



Environmental Impact of Waste Disposal in Nigeria

¹Ofodeme Nnaemeka Christian, ²Elendu Humphrey, ³Nnodim Johnkennedy*, ²Tokung Monday and ²Mashi Zakari Muhammad

¹Academic and Training Regulation Unit, Education Department, Medical Laboratory Science Council of Nigeria Headquarters Asokoro, Abuja, Nigeria,

²MLSCN NorthWest Zonal Office Kano, Medical Laboratory Science Council of Nigeria

³Department of Medical Laboratory Science, Faculty of Health Science, Imo State University Owerri, Imo State, Nigeria

Submission Date: 21st Feb 2022 | Published Date: 28th Feb 2022

*Corresponding author: Nnodim Johnkennedy

Abstract

Globalization and noncompliance to best practices on environmental waste disposal had led to increasing waste generation and its drastic environmental impacts anywhere in the world including Nigeria. To generate current local empirical information, the study on the “Environmental Impact of Waste Disposal in Nigeria” was carried -out. The methodology employed was descriptive research using field survey of 2000 households per 37 states of Nigeria (74, 000 households). Primary data were collected using questionnaires and interviews. Secondary data were collected from books, official documents, journals, internet, published and unpublished materials. Data were analyzed using epi-info Version 7, Excel 2019 with results presented in tables, figures and pictures were used for ease of understanding. Questionnaire result rate was 98.1% and validity, 97.1%. Males, 40,700 (55.0%), and 32,264 (43.6%) females responded, 1036 (1.4%), failed to indicate their gender. Respondents 2,072 (2.8%) were <20 years of age, 70,670 (95.5%) between 20 and 60 years and 888 (1.2%) aged 60 years and above, 370 (0.5%) failed to indicate their ages. 71,040 (96.0%) were educated, 1,258 (1.7 %) not educated and 1,702 (2.3%) failed to indicate their educational status. 11,322 (15.3%) of respondents had lived less than 20 years in their location, 30,710 (41.5%) of respondents had lived more than 20 years in their location, 31,376 (42.4%) had lived from 6-20years and 592 (0.8%) failed to indicate how long they had lived in their location. Identified environmental impact of waste disposal; waste generation volume at 71-90% ranking, neighborhood sanitation ranking, total of 16.9 respondents ranked their environment to be dirty, air pollution, unpleasant odor from nearby dump sites and 37.85% respondents affirmed that dump sites were <100meters to their household), health issues/disease outbreaks, flooding, land pollution and fire outbreak. It was concluded that the “Environmental Impact of Waste Disposal in Nigeria”, was huge and calls for immediate attention to avert imminent dire public health consequences especially in this era of emerged and reemerging infectious diseases. The recommendation was that government should hype waste regulation and all concerned stakeholders should create awareness on why people should properly dispose the wastes they generate, related regulatory agencies are to hype their roles in proper waste regulation especially, in Nigeria to avoid another “Wuhan” COVID-19 scenario.

Keywords: Environment, Waste Disposal, Public Health, Globalization, Nigeria

INTRODUCTION

Activities of continued globalization movement and noncompliance to best practices on environmental waste disposal by earthly inhabitants have continued to scale-up generation of large amount of waste in the environment globally and Nigeria in particular. Waste could be referred to as any item that cannot be used for any good use to the owner and is meant to be discarded. According to American Public Work Association, (1975), waste is any useless, unwanted or discarded material and longer useful to the immediate owner. Waste has the capacity to accumulate and deface the physical environment if it is not well managed (Sada & Odemoerho, 1988). The environment comprises all living and non-living things as well as all their immediate surroundings that exert direct influence on them. While public health

refers to the science and art of preventing disease, prolonging life and promoting human health through organized efforts of all. Practice show that the environment and waste are two unfriendly friends that has been continually saved by public health efforts. Practice has also, shown that humans need globalization in attending to the daily yearnings needs of humans. Propagating globalization with no recourse to the proper waste disposal could amount to serious public health disaster. For example, increasing scientific and technological advancement has continued to increase the quantities of wastes in our environment like: toxic materials, non-biodegradable substances, hazardous agents and other dangerous pollutants in the environment (Thitame, Phalke & Pondhe,2015 and Dwivedi, Augur & Agrawal, 2014). Another example in most countries, include open dumps and open drains-to-rivers or streams that continued to be the main common channels of disposing wastes; dumping sites have been sited wherever land is available with relative or absolute regard to safety, health hazards and aesthetic degradation or damage (Thitame, Phalke & Pondhe,2015).

According to David (1985), problem of environmental wastes had been seen as a worldwide danger that could cause increasing various environmental problems like environmental degradation, pollution, nature-imbalance, flooding, losses of materials and energy, epidemics of infectious diseases, morbidity and mortality of affected inhabitants, inconveniences, serious public health risks and decline in environmental life quality and safety. Presently, the amount of worldwide waste generation approximates 1.3 billion tonnes annually which would be expected to approximate 2.2 billion tonnes annually by 2025 (Debnath *et al.*, 2015)! Again, according to Debnath *et al.* (2015), the expected 2.2 billion tonnes annual waste generation by 2025 could represent a significant increase in per capita waste generation rates from 1.2 to 1.42 kg per person per day in the next decade depending on region, country or city.

