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Assessment of Household Hygiene, Potable Water Sources, and Sanitation Practices in Ikpoba Okha Local Government Area, Edo State, Nigeria

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ABSTRACT: Access to potable water and proper sanitation remains a pressing global issue, particularly in developing regions like Nigeria, where waterborne diseases are prevalent due to inadequate water and sanitation facilities. Consequently, the paper assesses household hygiene, potable water sources, and sanitation practices in IkpobaOkha Local Government Area, Edo State, Nigeria using appropriate standardized procedures with structured questionnaires surveying 1,131 households with children under ten. Results indicated that 83.6% of households rely on boreholes as their primary water source, 9.5% use wells, and 3.4% harvest rainwater. The study in IkpobaOkha LGA showed that 63% of households (708 out of 1,131) do not treat their drinking water, raising significant public health concerns. The findings also reveal diversity in sanitation practices, with 431 households using pit latrines, 594 utilizing flush toilets connected to pit systems, and 106 relying on bush toilets. These patterns highlight varying access to improved sanitation facilities. In terms of water storage, 512 households use tanks, 371 use plastic buckets, and 248 use wooden pots. The frequency of cleaning water storage facilities also varies, with 68 households cleaning weekly, 138 bi-weekly, 564 monthly, 352 quarterly, and nine (9) annually. Only eight (8) children visit hospitals weekly, 171 bi-weekly, 364 monthly, 486 quarterly, and 102 yearly. Most children (486) visit quarterly, suggesting a preference for routine health check-ups. The regression results indicated a statistically significant relationship between poor sanitation and water sources. Significant challenges in water quality, sanitation infrastructure, and hygiene practices were identified. The study highlights the need for improved sanitation, water treatment methods, and infrastructure development to mitigate public health risks and achieve Sustainable Development Goal 6, ensuring clean water and sanitation by 2030.

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Access to potable drinking water and sufficient sanitation continues to be an urgent global concern, particularly in developing regions where constrained resources, inadequate infrastructure, and swift urbanization converge to intensify these difficulties. According to World Health Organization (WHO)over 2 billion individuals worldwide lack access to safe drinking water, while around 4.2 billion reside without enhanced sanitation facilities (WHO, 2019). The widespread occurrence of waterborne diseases like diarrhea, cholera, and typhoid contributes substantially to high mortality rates, especially among children under the age of five (Okesany *et al.*, 2024). These illnesses are largely caused by unsafe

