

COMMUNICATION AND SUSTAINABLE ENVIRONMENTAL SANITATION IN LOCAL COMMUNITIES: A RISK COMMUNICATION PROCESS

Habiba Mohammed Sani*, Amina Ahmad Aminu*

*Department of Mass Communication, ABU Zaria.

Abstract

Environmental sanitation, often neglected in most parts of Nigeria has great implications for a Nation's health and economy. Imagine a country filled with sick people; how will the economy flourish? Central to these sanitation activities lay the media, who are saddled with the responsibility of communicating risks and hazards to society. Risk communication is not about telling people what to do, but it is about providing people with information aimed at helping them make informed decisions. This study aims at assessing the role of the media as risk communicators on environmental sanitation with the following objectives: awareness of environmental sanitation, the most reliable media in relaying sanitation information, knowledge and attitude towards environmental sanitation and knowledge of health-related risks of environmental sanitation among respondents. Using survey, the study assessed 640 respondents from two localities in Zaria (Sabon Gari and Samaru). Major findings reveal that respondents are aware of environmental sanitation as it was practiced a few years back. Radio was considered the most reliable medium in relaying sanitation messages, knowledge towards environmental sanitation was poor, and the people had a poor attitude towards it. Finally, most respondents did not know the health implications of living in an unhealthy environment. The study recommends that local media operators embark on a campaign to effectively communicate the hazards of environmental sanitation to the public to improve their knowledge and attitude towards it.

Key-words: *Risk communication, media, environmental sanitation, health issues.*

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

The risk of living in a poorly managed environment affects not just the physical health of man but also his socio-economic and psychological well-being. Even the sight of dumpsites is displeasing to the eyes; the stench that comes out of sewers alone can cause respiratory diseases, littered places are prone to accidents that might result in diseases like tetanus if not well managed, and the list goes on. These and many more can be averted by giving adequate attention to

issues that affect the environment; one of such is environmental sanitation. According to Onyango and Uwase (2017), environmental sanitation includes human excreta control, managing solid and liquid waste, pest and vector control in the environment. Chinemere and Adetoun (2015:36) reported that "in 1991 and 2006, census reports show about 80% of industries in Nigeria discharge liquid, solid and gaseous wastes directly into the environment without adequate treatment that meets the basic standard". If

serves as the main contributor to environmental pollution in Nigeria

The intensity of the problems caused by poor environmental management made it necessary for UNICEF in 2020 to make an urgent call to transform sanitation for better health, environments, economies and societies, as the intention to deliver sanitation for all by 2030 is becoming elusive. In 2010 United Nations General Assembly recognized access to safe and clean drinking water and sanitation as a human right and called for international efforts to help countries provide safe water and sanitation. Sustainable Development Goal 6.2 calls for adequate and equitable sanitation for all. The UN in 2013 called for the elimination of open defecation by 2025. In 2018 Nigeria's Water Sanitation and Hygiene sector declared a state of emergency as approximately 60million Nigerians were living without access to basic drinking water (World Bank, 2021). Many laws protecting the environment have been made locally and internationally, but most of these laws are hardly followed. It could be due to lack of knowledge of the effects of poor environmental management on humanity.

Environmental sanitation is directly related to key global issues such as food scarcity, biodiversity, climate change and more; this has made communication paramount to influencing policies affecting people's lives. According to WHO (2020), this can only be achieved through media campaigns and advocacy, as one of the major mediums proven to be used in sustaining water and sanitation at all levels is the use of media. In the recent decades, environmental issues have gained more attention due to the increased media coverage worldwide (Saikia, 2017). The rise in disastrous activities and actions of environmental groups has succeeded in drawing the media's attention to the environment (Mohammed, 2000). Global journalistic concern for the environment grew in the 1980s when Time Magazine named the earth "planet of the year". In Nigeria, environmental attention increased due to the dumping toxic waste in Koko, near Warri, Delta State (Batta, 2018:255).

