PRINT ISSN 1119-8362
Electronic ISSN 2659-1502

Full-text Available Online at
https://www.ajol.info/index.php/jasem
https://www.bioline.org.br/ja

J. Appl. Sci. Environ. Manage.
Vol. 27 (11) 2611-2618 November 2023

Water, Sanitation, Hygiene and Health Status of Ekosodin Community Residents, Benin City, Edo State, Nigeria

***[1,2]IMARHIAGBE, EE; [3]ONWUDIWE, CC; [1]AKAHOMHEN, M**

[1]Department of Environmental Management and Toxicology, Faculty of Life Sciences, University of Benin, Benin City.
[2]Applied Environmental Bioscience and Public Health Research Group (AEBPH RG), University of Benin, Benin, Edo State, Nigeria
[3]Department of Microbiology, Faculty of Life Sciences, University of Benin, Benin City.

**Corresponding Author Email: esosa.imarhiagbe@uniben.edu, ORCID ID: https://orcid.org/0000-0001-6339-0980*
Co-Authors: medichem1@yahoo.com, magdalenea84@gmail.com

ABSTRACT: Healthy living has been known to be linked to availability of portable water supply, clean sanitation, access to good hygienic and attainment of nice healthy status. Hence, the objective of this study was to evaluate the assess level of water supply sanitation, hygiene and health status of residents of Ekosodin community, Edo State using a structured questionnaire from 300 respondents analyzed with Statistical Package for the Social Sciences (SPSS), version 22. Findings showed that residents of the community primarily relied on boreholes as their main water source, with 72.7 % of respondents indicating its usage. The sanitation facilities, such as toilets, were predominantly available, but there was a need for additional facilities, as indicated by 24.7 % of respondents. In terms of hand hygiene, 67.3 % of participants reported the availability of soap and water in their premises. Moreover, 82.7 % of respondents stated that they had separate containers for bathing and storing drinking water, contributing to improved hygiene practices. Health status' findings revealed the prevalence of vomiting (66.7 %) among participants. Hospital/clinic facilities were the primary choice for medical treatment (74.7%), followed by herbal preparations (25.3%). In conclusion, a community-based intervention program needs to be carried out to educate the populace of Ekosodin residence on maintenance of hand washing practices, toilets and sanitary facilities.

DOI: https://dx.doi.org/10.4314/jasem.v27i11.33

Cite this paper as: IMARHIAGBE, E. E; ONWUDIWE, C. C; AKAHOMHEN, M. (2023). Water, Sanitation, Hygiene and Health Status of Ekosodin Community Residents, Benin City, Edo State, Nigeria. *J. Appl. Sci. Environ. Manage.* 27 (11) 2611-2618

Dates: Received: 30 September 2023; Revised: 29 October 2023; Accepted: 07 November 2023 Published: 30 November 2023

Keyword: hygiene, Health status, portable water supply, sanitation, respondents

Improving public access to sanitation services in a rapidly urbanizing world is an increasingly important, yet challenging issue for governments, international development agencies, urban planners, and sanitation practitioners (Mara *et al*., 2010). Several efforts have been made to provide the global population with sustainable access to safe drinking water and adequate sanitation (Ohwo and Agusomu, 2018). Report from the Water Project (2016) has shown that inadequate water, sanitation and hygiene (WASH) account for a large percentage of global population's illness and mortality, especially in developing countries. Sanitation is defined as a system that promotes proper disposal of human and animal waste for improving and protecting public and environmental health. An improved sanitation facility is that which hygienically separates excreta from human contact, and is used by only members of one household: toilets flushing to sewer systems or septic tanks, ventilated improved pit (VIP) latrines, pit latrines with a slab, and composting toilets (United Nations, 2010). However, about 32% of the global population, or about 2.4 billion people, do not have access to improved sanitation. Of these, about 1 billion people defecate in the open (Montgomery and Elimelech, 2007). In 2015, 62% of the population in the least developed countries relied on unimproved sanitation facilities (pit latrines without a slab, flush to pit latrines or to somewhere else, and bucket and