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drinking water, poor sanitation, and insufficient hygiene practices, which are common in low- and middle-income countries. Factors such as socioeconomic challenges, malnutrition, and limited access to clean water further increase the susceptibility of children to these diseases (Mshida *et al.,* 2018 Nigeria faces a severe water crisis, with millions lacking access to safe drinking water and sanitation. Nigerians lack clean water, while over 110 million lack proper sanitation (Efe *et al.,* 2024). Contaminated water causes 80% of global diarrheal deaths, highlighting the urgent need to improve water quality (Mapingure *et al.,* 2024). Oluwaseyi *et al.,* (2023) assessed the quality of drinking water in households within Ogbomoso North Local Government Area, Nigeria, highlighting inadequate access to Water, Sanitation, and Hygiene (WASH) facilities and high coliform contamination levels. It found that 63% of households had high coliform counts, influenced by the presence of toilet facilities and water sources. Adamu*et al.,* (2022) found that having an unimproved water source significantly increases the odds of diarrhea among Nigerian households, with an odds ratio of 1.59 after controlling for various factors. Additionally, the absence of soap/detergent for hand washing and a refrigerator in the home were also linked to higher diarrhea prevalence. Imarhiagbe *et al.,* (2023) evaluated the water supply, sanitation, hygiene, and health status of residents in the Ekosodin community, revealing that 72.7% of respondents relied on boreholes for water, while 67.3% had access to soap and water for hand hygiene, although there was a notable prevalence of health issues such as vomiting (66.7%) among participants . Additionally, the findings indicated a need for improved sanitation facilities, as 24.7% of respondents expressed the necessity for more toilets, highlighting the importance of community-based interventions to enhance hygiene practices In Ekosodin community, significant majority of the households (94.2%) had access to water, primarily from boreholes, but over 32.7% of these households did not treat their water before use, indicating potential health risks. Additionally, while most respondents practiced hand washing after using the toilet, there were notable deficiencies in sanitation infrastructure, with 57.9% of houses lacking drainage systems and 56.4% without waste storage facilities, underscoring the need for improved WASH services in the community (Rawlings and Seghosime, 2022). WASH practices in selected primary healthcare centers in Owerri West LGA, Imo State, reveals that 55.6% of respondents sometimes washed their hands daily, while only 23.0% reported always washing their hands, indicating a moderate level of hygiene practice among healthcare workers and patients . Additionally, the research highlighted that 37.5% of respondents used removable plastic waste collection containers for healthcare waste disposal, and there was a significant association between hand washing practices and the socio-demographic characteristics of the respondents, emphasizing the need for enhanced WASH education in healthcare settings (Orji *et al.,* 2024).Adelekan *et al.* (2020) explored the conditions of water and sanitation in rural communities within the Niger Delta and unveiled considerable challenges regarding water quality and availability, stemming from subpar infrastructure and environmental deterioration. Adamu, Andrade, and Singleton, (2022) discovered that unimproved water sources had higher odds of reporting diarrhea (odds ratio 1.59), even after controlling for socio-demographic and household factors. Ezugwu and Obi (2019) assessed water quality in urban slums in Enugu, elucidating the health risks associated with contaminated water sources. Analyzing the water access and sanitation issues in Ikpoba Okha is essential for mitigating public health risks and fostering sustainable development. Safe water and sanitation are integral components of the United Nations' Sustainable Development Goals (SDG 6), which aspire to guarantee universal access to clean water and sanitation by the year 2030. The burgeoning population in Ikpoba Okha, in conjunction with swift urbanization, has exerted mounting pressure on the existing water infrastructure, which frequently proves insufficient to satisfy the demands of inhabitants. This predicament necessitates a comprehensive evaluation of the water sources, hygiene practices, and sanitation facilities accessible to households within the region. This research endeavors to bridge the gaps in comprehension by delivering a meticulous assessment of potable water sources, domestic hygiene, and sanitation practices in Ikpoba Okha Local Government Area, Edo State. Consequently, the objective of this paper is to assess household hygiene, potable water sources, and sanitation practices in Ikpoba Okha Local Government Area, Edo State, Nigeria

MATERIALS AND METHODS

Study Area: Ikpoba Okha, located in Edo State, Nigeria, is part of the Benin metropolis, characterized by diverse topography, including plains, plateaus, and river valleys (Ikhile, 2016). The region's fertile soils, like ferralitic and lateritic types, support a variety of agricultural activities (Imadojemub *et al.,* 2018). Hydromorphic and alluvial soils in river valleys enable wetland agriculture, especially rice cultivation (Rao *et al.,* 2016).