In 1984, General Muhamadu Buhari enacted the environmental sanitation programme in his war against indiscipline, where every last Saturday of the month, private and public spheres come together to monitor and enforce activities such as no movement from 7_am to 10_am (Manton, 2013). This activity was relegated by succeeding governments as it is slowly becoming history in our communities. Environmental issues are seen to be given attention only when disease outbreak lasts only few weeks or months after the epidemic.

Over a 1.7billion people do not have access to basic sanitation services such as private toilets and lavatories. It reduces human wellbeing; social and economic development. According to WHO (2022), poor sanitation is linked to the transmission of diarrheal diseases such as cholera and dysentery, typhoid and polio. Diarrhoea remains a major killer, as 297,000 children under five die yearly. Malaria, typhoid and cholera have been at the fore-front, considering health issues due to improper disposal of domestic wastes (Tinuke, Badejo and Adetola, 2018). A global estimate of three to five million cases and deaths of twenty-eight (28) to one hundred and fifty thousand (150,000) occur yearly as a result of cholera breakout, with Nigeria having 22% of the cases (Dan-Nwafor, Ogbonna, Onyiah, Gidado, Adebobola, Nguku and Nsubuga, 2019:113). Approximately half of the worlds' population is at risk of malaria, with most cases in sub-Saharan Africa. According to the World Malaria Report (2021,p.81), Nigeria had the highest global malaria cases (31.9%) in 2020. It recorded the highest deaths (26.8%). Cullen (2020) states that poor environmental sanitation costs Nigeria \$3 billion annually.

2. STATEMENT OF THE PROBLEM

The strong influence of media in policy decisions, attitudes, perspectives, intentions and behavioural change cannot be over-emphasized (Luedecke and Boykoff, 2017). This statement can be proved by how the media set the agenda for public discourse. Media are a central public arena through which we become aware of environmental issues and how they are addressed, contested and perhaps resolved. The media are making an indispensable effort to sensitize the public about environmental issues. Saika (2017) believes that one of a country's deep-rooted environmental problems is lack of awareness which is the backbone behind inadequate management and utilization of environmental resources. However, Oforibika, Alalibo and Solomon (2018) attribute poor environmental reportage to media owners/editors having little appreciation for the environment and not viewing it as worth prime space in newspapers. The audiences' perception of such risk affects how journalists report risks on environmental issues. The public needs adequate knowledge on the ills of poor environmental management to act upon such media messages rightly.

3. AIM/RESEARCH OBJECTIVES

The study aims to know the impact of media messages on risk reduction of environmental sanitation issues through the following objectives

1. To ascertain the level of awareness of

- environmental sanitation by the public.
2. To find the prominent source of environmental sanitation messages.
 3. To determine the knowledge and practice of respondents to environmental sanitation
 4. To find the knowledge of the public on health-related risks of environmental sanitation.

4. REVIEW OF RELATED LITERATURE

Studies have been conducted from different academic perspectives to ascertain the role of the media in promoting environmental sanitation using different research methodology. Although, most of the studies focused on awareness creation, this study intends to ascertain knowledge and attitude of respondents towards environmental sanitation. Ukonu, Anorue and Uji (2016) surveyed the residents of Nsukka to gauge their environmental consciousness and awareness of pollution and land degradation. Findings from the study show that the respondents had an appreciable level of consciousness of the consequences of an unclean environment. The low awareness level was low was found to be associated with the low volume of environmental coverage. The study suggests that journalists should refrain from framing the issues as governmental concerns in reporting environmental issues. Rather, they should present them as personal issues and emphasize on the importance of individual contributions in ensuring a healthy environment

Srilaxmi, Inbarathi and Gomathi (2017) assessed the knowledge and practice of mothers of children under five in preventing of some selected water-borne diseases using a survey. Major findings show that 48% of the mothers had inadequate knowledge of the water-borne disease, and almost 67% had good practices towards preventing of the disease. The knowledge and practice of mothers had a significant association with age and educational background. The study recommends education for mothers on proper hygiene practices. The studies are similar in assessing the KAP of respondents on issues relating to water borne diseases.

