Pentavalent, Measles, Rota 1&2, Yellow fever, vitamin A 1&2	14 (3.3)
All vaccines	49 (11.7)
N/A	35 (8.3)

DISCUSSIONS

A total of 420 questionnaires were retrieved, representing a response rate of approximately 99.5% of the initial target of 422. This study investigated parents' awareness, perception, and practices regarding childhood immunization in Ughelli South Local Government Area. The primary objective of this research was to evaluate the level of awareness among parents about childhood immunization and its benefits. Awareness, in this context, encompasses the extent to which parents are informed about childhood immunization, including its purpose, benefits, schedules, and potential side effects. Essentially, it pertains to parents' knowledge base regarding vaccination. Existing literature emphasizes the significance of parents' awareness, as it influences adherence to vaccination schedules and the likelihood of seeking additional information (Abdulraheem et al., 2021). The findings of this study reveal that majority of parents (98.3%) are aware and have heard of childhood immunization and (68.3%), were aware of the recommended immunization schedule for children in Nigeria. An interview with a health worker revealed that majority of parents are well-informed about childhood immunization, largely due to the awareness they receive during antenatal clinics at the PHC. Parents tend to rely heavily on the information provided to them by healthcare professionals at the health center. This aligns with a study published in the Journal of Community Medicine and Primary Health Care in 2019 found that mothers in Kano State, Nigeria, had a moderate level of awareness about childhood immunization (Abdullahi et al., 2019). Another study published in the Journal of Health Education Research & Development in 2021 reviewed the awareness and perception of childhood immunization among parents in Nigeria (Abdulraheem et al., 2021). Likewise, a study published in the Pan African Medical Journal in 2021 found that mothers in Osun State, Nigeria, had a moderate level of awareness about childhood immunization. The study revealed that 76.1% of mothers had good knowledge of vaccine-preventable diseases and routine immunization (Abdullahi et al., 2019).

This study investigated parents' perceptions of childhood immunization, encompassing their beliefs, attitudes, and concerns. These deeply held beliefs can significantly influence parents' choices regarding vaccination (Ibrahim et al., 2022). Notably, the majority of parents (399, 95%) consider childhood immunization to be very important. Furthermore, 413 parents (98.3%) either strongly agreed or agreed that childhood immunization is effective in preventing diseases. However, concerns about vaccine safety were also prevalent, with 238 parents (56.7%) expressing either strong concern or concern about the safety of vaccines for their children. Parents' perception of childhood immunization plays a crucial role in determining whether their children receive timely vaccinations. A study published in the Journal of Health Education Research & Development in 2021 identified factors such as education level, socioeconomic status, and access to healthcare as influencing parents' perception of childhood immunization (Adeyinka et al., 2022).

This study also investigated the practices of parents regarding childhood immunization, including their Vaccination decisions and behaviors. Looking at parental practice on childhood immunization, this study reveals that a larger number of parents 378 (90%) have had all their children vaccinated according to the recommended schedule and have never missed vaccination appointment. Meanwhile significant number of parents

98 (23.3%) and 91 (21.7%) respectively have had their children vaccinated with about 4 or 5 type of the vaccines. The majority of respondents who consider child immunization "very important" strongly agree (287) or agree (105) with the effectiveness of vaccines, with very few disagreeing (7). Among those who find immunization "somewhat important," responses are evenly split between strong agreement (7) and agreement (7), while those who view it as "not very important" all agree (7) with no strong disagreement. The Chi-square test result ($\chi^2 = 21.863$, df = 4, $p < 0.0001$) indicates a highly significant association between the importance of child immunization and belief in vaccine effectiveness, highlighting a strong alignment between the perceived value of immunization and confidence in its preventive efficacy. A current study's findings align with this study which revealed that a significant majority of parents (82.5%) supported child immunization and recognized the role of vaccines in disease prevention (Kaur et al., 2022). Several evidence-based recommendations can be considered through improving awareness and education by implementing community-based education programs to increase awareness about the benefits and importance of vaccination. Engaging with local influencers and community leaders to promote vaccination and address misconceptions.

CONCLUSION

This study reveals that the majority of parents in Ughelli South local government area have awareness of childhood immunization. It also reveals that there is significant association between educational qualification and immunization awareness, suggesting that higher education levels are positively correlated with greater awareness.

STRENGTH OF THE STUDY

This study's findings can inform the development of targeted interventions, education programs, and policies to improve childhood immunization rates in the area. Also, focusing on Ughelli South LGA of Delta state will allow for a targeted and in-depth examination of the issues, making the findings more relevant and applicable to the local context. Additionally, the study can contribute to the existing body of knowledge on childhood immunization, particularly in Nigeria, and provide insights into the cultural, social, and economic factors influencing parents' decisions.

LIMITATION OF THE STUDY

This study is limited to Ughelli South LGA of Delta state, which may not be representative of other areas in Nigeria. This study is limited by the sampling method used, which may not ensure a representative sample of all parents in the study area. This study is limited by time constraints, which may not allow for an exhaustive examination of the research topic.