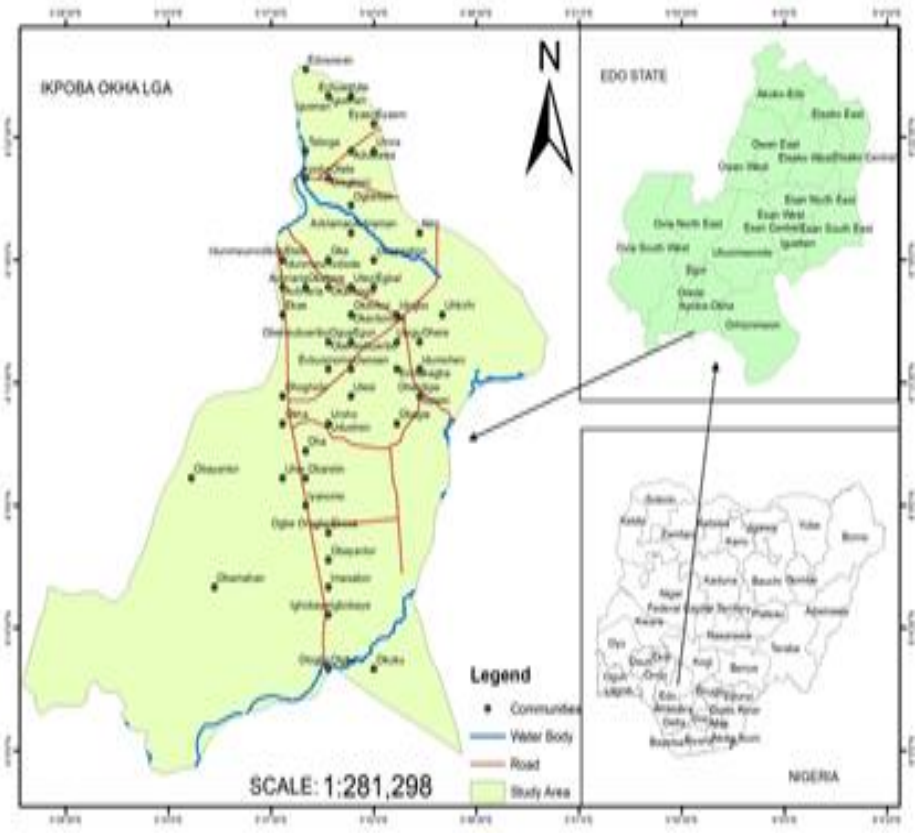

Fig. 1: Map of Nigeria showing Edo State and Ikpoba Okha LGA
Source: Omoregie, and Okoro, (2024)

Granite, shale, and limestone form the prevalent rock types, with sandstone deposits found along river valleys (Odokuma-Alonge *et al.,* 2019). The climate in Ikpoba Okha features tropical conditions with distinct wet and dry seasons (Floyd *et al.,* 2016). Heavy rainfall during the wet season causes frequent flooding in urban areas due to inadequate drainage, while dry seasons bring dusty Harmattan winds (Ejemeyovwi *et al.,* 2021). Vegetation ranges from dense rainforests in the south to savanna woodlands in the north, supporting agriculture, fishing, and diverse ecosystems, including freshwater swamp and mangrove forests, which play a role in flood regulation and habitat preservation (Igu *et al.,* 2020; Uche, 2023). Economic activities include subsistence and commercial agriculture, with crops such as cassava, yams, maize, and oil palm (Kubkomawa and Kenneth-Chukwu, 2019).

Sample Collection and Treatment: Data collection was carried out across eight different communities to provide a comprehensive overview of water sources, hygiene practices, and sanitation standards. The target sample size consisted of 1,131 households with children under ten years of age. Questionnaires were designed and administered to collect data on the type of water sources used, water treatment methods, and sanitation practices within these households. The study used the Yaro Yamani method to determine the appropriate sample size, ensuring adequate representation for statistical analysis. This phase of the research focused on collecting primary data to capture the actual conditions of water access and hygiene practices in the area.

Data Analysis: The data gathered from the structured questionnaires were analyzed to examine the connections between water sources, household hygiene, and sanitation practices. This data was crucial for identifying patterns and trends related to water quality and public health outcomes in the communities. The qualitative data collected from the survey responses provided insights into personal practices and household management of water and sanitation. These were complemented by quantitative data, which allowed for a broader statistical evaluation of the issues.

Statistical Data Evaluation: Data from the 1,131 households were analyzed using descriptive statistics, Regression analysis was also performed to evaluate the null hypothesis.

RESULTS AND DISCUSSION

In Ikpoba Okha LGA, households utilize diverse primary drinking water sources (Fig. 2). Survey data show that 27 households rely on streams, likely due to geographical proximity and lack of alternatives, while 109 depend on wells, reflecting traditional water extraction methods