These anti-environmental waste management activities have continued to contaminate the water bodies and entire environment with health and safety issues arising from improper waste management (Alam & Ahmade, 2013). Again, these anti-environmental waste management activities have continued to contaminate the natural environment especially, children play grounds, natural air and water as well as the entire environment due to the increasing incubation and proliferation of flies, mosquitoes, rodents and other carriers of deadly pathogens and toxins (Ogundele, Opeagbe & Abiodun, 2018, Thitame, Phalke & Pondhe,2015 & Salam, 2010). Consequently, presence of dump sites and agricultural animal farms very close to peoples' households provide feeding sites for pets like dogs, cats and others thereby providing dangerous portal of entry for dangerous toxins and diseases to pet-owners' households (Gouveia & Prado, 2010). Most disturbing of all is the continual generation of waste water from domestic, commercial, institutional and industrial sectors channeled to innocent inhabitants' areas and surface water sources serving the populace mostly in slums, villages and cities and with relative treatment or no treatment at all (Ogundele, Opeagbe & Abiodun, 2018 & Al-Sabahi, Abdul Rahim *et al.*,2009).

As a result, proliferation of agents that transmit and cause emerging, emerged and reemerging diseases, agents that transmit and cause antibiotic resistant diseases, antimicrobial mutations and accumulation of dangerous toxins have continued to ridicule scientific and technological innovations and population's health interventions (Ogundele, Opeagbe & Abiodun, 2018). These had been implicated in the proliferation of different types of illness like, allergies, irritation of the skin, eyes, and nose, neurological and psychological disorders, dermatological, respiratory, gastrointestinal, genetic, immunocompromised and infectious diseases with increased hospital visits and treatment costs (Ogundele, Opeagbe & Abiodun, 2018, Sunil, Deepak & Goraksha, 2015 & Salam, 2010). This could be why Okoh, Odjadjare *et al.*, (2007), reported that regulatory agencies, local authorities and concerned stakeholders whether in developing countries or developed countries should safe the populace by ensuring that all industrial, domestic and other wastewaters or sold wastes are treated before discharging or reusing in any sector. This is because, water contaminated by effluents or solids from any source is associated with different dangerous diseases burden and pose a high public health risk (Ogundele, Opeagbe & Abiodun, 2018). It is worthy of note that hazards in the environment could arise from natural occurrences like floods and hurricanes, human environmental disturbances like CO₂ build-up and acid rain, improper treatment and disposal of the toxic and hazardous wastes generated by an industrialized society (BMA, 1999). It is also noteworthy that in Nigeria, studies have shown that whether in slums, villages, towns or cities like Lagos, Kano, Sokoto, Maiduguri, Calabar, Port Harcourt, Uyo, Aba, Yenagoa, different types of wastes are being generated and disposed indiscriminately leading to lots of environmental and health hazards, long hospital stay and lot of treatment costs (Ogundele, Opeagbe & Abiodun, 2018; Kabiru, 2017; Karshima, 2016; Kaoje, Sabir *et al.*, 2015 & Krukru, 2015). Waste management, as the collection, transport, processing, recycling or disposal, and monitoring of waste materials, remains very necessary in order to reduce environmental waste disposal effect on health, on the environment or natural/artificial aesthetics (Abiodun, 2018; Kabiru, 2017 & Karshima, 2016).

Therefore, the ultimate strategic goal of any country or nation whether developed or developing (like Nigeria), remains to continually reduce the negative impacts of environmental waste disposal by strict compliance to waste and environmental best practices and using current scientific and technological strategies in upturning increasing waste generation, increasing population, urbanization, diversification of industries into gainful opportunities of business thereby creating meaningful new jobs and livelihood for individual growth and national emancipation. In order to achieve this, current empirical data in environmental impact of waste disposal/management is required which is the main goal of

this research work. This if achieved, could add to existing body of knowledge on waste management, public health emancipation and serve as reference for intervention activities, policies and guidelines reviews.

METHODOLOGY

In this study, a descriptive survey research design was adopted to study the “Environmental Impact of Waste Disposal in Nigeria”. According to Naliaka and Namusonge, (2015:96), “A descriptive research design determines and reports the way things are”. It is used when data is collected for the description of persons, organizations, settings/phenomena”. For the purpose of this study the method applied was ranking the results of the study in percentages within studied state populations and making pairwise comparisons of environmental impacts waste disposal within subgroups of parameters in the states (Moreno-Betancur *et al*, 2015).

STUDY POPULATION

Nigeria as the most populous nation in African, has total population of 140,431,790; male (71,345,488); female (69,086,302), sex ratio of 103.3 and total regular house-holds population of 28,197,085 (NPC, 2006). Approximately located between latitude 4° and 14° North of the Equator, and between longitudes 2° 2' and 14° 30' East of the Greenwich meridian; bordered to the north by the Republics of Niger and Chad, south by the Atlantic Ocean, east by the Republic of Cameroon and west by the Republic of Benin, land area of about 923,770 km² and mean temperature between 25 and 30 °C (77 and 86 °F) (Bench, 2019 and WHO/UNEP, 1997). The climatic condition that affects the quality and quantity of the country's water resources, results from effects of two main wind systems (the moist, relatively cool, monsoon wind blowing from the south-west across the Atlantic Ocean towards the country and brings rainfall, and the hot, dry, dust-laden harmattan wind blowing from the north-east across the Sahara-desert with accompanying dry weather and dust-laden air (WHO/UNEP, 1997).

STUDY SAMPLE

Field survey samples of 2000 households per 37 states of Nigeria (74, 000 households) out of total regular households population of 28,197,085 (NPC, 2006), participated in the study. A formula from Brewer and Miller (2003) cited in Addo, Adei & Acheampong, (2015) & Dinye and Acheampong (2013) was adopted for sample size determination.