RECOMMENDATIONS

1. Develop and Implement Effective Communication Strategies: Healthcare providers should educate parents more on the benefits and risks of immunization, addressing their concerns and misconceptions and learn to talk to parents politely and with respect.

2. Strengthen Immunization Services: Government should ensure that immunization services are accessible, affordable, and of high quality, with adequate vaccine supply and employ more trained healthcare workers.

3. Establish Community-Based Outreach Programs: Government should implement

outreach programs to reach remote or hard-to-reach areas, ensuring that all children have access to immunization services.

4. Awareness: Government should ensure that more awareness are carried out through TV, radio, social media etc. They should also implement more ways to give reminders to parents for their next immunization visits, such as sending emails and text messages.

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FACTORS WITHIN THE PRIMARY HEALTH CARE SYSTEM AFFECTING COMPLIANCE WITH STANDARD INFECTION PREVENTION PRECAUTIONS AMONG COMMUNITY HEALTH PRACTITIONERS IN BAYELSA STATE, NIGERIA

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ABSTRACT

Background: The cross-sectional study explored factors in the primary healthcare system affecting compliance with infection prevention precautions and strategies to improve compliance level among community health practitioners in Bayelsa State.

Methods: The study involved 389 CHPs recruited through multistage sampling techniques. Data was collected using a mixed method techniques involving questionnaires, focus group discussions, and Key information interviews. However, 354 (91%) questionnaires were correctly filled out and returned. Item Mean Analysis was used to analyze data with a 2.0 criterion mean to determine factors affecting compliance with standard infection prevention precautions. Any item mean that is less than the criterion mean affects compliance with infection prevention precautions.

Results: The study found that a significant proportion of CHPs (139, 39.3%) are aged 48 and above, with a 'mean age' of 42 (SD = 11.3). The majority were male (217; 85%), married (190; 54%), Christian (345; 96.8%), and had served for 21-30 years (119;37%). The study identified unavailability of resources (1.2), lack of infection prevention training (1.0), and absence of policy enforcement (1.0) as key factors of the primary health care system affecting compliance with standard infection prevention precautions. Regular training on SIPP, increase availability of resources, improve staffing levels, enhance facility infrastructure, strengthen supportive supervision, enforce IPP in PHC, and provide funding for supportive supervision were considered as strategies to improve compliance level among community health practitioners.

Conclusion: The findings of this study underscore the crucial role of policymakers and government officials in addressing the factors affecting compliance with infection prevention precautions. They should commit to

infection prevention by providing resources, support, and responsible personnel for overseeing and enforcing measures at the primary health centers.

Keywords: Primary Health Care, Community Health Practitioners, Bayelsa State, infection prevention, standard precaution.

INTRODUCTION

Infection prevention and control (IPC) is a practical, evidence-based approach to prevent avoidable infections, requiring continuous action at all health system levels (1). Infection prevention policy includes hand hygiene, use of personal protective equipment, respiratory hygiene, environmental hygiene, injection safety, etc. (2). Healthcare professionals are more likely to contract infection at work when infection control procedures are not followed correctly (7).

However, a study conducted in Saudi Arabia among primary healthcare personnel indicated that the facility's compliance with standard infection prevention precautions was low (49.5%). Still, they were better (p = 0.040) among those who had training in infection prevention (6). A study conducted in Geneva also indicated that even advanced systems have deficiencies in implementing infection control policies (8,9). Another study conducted in Brazil to assess infection control structure in primary health centers indicated that it lacks most infection prevention equipment (10). Low compliance with infection prevention precautions was also discovered in health facilities in Tanzania (11). However, a cross-sectional study conducted in primary health facilities in Enugu, Nigeria, indicated poor knowledge and compliance with infection prevention and suggested more research to unravel this gap (12).

Previous studies indicated that individual, work-related, and primary healthcare systems factors were implicated (3,4,5,15). A study conducted among health workers in primary health centers in Tanzania indicated that attending IPC training or an IPC seminar in the previous year organized by the Primary Health Care system influenced their compliance with infection prevention precautions (13). Another study conducted in Italy among nurses indicated that factors surrounding the management of the system is affected their compliance level (14). However, no study has investigated the primary healthcare system factors affecting compliance with standard infection prevention precautions.