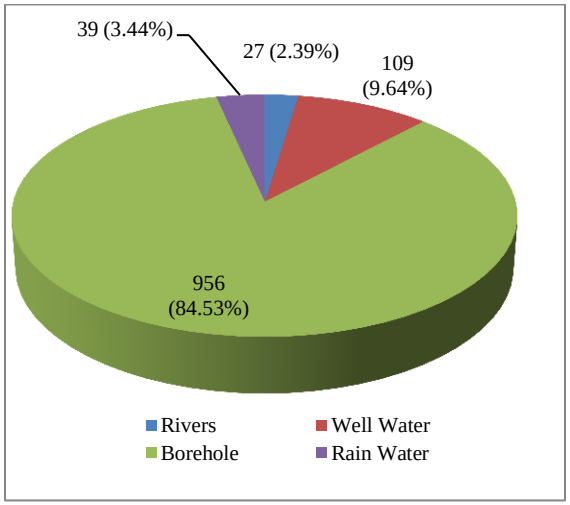

Fig. 2: Primary source of drinking water from household

The majority, 956 households (83.6%), use boreholes, indicating a preference for cleaner and more reliable groundwater sources. Additionally, 39 households harvest rainwater, a practice facilitated by substantial rainfall and suitable storage systems. This reliance on boreholes aligns with trends in southern Nigeria, where groundwater is increasingly favored over polluted surface water. Nwachukwu, and Onyenechere (2023) highlight widespread borehole use as communities seek safer alternatives amidst environmental degradation and water contamination. However, the use of wells in Ikpoba Okha (9.5%) contrasts with other urbanized parts of southern Nigeria, such as Ogbomoso, where wells are less common (Oluwaseyi *et al.*, 2023). This may reflect cost constraints or limited borehole infrastructure, paralleling rural areas in the Southeast. The collection of rainwater by 39 households highlights the importance of rainwater harvesting in regions like Bayelsa and Cross River, where contamination of surface water is prevalent. These patterns underscore the complexity of water access challenges in Ikpoba Okha, shaped by local geography, rainfall, and infrastructure availability, mirroring broader trends in southern Nigeria. In IkpobaOkha LGA, households exhibit varying water access frequencies, shaped by storage capacity and water needs (Fig. 3). Survey data indicate that 235 households access water daily, reflecting high dependence on regular collection due to limited storage or the need for fresh water. This trend aligns with findings in the Niger Delta, where Nkwocha, (2009) reported frequent daily trips to boreholes and rivers due to inadequate storage facilities.

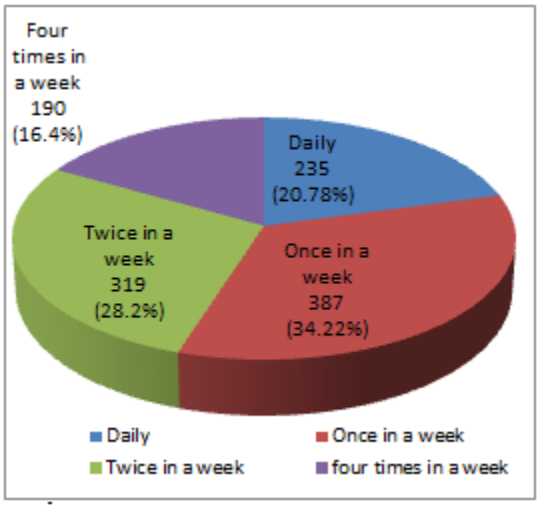

Fig. 3: How often do you access water from the primary source?

Conversely, 381 households access water once a week, suggesting better storage systems that reduce the need for daily collection. Manga *et al.* (2021) noted that households with larger tanks could store sufficient water for longer periods. Additionally, 319 households collect water twice a week, reflecting moderate storage capacities and balancing between daily and weekly collection. This pattern mirrors findings by Oluwaseyi *et al.* (2023) in Ogbomoso, where moderate access frequencies were influenced by water availability and household needs. Finally, 190 households access water four times a week, suggesting smaller storage capacities that necessitate more frequent trips but not on a daily basis. These access patterns highlight the complexity of water availability and household storage capacities in Ikpoba Okha, influenced by local infrastructure and water needs, reflecting broader trends in southern Nigeria.