Montoute and Cashman (2015) identified the current state of knowledge, attitudes and practices (KAP) of households regarding water, sanitation and hygiene (WASH) as a means of determining necessary interventions for addressing environmental and public health threats. Both qualitative and quantitative research methods were used in this study. This qualitative component included observation, in-depth guided interviews and one focus group discussion. The quantitative research data revealed that only few

individuals had access to improved sanitation, resulting in cases of open defecation and night soil disposal on the Anse La Raye Waterfront and the two rivers bordering the village. The low depth of the water table also renders septic tank absorption systems ineffective, further compounding environmental health issues. The results revealed that about 42% of households had no water connection and 29% had no toilets. Residents were generally knowledgeable about the causes of waterborne faecal-oral disease. They also practised good personal hygiene and engaged in point-of-use-water treatment. Knowledge about the health effects associated with the use of polluted recreational water was lacking regarding the infection of diarrhoea causing pathogens.

Babaei, Alavi, Goudarzi, Teymouri, Ahmadi and Rafiee (2015) evaluated KAP towards solid waste reduction, source separation and recycling to find relationships between demographic variables and KAP towards solid waste management. Findings from this study show that KAP of solid waste management was influenced by age, educational level, gender and occupation. The study concludes that providing the public with modern solid waste infrastructures and improving citizens' awareness about solid waste source separation and recycling would help promote effective waste management campaigns and behaviour-changing interventions.

Mourad, Habumugisha and Sule (2019) assessed human waste disposal practices, knowledge on; diseases caused by contact with human faeces, causes and prevention of selected WASH-related diseases. The result from the interview indicates that over 96% of the students use pit latrines. Another 2% defecate openly, and almost 4% defecate in water bodies. Most students could not identify the main causes of WASH-related diseases and, thereby, would not know how to prevent them. The study recommends that the provision of water and sanitation infrastructures should go with the provision of health education on the causes, effects and preventive measures to improve the well-being of the students.

Sridhar, Okareh and Mustapha (2020) assessed KAP towards the water, sanitation and hygiene (WASH) in Kaduna State, intending to ensure sustainable WASH facilities intervention in the state. The study employed observation and survey and found that the level of person and environmental hygiene understanding was fairly good across the state. The incidence of water-related diseases was generally low in the study area. Despite these findings, the communities are still at risk due to a lack of safe water supply and poor practices of home treatment and excreta disposal. The researchers recommended providing WASH facilities and education

in the study area.

Risk Communication

The management of natural disasters and public health emergencies has always included a significant communication component in the form of warnings, risk messages, evacuation notifications, and messages regarding self-efficacy information regarding symptoms and medical treatment. Different kinds of crises manifest different forms of threat and different communication exigencies (Pauchant and Mitroff 1992, Seeger, Sellnow and Ulmer 2003 as cited in Reynolds and Seeger 2005); as such, adequate knowledge of such crises will be needed to pass accurate information, on the threat/disaster to the public as some disasters such as hurricanes for example, may prompt recommendations that residents stockpile water e.t.c

Studies show that people in generally get more information about risk and hazard from the media than from their doctors, friends or relatives (Shaw 1994 in Lang, Fewtrell and Bartram 2001). This reason makes the media important in relaying information on risk-related events. The job of risk communicators is to offer the information the public needs and counter some of the harmful behaviour that is common during an emergency so the public can be effectively supported (Covello and Milligan, 2010).

Lang, Fewtrell and Bartram (2001:p.317-318) define risk communication as “the act of conveying or transmitting information between parties about a range of areas including; levels of health or environmental risks, the significance or meaning of health or environmental risk and the decisions actions or policies aimed at managing or controlling health or environmental risk”. Examples could be seen in the constant messages on immunization, HIV aids and the likes. People are being informed about the threat the diseases pose and the need to take actions to control them.

