

Perception of Residents on the Menace of Solid Waste on Environmental Quality in Benin City, Edo State, Nigeria

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ABSTRACT

The paper examined the perception of residents on the menace of solid waste on environmental quality in Benin City, Edo State. There is a linkage between waste management and environmental quality as a filthy environment stimulates environmental ill-quality. The objective of study is to examine human perception and knowledge of residences of the menace of solid waste disposal on environmental quality. Data for this study were obtained from primary and secondary sources. Primary data were obtained from 25 selected wards and communities (comprising of 110 settlements) which constitutes the study area. These data were collected through systematic sampling technique from the selected streets and houses in each of Oredo, Egor and Ikpoba-Okha Local Government council areas. In each of the selected street, the 2nd, middle and 2nd to the last households were selected and administered with questionnaire. A total of 1,781 questionnaires were administered in the 768 polling unit stations across the 3 local government areas of the study. Secondary data were sourced from published and documentary materials. Both the descriptive and statistical analyses were used for the study. The results show that there is variance in human perception and environmental quality does not vary significantly among residents of the 3 Local Government areas namely: Oredo, Egor and Ikpoba-Okha in Benin City. The study recommends that there should be a change of human attitudes and techniques on waste management and proffer better orientations of the menace of waste on environmental quality. There should be stiff measures of enforcement on residences while Sanitary Health Officers needs to intensify drives on sanitation and crammed down on offenders and environmental waste managers of the danger of indiscriminate dumps of waste anywhere and anyhow in the City of Benin. Finally, there should be improved waste management mechanism, routine fumigation and remediation been carried out on regular bases on the components of the environment as this will help to curb the menace of ill-managed waste disposal in Benin City.

Keywords: Environmental Quality, Menace, Perception, Residents, Solid Waste and Benin City

1.0. Introduction

Humans have a diverse knowledge and perception of what waste management and environmental quality connotes. To many they believe that waste management is all about refuse disposal and clean atmosphere but not undermining the processes and concepts involves to attain these qualities for the former and latter (Agbebaku, 2019). There is a linkage between waste management and environmental quality as a filthy environment stimulates environmental ill-quality (Cunningham and Cunningham, 2012). Environmental quality is a function of effective waste management from the ill-practices of indiscriminate dumps of refuse materials anywhere, anyhow and contamination on the earth resources (air, land and water) with less caution of its threats to the immediate environment (Oditte, 1993; Agunwamba, 1998; Osaghale, 2011; Cunningham and Cunningham, 2012; Agbebaku, 2019). Human attitudes and techniques of waste management is a determinant factor of the healthy state of man in the ecosystem as a filthy environment influence poor environment quality. To many they assumed that a clean land, water and bright air is what an environment entails not undermining the healthy state of these components on human health, safety and others living organisms of the environment (Cunningham and Cunningham, 2015; Agbebaku, 2019). In all the techniques of waste

disposal acrossed the global, the rudimentary methods of open burning and open dumping still prevail and widely used in the developing nations. In Nigeria most towns and cities including Benin City patronizes these methods mainly because it's easy to operates and of zero cost if compared to modern techniques of waste management and these ill-practices constitutes threat on quality of the environment in terms of conducive environment, human health and other living organisms in the environment (Oseghale, 2011; Cunningham and Cunningham, 2015; Agbebaku, 2019). Environmental quality (EQ) connotes the atmospheric state of clean air, land, water and hygiene. It further depicts a healthy, conducive and friendly state of the components of the environment "atmosphere, hydrosphere and lithosphere" to sustained man and other living organisms of the biosphere (Odiette, 1993; Omofonmwan, 1992; Wright and Nebel 2002; Wright and Boorse, 2011; Cunningham and Cunningham, 2012). The index for measuring the indices of environmental quality are fixed and standardized globally and nations of the universe are expected to align with the set standards and recommendations on the hygienic state of her citizenry and as a measure for assessing environmental quality (Wright and Boorse, 2011; Cunningham and Cunningham, 2012, 2015). For instance, the index for measuring water quality is through laboratory experimentation, in this case, physical, chemical and biological parameters in water sampled are collected and analysed. The same procedures go for determinant of air quality, these polluting gases can be measured with the aids of flue and lancom (111) gas analyzers. The determinant for land pollution is where soil samples are collected, tested and analysed in the laboratory with the aids of soil auger, pH meter and test tube (Chapman, 1996; Ayo, 2015; Uluocha, 2015; Agbebaku, 2014; 2019).

According to the study of Wright and Boorse (2011), the indices of environmental quality functions as the essentials for man's existence, safety and sustainability of others living organisms of the ecosystem. An environment that is mixed with the threats of pollutants and contaminants such as: (a) smoke (b) fumes (c) sooth (d) carbon monoxide (e) sulphur dioxide (f) methane gas (g) lead (h) toxic chemicals and (i) particles of pollens and solid waste matters may cause discomfort, disease and other health related problems only where these mixed pollutants are not well managed (Thomas, 2019; Wright and Boorse, 2011; Cunningham and Cunningham, 2015). For instance, the qualitative state of the environment in a developed state depends on the extent of management via; planning, organising and control of human activities in general and waste disposal in particular. These managerial functions can be in term of management of the increase in human population, urban growth and development, increase in waste generation, quality of building infrastructural development and standard of public health services and facilities (Omofonmwan, 1992, 1995; Paul and Steven, 2010; Oseghale, 2011; Cunningham and Cunningham, 2015; Agbebaku, 2018, 2019). There is no denying fact that the menace of solid waste hinders environmental quality in most cities of the globe but this is a function of their level of management (Cunningham and Cunningham, 2015). Solid waste comprises of all waste items arising from human and animals' activities that are solid in nature, discarded as useless and unwanted materials. Solid waste is predominantly any garbage, refuse or rubbish items that are generated, deposited and burned on the surface of the earth. The remains from these particle matters fine it ways into the water, air and land components of the ecosystem thereby constituting harms on the conducive state, safety and value of human health of man existence and other living organisms on the environment (Oseghale, 2011; Egbenoma, 2016; Agbebaku, 2019). The studies of Agunwamba (1998) and Zurbrugg (1999) as cited by Osuagor (2000), states that solid waste irrespective of its types and nature constitutes menace to environmental quality. Agunwamba (1998), states that since waste items are generated in varied ways; classified into different types and compositions and deposited in different ways and methods, that their modes of deposition have devastating effects on the quality of the environment. In most cities, un-managed waste items and the processes of waste disposal have negative effects on the quality of the environment. The effects of ill-waste disposal results to contamination of land and water sources, atmospheric pollution, offensive odours and ailment on man's health and safety. The ill-deposition of waste materials into the components of the environment is becoming unbearable to human health and safety and others unforeseen incidence of poor aesthetics, un-pleasant scene, overflows of dumpsites (temporal) as observed mainly in markets and hospitals places in the City of Benin in recent time. In addition, the menace of heap-counts of refuse dump litters on major streets, roads junctions, open spaces, abandoned buildings and water channels observed at major, strategic, common and unusual places in most of the communities and urban centers in Benin City of late is another challenging factor (Monday and Daniele, 2011; Medupin and Adedoyin, 2015; Egbenoma, 2016; Agbebaku, 2019).