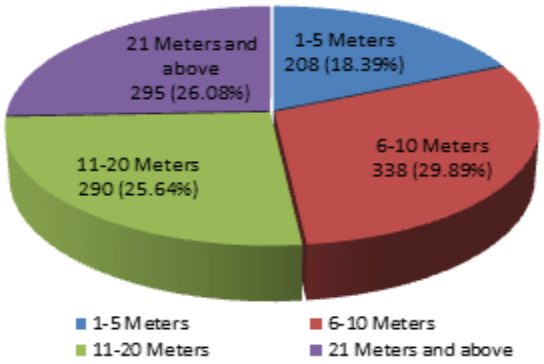

Fig. 4: Distance of the primary water source

In Ikpoba Okha LGA, the distances households travel to access their primary water source vary significantly, influencing water accessibility and usage (Fig. 4). Survey data show that 208 households have their water source within 1–5 meters, offering convenience and ease of access. Another 338 households travel 6–10 meters, while 295 households face distances of 11–20 meters, requiring more effort and time. Notably, 290 households travel over 21 meters, a significant challenge that can limit water collection frequency and availability for daily use. This variation aligns with broader patterns in South-South and Southeast Nigeria. Obisesan, and Famous, (2016) reported that households in Delta State face similar challenges, with those traveling beyond 15 meters often experiencing reduced water usage due to logistical barriers. The disparity in water access distances underscores the need for infrastructural improvements to ensure equitable water distribution. While urban areas have made progress, rural and semi-rural regions, such as Ikpoba Okha, remain disproportionately affected, highlighting the critical importance of addressing water accessibility challenges to enhance living conditions.

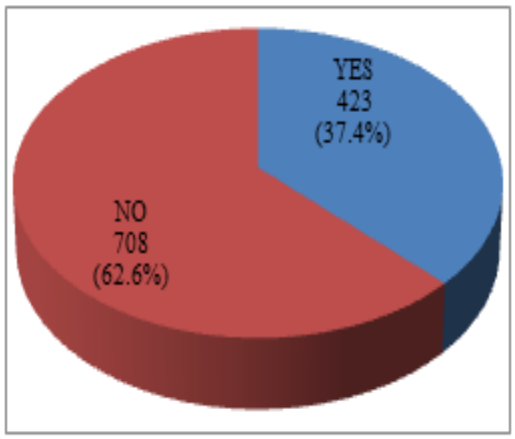

Fig.5: Treatment of water before consumption

In Ikpoba Okha LGA, water treatment practices before consumption reveal a stark divide among households (Fig. 5). Survey data show that 423 households (37%) treat their water using methods like boiling, filtering, or chemical disinfectants, reflecting awareness of waterborne health risks. Conversely, 708 households (63%) do not treat their water, raising concerns about exposure to contaminants and the safety of consumed water. This pattern aligns with findings across South-South and Southeast Nigeria. In Enugu State study found that while urban households were more likely to treat water, up to 50% of rural households lacked such practices due to cost barriers and insufficient public health outreach (Okpasuo *et al.,* 2020). In Delta State, untreated water was linked to gastrointestinal illnesses in communities reliant on surface water sources (Edeki *et al.,* 2023). These findings underscore the persistent challenge of promoting safe water practices in rural and underserved areas. Expanding education programs and improving access to affordable treatment methods are crucial for addressing this public health issue. Strengthening community awareness and providing resources can help reduce the health risks associated with untreated water consumption in Ikpoba Okha and similar regions.

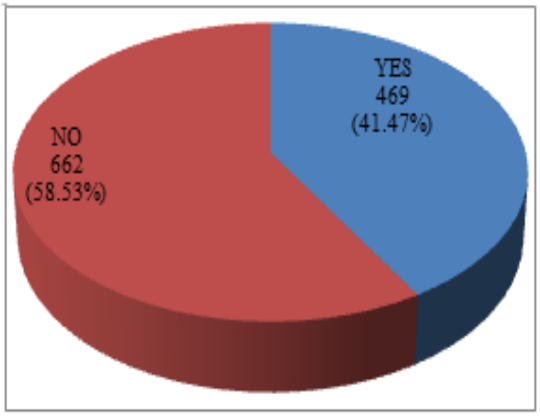

Fig. 6: Access to improved water hygiene facilities

The survey in Ikpoba Okha LGA highlights significant disparities in access to improved water hygiene facilities (Fig. 6). While 469 households (38%) reported access to safe water handling and hygiene infrastructure—such as hand washing stations, soap, clean water storage, and sanitation facilities—749 households (62%) lack such access.