hanging toilets), shared facilities, or defecation in the open (Adams *et al*., 2016). The improved standards made possible by sanitation and hygiene include, among others, better physical health, protection of the environment, better educational outcomes, convenience, time savings, assurance of lives lived with dignity, and equal treatment for both men and women (Benova *et al*., 2014; Imarhiagbe *et al.*, 2023). Improved sanitation and hygiene are central to reducing poverty, promoting equality, and supporting socioeconomic development. According to Gaffan *et al*. (2022), in sub-Saharan Africa, approximately 700 million people of the population lacked access to improved sanitation. The negative impact of poor sanitation on human and environmental health has been widely acknowledged and includes exposure to acute excreta-related illness such as diarrhea, cholera, dysentery, typhoid, and hepatitis A, contamination of drinking water sources, environmental degradation, and contributes to malnutrition and poor school attendance in children (Wolf *et al*., 2018; Luby *et al*., 2018). Although the MDG target 7c does not provide a global indicator for hygiene, the data on the presence of a handwashing facility with soap and water are increasingly collected as part of nationally representative surveys and will form the basis for efforts to monitor target 6.2 of the SDGs (Freeman *et al*., 2014). Many benefits of hygiene and sanitation interventions are non-health in nature; including only health effects in impact evaluations can severely underestimate the intervention benefits (Loevensohn *et al*., 2015). Lack of sanitation leads to the transmission of pathogens through feces and, to a lesser extent, urine. Diseases transmitted by the fecal pathway include diarrheal disease, enteric infection, hepatitis A and E, poliomyelitis, helminths, trachoma, and adenoviruses (conjunctivitis) (Strickland, 2000). Most of these diseases are transmitted through the fecal-oral pathway, but some are transmitted through the fecal-skin pathway (for example, schistosomiasis) and the fecal-eye pathway (for example, trachoma) (Strickland, 2000). In Nigeria, children under 5 years old have a 38% higher risk of dying from lack of improved sanitation and water sources (Mehndiratta *et al*., 2014). This study evaluated the Water, Sanitation, Hygiene and Health status of Ekosodin community residents, Benin City, Edo state in Nigeria.

MATERIALS AND METHOD

Study area: Ekosodin community is positioned to the east of Isihor within the Ovia North-East Local Government Area (LGA) of Edo State, as indicated in Fig1. The Ovia North-East LGA, with its administrative center in Okada town, covers an expanse of 2,301 square kilometers (Akinbo and Okaka, 2010). It is situated within the coordinates of 5º 451 to 6º 151 east longitude and 5º 151 to 6º 451 north latitude, within the central province of Edo State. As of the 2006 census conducted by the National Population Commission, Ekosodin community was estimated to have a population of 7,000 people. This population has been projected to grow by 543.2% using a geometric method, reaching an estimated 45,000 people by the year 2022 (Ogeah and Ajalaye, 2011).

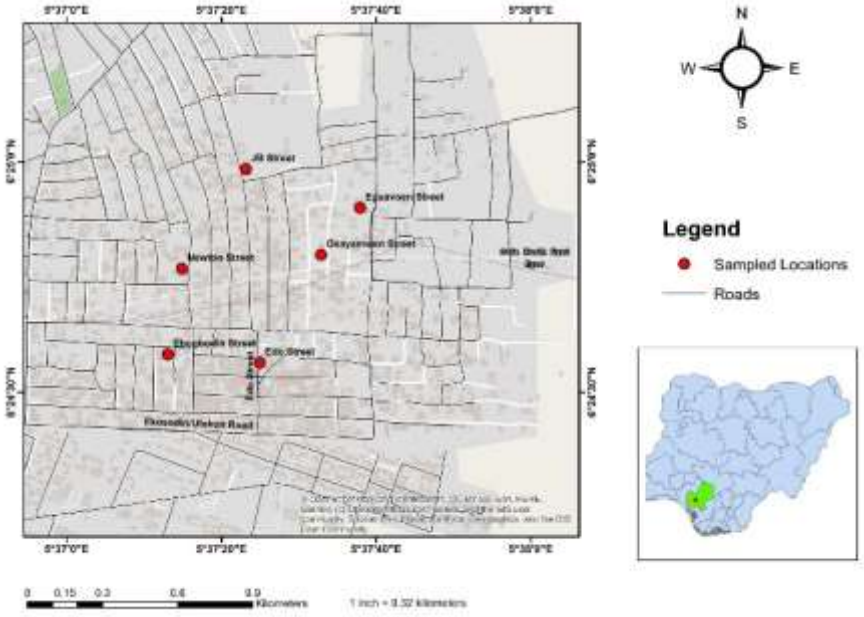

Fig 1: Map showing studied location

Data Collection and Analysis: The data used for this study were collected via questionnaires. A multi-stage sampling technique was used to constructively administer structured questionnaire to households in Ekosodin community. A total of three hundred completed copies of questionnaires were retrieved (estimated sample size) upon completion of the survey. The retrieved questionnaires were analyzed using Statistical Package for the Social Sciences (SPSS, version 22) and results were presented using descriptive tables.