Risk communication is grounded in the assumption that the public has a generalized right-to-know about hazards and risks (Reynolds and Seeger, 2005). This could be because a threat's general lack of familiarity is likely to enhance the perceived risk by the general public (Sandman, 2005, as cited in Reynolds and Seeger, 2005). In most cases, they involve things that cannot be seen and diseases and symptoms that have not been evident in the general population. The availability of information will allow the public to make informed choices regarding the risk posed to the environment. But in relaying the risk information, Turner et al (2011) believe that communicators should acknowledge the importance of understanding the role

of receivers, messages, and sources. They need to pay special attention not only to what they say, how their messages are formulated and framed, and how those messages affect receivers differently, depending on their characteristics, perceptions, and beliefs.

5. METHODOLOGY

To effectively evaluate the knowledge and attitude of the public towards environmental sanitation and its effect, the researchers used a survey design. This approach enabled the researchers to generate quantitative data for the results to be generalized to the entire population. The population of this study comprised all the residents of Sabon Gari and Samaru communities in Zaria. According to a figure released by the National Population Commission (NPC) based on the 2006 census figure, the population of Sabon Gari Local Government is estimated to be 393,300 within a 263km². Sabon Gari and Samaru communities both have a population of close to 10,000. Using survey monkey online calculator with 95% confidence and 5% margin of error, the sample size was 320, making it 640 for both communities. The researchers used an accidental sampling technique as the answers needed for the questionnaire could be gotten from any adult member of the community. The questionnaire comprised of two sections; 1st section centered on demographic data as it could affect their responses. The 2nd section was designed to elicit answers based on the research objectives. The questionnaires were administered with the help of four research assistants for ease of collection, to save time and clarification where necessary.

6. RESULTS

Table 1: Demographic Data

| Variable | Frequency | Percentage (%) |
|---------------------------|-----------|----------------|
| Age (years) | | |
| ≤ 20 | 133 | 20.8 |
| 21 - 39 | 245 | 38.2 |
| 40 - 59 | 209 | 32.7 |
| ≥ 60 | 53 | 8.3 |
| Educational Status | | |
| Non-formal | 48 | 7.5 |
| Primary | 120 | 18.8 |
| Secondary | 274 | 42.8 |
| Tertiary | 198 | 30.9 |
| Gender | | |
| Male | 267 | 41.7 |
| Female | 373 | 58.3 |
| Total | 640 | 100 |

The demographic data of respondents is presented in the table above, as age, educational status and gender play a significant role in environmental sanitation. Most respondents within the age group 21-39 and 40-59 (38.2% and 32.7%) were youthful making them active enough to carry out sanitation activities. Also, most of the respondents had a minimal level of education, with only 48(7.5%) having non-formal education. Health and civic education is believed to be taught right from primary school. Regarding gender, the majority (373) of the respondents are female. Women are known to be responsible for keeping the house clean. It has made it favourable for the research.

Table 2 Respondents' Awareness of Environmental Sanitation

| Response | Frequency | Percentage (%) |
|----------|-----------|----------------|
| Yes | 622 | 97.1 |
| No | 18 | 2.9 |
| Total | 640 | 100 |

Awareness of environmental sanitation will give the respondents knowledge on the issue, making further responses valid. Out of the 640 respondents, 18(2.9%) were unaware of environmental sanitation. From their demographic data, it is evident that the respondents were below 20years of age. Environmental sanitation was practised monthly even a few years back. Further questions would only be valid from the 622 respondents aware of environmental sanitation.