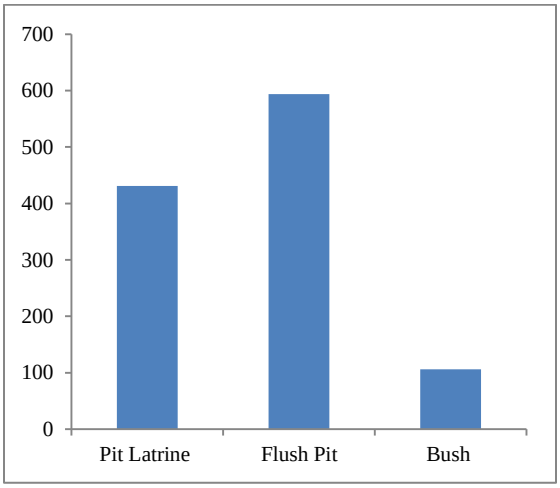

Fig. 7: Toilet Type

This deficit poses serious public health risks, increasing vulnerability to waterborne diseases due to

inadequate hygiene practices.Similar trends are evident across South-South and Southeast Nigeria. The findings underscore an urgent need for targeted infrastructural development in rural and semi-urban areas to bridge these gaps. Investments in water hygiene facilities, combined with community education, are critical to reducing health risks and promoting well-being in underserved communities like Ikpoba Okha.

The survey in Ikpoba Okha LGA reveals diverse household sanitation practices (Fig. 7). Among respondents, 431 households (33%) use pit latrines, a traditional and cost-effective option; 594 households (45%) utilize flush toilets connected to pit systems, indicating a preference for improved sanitation; while 106 households (8%) rely on bush toilets, reflecting inadequate access to sanitation facilities. This distribution highlights disparities in sanitation infrastructure and access within the community. Similar trends are observed in other regions.

In Esan West LGA, Edo State, Abubakar (2017), found that 44.2% of households used pit latrines, 10.3% had flush toilets connected to septic tanks, 5.3% used sewer-connected toilets, 31.5% lacked any sanitation facilities, and 8.7% used other types.The prevalence of improved sanitation facilities, such as pit latrines and flush toilets, signifies progress, yet the continued use of bush toilets underscores ongoing challenges. Addressing these requires infrastructural investments, financial support, and community awareness campaigns. Collaborative efforts among governments, NGOs, and local stakeholders are critical for achieving sustainable and equitable sanitation access.

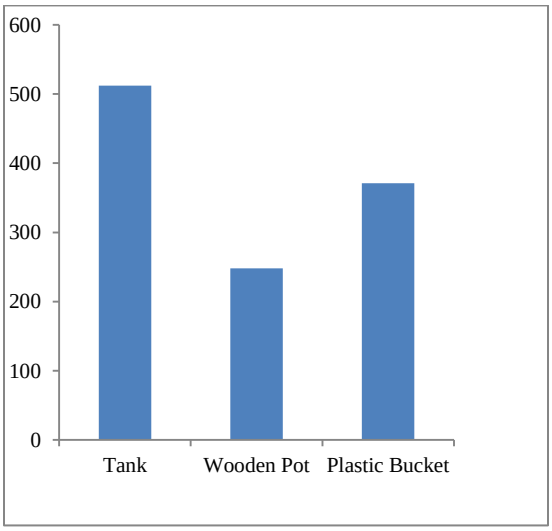

Fig. 8: Water storage facilities

Households in Ikpoba Okha LGA employ diverse water storage methods, reflecting economic considerations and resource availability (Fig. 8). The survey reveals that 512 households (45%) use tanks, valued for their large capacity and reliability, 371 households (32%) use plastic buckets due to affordability and portability, and 248 households (22%) use wooden pots, likely tied to traditional practices. Similar trends are observed in other regions.