INCLUSION CRITERIA

The inclusion criterion was based on all persons or adults residing in Nigeria.

EXCLUSION CRITERIA

The exclusion criterion was based on all persons or adults and NOT residing in Nigeria.

INFORMED CONSENT

Informed consent was duly obtained from each individual who participated in this Study.

DATA COLLECTION INSTRUMENT

The instruments used for primary data collection in this study was structured closed and open-ended questionnaires created using the Epi-Info software version 7 based on the research objectives of this study and administered to the 2000 respondents per state. Research study-related secondary data were collected from literature. For the purpose of this study, the environmental waste disposal impact data/parameters as extracted from (WHO,2008) were collected with the structured closed and open-ended questionnaires on gender (male and female); age; highest education of respondents; length of stay at location (in any state in Nigeria); distance of dump sites from living homes; dump sites; main problem of waste management in states; and main challenge of tackling waste management in states.

VALIDITY AND RELIABILITY OF DATA

The face and content validity and reliability of the instrument were assured by initial testing of the questionnaire, seeking expert opinion and positive criticism from colleagues.

STATISTICAL ANALYSIS METHOD

According to Sounders, Lewis & Thornbill (2009), data analysis is the processing of data to make the data meaningful or give useful information. The data was analyzed using Epi-Info software version 7 and excel 2019 while the resulted data, presented in frequency tables and percentages.

RESULTS

The questionnaire result rate (Table 1) was 98.1% and validity, 97.1%. Males, 40,700 (55.0%) and 32,264 (43.6%) females responded, 1036 (1.4%), failed to indicate their gender (Figure 1). Respondents 2,072 (2.8%) were <20 years of age, 70,670 (95.5%) between 20 and 60 years and 888 (1.2%) aged 60 years and above, 370 (0.5%) failed to indicate their ages (Figure 2). 71,040 (96.0%) were educated, 1,258 (1.7 %) not educated and 1,702 (2.3%) failed to indicate their

educational status (Figure 3). 11,322 (15.3%) of respondents had lived less than 20 years in their location, 30,710 (41.5%) of respondents had lived more than 20 years in their location, 31,376 (42.4%) had lived from 6-20 years and 592 (0.8%) failed to indicate how long they had lived in their location (Figure 4). The environmental impact of waste disposal in Nigeria observed in the study were: waste generation volume at 71-90% ranking, total of 16.9% respondents ranked their neighborhood sanitation to be dirty, air pollution, unpleasant odor from nearby dump sites and wastes and dump sites cover roads, drainages and water ways while 37.9% respondents affirmed that dump sites were mostly less than 100 meters from households, health issues/disease outbreaks, flooding, land pollution and fire outbreak (Figures 5-8), waste generation volume at 71-90% ranking and neighborhood sanitation ranking (Figure 9), total of 16.9 respondents ranked their environment to be dirty (Figure 10).

DISCUSSION

The main aim of this research study was to showcase the dangerous impact of indiscriminate waste disposal in Nigeria and to provide empirical data or information for policies reviews, adequate and effective program interventions in waste management. The age, sex, education and length of stay in location of respondents indicated that the respondents were mature, educated, well experienced and are therefore, fit as respondents for the study (figures 1 – 4). Various researchers had reported that there were little or no attention paid to waste disposal as it had remained common culture to see heaps of waste littered indiscriminately everywhere in slums, villages towns and cities either along or within streets, drainages, vacant plots and open spaces (Ogundele, Opeagbe, and Abiodun, 2018) and this agreed with the result of this study where heaps of wastes were seen littered near residential houses, drainages and on roads in cities, slums and villages (figures – 8). The result of the study revealed other environmental impacts of waste disposal in Nigeria which include: increased blocked drainages (figure 7) and environmental pollution from waste burnings (figure 11). According to Abd'Razack *et al.* (2013) and Babalola *et al.* (2010), the resultant environmental impacts like increased flooding, increased environmental pollution or contaminations, had become the order of the day with increasing spread of infectious diseases, inhabitants' morbidity and mortality in the affected places.

These ill care-free attitudes of people on waste disposal further impact negatively on national economy, investments, businesses with serious adverse effects on developments, industrial, infrastructural projects, diseases spread diseases control/prevention and high public health risks (Thitame, Phalke and Pondhe, 2015). These inherent indiscriminate environmental wastes disposal that negatively impact on the Nigeria's environment are in various forms as indicated in the survey. Especially, the result of waste dump sites that cover roads, drainages, water ways and waste burning near living houses (Figures 6 – 8 & 11), which again, agreed with WHO (2018) & UNCHS (1988) who reported that, indiscriminate waste dumping could damage the environmental esthetics, the uncollected wastes pollute surrounding air, constituting health risk, contaminate ground water, especially, where the use of well-water for drinking is common. But further disagreed with Amuda *et al.* (2014), who reported that, the methane generated at dump sites were crucial in anaerobic decomposition of organic wastes and anaerobic life. Also, the result of the study revealed the channeling of wastes from factories into drainages and water bodies which could further contaminate water bodies with severe impact on the ecosystem supporting the work of the World Bank (1990), which reported that most factories in Nigeria were located on river banks, using the rivers as open sewers for their effluents and water pollution mainly by industries from petroleum, mining (for gold, tin and coal) wood and pulp, pharmaceuticals, textiles, plastics, iron and steel, brewing, distillery fermentation, paint and food with great pollution threat to water quality. WHO/UNEP (1997) added that, the occurring water contamination place other resources at risk like the fisheries and land resources.