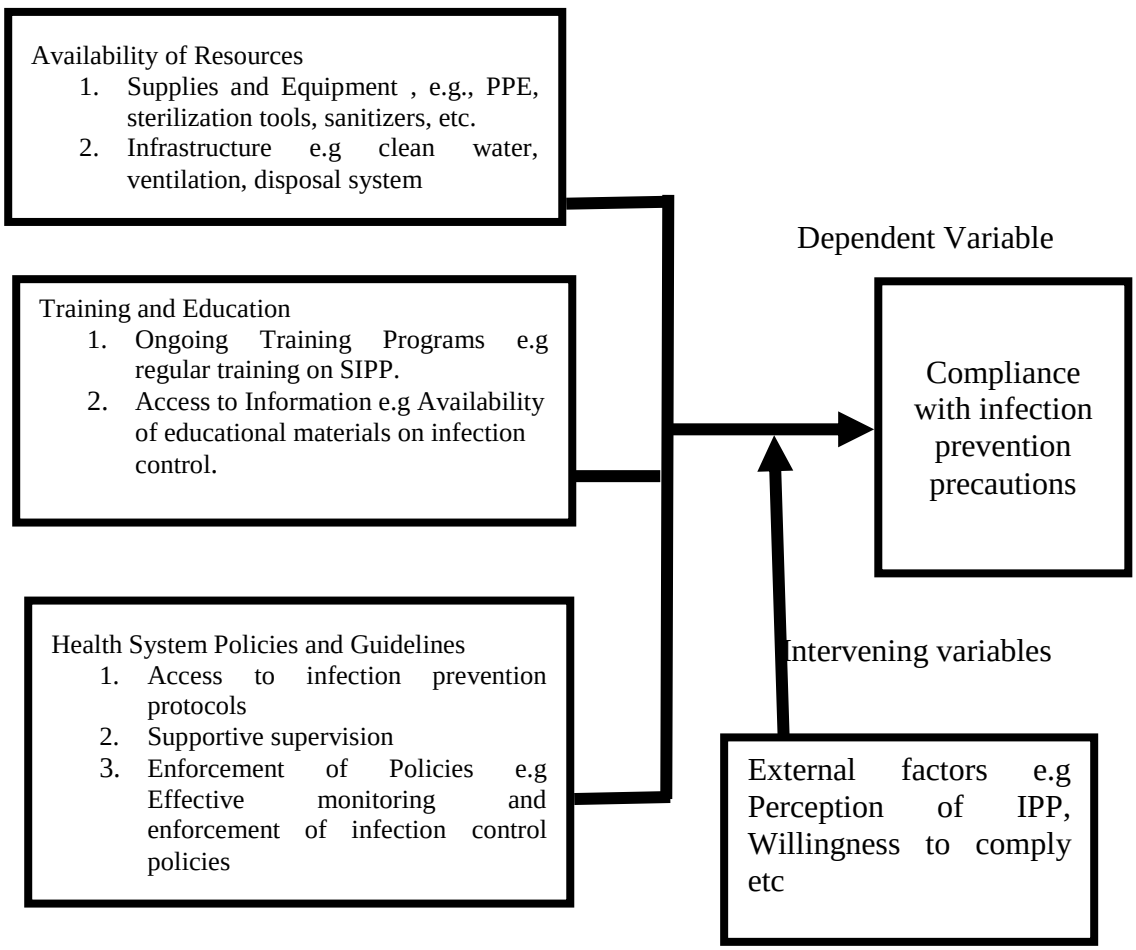
Primary healthcare (PHC) is the foundation of the healthcare system, managing non-emergency health issues and providing preventative care. It is the first point of contact for individuals, families, and communities, ensuring affordability and maintaining primary health centers throughout development. PHC also promotes health promotion and education, connecting patients with secondary care. It aims to bring health closer to the community (20). PHC is a comprehensive approach to health, focusing on people's needs from health promotion to disease prevention, treatment, rehabilitation, and palliative care, ensuring equitable distribution and the highest possible health and well-being (21).

Nigeria operates three tiers of the Health System- Tertiary Health Care System, Secondary Health Care System, and Primary Health Care System. The Federal Government funds the tertiary health system, the State Government funds the

secondary health system, and the local government owns and funds the primary health care system. The National Primary Health Care Development Agency (NPHCDA) regulates the Primary Health Care system (22). The Agency is responsible for monitoring and evaluating the National Health Policy, providing technical support for primary health care planning, management, and implementation, and mobilizing resources for its development. Every state in Nigeria is expected to have a State Primary Health Care Development Agency (23).

The study investigated the primary healthcare system factors influencing compliance with infection prevention precautions among community health practitioners in Bayelsa State. It explored the lived experiences of primary healthcare managers and community health practitioners on factors affecting compliance with infection prevention precautions in the primary healthcare system. The findings will help the system identify improvement areas and implement necessary changes, protect public health, prevent healthcare-associated infections, enhance health workers and patient safety, enhance continuous quality improvement, and guide evidence-based policy decisions.

Fig 1: **Conceptual framework**



Systemic Factors set the foundation for compliance with infection prevention precautions by ensuring that necessary resources, training, and policies are in place. Figure 1 above indicates that when factors within the primary health care system, like availability of resources, training, education, and health system policies and guidelines, are put in place, compliance with standard infection precautions is achievable. The conceptual framework outlines the key elements and their relationships that guide the research. This framework integrates systemic factors to provide a comprehensive understanding of the determinants of compliance.

Theoretical framework

Systems Theory was an effective guiding framework. This theory emphasizes that health care systems are complex entities composed of interrelated components that work together to achieve health outcomes. The Systems Theory was primarily propounded by Ludwig von Bertalanffy, a biologist who introduced the concept in the 1940s and 1950s. His seminal work, "General System Theory: Foundations, Development, Applications," published in 1968, laid the groundwork for understanding systems as interconnected components that interact to form a whole. Bertalanffy aimed to establish universal principles applicable across various scientific disciplines, emphasizing the importance of viewing organizations and systems holistically rather than as isolated parts (29,30,31).