These ill-wastes disposal and ill-managements techniques by man and environmental waste managers have led to severe environmental challenges on the value of human health, safety and conducive environment for man existence and sustainability. The menace of waste disposal on environmental quality of human health, safety and conducive environment could be from one or a combination of the indices of (a)offensive smells, poor aesthetics and (b)environmental ill-quality (poor sanitary condition resulting from polluted and contaminated air, water and land and ailment on man health and safety). For example, the effect of waste materials on the atmosphere is air pollution and offensive odour. Its effects on land ecosystem are land contamination, poor aesthetics, the menace of these pollution and contamination harbor insects and rodents and causes seepage and leachate of dangerous chemicals and epidemic while waste effects on water causes contamination of water source and epidemic (Chapman, 2004; Strahler and Strahler, 2006; Wright and Boorse, 2011; Cunningham and Cunningham, 2012, 2015; Agbebaku, 2019). On the bases of the above, the World Health Organization in 2004 and 2007 provided global recommendations and standards for measures and determinants of environmental quality which most countries of the world including Nigeria and the City of Benin are observing and abiding. These recommended standards and measures are subject to amendments and reviews and the last amended and revised Acts and Standards of 2015 was used as the index of environmental quality in this research. These includes the varied Acts and Standards of the indexes of environmental quality such as; (a)Clean Water Act, (b)Clean Air Act, (c)Clean Land Act, and (d)WHO Acts (FEPA, 1988; 2014; WHO. 2014; 2017; USAID, 2006; Strahler and Strahler, 2006; EPA, 2008; LASEPA, 2010; Iqbal, 2011; Agbebaku, 2019; Cunningham and Cunningham, 2015). The clean water act (CWA, 1972), determines the basic structure and criteria for regulating discharge of pollutants into water bodies 'surface and underground' and in regulating water quality in line with WHO (2004) recommend standards. According to the studies of Chapman (1996) and Adelegan (2004), this Act requires Federations to adopt; global water quality standards for each of the designated uses water are assigned with (drinking, cooking, bathing, washing and gardening). The CWA has the mandates to assess and ascertain the quantity of Cat-ions and An-ions presence in water on one hand and on the order disclose what is being dumped into the water bodies and revoke the permits of concern persons or entities (industry, company, mining and municipality) from dumps of unlawful waste materials into surface and underground water sources. Furthermore, the linkage and movement from sewage, oil spills, leachate and industrial runoff can render water source unsuitable for human consumption and of the need for water sources to be guided against epidemic for healthy and safety purpose. In Nigeria and Benin City, the appropriate authorities on environmental matters such as; FEPA 1988; NESREA, 2008; LASEPA, 2010; FMWR, 2015; ESWMB, 2018; ESWC, 2018 are in alliances with these recommendations and standards for protection and uses of water as a resource and hygienic state of man and safety environment as these measures will enhance the qualitative states of the environment (Chapman, 1996; Strahler and Strahler, 2006; NESREA, 2008; Iqbal, 2011; Wright and Boorse, 2011; Monday and Danieles, 2011; Agbebaku, 2014; Cunningham and Cunningham, 2015).

The clean air act (CAA, 1990), this Act is saddle with the mandate to curtail the effect of air polluting gases and compounds of particle matters into atmospheric resource (Cunningham and Cunningham, 2015). Air pollution an index of more of anthropogenic than natural factors is sourced from industrial emission, bush burning, toxicants, automobiles, gas flaring, underground coal fires, oil pollutants, production of plastics, loss heat in nuclear plants and bio-fuel (wood) consumed at a greater rate than it growth and others sources as methane gases and particle matters capable of contaminating the quality of the atmosphere. According to the study of Ali, Bilal and Jamal (2014), sulphur gas from open burning and incineration of waste items are not left out in deferring air pollution. The studies of Oyediran, Kayode and Feyi (2001), Wright and Nebel (2002) and Ayo (2014), observed that this Act has been the subject of open political warfare in the past 5 decades between those who think its cost of mitigation has been too high for industry, taxpayers, labour and consumers and those concerned about human health and environmental benefit. Studies have revealed that build-up of these gases and other pollutants in the atmosphere caused excessive heat and waves, global warming and climate change. The global recommendations and standards of clean air Act approved by WHO (2015) is what is obtainable and abiding in Nigeria and Benin City in deterring environmental quality (Odiette, 1993; FEPA 1988; NESREA, 2008; Thomas, 2009; Ayo, 2014; FGN, 2015; Cunningham and Cunningham, 2015; ESWMB, 2018; Agbebaku, 2015, 2018). On the other hand, the clean land act (CLA, 1987), is concerned about the safety and hygienic state of the land ecosystem in term of contamination from man activities such as waste disposal. This is where the land ecosystem should be devoid from toxic