CONCLUSION

The environmental impact of waste disposal in Nigeria is huge as revealed in this study. Mostly, it is very abnormal to: site dump sites near roads or residential houses, dump wastes in drainages, in water ways and dump sites mostly less than 100 meters from households. These phenomenon of indiscriminate waste disposal in Nigeria, could aid release of contaminated objects (sharps or solids, liquids or gas), drain obstructions and roads obstruction, could pose health risks via release of pathogens and toxic pollutants. The scavengers or workers that handle refuse, and individuals that live near or on disposal sites and the animals or plants that grow on such wastes (with inadequate environmental sanitation) could be infected with gastrointestinal parasites or be potential sources for spread of diseases. Finally, as a recommendation, we support Okoh, Odjadjare *et al.* (2007), who reported that regulatory agencies, local authorities and concerned stakeholders whether in developing countries or developed countries like Nigeria, should save the populace by ensuring that all industrial, domestic and other wastewaters or solid wastes are treated before discharging or reusing in any sector properly. This is because, according to Ogundele, Opeagbe & Abiodun, (2018), water contaminated by effluents or solids from any source is associated with different dangerous diseases burden and pose a high public health risk.

FIGURES & TABLE

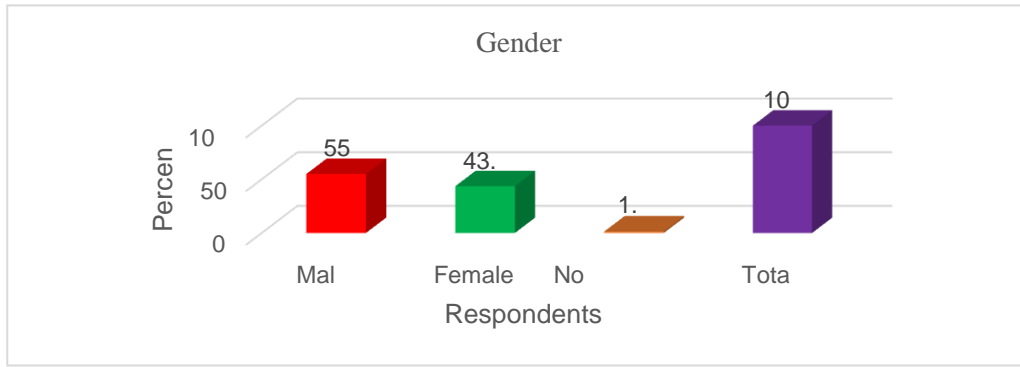


Figure-1: Bar chart of distribution of gender of respondents. (Source: Researcher’s survey, 2021).

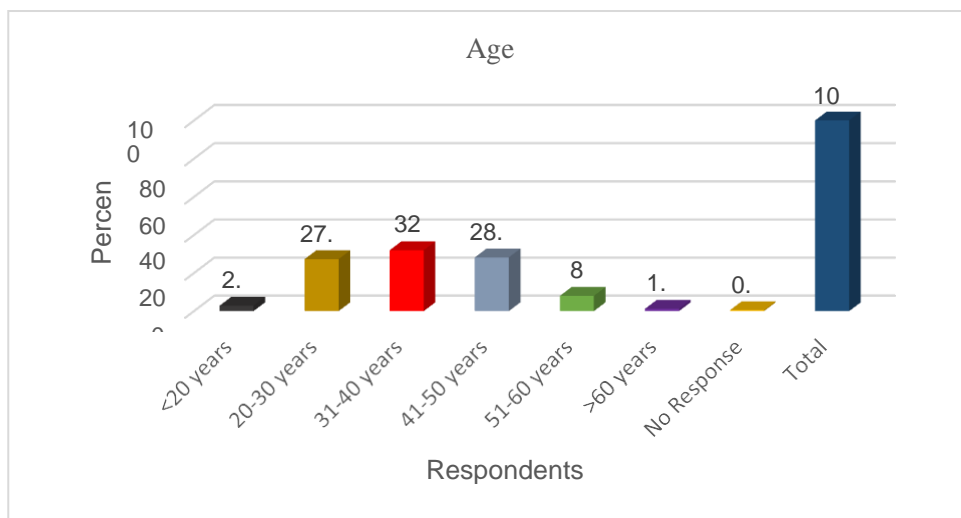


Figure-2: Bar chart of distribution of age of respondents. (Source: Researcher’s survey, 2021).