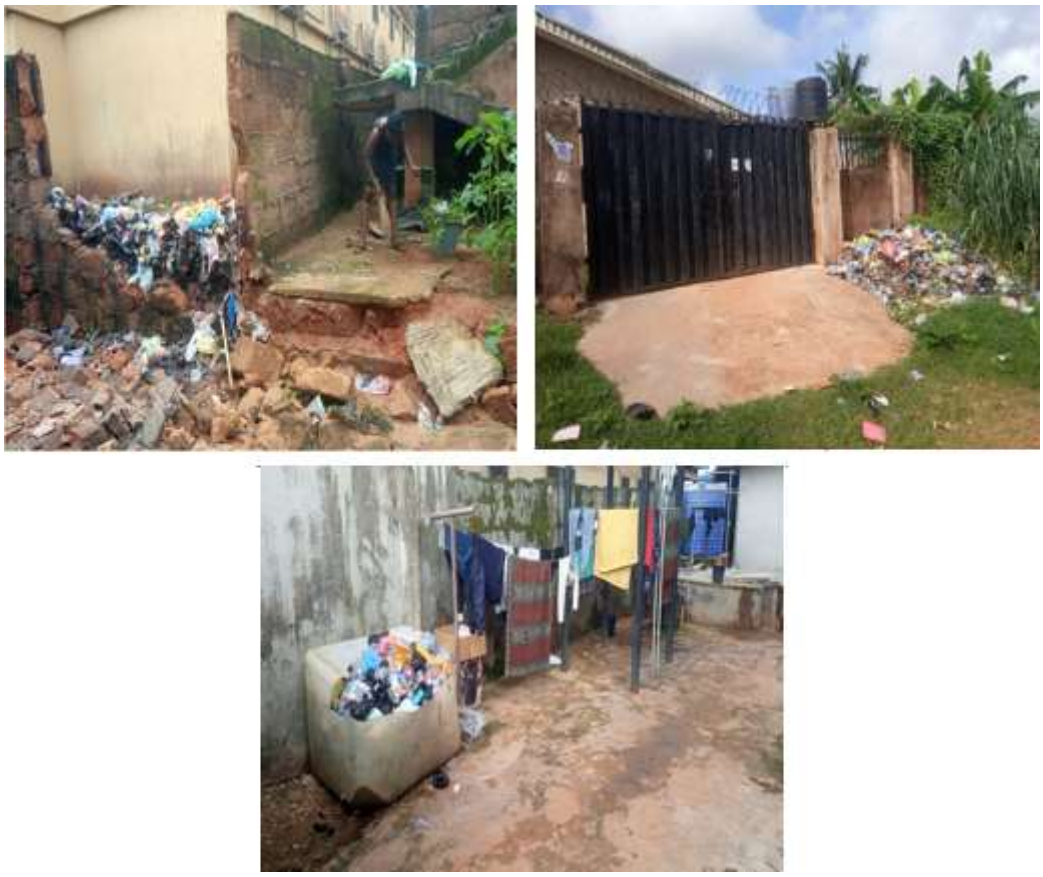

Plate 1: pictorial views of sanitary conditions of Ekosodin residences

RESULTS AND DISCUSSION

The socio-demography of participants in this study as revealed in table 1, showed the sex distribution was 170 (56.7%) were female, while 130 (43.3%) were male, suggestive of the relative willingness of females to responding to survey interviews when compared to males. The age group of participants revealed a varied frequency in age categories as 18-20 years (16.7%), 21-24 years (39.3%) 25-30 years (29.3%), 31-40 years (9.3%) and 41-50 years (5.3%); with the highest proportion occurring in aged 21-24 years which represents 39.3% of the total respondents. The participants' level of education suggest that the majority of respondents had tertiary level of education (85.3 %), while 14.7 % are secondary school certificate holders. Survey also showed 256 (85.3%) are single, while 44 (14.7%) are married indicating the respondents' marital status.