pollutants and indiscriminate dumps of waste materials that may lead to poor aesthetics, un-necessary blockage of water channels, accumulation of leachates and flow of seepage, devoid greenification of environment, loss of microbial organisms, un-hygienic and sanitary condition and fumigation of their domains but instead enhance accommodating and conducive environment for man health and safety. In attaining this, the methods of open dumping and sanitary landfill of waste materials need to be improved to enhance environmental quality of the soil resource for man activities, health and safety. Authority of Benin City are in alliance with the WHO global recommendations and standards to protect and prevent of land contamination from the menace of waste disposal and enhance environmental quality (Adewole, 2009; Medupin and Adedoyin, 2015; Cunningham and Cunningham, 2015; Egbenoma, 2016; Agbebaku, 2019). Furthermore, the World Health Organisation Act (WHO, 2004, 2014, 2015), Act emphasized the significant of the need for qualitative state of the environment in terms of human health, safety and environment. Its mandates are based on the overall indices of enhancing environmental quality in terms of qualitative air, water, land safety and human health and environment. According to Article 21 of the WHO Act of 1947 as amended in 2014 with emphasis on Health Assembly of the Nations of the universe on environmental matters. The theme of WHO 2014 of Article 21, submitted that each Nation should adopt policies and regulations concerning the measures to enhance the qualitative state of their environment mainly in the areas as; (a) determine policies and regulations of the components of the environment (b) sanitary and quarantine requirements and other procedures designed to prevent the international spread of diseases and nomenclatures with respect to diseases, causes of death and public health practices and (c) measures to enhance environmental quality and safety of man and other living creatures of the ecosystems (Wright and Boorse, 2011; Cunningham and Cunningham, 2015).

In Nigeria and Benin City, these policies and regulations of the WHO Acts, Standards and Measures are what the Federal and State governments have adopted and committed in enhancing and sustaining environmental quality. Enhancement and sustainability of these Acts and Standards is achievable through the machineries of the commissioned authorities and agencies such as; Federal and State Ministries of Environment and Sustainability, National Environmental Standards and Enforcements Agency, Federal and State Waste Management Boards, Federates and States Environmental Protection Agencies and Environmental Health Officer at the State and Local Government level (FGN, 2005; FME, 2005, 2015; NESEA, 2008). In Benin City for instance, the Edo State Ministry of Environment and Sustainability, Edo State Waste Management Board, Benin City among other bodies were all established to enhance healthy, conducive and friendly state of the components of the environment (NESEA, 2008; ESG, 2010; Oseghale, 2011; FME, 2015; Cunningham and Cunningham, 2015; ESMFS, 2018; Medupin and Adedoyin, 2015; Agbebaku, 2019). The situation with waste management in Benin City is such that waste materials are dumped and burned anywhere and anyhow mainly in open spaces, in public facilities like schools, along major and minor roads and junctions, abandoned projects, into streams or rivers and markets places in recent times and these constitutes a menace to the environment and of its quality. Although in Benin City, there are collaborative efforts between the State Government and Private Sector Managers through the State Ministry of Environment in handling the menace of solid waste. Though, these collaborations have been on since over the last 10 years but their effects are not good enough to yield the needed results (Monday and Daniele, 2011; Igbinomwanhia and Ohiwovori, 2011; Egbenoma, 2016; Agbebaku, 2018). Much studies on waste management have been carried out in Benin City but none of these studies have effectively seek the knowledge and perception of residents on the menace of waste disposal on environmental quality in Benin City and this is the research gap of the study. This research gap, informed the reason for this study as the research is meant to determine the perception of residents of the menace of solid waste management on environmental quality in Benin City. In order to achieve this, the objective of this paper is to examine human perception and knowledge of residence of the menace of solid waste on environmental quality in Benin City. Benin City lies within Latitude 6^o20' and 6^o58' North of the Equator and Longitude 5^o35' and 5^o44' East of the Greenwich Meridian. The Benin City is administered majorly by 3 Local Government Areas of Oredo, Egor and Ikpoba-Okha and parts of Ovia South-West, Uhunwonde and Orhionmwon Local Government areas respectively. These 3 Local Government areas are regarded as the hob area coordinating activities of other parts of the Benin metropolis. These 3 Local Government Areas are made up of several settlements some of which were used for this study. The selected communities used for this study in Oredo Local Government area are; (1)Ogbelaka/Nekpenekpen (2)GRA/Etete, (3)Oredo (4)New Benin 2 (5)Ikpeema/Eguadase (6)Urubi/Iwehen (7)Ogbe (8)Uzebu (9)Ohogbe/Isehere/Ice Rd (10)New

Benin 1 (11)Unuera/Ogboka and (12)Ibiwe/Iwegie/Ugbague. In Egor Local Government area are; (1)Ugbowo (2)Ogida/Useh and (3)Okhoro while those from Ikpoba-Okha Local Government area are; (1)Gorretti (2)Idogbo (3)Obayantor (4)Iwogban/Uteh (5)Aduwawa/Evbo Modu (6)Ogbeson (7)Oregbeni (8)St. Saviour (9)Ugbekun and (10)Ologbo, However, a total of 25 communities were selected for the study (Figures 1 and 2). Each of these Local Government areas are made up of political wards and the wards are made up of settlements.