Key Aspects of Systems Theory in Infection Prevention

1. Interconnected Components: The primary health care system includes various elements such as healthcare providers, facilities, policies, and resources. Each component influences infection prevention practices. For instance, the availability of personal protective equipment (PPE) and hand hygiene supplies directly impacts compliance rates among practitioners (29,30).

2. Feedback Loops: Systems Theory posits that feedback from different levels of the healthcare system can influence behaviors and practices. For example, if community health practitioners receive positive reinforcement (e.g., successful outcomes or recognition for adherence to infection control measures), they are more likely to maintain compliance(29,32).

3. Environmental Context: The theory acknowledges the role of external factors, such as socio-economic conditions and cultural beliefs, which can affect the implementation of infection prevention protocols. In Bayelsa State, challenges like inadequate infrastructure or limited access to clean water can hinder effective infection control practices(30,33).

4. Policy and Governance: Effective governance and clear policies are critical for establishing standards and protocols for infection prevention. Comprehensive infection prevention guidelines within health facilities correlate with improved compliance among healthcare providers(3,5). Systems Theory helps in understanding how these policies are developed, communicated, and enforced throughout the healthcare system.

5. Training and Education: Continuous professional development is essential for ensuring that community health practitioners are equipped with the latest knowledge and skills related to infection prevention. Systems Theory highlights the importance of integrating training programs into the health system to foster a culture of safety and compliance[30].

Application of theory to the study

By applying Systems Theory, researchers investigated various systemic factors—such as resource allocation, training opportunities, policy frameworks, and environmental conditions (Workload)—interact to influence compliance with infection prevention precautions among community health practitioners in Bayelsa State. This holistic approach allows for identifying leverage points where interventions could be most effective in enhancing compliance and improving overall health outcomes in the community.

Methods

Study Area

Bayelsa State was carved out of Rivers State in the Niger Delta Region of Nigeria in 1996. it's bounded to the East and West by Rivers and Delta State, with the beautiful waters of the Atlantic Ocean dominating its southern borders. Bayelsa, known as the cradle of Ijaw culture and tradition, has established a separate ministry for culture and Ijaw national affairs, mandating public servants to wear traditional attire every Friday and promoting the importance of the people's culture (17).

There are eight (8) Local Government Areas in Bayelsa State. The State is characterized by scattered villages and rural settlements, with 25% of the population living in urban villages like Ogbia, Oloibiri, Bassambiri, Okpuama, Twon-Brass and Nembe. These towns have over 10,000 residents and are now local government headquarters. Out of 1,121,493 residents of Bayelsa State, only 280,280 live in urban centers, with high urbanization in Nembe and Yenagoa. The indigenes of Bayelsa State are mostly farmers, fishermen, petty traders, and civil servants (18).

Study design

A descriptive study with a mixed-method approach was adopted to investigated factors within the primary health care system affecting compliance with infection prevention precautions and strategies to improve compliance among community health practitioners in Bayelsa State.

Study population

Community health practitioners are frontline primary health care workers in Nigeria. They are trained and licensed to provide promotive, preventive, curative, and rehabilitative health care services to people in the community and at the primary health care center (15, 30). Their educational qualifications include Certificates, National Diplomas, higher national Diplomas, Bachelor of Community Health Science (BCHS), MSc in Community Health, and Ph.D. in Community Health (16, 28). They are trained at the College of Health Technology, University Teaching Hospitals, and Universities in Nigeria. The Community Health Practitioners Registration Board of Nigeria (CHPBN) is saddled with the responsibility of Licensing and regulating the training and practice of Community Health Practitioners in Nigeria (16). In Bayelsa State, 511 Community health practitioners are employed by the State Government to provide health services in primary health care centers. Bayelsa State has about 189 primary healthcare facilities, mostly in rural areas, and are manned by community health practitioners (16, 29).

Sample Size determination

The Taro Yemen formula and a 10% response rate was used to determine the sample size of 389.

Inclusion Criteria

Community health practitioners who are employed by the Bayelsa State Government, work in primary health care settings, provided verbal consent to participate and were actively present and working at the health facility during the study period.

Exclusion Criteria

The study excluded community health practitioners who are not employed by the Bayelsa State Government, do not work in primary health care settings, declined to provide verbal consent for participation and were on extended leave or unavailable during the study period.

Sampling technique

A multistage sampling technique was employed to recruit participants for the study. First, Bayelsa State was stratified into three geopolitical zones: Bayelsa East, Bayelsa West, and Bayelsa Central. Second, a simple random sampling technique was used to select 159 communities with primary health centers within each zone. Third, 389 community health practitioners were randomly selected from these communities for participation in the study. Additionally, a snowball sampling technique was used to recruit six (6) PHC managers for the Key Informant Interviews (KII). Three focus group discussion comprising of four persons each were held in the three senatorial districts.