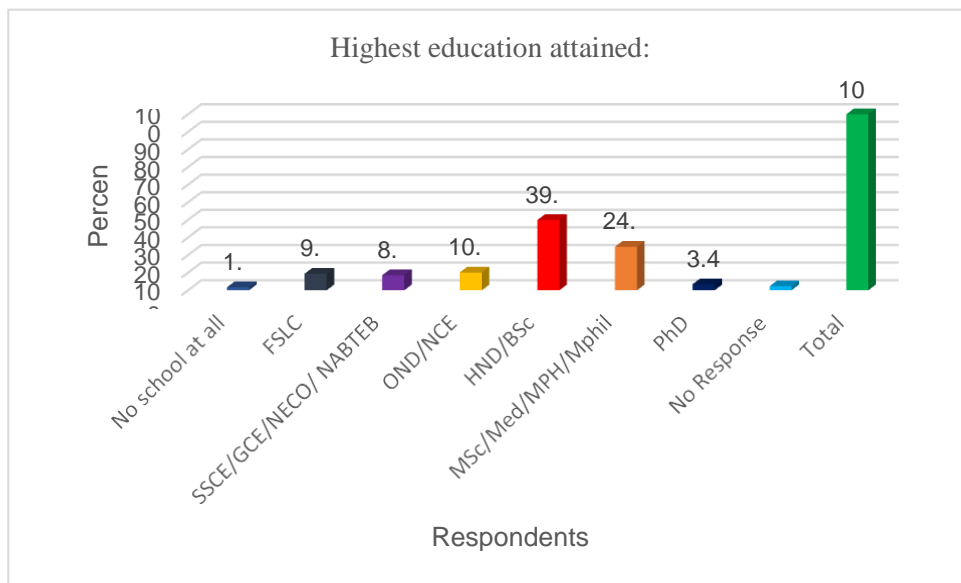


Figure-3: Bar chart of distribution of highest education attained of respondents. (Source: Researcher’s survey, 2021).

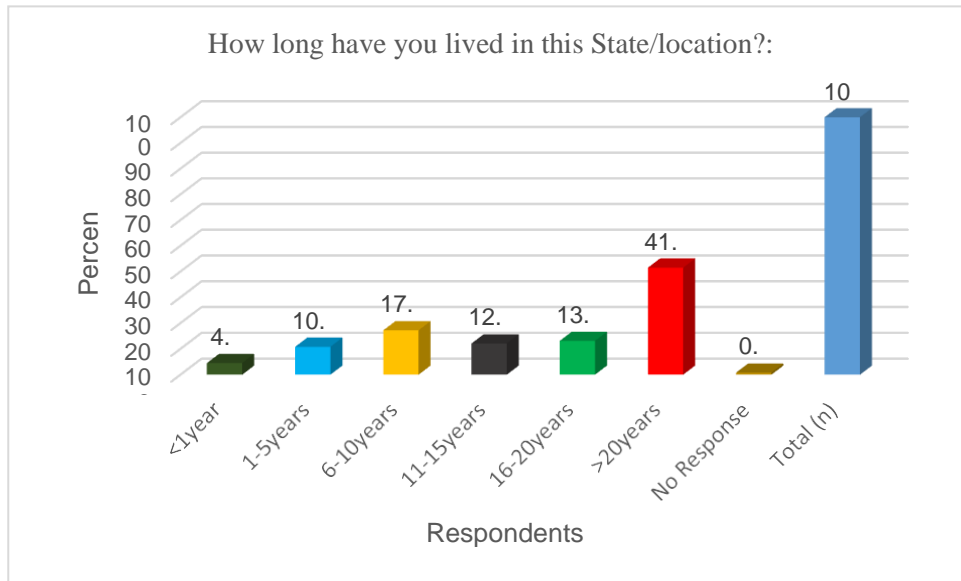


Figure-4: Bar chart of distribution of length of stay in location of respondents. (Source: Researcher’s survey, 2021).