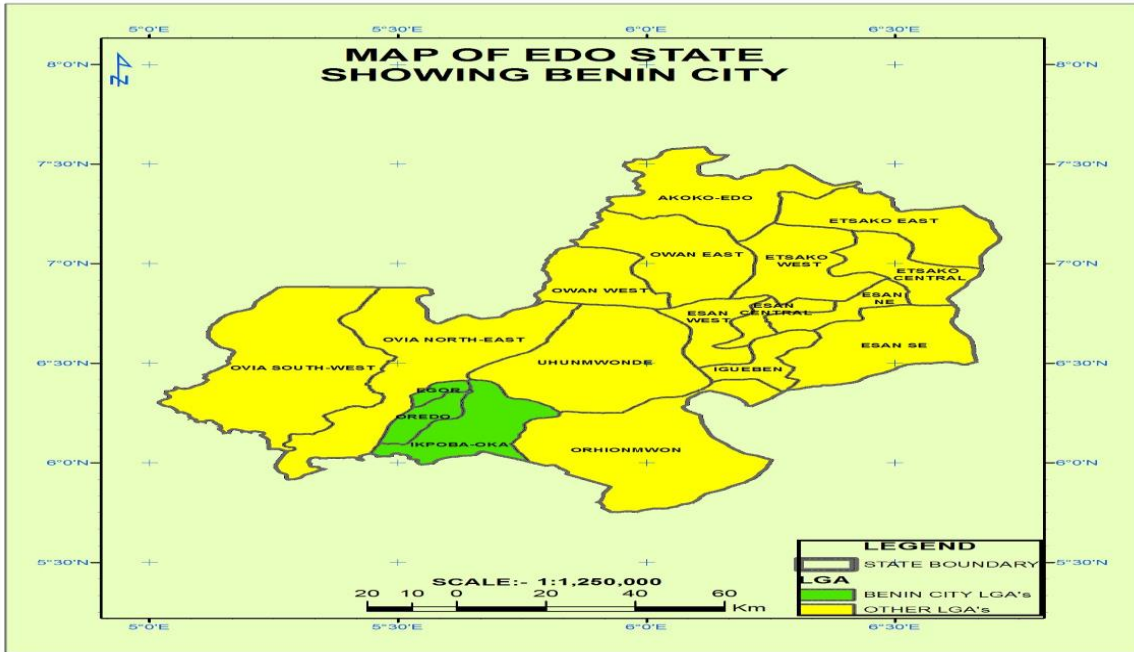


Figure 1: Edo State; Local Government Areas of the location of Benin City.
 Source: Cartography Studio, A.A.U Ekpoma, 2020

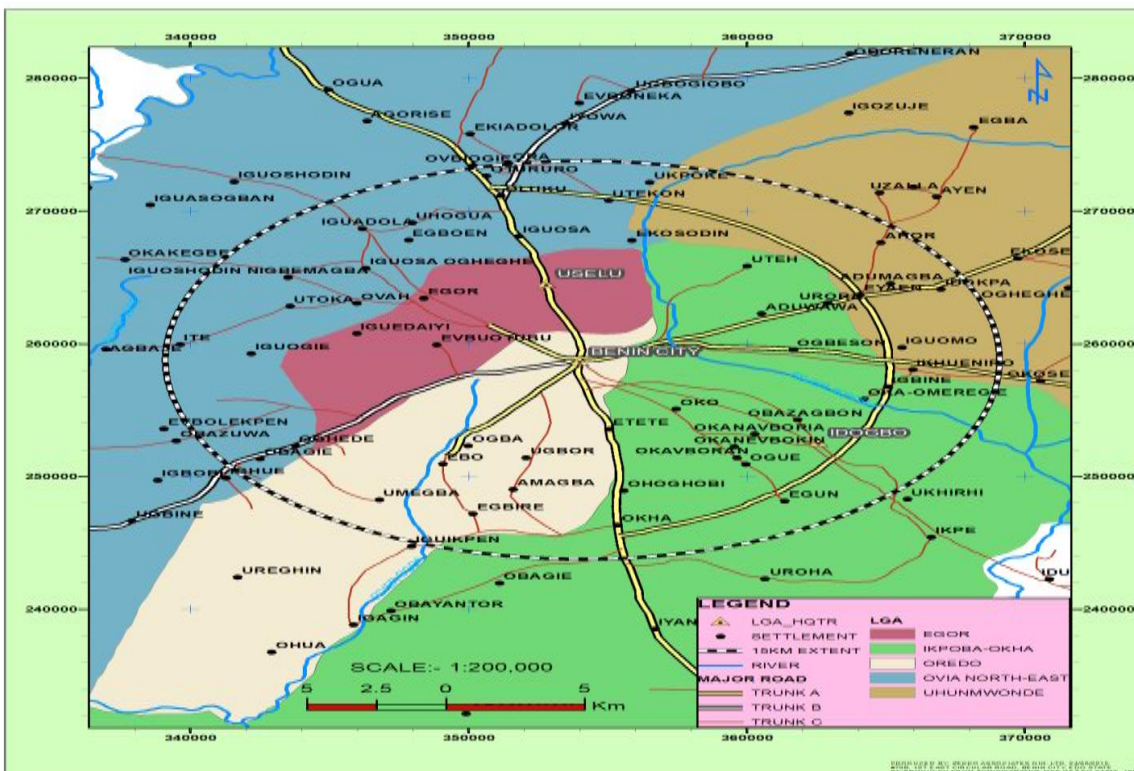


Figure 2: The Benin metropolis
 Source: Ministry of Land and Survey, Benin City, Edo State (2020)