Table 1: Socio-demographic of Participants from Ekosodin

Parameter	Opinions	Frequency of Participants (n=300)	Percent of participants (%)
Sex of Participants	Female	170	56.7
	Male	130	43.3
Age of Participants	18-20yrs	50	16.7
	21-24yrs	118	39.3
	25-30yrs	88	29.3
	31-40yrs	28	9.3
	41-50yrs	16	5.3
Level of Education of Participants	Secondary school	44	14.7
	Tertiary	256	85.3
Marital Status of Participants	Married	44	14.7
	Single	256	85.3

These findings suggest that the majority of respondents are educated, with a higher representation of individuals with tertiary education and a clear

description of Ekosodin community, where a large proportion of staff and students of University of Benin Ugbowo campus are residence. The responses of the participants to core water issues in Ekosodin community are shown in table 2. The survey revealed that 72.7 % of respondents reported using boreholes as main source of water in their houses, while 27.3% relied on piped water. Furthermore, 94 % of participants had their main water source located within their premises, with 82.7 % confirming the availability of this source. The majority of the respondents (70 %) asserted using the water from their premises for washing and cooking only, while only 30 % used it for drinking, washing, and cooking. Sachet/bottle water was the preferred alternative drinking water source for 82 % of participants, and 90.7 % stated that they do not boil their water before its usage. Some residence (76.7 %) reported that their main water source had no taste, and 77.3 % mentioned it had no color; however, 55.3 % of the respondents had observed sand particles and visible impurities in their water source within the community, which defines the water not fit for human consumption (WHO, 2008). Findings also revealed that only 4.0 % of respondents had analyzed their water in the Laboratory to determine its physicochemical and microbiological qualities (WHO, 2008), with 63.19 % attributing their inability to analyze their water to be lack of knowledge and 36.81 % citing the high cost of water analysis as the reason for not doing so. According to earlier report of WHO and UNICEF (2015), 91 % of the world's population used drinking water from improved sources, 58 % used water from a piped connection in their dwelling, plot or yard and 33 % from other improved drinking water sources, leaving 663 million people lacking access to an improved source of water.

Table 2: Participants' responses to core water questions in Ekosodin resident

Parameter	Opinions	Frequency of Participants (n=300)	Percent of participants (%)
Main water source	Piped	82	27.3
	Borehole	218	72.7
Location of main water source in premises	Yes	282	94
	Off premises but up to 500m	18	6
Availability of main source of water	Yes	248	82.7
	No	52	17.3
Purpose of water usage	Drinking, Washing and Cooking	90	30
	Washing and Cooking only	210	70
Alternative source of drinking water	Sachet/Bottle Water	246	82
	Vendors supply	54	18
Boil water before usage	Yes	28	9.3
	No	272	90.7
Does Water from main source has taste	Yes	70	23.3
	No	230	76.7
Does Water from main source has Colour?	Yes	68	22.7
	No	232	77.3
If yes what colour?	Yellowish	68	22.7
Presence of sand particles and visible impurities	Yes	166	55.3
	No	134	44.7
	None	284	94.7
Number of water taps present within facility	1-5 taps	16	5.3
Is there adequate number of water taps for users?	Yes	274	91.3
	No	26	8.7
Have you taken water to laboratory for analysis?	Yes	12	4
If No to the above question why?	No	288	96
	No knowledge	182	63.19
	High cost of analyzing water	106	36.81

Participants' responses to core sanitation questions (table 3) in the studied location show that the majority of participants (99.3 %) have access to usable toilets and contrary to the opinions of few (0.7 %). Also, overwhelming 99.3 % of respondents expressed satisfaction with the available toilets, and a mere 0.7 % requested that more toilets be constructed for their use. The survey data reveal that 34 % of the respondence have access to flush or pour-flush toilets connected to sewers, while the remaining 66 % have flush or pour-flush toilets connected to tanks or pits. Findings also revealed that an approximately 64.7 %

of the respondents indicated that the toilets in the area are separated into male and female sections and 35.3 % stated otherwise. A significant majority (87.3 %) reported that female toilets have menstrual hygiene facilities, and 12.7 % indicated a lack of such facilities. The survey highlights that 95.3 % of participants stated that their toilets are frequently maintained, as against 4.7 % respondence who expressed dissatisfaction with the maintenance. A substantial 91.3 % of respondents confirmed the presence of functional drainage systems within the premises, and 8.7 % reported the absence of such systems. A respondence (82 %) stated that the drainage systems are maintained by the residence, and 18 % reported the involvement of a government agency. According to report of UN-Water (2021), the presence of a safe water supply and clean, functioning, private toilet facilities can enhance students' education and comfort, also females would have the facilities and knowledge to be able to manage their menstrual cycles in safety and dignity. The provision of these facilities in an institutional area will obviously enhance the girls' education, strengthens economies and reduces inequality (Orimoloye *et al*., 2015).