Table 3 Knowledge of Respondents on Environmental Sanitation Day

| Date | Frequency | Percentage (%) |
|--------------------------------------|-----------|----------------|
| 1 st May | 102 | 16.4 |
| 30 th December | 76 | 12.2 |
| Last Saturday of each month | 421 | 67.7 |
| 1 st Sunday of each month | 23 | 3.7 |
| Total | 622 | 100 |

The result from table 4.3 above shows that the majority of the respondents know when environmental sanitation day is. It is because of its popularity as part of the war against indiscipline. Despite its importance, most states have abandoned the act. It has left the environment filthy and unpleasant.

Table 4 Respondents' Knowledge of the Meaning of Environmental Sanitation

| Definition | Frequency | Percentage (%) |
|--|-----------|----------------|
| Cleaning of dirt from inside the house | 41 | 6.6 |
| Cleaning of Surroundings | 482 | 77.5 |
| Burning of Refuse | 32 | 5.1 |
| All of the above | 67 | 10.8 |
| Total | 622 | 100 |

Most (482) respondents know that environmental sanitation means cleaning the surroundings. It might be because they have taken part in it or because of their educational status most of which have attended at least primary school.

Table 5 Respondents' Source of Information on Environmental Sanitation

| Source | Frequency | Percentage (%) |
|------------------|-----------|----------------|
| Radio | 345 | 55.5 |
| Television | 109 | 17.5 |
| Newspaper | 57 | 9.2 |
| Internet | 78 | 12.5 |
| Family & Friends | 33 | 5.3 |
| Total | 622 | 100 |

It is shown that radio is the major source of information on environmental sanitation, with 55.5% of the total population. Most times sanitation activities are being announced by state and local stations for free as part of community development. It is followed by television with 17.5%. People who do not have access to the media get information from family and friends.

Table 6 Respondents' Availability of Information on Environmental Sanitation

| Source | Frequency | Percentage (%) |
|---------|-----------|----------------|
| Daily | 20 | 3.2 |
| Weekly | 278 | 44.7 |
| Monthly | 320 | 51.5 |
| Yearly | 4 | 0.6 |
| Total | 622 | 100 |

The table above shows that most of the respondents (320) get sanitation information monthly. It could be because environmental sanitation day comes once a month. 278 claims to get the information weekly; they could be getting this information from programmes or events related to environmental sanitation. Twenty respondents who claim to get the information daily might be getting it from family and friends or health

workers around them.

Table 7 Type of Waste Storage Facility used by Respondents

| Facility | Frequency | Percentage (%) |
|--------------------|-----------|----------------|
| Basket | 98 | 15.8 |
| Covered bin | 92 | 14.8 |
| Sack/polythene bag | 145 | 23.3 |
| Bucket | 287 | 46.1 |
| Total | 622 | 100 |

In the table above, the respondents mostly use the bucket to store waste, followed by sack/polythene bags. Only 14.8% of the respondents use covered bins, which is the best way of waste storage before disposal. Open waste attracts insects and germs, which are detrimental to health.

Table 8 Respondent's Method of Waste Disposal

| Process | Frequency | Percentage (%) |
|-----------------|-----------|----------------|
| Burning | 108 | 17.3 |
| Dumpsites | 367 | 59 |
| In-drainages | 90 | 14.5 |
| Dump collectors | 57 | 9.2 |
| Total | 622 | 100 |

Most of the respondents dispose of their waste in dumpsites leaving the environment dirty and unhealthy. Most have not heard of dump collectors, and only 9.2% have access to them due to their location. 17.3% of the respondents burn their waste, while 14.5% dump it in drainages. This act clogs the drains leading to stagnant water that harbor mosquitoes and eventual flooding in some areas.

Table 9 Respondents' Bush Clearing around the House

| Variable | Frequency | Percentage (%) |
|----------|-----------|----------------|
| Weekly | 12 | 1.9 |
| Monthly | 176 | 28.3 |
| Yearly | 362 | 58.2 |
| Never | 72 | 11.6 |

The table above shows that 58.2% of the respondents clear the bushes around their houses yearly due to seasonal changes. Bushes are only cleared after the rainy season when serious grasses grow. Another 28.3% clear their bushes monthly; these settings are conscious of their environment and have a good knowledge of the effect of leaving bushes around the house, while 11.6% of the respondents have never cleared the bushes around their house.