2.0. Methodology

This paper is purely an empirical research. Materials used for this study includes the used of maps and design of questionnaires which formed the research instrument. A total of One Thousand, Seven Hundred and Eighty-One (1,781) number of questionnaires were administered in the selected 25 political wards which comprises of 110 settlements of the 3 Local Government council areas that constitutes the study area. In each of the selected communities' questionnaire were administered in these settlements and wards. Settlements and wards with high number of polling unit stations (PUS) of 20 and above and those with voters' registration numbers of 250 and above were used for this study and these places constitutes the major settlements of the study area. However, 60% of the wards of each Local Government area were randomly selected for the study. In doing this, 12 wards were selected from Oredo L.G, 03 wards were selected from Egor L.G and 10 wards were selected from Ikpoba-Okha L.G areas respectively. For the purposed of determining the population size for primary data collection, the number of registered voters of 250 registrations and above were used. The used of the number of registered voters is predicated upon the unavailability of 2006 population census figure for settlements. From the total of 1,781 questionnaires administration 616 were administered in Oredo L.G area, 559 in Egor LG area and 606 in Ikpoba-Okha LG area respectively. The distributions of 1,781 questionnaires were in order with the laid criteria were political wards with 20 and above polling unit stations (PUS) and with 250 registration number of voters were selected in each of the 3 Local Government areas. To this end, Oredo L.G area with 28 communities constitutes of 12 wards, all the communities in the 12 wards were used for questionnaire administration (going by the bench mark of 20 and above polling units). These areas in Oredo L.G constitute of highly and moderate numbers of human population than other areas from Egor and Ikpoba Okha L.G respectively. In Egor L.G area with 20 communities; which constitutes of 10 wards from these, 3 ward areas were used for questionnaire administration while in Ikpoba-Okha L.G area with 62 communities and constitutes of 10 wards and all the communities in the 10 ward areas were used for questionnaire administration. Selections of these places and houses were done through the systematic random sampling techniques.

In this case, in each of the selected wards and streets for questionnaire administration, the 2nd houses, the middle houses and the 2nd to the last houses were selected and used for this study. In addition, to the places used for questionnaire administration, the 1st 2-most populous wards, the 1st 2-moderately populated wards and the least-2 populated wards in each of the selected communities were chosen for this study and at the end the total numbers of communities to covered therefore were 25. That is, 12(Oredo), 03(Egor) and 10(Ikpoba-Okha) respectively from the 3 Local Government areas. From the total number of 1,781 questionnaires administered, 616 were for Oredo, 559 for Egor and 606 for Ikpoba-Okha Local Government areas respectively. Furthermore, 5% of the total numbers of questionnaires per Local Government area were administered to environmental waste managers (EWM) which comprises of staff of Edo State Waste Management Board (ESWMB) and Private Sector Practitioners (PSP). That is, 5% of 616 questionnaires for Oredo L.G are 31. 5% of 559 questionnaires for Egor L.G are 28 and 5% of 606 questionnaires for Ikpoba-Okha L.G are 30 respectively. Both the descriptive techniques of the use of tables and figures and statistical analyses of 2-way ANOVA were used for the study. Summary of the tabulation and breakdown of questionnaire administration in the selected communities and wards and population projection of residences of the 3 Local Government councils that constitutes the study area is shown in Table 1. The used of 0.01% were due to the large population size of the study area and non-availability of population data for 2016.

Table 1: Questionnaire administration in the Study Area

S/N	Local Government Area	No. of Comm.	No. of Ward	No. of Selected Ward	2006 Population	2016 Population Projection	Sample at 0.01%
1	Oredo	28	12	12	377, 671	407, 365	616
2	Egor	20	10	03	340, 287	369, 981	559
3	Ikpoba-Okha	62	10	10	371, 106	400, 800	606
Total	3 LGAs	110	32	25	1, 089, 064	1, 178, 146	1,781

Source: National Population Commission (NPC, 2006) and Pilot Survey, 2019.

3.0. Results and Discussion

The results of tests carried out on the perception of residents on the menace of solid waste on environmental quality in Benin City, Edo state were summarized and presented in tables. Tables 2 to 6 show the results and discussions on solid waste management while that of environmental quality were presented and discussed in Tables 7 to 16 respectively.

3.1. Results and discussion on solid waste management

Table 2 showed the comparative analysis of the most common types of waste materials generated by Local Governments in the study area. From the Table, Oredo LG generated most of the household wastes than any other Local Government areas. This is followed by responses from Ikpoba-Okha and Egor Local Government areas respectively. The reasons for Oredo generation of high household wastes could be due to more influx of high human population, choice of domain of residences, seat of power and hub council area in coordinating the administrative, social-economic and cultural activities in Benin City. On the other hand, commercial and institutional wastes were also high in Oredo Local Government than in Ikpoba-Okha and Egor. Furthermore, findings from the study revealed that commercial and institutional activities were low in Ikpoba-Okha Local Government area and moderate in Egor Local Government area if compared with that of Oredo Local Government. Findings also revealed that waste from auto-mobile, industrial and others were also higher in Oredo, moderate in Egor and low in Ikpoba-Okha LGA's.

Table 2: Common types of waste materials generated in the Study Area

Local Govt Area	Household waste	Commercial waste	Institutional waste	Auto mobile waste	Industrial waste	Other waste
Oredo	421	53	34	28	26	27
Egor	391	32	24	21	19	17
Ikpoba-Okha	416	49	28	13	16	12
Total	1228	134	86	62	61	56

Source: Fieldwork, 2019

Table 3 showed the comparative analysis on responses on the composition of wastes generated of residences of the 3 Local Governments in the study area. From the Table, the responses of the generation of non-hazardous wastes were evenly spread across the 3 Local Government areas with Oredo having the highest responses. This is followed by responses from Ikpoba-Okha and Egor Local Government areas respectively. Furthermore, responses on hazardous wastes were higher in Ikpoba-Okha than any other Local Government. This is followed by responses from Egor and Oredo respectively. Findings from the study revealed that hazardous wastes are highly generated outside the core area of Oredo and Egor Local Government. On the other hand, responses on infectious wastes were evenly distributed in the study area but responses from Ikpoba-Okha were higher than any other Local Government. This is followed by responses from Oredo and Egor Local Government respectively.