Table 3: Participants' responses to core sanitation questions in Ekosodin resident

Parameter	Opinions	Frequency of Participants (n=300)	Percent of participants (%)
Number of usable toilets	1-5 toilets	298	99.3
	None	2	0.7
Are the usable toilets sufficient for users?	Yes	298	99.3
	No	2	0.7
If no should facility owners build more usable toilets?	Yes	74	24.7
	No	226	75.3
Types of toilets and latrines	Flush/pour-flush to sewer	102	34
	Flush/Pour-flush to tank/pit	198	66
Are the toilets separated based on sexes?	Yes	194	64.7
	No	106	35.3
Menstrual hygiene needs available in female toilets	Yes	262	87.3
	No	38	12.7
Are toilets frequently maintained?	Yes	286	95.3
	No	14	4.7
Are there functional drainage system within premises?	Yes	274	91.3
	No	26	8.7
Who maintains drainage systems?	Residence	246	82
	Government agency	54	18
General waste are safely separated into three bins	Yes	168	56
	Somewhat [Bins full, include other waste or only 1/2 available]	132	44
Wastes are centrally collected and openly burnt	Yes	50	16.7
	No	250	83.3
Wastes are centrally collected and burnt in closure	Yes	230	76.7
	No	70	23.3
Solid wastes from facility accumulated outside fenced premise	Yes	114	38
	No	186	62
Accumulated wastes are collected and evacuated by scavengers	Yes	128	42.7
	No	172	57.3
Wastes are collected and evacuated by Govt waste mgt board	Yes	300	100
	No	0	0

Participants (56 %) claimed that the general waste is safely separated into three bins, but 44 % mentioned that the separation is somewhat lacking or not fully adhered to. The survey reveals poor waste management in Ekosodin community, with 83.3 %, reported that the wastes are not centrally collected and are openly burnt. Results further confirmed that 76.7 % agreed that wastes are collected and burnt in a closed setting and 23.3 % indicated otherwise. However, respondents' opinions showed that

accumulated wastes are collected and evacuated by scavengers and by the Government Waste Management Board. According to the study of Armah *et al*. (2018), only 30 % and 47 % of populations of Sub-Saharan Africa and Southern Asia used improved sanitation facilities with about 13 % of the world's population living without any form of sanitation and practices open defecation. He also went further to state that people who are deprived of improved water and sanitation services do not get opportunities to realize their potentials in the professional arena.

Table 4: Participants' responses to core hand hygiene questions in Ekosodin residence

Parameter	Options	Frequency of Participants (n=300)	Percent of participants (%)
Soap and water currently available in premises	Yes	202	67.3
	Partially [Lacking materials]	98	32.7
Soap and water currently available at toilets	Yes [within 5m from toilets]	112	37.3
	Yes [more than 5m from toilets]	188	62.7
Are staff employed to clean toilets?	Yes	262	87.3
	No	38	12.7
How often do you wash hands after using toilets?	Yes, Always	228	76
	Yes, Sometimes	72	24
How often do you wash hands before eating or cooking?	Yes, Always	162	54
	Yes, Sometimes	138	46
What do you use to wash hands?	Water only	96	32
	Soap and Water	204	68
Separate containers for bathing and storing drinking water	Yes	248	82.7
	No	52	17.3
Are rodents present in the house?	Yes	244	81.3
	No	56	18.7
How often do you take your bath?	Not always	300	100