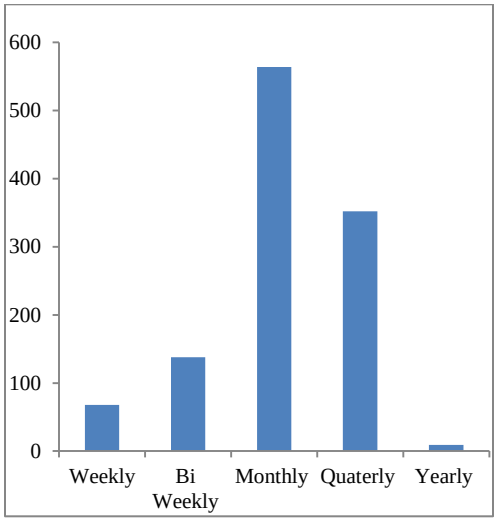

Fig. 9: How often do clean your water storage facilities

The reliance on tanks in Ikpoba Okha mirrors regional patterns, emphasizing their importance in areas with intermittent water availability (Fig. 9). Plastic buckets are common among households with limited financial resources, while wooden pots reflect traditional practices. Addressing water storage challenges in these regions requires affordable, effective storage solutions and community education on water management. Such efforts can enhance water security, reduce health risks, and promote sustainable water practices. In Ikpoba Okha LGA, the frequency of cleaning water storage facilities highlights efforts to maintain water quality, with 68 households cleaning weekly, 138 bi-weekly, 564 monthly, 352 quarterly, and 9 annually. Monthly cleaning is the most common practice, reflecting a balance between effort and effectiveness. The significant number of households in Ikpoba Okha cleaning quarterly or less frequently suggests a need for targeted interventions. Public health campaigns emphasizing the risks of infrequent cleaning could further improve water hygiene practices. Overall, the prevalence of regular cleaning demonstrates community awareness, but localized efforts remain critical to enhancing water quality and public health outcomes.

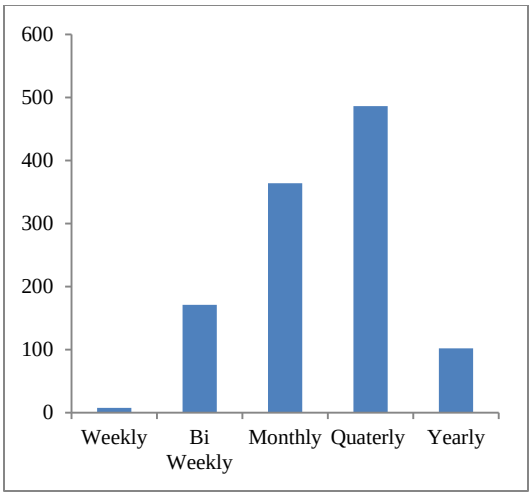

Fig. 10: How often do your child/children visit hospital?

The frequency of hospital visits among children in Ikpoba Okha LGA varies, with 8 children visiting weekly, 171 bi-weekly, 364 monthly, 486 quarterly, and 102 yearly (Fig. 10). Quarterly visits are most common, likely due to routine health monitoring and immunization schedules, while yearly visits may reflect annual check-ups or less frequent medical needs. The trends in Ikpoba Okha demonstrate a focus on regular child health check-ups influenced by public health campaigns, school requirements, and immunization schedules. However, the low number of weekly and bi-weekly visits in Ikpoba Okha may reflect fewer acute health issues or barriers to frequent healthcare access. Addressing these barriers through improved infrastructure, workforce expansion, and health education could enhance healthcare accessibility and optimize child health outcomes.

Conclusion: The study identifies major challenges with potable water sources, hygiene, and sanitation in Ikpoba Okha LGA, Edo State. Reliance on contaminated boreholes, wells, and surface water contributes to the spread of waterborne diseases, while poor sanitation practices like open defecation worsen public health risks and environmental degradation. To address these issues, the government must prioritize upgrading water infrastructure, ensuring regular water quality monitoring, and investing in sanitation facilities to reduce open defecation. Public health campaigns should focus on educating residents about water treatment, hygiene, and waste management. Establishing community-based water management programs will encourage local involvement and resource sustainability. Collaborative efforts between the government, private sector, and communities are essential for improving public health and achieving long-term water sustainability goals.

Declaration of Conflict of Interest: The authors declare that there is no conflict of interest

Data Availability Statement:Data are available upon request from the first author or corresponding author

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