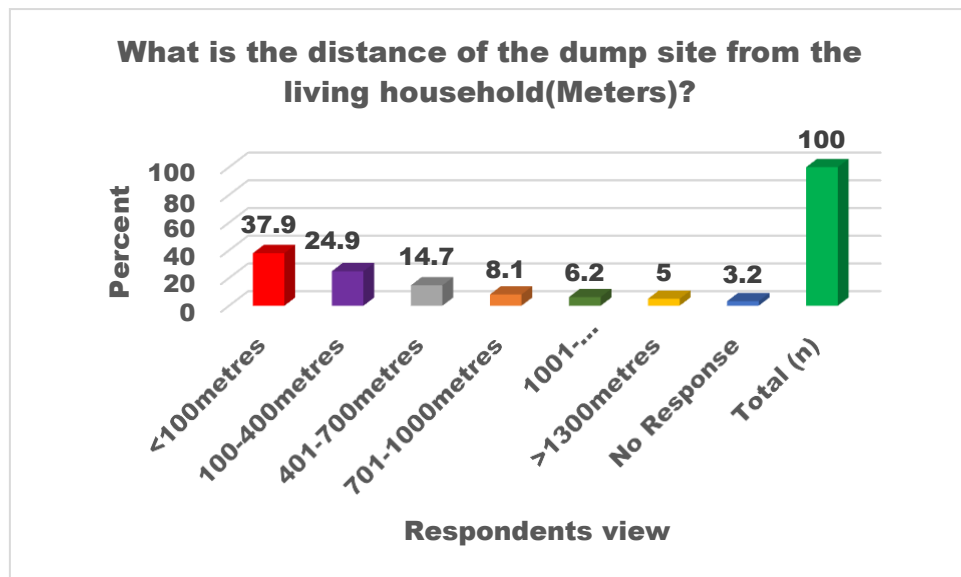
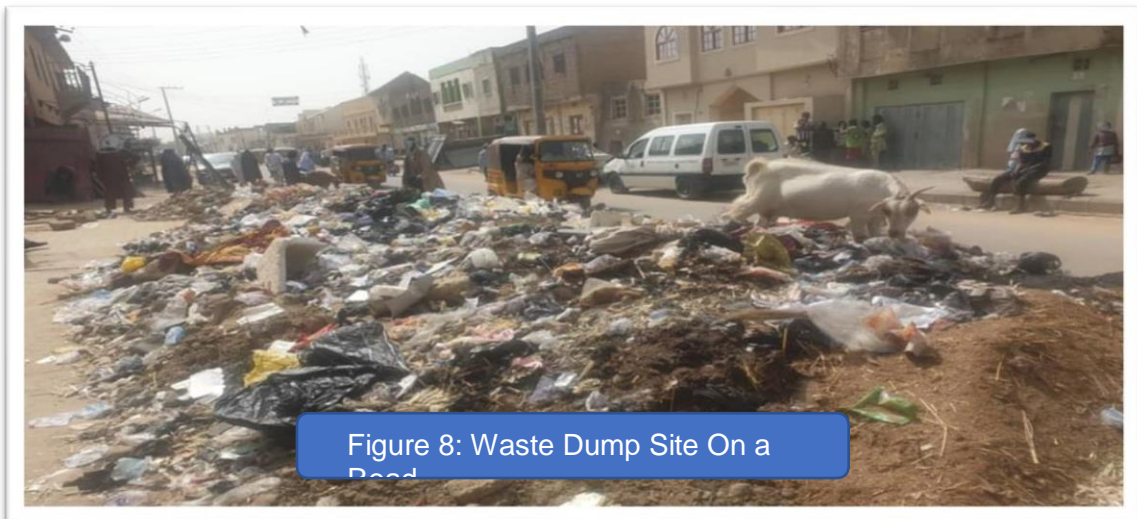
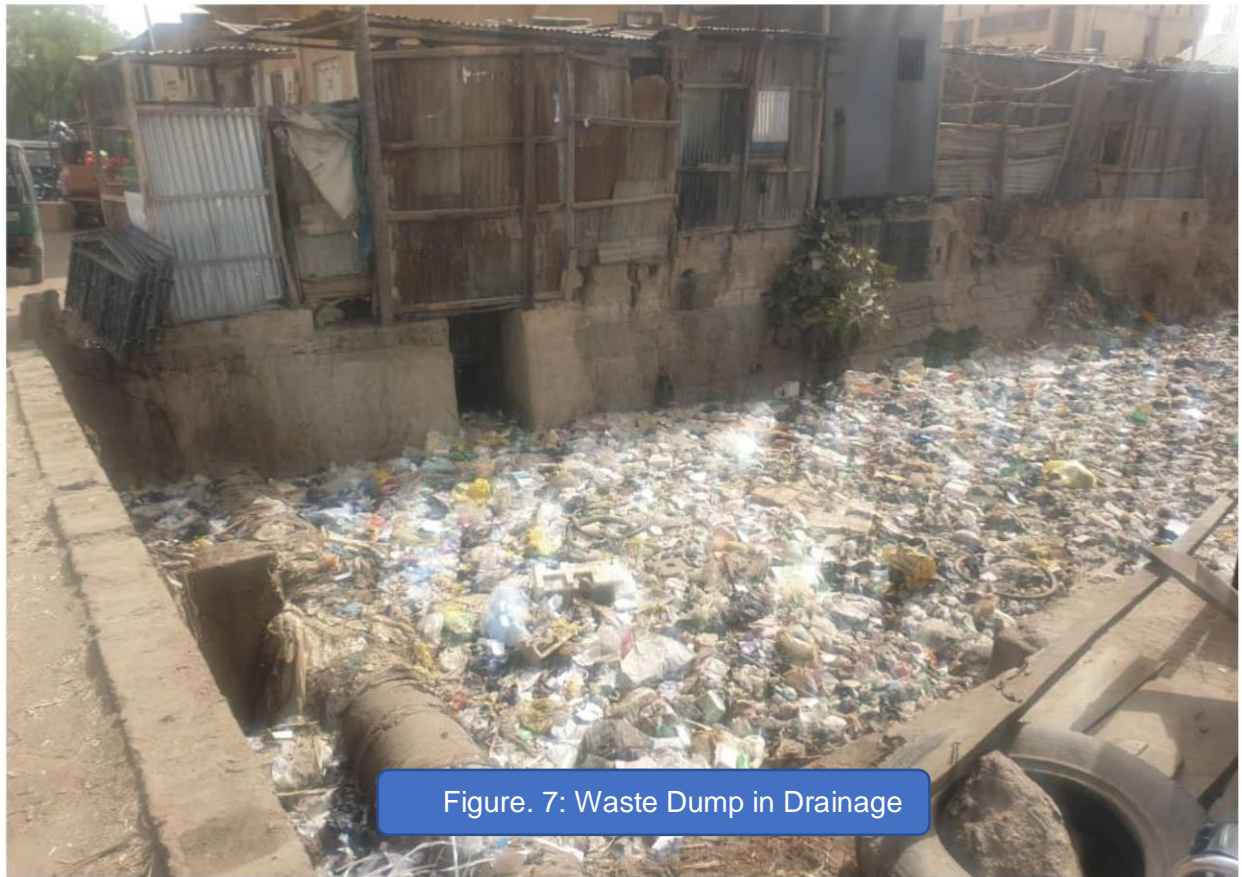


Figure-5: Bar chart of waste dump distance from residential houses by respondents. (Source: Researcher’s survey, 2021).



Figure. 6: Waste Dump Near Houses



Figures 6 – 8: Pictures of waste dump sites near households, in drainages and on roads of respondents. (Source: Researcher’s survey, 2021).