Study instrument

A self-structured Likert scale questionnaire of always, sometimes, and never was used for data collection. Key informant interviews and focus group discussions were used to collect qualitative data from CHPs and primary healthcare system managers.

Validity of the Instrument

The validity of the quantitative instrument is the ability to measure what it can (25). The principal investigator and analysis specialists ensured face and material validity, covering all aspects of the construct to ensure accurate content and accurate outcomes (25). The validity of qualitative data collection instruments (Interviews and focus group discussions) is based on trustworthiness (credibility, transferability, dependability, and confirmability) (27).The credibility of the qualitative data was tested through triangulation, member checks, and saturation. Triangulation involves documenting evidence from various sources, while member check allows participants to verify findings. Saturation involves continuous recruitment until rich information is gathered (27).

Reliability Test

The reliability of the quantitative instrument was also tested. Reliability refers to an instrument's ability to produce similar results when replicated under the same conditions (26). The test-retest reliability technique was used to assess the instrument's reliability. This entails conducting an overview with a group of respondents, rehashing the study with a similar gathering sometime in the not-too-distant future, and looking at the reactions at the two focuses in time (26). Twenty questionnaires were distributed to community health practitioners in yenagoa local government area of Bayelsa State. The questionnaires were distributed and retrieved immediately, and a second collection of 20 questionnaires was redistributed and retrieved immediately after two weeks. The Pearson Product Moment Correlation Coefficient was used

to compare outcomes. A coefficient of 0.76 was obtained, which is considered sufficient.

Researchers created a detailed description of interview participants' experiences on factors of the primary healthcare system affecting compliance with standard infection prevention precautions, ensuring transferability for future research. The study utilized triangulation, interviews, focus group discussions, observation, tape recorder, and field notes to ensure dependability, enhancing reliability. Researchers used a reflexivity strategy to ensure confirmability and trustworthiness in the study. They made their position explicit, acknowledging biases and values, and allowed data to speak for itself, ensuring the truth and accuracy of participant opinions.

Data collection

The study involved ethical clearance certificates from Bayelsa State Health Research Ethics Committee, permissions from the Association of Community Health Practitioners and Primary Health Care Board were obtained before the commencement of data collection. Only community health practitioners who met the inclusion criteria participated in the study. Researchers used direct delivery technique (DDT) to distributed 389 questionnaires to community health practitioners with a 30-minute time limit for responses. Three focus group discussions were conducted focus group with four practitioners from each senatorial district. Key informant interviews were conducted with primary health care managers to gather information on related variables. A tape recorder was used to document these discussions and interviews. The data collection period lasted 12 months, from December 2022-Nov 2023.

Data analysis

Quantitative data were analyzed with descriptive statistics of item mean analysis, frequency, and percentages. The scoring of the questionnaire on factors influencing SIPP compliance was analyzed by using the " 3point Likert where (3) Always , (2) Sometimes, and (1) Never) scale". The criterion mean was set at 2.0 (3+2+1 = 6/3=2.0). Data on strategies to improve compliance were analysed with simple frequency and percentages. Colaizzi's phenomenological method was used to analyze the qualitative data. The Colaizzi method is a phenomenological research method used to analyze qualitative data, identifying and extracting meaningful themes or categories to understand individual subjective experiences (19). The study investigated factors within the primary health care system affecting compliance with infection prevention precautions and strategies to improve compliance among community health practitioners in Bayelsa State. Three hundred and eighty-nine (389) questionnaires were administered, but 354 (91%) were correctly filled and returned, which was considered high for making quality inferences. Three focus group discussions with four participants each and Six key informant interviews with PHC managers that lasted for 1hr each. The data obtained were subjected to statistical analysis such as descriptive statistics (Item Mean Analysis, percentages, and frequency) using the Statistical Package of Social Sciences (SPSS) version 21. The criterion mean was set at 2.0, which means that any item mean greater than or equal to the criterion is accepted. Any item mean less than the criterion mean is rejected and is considered a factor within the primary health care system affecting compliance with infection prevention among community health practitioners in Bayelsa State. Thematic analysis was conducted on the qualitative data, extracting meaningful

themes or categories to understand individual subjective experiences.

Ethical consideration

Ethical clearance certificate was obtained from the Bayelsa State Ethical Review Committee, and all participants were dully informed. Before they were recruited for the study, consent was sought, and verbal consent were given by participants. Participants willingly participated and were free to quit the research as they wished. In developing the questionnaire, focus group discussion, and Key informant interview guide, insulting or inappropriate language was avoided. The privacy and anonymity of respondents were a top priority for the researcher. All participants were treated with respect and dignity.

RESULTS

Demographic Variables of Participants

Table 1 indicated that majority were 48 years and above (139;39.3%) with a "mean age" of 42 ('SD' = 11.3), Males (217;61%), Christian (343;99%), Married (190 (54%), possessed National Diploma in community health (CHEWS) (200;56%) possessed, and have served for 21-30years (119; 34%).