A total of 67.3 % of responses to core hand hygiene questions (table 4) reported that soap and water were available in their premises, and 32.7 % reported a partial availability. Findings further revealed that participants (37.3 %) had soap and water within 5 meters from their toilets, and 62.7 % reported that soap and water were available but at a distance greater than 5 meters from the toilets. A significant majority, 76 % of respondents reported that they always washed their hands after using toilets and 24 % admitted to sometimes neglecting this important practice. Also, a total of 54 % of participants claimed that they always washed their hands before eating or cooking; contrary to 46 % reported that they sometimes skipped this essential hygiene step. It was also observed that 68 % of respondents used soap and water for handwashing and 32 % relied on water alone, which may not be as effective in removing contaminants. A significant number of the respondence (82.7 %) reported having separate containers for bathing and storing drinking water. However, 17.3 % did not maintain this separation, which could potentially affect water quality. All participants, 100%, responded that they don't always take bath, which may have varying implications for personal hygiene and health (Imarhiagbe and Eghomwanre, 2023). Also, findings from this study revealed a worrisome percentage of respondence (81.3 %) reported the presence of rodents in their houses, which is suggestive of a possible disease outbreak due to potential sanitation and hygiene challenges (Usifoh *et al*., 2018). Residents' responses to their health status as shown in table 5 revealed that the participants had experienced typhoid fever in the past, contrary to experiencing cholera infection. Findings showed no reported cases of dysentery and dehydration among the participants as at time of this survey. In contrast to the other health conditions outlined in this study, vomiting was reported by 200 participants (66.7 %), and of those who experienced vomiting, 100 participants (33.3 %)

reported experiencing it frequently. It was also observed that 224 respondents (74.7 %), sought medical treatment at hospitals or clinics, while 25.3 % participants opted for herbal preparations. A total of 102 participants (34 %) reported visiting health facilities frequently, and 198 participants (66 %) indicated that they seldom visit health care facilities. Contaminated water and poor sanitation are strongly linked to transmission of diseases such as cholera, diarrhea, dysentery, hepatitis A, malaria, typhoid and polio (Cheesebrough, 2001). Individuals are exposed to preventable health risk due to absent, inadequate or inappropriately managed water and sanitation (Ogeah and Ajalaye 2011).

Table 5: Participants' responses to health status and management questions in Ekosodin resident

Parameter	Opinions	Frequency of Participants (n=300)	Percent of participants (%)
Cholera	Yes	0	0
	No	300	100
Typhoid fever	Yes	300	100
	If Yes, how often?	0	0
	No	0	0
Dysentery	Yes	0	0
	No	300	100
Dehydration	Yes	0	0
	If Yes, how often?	0	0
	No	300	100
Vomiting	Yes	200	66.7
	If Yes, how often?	100	33.3
	No	0	0
Type of Treatment facility patronized	Hospital /clinic	224	74.7
	Herbal Preparation	76	25.3
	Medical Drug shop	0	0
	Self-medication	0	0
How often do you visit health facility	Frequently	102	34
	Seldom	198	66

Conclusion: Considering the fact that Ekosodin community plays host to several staff and students of University of Benin (Ugbowo campus), effort should therefore be put into ensuring a community-based intervention program be carried out to educate the populace on practice and sustainability of water, sanitation and hygiene services due to the enormous health benefits that will be derived as well as in pursuance of the global Sustainable Development Goal-6 target.

Acknowledgement: The authors acknowledge the people of Ekosodin community and the students of University of Benin who reside within the community for their cooperation during this work.

REFERENCES

Adams, EA; Boateng, GO; Amoyaw, JA. (2016). Socioeconomic and demographic predictors of potable water and sanitation access in Ghana. *Soc. Indicators Res.* 126: 673–687.

Akinbo, FO; Okaka, CE. (2010). Hyperendemicity of onchocerciasis in Ovia North-East Local Government Area, Edo State, Nigeria". *East Afr. J. Public Health*, 7(1): 84-86.

Armah, F; Ekumah, B; Yawson, DO; Justice, OO; Afitiri, A; Nyieku, FE. (2018). Access to Improved Water and Sanitation in Sub-Saharan Africa in a Quarter Century. *Heliyon*, 4(11): 56-58.

Benova, L; Cumming, O; Campbell, O. (2014). Systematic review and meta-analysis: association between water and sanitation environment and maternal mortality. *Trop. Med. Int. Health*, 19(4): 368–387.

Cheesebrough M (2001). *District Laboratory Practice in Tropical Countries. Part II*. Cambridge University Press, Cambridge, 426 pp.