Table 3: Composition of waste materials generated in the Study Area

Local Government Area	Non-Hazardous Wastes	Hazardous Wastes	Infectious Wastes
Oredo	508	16	17
Egor	502	18	15
Ikpoba-Okha	503	30	18
Total	1513	64	50

Source: Fieldwork, 2019

Table 4 showed the comparative analysis on responses of the storage facilities mostly used by residents in the study area. From the Table, responses from residents from Ikpoba-Okha used more of the baskets and sack bags storage facilities than residents from any other Local Government areas. This is followed by residents from Oredo and Egor Local Government areas respectively. The used of block setting storage facilities were mainly used by residents from Oredo than any other Local Government. This is followed by residents from Egor and Ikpoba-Okha respectively. Findings from the study revealed that the frequent used of baskets and sack bags by residents from Ikpoba-Okha are due to less-cost of purchase, carriage and evacuation than others storage facilities. On the other hand, the used of block setting storage facilities by residents of Oredo is to helped curtain effects of poor

aesthetics and sanitation level of the area been the seat of power and coordination of administrative duties in Benin City. Others storage facilities used in the study were that of polythene bags, metal drums and others storage materials.

Table 4: Storage facility used by residents in the Study Area

Local Govt. Area	Basket	Sack bag	Block setting	Polythene bag	Metal drum	Others
Oredo	39	303	209	61	13	29
Egor	27	206	105	53	09	33
Ikpoba-Okha	43	390	39	39	06	23
Total	109	889	353	153	28	85

Source: Fieldwork, 2019

Table 5 shows the comparative analysis of the responses on waste collections by Environmental Waste Managers in the study area. From the Table, waste collections on weekly, every fortnight and once a month were highly evacuated in Oredo than in any other Local Government areas. This is followed by collections from Egor and Ikpoba-Okha Local Government areas respectively. The reasons for this could be due to level of sensitization, functionality and administrative and coordinating services at Oredo than in any other councils of the study area. Findings from the study revealed that collection of waste items by Environmental Waste Managers in Egor and Ikpoba-Okha were not as effective if compared to that from Oredo Local Government. The reasons could be the low level of patronage and poor service provider in these Local Government areas. Other waste materials collections from the study area were responses such as; whenever they like, once a month, once in two months, every fortnight, whenever they like and daily collections with Oredo having the highest collections. This is followed by wastes from Egor and Ikpoba-Okha Local Government areas respectively.

Table 5: Waste collection by environmental waste managers

Local Govt. Area	Weekly collection	Every fortnight collection	Once a month collection	Whenever they like	Once in two months	Daily
Oredo	215	235	66	29	15	8
Egor	201	216	54	30	13	6
Ikpoba-Okha	197	192	49	63	34	4
Total	613	643	169	122	62	18

Source: Fieldwork, 2019

Table 6 showed the responses of the comparative analysis by residents on the methods of solid wastes disposal in the study area. From the Table, responses on rudimentary methods of solid wastes disposal were similar from one Local Government to another. Findings from the study revealed that responses from Ikpoba-Okha shown that the methods of open dump, open burning and dug-pits were frequently used. This is followed by responses from Egor and Oredo respectively. The study further revealed that the methods of open burning and dug-pit in Oredo and Egor were relatively low if compared with responses from Ikpoba-Okha Local Government area. This could be the reasons of level of awareness and sustainability of environmental quality in Oredo and Egor L.G and also going by the ranking of the 3 Local Government areas in Benin City. Furthermore, the study revealed that in Okhoro and Idogbo communities in wards 8 and 9 respectively, the practice of open dumping of waste materials into flood waters in relatively high and these can also be said of communities like Aduwawa and Ologbo in wards 4 and 10 respectively. Others methods of solid waste disposal used in the study area are other methods such as; shot-put and disposal into sewers.

Table 6: Methods of solid waste disposal by residents

Local Govt. Area	Open dumping	Open burning	Dug-pit	Dumpsite	Others
Oredo	240	55	19	12	09
Egor	359	135	24	15	13
Ikpoba-Okha	401	245	32	33	40
Total	1000	435	75	60	62

Source: Fieldwork, 2019

3.2 Results and discussion on solid waste on environmental quality

Results from Table 7 revealed that majority of the despondence strongly agrees that there exists a correlation between waste disposal and environmental quality in their areas of residences in Benin

City as 328 (23.3%) testified to this statement. 306 (19.3%) of the respondents averagely agrees to the statement and 221 (13.3%) of the respondents completely disagree to this. In addition, 220 (12.7%) of the respondents strongly disagrees to this statement, while 168 (11.3%) of the respondents averagely agrees and 206 (8.0%) of the despondence agrees to this statement. Furthermore, 97 (6.7%) of the despondence have no idea to this statement while the remaining 83 (5.3%) of the despondence have partial idea to the statement. From the results, it shows that the majority 328 (23.3%) of the despondence which indicates there exists a correlation between waste disposal and environmental quality in their areas of residences in Benin City are aware of theme of the index of environmental quality and the need to residents to adhered to strict compliance to clean and safe environment by ensuring strict and proper disposal of waste items on the components of the environment as this will enhance environmental quality.

Table 7: Do you agree there is a linkage and correlation between waste disposal and environmental quality in your area of resident in Benin City.

Responses	Frequency	Percent
Strongly Agree (S.A)	328	23.3
Averagely Agree (A.A)	306	19.3
Agree (A)	206	8.0
Disagree (D)	221	13.3
Average Disagree (A.D)	168	11.3
Strongly Disagree (S.D)	220	12.7
No Idea (N.I)	97	6.7
Partial Idea (P.I)	83	5.3
Total	1627	100.0

Source: Fieldwork, 2019.

Results from Table 8 revealed that majority of the despondence are ware that ill-practices of waste disposal deters environmental quality of their areas as 516 (31.1%) of the total despondence indicates the index of clean water more than others indices EQ that promote environmental quality. This is followed by responses for clean land as 510 (29.0%) of the despondence testified to this. Responses from clean air represents 420 (25.7%) of the total despondence while responses for human health and safety represents 154 (12.1%) and 27 (2.1%) respectively. This shows that there exist some mixed reactions from residences and their level of awareness of the ill-practices of waste disposal on environmental quality in Benin City.