Table 1: Demographic Variables of Participants

Age	**Frequency**	**Percentages**
18-27 years	40	11.3
28-37 years	90	25.4
38-47 years:	85	24
48 and above	139	39.3%
Total	354	100
Sex	Frequency	Percentage
Male	217	61
Female	137	39
Total	354	100
Marital status	Frequency	Percentage
Single	40	11.3
Married	190	54
Divorce	85	24
Widowed	39	11
Total	354	100
Religion	Frequency	Percentage

Christianity	343	97
Islam	2	0.6
Others	9	2
Total	354	100
Educational/Professional Qualification	Frequency	Percentage
JCHEW	80	23
CHEW	200	56
CHO	30	8
BCHS	0	0
PGD	20	6
MSc	24	7
Total	354	100
Years of Service	Frequency	Percentages
1-10 years	66	12
11-20 years	72	20.3
21-30 years	119	34
31 and above	97	27
Total	354	100

Factors of Primary Health Care System affecting Compliance with Standard Infection Prevention Precaution

Table 2 indicated that resources for compliance with standard infection prevention precautions are unavailable: The item mean was 1.2 lower than the criterion mean of 2.0. Training on standard infection prevention precautions is not available. The item mean was 1.0, lower than the criterion mean of 2.0. There is no enforcement of infection prevention policy. The item mean is 1.0, lower than the criterion mean of 2.0.

Table 2: Factors of Primary Health Care System affecting Compliance with Standard Infection Prevention Precaution

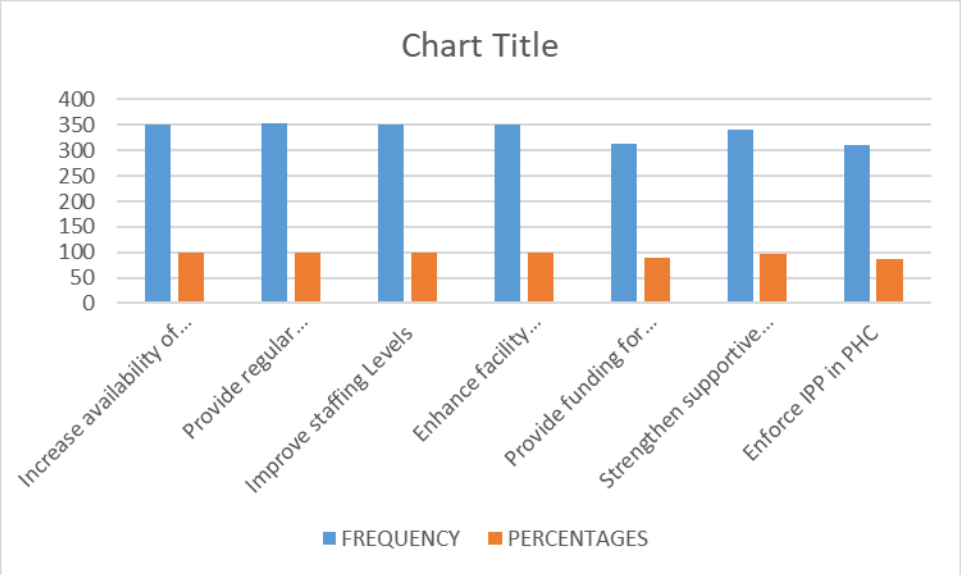
S/N	ITEMS	RESPONSES					
		ALWAYS	SOMETIMES	NEVER	TWS	MEAN	DECISION
1	Availability of resources for infection prevention e.g PPE	15 (45)	39 (78)	300(300)	423	1.2	Rejected
2	Infrastructure e.g, clean water, waste disposal system, ventilation	20(60)	25(50)	309(309)	419	1.2	Rejected
3	Regular training on Standard Infection Prevention Precaution	5 (15)	4 (8)	345 (345)	368	1.0	Rejected
4	Availability of educational materials on infection control.	200(600)	50(100)	104 (104)	804	2.3	Accepted
5	Access to infection prevention protocols	9 (27)	335 (670)	10 (10)	707	2.0	Accepted
6	Enforcement of infection prevention policies	4 (12)	2 (4)	348 (348)	364	1.0	Rejected

Strategies to improve compliance with SIPPs among community Health practitioners

Fig 2 below indicated that participants considered regular training on SIPP (354. 100%), increase availability of resources (350, 99%), improve staffing levels (352, 99.4%), enhance

facility infrastructure (350, 99%) strengthen supportive supervision (340,96%) enforce IPP in PHC (310, 88), and provide funding for supportive supervision (312, 88.1%) as strategies to improve compliance among community health practitioners in Bayelsa State.

Fig 2: Strategies to improve compliance with SIPPs among community Health practitioners.