Freeman, M; Stocks, M; Cumming, O; Jeandron, A; Higgins, J. (2014). Hygiene and health: systematic review of handwashing practices worldwide and update of health effects. *Trop. Med. Int. Health*, 19(8): 906–916.

Gafan, N; Alphonse, K; Cyriaque, D; Yolaine, GA; Romain, GK; Roger, S. (2022). Household access to basic drinking water, sanitation and hygiene facilities: secondary analysis of data from the demographic and health survey V, 2017–2018. *BMC Public Health*, 22 (1345): 1-16.

Imarhiagbe, EE; Eghomwanre, AF (2023) Assessment of Water, Sanitation and Hygiene Conditions in Selected Markets in Benin City, Nigeria. *J. Appl. Sci. Environ. Manage.* 27 (6) 1229-1235

Imarhiagbe, EE; Oriakhogba, E; Osayande, AG. (2023): Assessment of water, sanitation and hygiene (WaSH) status and water qualities using physicochemical and bacteriological indices at automobile spare-parts Markets in Benin City, Nigeria. *Afr. Sci.* 24 (1): 105 -113

Loevensohn, M; Mehta, L; Cuming, K; Nicol, A; Cumming, O. (2015). The cost of a knowledge silo: A systematic re-review of water, sanitation and hygiene interventions. *Health Policy and Planning*, 30 (5): 660–674.

Luby, SP; Rahman, M; Arnold, BF; Unicomb, L; Ashraf, S; Winch, PJ. (2018). Effects of water quality, sanitation, handwashing, and nutritional interventions on diarrhea and child growth in rural Bangladesh: a cluster randomized controlled trial. *The Lancet Global Health, 6*: 302–315.

Mara, D; Lane, J; Scott, B; Trouba, D. (2010). Sanitation and health. *PLoS Medicine*, 7: 133-136.

Mehndiratta, MM; Mehndiratta, P; Pande, R. (2014). Poliomyelitis. *Neurohospitalist*, 4: 223–229.

Montgomery, MA; Elimelech, M. (2007). Water and sanitation in developing countries: Including health in the equation. *Environ. Sci. Technol.* 41(17): 17–24.

Ogeah, FN; Ajalaye, V. (2011). Students' off-campus residence and impact on localities: the case of the University of Benin and Ekosodin Village. *Global J. Soc. Sci.* 10(1&2), 37-43.

Ohwo, O; Agusomu, TD (2018) Assessment of water, sanitation and hygiene services in Sub-Sahara Africa. *European Sci. J.* 14 (35): 308 - 326

Orimoloye, EO; Amadi, COA; Amadi, AN; Azuamah, Y; Nwoke, EA; Zacchaeus, U; Dozie, INS. (2015). Assessment of Water Sanitation and Hygiene Practices in Ibadan, Nigeria. *Inter. J. Res.* 2(2): 94-100.

Strickland, G. (2000). Hunter's Tropical Medicine and Emerging Infectious Diseases. 8th ed. Philadelphia, PA: W. B. Saunders Company.45p.

UN General Assembly. (2010). *The Human Right to Water and Sanitation: Resolution / adopted by the General Assembly, 64th Assembly.* 45p.

UN-Water. (2021). Water, Sanitation and Hygiene. Retrieved from https://www.unwater.org

Usifoh, SF; Ighedosa, SU; Aighewi, IT; Asemota, OD; Odigie, EA; Faboya, T (2018) Impact of Lassa fever on the practice and consumption of stored food by University of Benin Community in Benin City, Nigeria. *J. Comm. Med. Prim. Health Care* 30 (1): 66 – 76

Wolf, J; Hunter, PR; Freeman, MC; Cumming, O; Clasen, T; Bartram, J; Higgins, JPT; Johnson, R; Medlicott, K; Boisson, S; Prüss-Ustün, A. (2018). Impact of drinking water, sanitation and handwashing with soap on childhood diarrheal disease: updated meta-analysis and meta-regression. *Tropical Med. Intern. Health*, 23: 508–525.

World Health Organization (2008). *Guidelines for Drinking-water Quality: Incorporating 1st and 2nd addenda, Vol.1. Recommendations*. 3rd ed., WHO, Geneva, 668 pp.

WHO & UNICEF. (2015). *Progress on Drinking Water and Sanitation: Update and MDG Assessment.*

Yamane, T. (1967). *Statistics. An Introductory Analysis*, 2nd Ed. New York: Harper and Row.