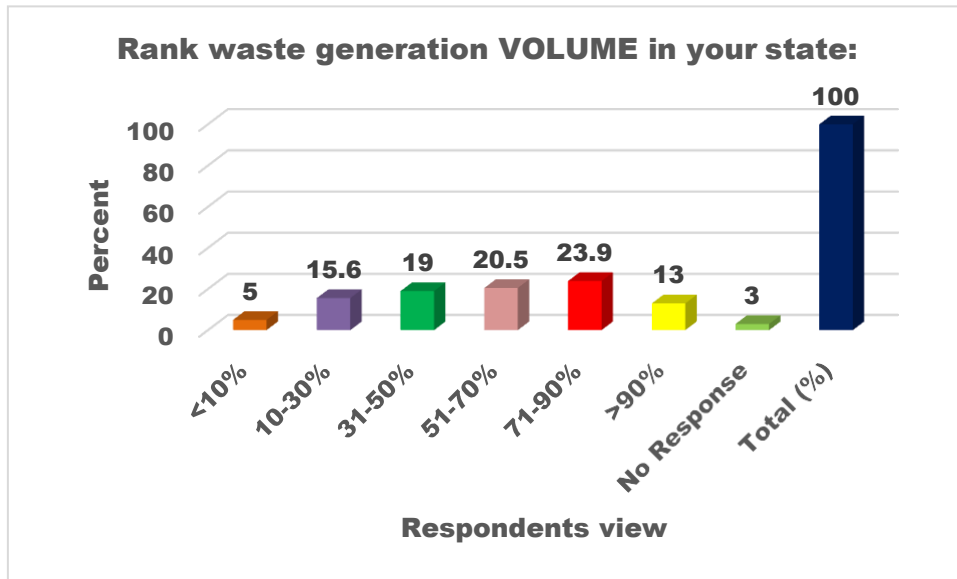


Figure-9: Bar chart of waste generation rankings by respondents. (Source: Researcher’s survey, 2021).

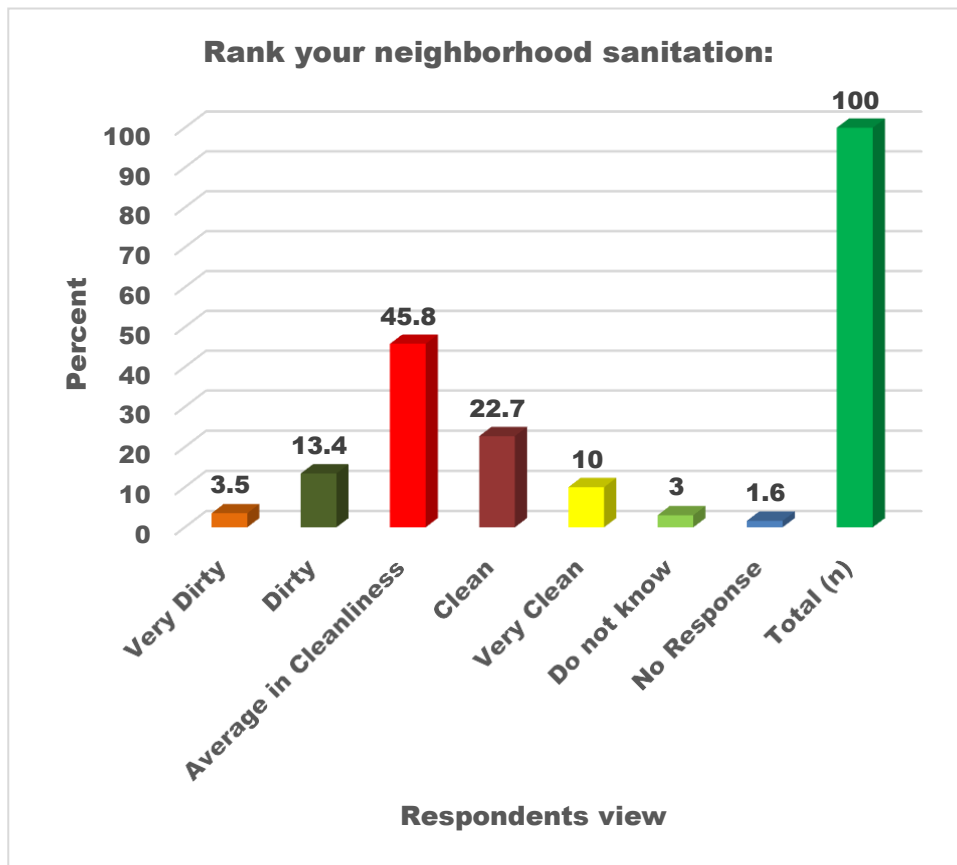


Figure-10: Bar chart of distribution of neighborhood sanitation ranking of respondents. (Source: Researcher’s survey, 2021).



Figure 11: Waste Burning and Scavengers Near Residential Areas



Figure 12: Channeling of sewage and other unidentified waste materials in drainages

Table-1: Information and analysis of sample

Serial	Parameter	Value	Percent (%)
1.	Estimated sample size (n)	74,000	-
2.	Number of questionnaire distributed (QD)	77, 700	-
3.	Number of questionnaire Returned (RQ)	76, 220	-
4.	Number of Valid Questionnaire after crosschecking (VQ)	74, 000	-
5.	Questionnaire Return Rate (QRR)	$RQ/QD \times 100/1$	98.1
6.	Validity	$VQ/RQ \times 100/1$	97.1