Table 8: Are you aware that ill-practice of waste disposal deters environmental quality of a place in terms of clean air, clean water, clean land, human health and safety

Index of environmental quality	Frequency	Percent
Clean air	420	25.7
Clean water	516	31.1
Clean land	510	29.0
Human health	154	12.1
Safety	27	2.1
Total	1627	100.0

Source: Fieldwork, 2019.

Results from Table 9 revealed responses of residents on their perceptions of environmental quality in Benin City. Table 9 shows that the perceptions of the indices of clean air were more in number than those of clean water and land put together. From the table, the perception of clean air represents 998 (61.3%), this is followed by the perception of clean water and this represents 486 (29.9%) while responses of clean land represent 143 (8.8%) respectively. From personal interviews granted in addition with questionnaires administration it was revealed that the reasons for the response of more of clean air than from other indices of environmental quality could be due to one a combination of other factors such as; low level of industrial activities, less activities of heavy and light duties automobiles factories and less open burning of refuse in the high-sprawl areas in the study area. In addition, the study revealed that places with more of clean air like in Government Reservation Areas were more cautions and oriented of the effects of air pollution from burning of waste items and emission of carbon dioxide into the environment than other places that are low-sprawl areas in the City of Benin. On the other hand, residents and places that testify of clean water were areas that were cautions of the methods of open dumps and blockage of water sources and its effect on water quality.

In addition, places with clean land were areas cautious of sanitary condition such as the high sprawl areas like the GRA, legislative quarters and other high-sprawl places in Oredo and Egor communities. Furthermore, a comparative analysis of responses of residents on their perception of environmental quality indicates that from the total of 998 (Oredo), 486 (Egor) and 143 (Ikpoba-Okha) of the dependence, residences from Oredo has the highest counts of clean air and clean water than residents from other council areas. This was followed by responses from Egor and Ikpoba-Okha respectively. The reasons for this could be due that the level and standard of sanitary condition were much higher in Oredo and Egor than in Ikpoba-Okha if comparison is to be made. On the other hand, responses on clean land followed the order and sequence of Oredo, Egor and Ikpoba-Okha respectively.

Table 9: Perception of residents on the index of environmental quality

Environmental quality	Frequency	Percent
Clean air	998	61.3
Clean water	486	29.9
Clean land	143	8.8
Total	1627	100.0

Source: Fieldwork, 2019.

Results from Table 10 revealed that residents' response on perception in ranking of the indices of environmental quality of clean air, water, land, human health and safety indicates that the perception of fair ranking represents 1005 (61.7%). This is followed by responses from perception for poor ranking as this represents 472 (29.1%). The ranking of good perception constitutes 79 (4.8%) while 70 (4.4%) of the responses for indicates very good ranking perception respectively of as their assessments of environmental quality in the City of Benin. Furthermore, places that indicates good ranking perception of environmental quality may have less challenge of clean air, water and land as well as sanitary and health condition. The study revealed that these places constitute the high-sprawl areas were refuse materials were well managed and effectively coordinated due to adequate management and government presence like in the GRA, Legislative Quarters, Medical and other selected areas in Benin City. In addition, areas that indicates poor ranking perception of environmental quality are places non-conforming to the indices of clean air, water and land as well as poor sanitary and hygienic condition as observed in places like Aduwawa, Okhoro, Gorretti and Idogbo communities.

Table 10: Perception of residents on ranking of environmental quality

Ranking of environmental quality	Frequency	Percent
Very Good	70	4.4
Good	79	4.8
Fair	1005	61.7
Poor	472	29.1
Total	1627	100.0

Source: Fieldwork, 2019

Results from Table 11 show a comparative analysis of residents' responses of their perception in ranking of environmental quality from the menace of indiscriminate waste disposal. From the Table, it was revealed that from the total number of 682 (Oredo), 482 (Egor) and 462 (Ikpoba-Okha) of the dependence, residences from Oredo that indicates good and fair ranking were higher than those from other council areas. This was followed by responses from Egor and Ikpoba-Okha respectively. On the other hand, responses for poor perception of environmental quality were much higher in Ikpoba-Okha than from other council areas. In addition, the study further revealed that the perception of very good ranking was higher in Oredo and lower in Ikpoba-Okha Local Government area if comparison were to be made. Responses from Egor Local Government area were in-between responses from Oredo and Ikpoba-Okha.

Table 11: Comparative analysis of responses of residents on perception of environmental quality in the study area

Local Government Area	Good	Fair	Poor	Very Good
Oredo	30	405	119	28
Egor	26	378	152	26
Ikpoba-Okha	23	222	201	16
Total	79	1005	472	70

Source: Fieldwork, 2019.

Results from Table 12 revealed the state of responses of residents' perception on the relationship between waste management on environmental quality. From Table 7, the results show that majorities of residents indicate their remarked of good relationship between waste management on environmental quality in the study area as 550 (36.0%) attested to this. This is followed by responses of fair relationship and this represents 513 (31.1%). 503 (29.0%) indicate very good relationship while responses of poor relationship constitute 64 (3.9%) respectively. The study further showed that residents were aware that there exists a positive relationship between solid waste management on environmental quality and the need to protect the components of the environment from the threat of indiscriminate dumps of refuse materials anywhere and anyhow in Benin City. If the is achievable and sustained, with time there will be improvements in environmental quality of the environment in term of clean air, land and water sources for the betterment of man, human health and safety and healthy environment.

Table 12: Residents perception on the relationship between waste management on environmental quality

Relationship between Waste Management and Environmental Quality	Frequency	Percent
Very Good	503	29.0
Good	550	36.0
Fair	513	31.1
Poor	64	3.9
Total	1627	100.0

Source: Fieldwork, 2019.