Table 10 Respondents' Knowledge of Harm caused by Unhealthy Environment

| Item | Frequency | Percentage (%) |
|-------|-----------|----------------|
| Yes | 309 | |
| No | 313 | |
| Total | 622 | 100 |

In the table above majority (313) of the respondents are not aware that an unhealthy environment can cause harm to their health. This might be due to the shallow information they receive in the media about environmental sanitation. Presenting it as a risk-related issue will help increase respondents' knowledge of the health implication of the issue.

Table 11 Respondents' Knowledge on the Causes of Typhoid

| Causes | Frequency | Percentage (%) |
|--------------------|-----------|----------------|
| Mosquito bite | 328 | |
| Solid waste | 97 | |
| Contaminated water | 197 | |
| Total | 622 | 100 |

The result from the table above shows that the majority of the respondents believe mosquito bites cause typhoid. It could be because malaria and typhoid go hand, in hand or they believe typhoid to be an advanced form of malaria. One hundred and ninety-seven (197) respondents agree that typhoid is caused by contaminated water, while ninety-seven (97) believe it is caused by solid waste.

7. DISCUSSION

Findings from the study show that most respondents are aware of environmental sanitation and its specific date because they have, in one way or another taken part in the exercise which comes up on the last Saturday of every month. This finding contrasts with Ukonu et. al. (2016), as respondents from the study only have environmental consciousness with a low level of awareness due to the low volume of reportage by the media. The major source of information on environmental sanitation is the radio which is easily accessible and has no literacy barrier as most programmes are broadcast in local languages. Using the internet requires internet access and reading newspapers require formal education, even as not every community member can afford to buy a newspaper. While most of the respondents who are adults and have at least attended primary school have good knowledge of the meaning of environmental sanitation, their practice towards it was poor as they still dump refuse in dumpsites and use uncovered

items for storing garbage. The majority of the respondents also clear the bushes around their houses yearly. It will give room for rearing rodents and reptiles. These findings align with Srilaxmi et al (2019) and Montoute and Cashman (2015) that recorded a good knowledge of environmental sanitation issues. Although findings from Sridhar (2020) show a fairly good KAP towards environmental sanitation, the people lack adequate safe water for proper practice.

Regarding knowledge on the health effect of an unhealthy environment, most respondents did not know the health implication of keeping the environment dirty. Most did not know that diseases such as cholera and typhoid are caused by poor environmental sanitation. Montoute and Cashman (2015) also have findings that reveal a lack of knowledge about the health implication of environmental sanitation.

8. CONCLUSION

In assessing the impact of media messages on risk reduction of environmental sanitation issues, results show that the respondents are aware of environmental issues. Still, they are not aware of the risks of these issues. Conclusively, the media has neglected its role in risk communication of environmental issues. It is therefore recommended that local media operators embark on a campaign to effectively communicate the hazards of environmental sanitation to the public to improve their knowledge and attitude towards it.

References

1. Babaei, A., Alavi, N., Goudarzi, G., Teymouri, P., Ahmadi, K.A., & Rafiee, M. (2015). Household recycling knowledge, attitudes and practices towards solid waste management. *Resources, Conservation and Recycling*. 102:94-100.
2. Batta, H.E. (2018). Coverage of environmental issues in the Nigerian press: In Wilson, D and Batta, H.E (Eds.) *Science, health and environmental communication: Global issues and perspectives*. Ibadan: Ibadan University Press.
3. Chinemere, A.T & Adetoun, A.E. (2015) Environmental sustainability for national development in Nigeria: the role of mass media. *European Journal of Educational and Development Psychology*. 3 (1), pp.31-43.
4. Covello, V.T. (1992). Risk communication: An emerging area of health communication