Discussion

The findings indicated that the Primary Health Care system's factors affecting compliance with standard infection prevention precautions on infection among Community Health Practitioners in Bayelsa State include unavailability of resources for infection prevention ($\bar{x} = 1.2$) and No adequate infrastructure ($\bar{x} = 1.2$),. The item mean for availability of resources and no adequate infrastructure are significantly lower than the criterion mean of 2.0, indicating that the primary hearethcare facilities often lack the necessary infrastructure, materials and equipment to adhere to infection prevention protocols effectively. Participants in the focus group also confirmed that the government has not provided them with PPE for some years but that they go individually to the health facility with disposable gloves and sanitizers. Participants also confirmed that most facilities do not have a good water supply and that the infrastructures are dilapidated. This is consistent with previous studies that have identified shortages of personal protective equipment (PPE) as a major barrier to compliance (29,30). Another studies indicated that lack of accessibility of personal protective equipment, and lack of management support were responsible for noncompliance with infection prevention among health worker (14).). The unavailability of resources not only hinders compliance but also exposes healthcare workers and patients to increased risks of healthcare-associated infections (HAIs) (31,32). A study highlighted the lack of knowledge, infrastructure, and management support as significant impediments to implementing IPC measures effectively (36). Healthcare facilities should prioritize resource allocation to ensure that necessary equipment and materials are available for

infection prevention. This includes providing adequate PPE, maintaining a well-stocked inventory of essential supplies and providing necessary infrastructures like hand washing facilities.

Another finding of the study also indicated that health workers in primary health care facilities have no regular training on Standard infection precautions. The mean score for training on standard infection prevention precautions was 1.0, falling short of the criterion mean of 2.0. Participants in the focus group discussions also stated that they had not received training on personal protective equipment. Their knowledge of standard infection prevention precautions was based on personal studies of the infection prevention protocols available in the facility and what they learned during their school days.This suggests that healthcare workers do not receive adequate training, which is crucial for understanding and implementing infection control guidelines effectively (30). This finding aligns with a study that states that compliance with standard infection prevention precautions among healthcare workers is very low due to lack of training on standard infection prevention precautions (3). Another study indicated that attending IPC training or an IPC seminar in the previous year was identified as predictors of HCWs compliance with IPCSPs in Tanzania (31). A study at St. Francis Regional Referral Hospital at Ifakara, Morogoro region also indicated that IPC training was statistically significant to IPC compliance (33). Training is essential for updating healthcare workers on the latest practices and ensuring they can apply them correctly. Studies have shown that comprehensive and regular training programs can significantly improve compliance with infection prevention and control (IPC) guidelines (33).

Findings of the study also indicated that enforcement of infection prevention policies was lacking in the primary health care facilities in Bayelsa State. The lack of enforcement of infection prevention policies is a significant concern. The item mean for enforcement was 1.0, lower than the criterion mean of 2.0. This indicates that there is insufficient monitoring or consequences for non-compliance, which can lead to inconsistent adherence to guidelines (29,34). The key informant interview with management of the Primary Health Care System revealed that the lack of funds to conduct supportive supervision and monitoring for health workers in the primary health centers had been a challenge.This aligns with the findings of the World Health Organization that indicated that only 37% of countries have correctly implemented and monitored infection prevention and control programs nationwide, with significant gaps in low-income countries (35). This lack of implementation is often due to inadequate governance and resources, which hinder the enforcement of infection control policies (35). Monitoring by superiors or public health authorities has been shown to encourage compliance (29). Establishing clear enforcement mechanisms, such as regular audits and feedback sessions, can help maintain high levels of compliance. This could include incentives for adherence and consequences for non-compliance to ensure that policies are consistently followed (29,31). A study in a Jamaican teaching hospital found that only 17% of healthcare workers were fully compliant with all infection control policies, indicating selective adherence and a need for better enforcement (36). The study suggests that education alone is insufficient; enforcement and behavioral interventions are necessary to improve compliance (36).

The study also indicated that educational materials on infection prevention were

a**vailable** ($\bar{x} = 2.3$) and **accessible** ($\bar{x} = 2.0$). This confirms what the managers of PHC stated in the Key Informant Interview that when there are infection prevention protocols from the National Primary Health Care Agency, they ensure that these protocols are distributed to primary health care facilities. Consistent support in terms of training and resources is essential for enforcing infection control policies (37). Another study conducted in Lagos, Nigeria, among Nurses, indicated that the most reported factors affecting the practice of standard precautions were non-availability of personal protective equipment (PPE) (92.1%), lack of regular training on standard precautions (91.1%) and lack of good policy on standard precautions (81.5%) (24).

Findings also indicated that recommended strategies
to improve compliance with SIPPs among community Health practitioners are regular training on SIPP, increase availability of resources, improve staffing levels, enhance facility infrastructure, strengthen supportive supervision enforce IPP in PHC and provide funding for supportive supervision. These identified strategies are very crucial to improving compliance with infection prevention in Bayelsa State primary health care facilities. A study in Tanzania found that IPC training and years of work experience were significant predictors of high compliance with IPC standard precautions (31). Regular training ensures that practitioners are updated on the latest protocols and best practices. While training is crucial, a study noted that lack of formal training is a significant barrier, but it also highlighted that even with training, other factors like workload and time constraints can hinder compliance (30). This suggests that training alone may not be sufficient without addressing other systemic issues.