REFERENCES

1. Abd'Razack, N.; Yusuf, A. Y.; Agbu, E.; Utange, J. Z. and Jonathan, Z. (2013). An appraisal of solid waste generation and Management in Jalingo City. *Nigeria Journal of Environmental and Earth Science*. 3 (9): 1-6.
2. Addo, I. B.; Adei, D. and Acheampong, E. O. (2015). Solid Waste Management and Its Health Implications on the Dwellers of Kumasi Metropolis, Ghana. *Current Research Journal of Social Sciences*. 7(3): 81-93.
3. Al-Sabahi, E.; AbdulRahim, S.; WanZuhairi, W.Y.; Al-Nozaily, F. and Alshaebi, F. A (2009). Study of Surface Water and Groundwater Pollution in Ibadan City, Yemen. *Electronic Journal of Geotechnological Engineering*. 14:1-12.
4. Al-Sabahi, E.; AbdulRahim, S.; WanZuhairi, W.Y.; Al-Nozaily, F. and Alshaebi, F. A (2009). Study of Surface Water and Groundwater Pollution in Ibadan City, Yemen. *Electronic Journal of Geotechnological Engineering*. 14:1-12.
5. Amuda, O.S.; Adebisi, S. A.; Jimoda, L. A. and Alade, A.O. (2014). Challenges and possible panacea to the municipal solid wastes Management in Nigeria. *Journal of Sustainable Development Studies* 1:64-70.
6. Babalola, A.; Ishaku, H.T.; Busu, I. and Rafee, M. M. (2010): The practice and challenges of solid waste Management in Damaturu, Yobe state Bakare W (2016) *Solid Waste Management in Nigeria*. Published by BioEnergy Consult online.
7. BMA (1999). Health & Environmental impact assessment, an integrated approach, Earthscan Publications Ltd.
8. Debnath, B.; Baidya, R. and Ghosh, S.K. (2015). Simultaneous analysis of WEE management system focusing on the supply chain in India, U.K and Switzerland. *International Journal of Manufacturing and Industrial Engineering* 2(1):16-20.
9. Dwivedi, P. R.; Augur, M.R. and Agrawal, A. (2014). A study on the effect of solid waste dumping on geo-environment at Bilaspur. *American International Journal Research for Formal Applied Natural Sciences*. 14:86-90.
10. Ezechi, E.H.; Nwabuko, C.G.; Enyinnaya, O.C. and Babington, C.J. (2017). Municipal Solid waste Management in Aba, Nigeria: Challenge and Prospects. *Environmental Engineering Research*. 22: 231-236.
11. Gouveia, N. and Prado, R.R. (2010). Health risks in areas close to urban solid waste landfill sites. *Review of Saude Publica*. 44:859-66.
12. Imam, A.; Mohammed, B.; Wilson, D.C. and Cheeseman, C.R. (2007). Solid Waste Management in Abuja Nigeria. *Journal of Environmental Science and Technology*. 128 (2).12-14.
13. Kabiru, M.Y. (2017). Environmental and Public Health Impact of Poor solid Waste Disposal in Kano Metropolis Nigeria. *Texila International Journal of Public Health* 5 (4):
14. Kaoje, A.U.; Sabir, A.A. Yusuf, S.; Jimoh, A.O. and Raji, M.O. (2015). Residents' perception of solid waste disposal practices in Sokoto, Northwest Nigeria. *African Journal of Environmental Science and Technology*. 11(2):94-102.
15. Karshima, S. N. (2016). Public Health Implications of Poor Municipal Waste Management In Nigeria. *Vom Journal of Veterinary Science*. 11: 142.
16. Krukru, K. (2015). Assessment of Waste Management Strategies in Nigerian Universities, Munich, GRIN Verlag, <https://www.grin.com/document/337207>
17. Loredana, M.A. and Maria, R.C. (2010). The impact measure of solid waste management on health: the hazard index. *Ann Ist supers AnItà*. 46(3):293-298.
18. Napoleon, S.; Momodu, K.O. and Joan, E.D. (2011). Mitigating the impact of solid wastes in urban Centres in Nigeria. *Journal of Human and Ecology*. 34(2):125-133.

19. Ogundele, O.M.; Opeagbe, M.R. and Abiodun, A.M. (2018). Effect of Municipal Waste Disposal Methods on Community Health in Ibadan-Nigeria. *Polytechnica* 1:61-72.
20. Okoh, A.I.; Odjajare, E.E.; Igbinsola, E.O. and Osode, A.N. (2007). Wastewater treatment plants as a source of microbial pathogens in the receiving watershed. *African Journal of Biotechnology*. 6:2932-2944.
21. Olowe, B. (2018). Existing Situation of Solid Waste Management in Ibadan read online at <http://www.google.com>.
22. Olukanni, D.O. and Akinyinka, O. M. (2012). Environment, health and wealth: towards an analysis of municipal solid waste management in Ota, Ogun State, Nigeria. Presented at the International Conference on Clean Technology and Engineering Management, Covenant University, Ota, Nigeria, ICCEM: 51–71.
23. Thitame, S.N.; Phalke, D.B. and Pondhe, G.M. (2015). Public Health Risk and Environmental Impact Associated with Disposal of Urban Waste at Sangamner City, Ahmednagar, Maharashtra, India. *International Journal of Preventive Public Health Science*. 1(2):5-8.
24. WHO, (2018). Health care Waste. <https://www.who.int/en/news-room/fact-sheets/detail/health-care-waste>.
25. WHO/UNICEF, (2015). Water, sanitation and hygiene in health care facilities: status in low- and middle-income countries. World Health Organization, Geneva.
26. WHO/UNEP, (1997). Water Pollution Control - A Guide to the Use of Water Quality Management principles. Geneva.
27. World Bank (1990). Towards the Development of an Environmental Action Plan for Nigeria. Report Number 9002-UNI. World Bank, Washington, D.C.