- research. *Annals of the International Communication Assessment*:Pg 359-373.
5. Cullen, M. (2020). The Nigerian water and sanitation program. Retrieved online via [www.borgenproject.org], April 10, 2022:00:17am.
6. Luedecke, G & Boykoff, M.T. (2017). Elite news coverage of climate change. *Oxford Research Encyclopedia of Climate Science*, Doi. 10.1093/acrefore/9780190228620.013.357
7. Land, S, Fewtrell, L and Bartram, J (2001) *WHO water quality: guidelines, standards and health*. IWA Publishing: London.
8. Manton, J. (2013). Environmental alkalism and the war on filth: the personification of sanitation in urban Nigeria. *Africa (Lond)*. 84(4): 606-622.
9. Mohammed, J.B. (2000). *Introduction to specialized reporting*. Zaria, Ahmadu Bello University Press Limited.
10. Montoute, M.C & Cashman, C. (2015) A knowledge, attitudes and practices study on water, Psanitation and hygiene in Anse La Raye Village, Saint Lucia. Centre for Resource Management and Environmental Studies (CERMES) Faculty of Science and Technology, The University of the West Indies, Cave Hill Campus, Barbados.
11. Mourad, M.W & Pereira, J.J. (2019). Malaysia: Environmental health issues. *Encyclopedia of Environmental Health*. 2 (4) , <https://doi.org/10.101616978-0-12-409548-9.11529-5>.
12. Oforibika, G.A., Alalibo, I.K and Solomon, L (2018) Environmental Pollution and Reportage in Nigeria. *World Rural Observations* 10(1):75-77. doi:10.7537/marswro100118.10.
13. Onyango, M.A. & Uwase, M. (2017). Environmental sanitation. *International Encyclopedia of Public Health* 2nd ed.
14. Reynolds, B & Seeger, M. (2005). Crisis and emergency risk communication as an integrative model. *Journal of Health Communication*. 10(1):43-55
15. Saikia, R. (2017). Role of mass media in creating environmental awareness. *National Journal of Multidisciplinary Research and Development*.

- 2(1): 01-04.
16. Sridhar, M.K., Okareh, O.T. & Mustapha, M. (2020) Assessment of Knowledge, Attitudes, and Practices on Water, Sanitation, and Hygiene in Some Selected LGAs in Kaduna State, North-western Nigeria. *Journal of Environmental and Public Health*. Article ID 6532512, 14 pages <https://doi.org/10.1155/2020/6532512>
 17. Srilaxmi, N, Priscilla, R, Inbarathi, S. & Gomathi S. (2017) Knowledge and Practices of Mothers of under Five Children on Prevention of Selected Water Borne Diseases At Israel pet, Guntur (Dt.). A.P. *Journal of Medical Science and Clinical Research*. 5(11): 30897-30903.
 18. START (2012). Understanding Risk communication theory: a guide for emergency managers and communicators. US Department of Home land Security: University of Maryland.
 19. The World Bank, (2021). Nigeria: Ensuring water, sanitation and hygiene for all. Retrieved online via [www.worldbank.org], May 26th, 2022 00:09am
 20. Tinuke, B.B & Adetola, B.M. (2018). Health issues associated with domestic waste management in local government councils in Nigeria. *International Journal of the Tropical Environment*. 15:60-70.
 21. Turner, M.M., Skubisz, C., & Rimal, R.N. (2011). Theory and practice in risk communication: a review of literature and visions for the future. In Thompson, T.L., Parrott, R., & Nussbaum, J.F. Eds. *The Routledge Handbook of Health Communication*, 2nd ed.
 22. UNICEF & World Health Organization. (2022). UNICEF & WHO state of the world's sanitation. New York. Retrieved online via: www.unicef.org/wash
 23. World Health Organization. (2020). Environmental challenges. Retrieved online via: www.who/environmental/challenges
 24. World Malaria Report (2021) Geneva: World Health Organization: Licence: CC BY-NC-SA 3.0 IGO