The availability of resources is a critical factor in compliance. Studies have shown that lack of resources hinders effective implementation of infection control measures (39). Ensuring that necessary resources, such as PPE, are available supports compliance. The availability of resources is often cited as a critical factor, but studies highlight that even when resources are available, other barriers such as poor infrastructure and lack of trained personnel can limit their effectiveness (40,38). This indicates that resource availability is necessary but not sufficient on its own.

Adequate staffing is recommended for maintaining high standards of care and compliance. Proper staffing ratios contribute to a safer environment for both patients and healthcare providers. Improved staffing levels can enhance the quality of care and reduce errors related to overwork. Optimizing healthcare infrastructure is vital for effective care delivery and compliance. While adequate staffing is important, notes that even with sufficient staffing, a high workload and inadequate patient-to-community health practitioners ratios can hinder compliance (40). This suggests that staffing levels must be considered in conjunction with workload management.

A study highlighted the importance of blending technology, regulatory compliance, and patient-centric design to ensure optimal care (41). Upgrading facilities can improve the environment for healthcare delivery, supporting better adherence to infection control measures. Upgrading infrastructure is crucial, but study points out that poor infrastructure is often accompanied by other challenges like inadequate waste management and non-compliance by patients (42). This underscores the need for a comprehensive approach that addresses multiple barriers.

Supportive supervision has been shown to improve IPC standards and compliance. A study in Liberia demonstrated that supportive supervision significantly enhanced IPC practices during the Ebola outbreak (43). Another study noted that supportive supervision can foster compliance and strengthen healthcare workers' performance (44). Supportive supervision is beneficial, but a study highlights that in resource-constrained settings, supervision may be limited by a lack of trained professionals and inadequate funding (40). This suggests that supervision must be supported by sufficient resources and personnel.

Enforcing IPP is crucial for reducing healthcare-associated infections. Studies emphasize the importance of implementing evidence-based interventions to control infections (39). Strict enforcement can lead to a significant reduction in HAIs and improve patient safety. Enforcement is important, but a study notes that non-compliance by patients and healthcare workers can be significant barriers (42). This indicates that enforcement must be accompanied by education and engagement strategies to foster a culture of compliance.

Funding for supportive supervision is essential for sustaining these programs. While specific studies on funding for supervision are limited, the importance of adequate resources for effective supervision is well-documented(44). Financial support ensures that supervision activities are consistent and effective. Funding is essential, but a study emphasizes that reliance on external funding sources can lead to sustainability challenges (40). This suggests that local funding mechanisms should be developed to ensure long-term support for supervision activities.

These studies highlight the importance of multifaceted strategies, complexities and challenges to improve compliance among healthcare practitioners, emphasizing training, resource availability, staffing, infrastructure, supervision, enforcement, and funding. They underscore the need for a multifaceted approach that addresses various barriers and ensures sustainability.

All recommendations in the discussion should be moved to the recommendation section below; if they are not highlighted there already.

Be coincise in the discussion. The overall number of pages are too much. Reduce them to maximum of 20 pages

Strength and Limitations of the study

Strengths:

i. The use of a multistage sampling approach ensures a representative selection of community health practitioners across different regions of Bayelsa State.
ii. The combination of quantitative (survey) and qualitative (Key Informant Interviews) methods enhances the depth and reliability of the findings.
iii. By focusing on community health practitioners within primary health care settings, the study provides valuable, contextually relevant information for improving healthcare delivery.
iv. The involvement of managers through Key Informant Interviews allows for a broader understanding of systemic factors affecting community health practice.

Limitations:

1. The use of snowball sampling for managers may lead to the recruitment of participants with similar

perspectives, limiting diversity in responses.

2. The reliance on verbal consent and self-reported responses may introduce recall bias or social desirability bias.

3. Findings may not be fully generalizable beyond the study area, as healthcare structures and policies may differ in other states or regions.

4. Since participants were selected from those actively present at health facilities, the study may have excluded practitioners on leave or those engaged in outreach services, potentially missing important perspectives.

Recommendation

The findings of this study underscore the crucial role of policymakers and government officials in addressing factors affecting compliance with infection prevention precautions in Primary Health Centers.

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They should commit to infection prevention by providing resources, support, and responsible personnel for overseeing and enforcing measures at the primary health centers. Who are "They" highlighted?

Improving compliance with standard infection prevention precautions (SIPPs) among community health practitioners in Bayelsa State has the potential to drive significant social change by reducing the spread of infectious diseases, enhancing community trust in healthcare services, promoting healthier populations, and strengthening the overall resilience of the primary healthcare system.

Add recommendations from discussions section

Conclusion

Findings indicate that multiple PHC System factors like the unavailability of infection prevention resources, lack of training on infection prevention and how to use PPE, inadequate infrastructures and the non-enforcement of infection prevention policies influence compliance with infection prevention precautions among community health practitioners in Bayelsa State. Addressing these factors through regular training on SIPP, increase availability of resources, improve staffing levels, enhance facility infrastructure, strengthen supportive supervision, enforce IPP in PHC, and provide funding for supportive supervision is essential for enhancing compliance with IPC measures at the primary health centers in Bayelsa State..

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Conflicting Interest

The Authors declared no conflicting interest.

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