Results from Table 13 show the comparative analysis on responses of residents of the relationship between solid waste management on environmental quality. From the Table, responses for the relationship of very good perception were higher in Oredo LG than in any other council areas. This is followed by responses from Egor and Ikpoba-Okha Local Government respectively. The reasons for this could be due to level of sanitation, orientation and sustainability of environmental quality by residences from Oredo more than from other council areas. On the other hand, responses for fair relationship were higher in Ikpoba-Okha, in-between in Egor and low in Oredo council areas respectively. Responses from poor relationship were relatively high in Oredo and Egor and low in Ikpoba-Okha Local Government areas respectively.

Table 13: Comparative analysis of residents' responses on perception on the relationship between waste management and environmental quality

Local Government Area	Very Good	Good	Fair	Poor
Oredo	217	205	118	31
Egor	181	217	169	27
Ikpoba-Okha	105	128	224	11
Total	503	550	513	64

Source: Fieldwork, 2019.

Results from Table 14 revealed the possible ways of improvements of waste management that will enhance environmental quality in the study area. From the Table, majorities of the responses indicate the need for environmental education as one of the possible ways of improvement of waste management to sustain environmental quality as this represents 321 (19.7%). This is followed by the need for the use of modern techniques and this represents 305 (18.7%). This is followed by the duo of the need for effective waste management and prompt service provider and these represents (258) 15.9 each respectively. This is followed by the need for adequate sanitation measures and this represents 201 (12.4%), the need for adequate sanctions represents 164 (10.1%) while the need for use of degradable materials constitutes 120 (7.4%) respectively. Furthermore, the study revealed that there is need for improvement of waste management without polluting the components of the environment and this can be done only where there are adequate provisions of waste storage facilities, improved disposal methods and improvements in service delivery. However, this is achievable were more service operators are engaged and area of coverage reduced into smaller bits or cells for effective coverage. In addition, it was observed from the study, that a filthy environment repels environment quality and the need to protect the environment from these threats of indiscriminate waste disposal anywhere and anyhow in the City of Benin. These ill-practices of waste disposal have negative effects on residents' vicinity, human health and environment and these lead to ill-quality of the environment.

Table 14: Residents responses on areas of improvement in waste management that will enhance environmental quality

Areas of improvement	Frequency	Percent
Effective waste management	258	15.9
Use of modern techniques	305	18.7
Environmental education	321	19.7
Prompt service provider	258	15.9
Use of degradable materials	120	7.4
Adequate sanitation measures	201	12.4
Adequate sanctions	164	10.1
Total	1627	100.0

Source: Fieldwork, 2019

Results from Table 15 revealed that from the comparative analysis of residents' responses on areas of improvements to environmental quality shows that responses on the use of modern techniques were much higher in Oredo LG than from other council area. This is followed by responses from Egor and Ikpoba-Okha respectively. The reasons for this could be that residences from Oredo and Egor LGAs were better enlightened on the need for a change from the old techniques of waste disposal than residents from Ikpoba-Okha. Also, responses for improvement on environmental education were higher in Egor than from other council areas. The reasons for this could be due to the fact that some residents in Okhoro community in Egor Local Government area still indulged in the practice of disposition of waste materials into flood waters of which have adverse effects on water sources in particular and the environment at large. On the other hand, responses for effective waste management and prompt service provider were higher in Oredo than from other council areas. The reasons for this could be due to the simple fact that Oredo LG executes the functional role as the seat of power and hub-centre coordinating administrative, economic, social and political activities in the City of Benin far more than other council areas. Responses from other variables from Table 9 revealed that in order of occurrence were adequate sanitary measures, adequate sanctions and use of degradable materials. In all of these, responses for areas of improvements to promote environmental quality, responses from Oredo were much higher and low in Ikpoba-Okha LG while that from Egor LG were in-between if comparison were to be made.

Table 15: Comparative analysis of residents' responses on areas of improvement to environmental quality

Local Area	Govt	Use of modern techniques	Environmental education	Effective waste management/prompt service provider	Adequate sanitary measures	Adequate sanctions	Use of degradable materials
Oredo		142	119	101	88	69	45
Egor		131	121	96	80	56	39
IkpobaOkha		32	81	61	33	39	36
Total		305	321	258	201	164	120

Source: Fieldwork, 2019

Table 16 shows the variables that were used to compute the 2-way analysis of variance on the perception of waste management on environmental quality for the 3 Local Governments that constitutes the study area. These variables were the examination of the perception of clean air, clean water and clean land as well as frequency of waste evacuation, perception of frequency distribution, ranking perception of the environment, relationship between solid waste and environmental quality, number of persons per household outbreak of epidemic and availability of storage facility. The results of these variables are computed in Table 17.

Table 16: Variables used to compute 2-way analysis of variance on perception of environmental quality

Local Government Area	Perception of clean water, air and land	Ranking perception of the environment	Perception of effectiveness of waste collection	Perception of frequency distribution	Relationship between solid management and environmental quality
Oredo	624	582	612	517	571
Egor	458	582	500	512	594
Ikpoba-Okha	445	462	515	588	468
Total	1527	1626	1627	1617	1633

Source: Fieldwork, 2019

Table 17: The 2-way analysis of variance on perception of environmental quality

		Sum of Squares	df	Mean Square	F	Sig.
Attitude of persons on Indiscriminate dumping of waste	Between groups	9.157	1	9.157	16.757	.000
	Within groups	44.265	81	.546		
	Total	53.422	82			
Solid waste management you think needs urgent attention	Between groups	29.467	1	29.467	5.600	.020
	Within groups	426.220	81	5.262		
	Total	455.687	82			
Solid waste and environment menace	Between groups	1.686	1	1.686	8.447	.005
	Within groups	16.169	81	.200		
	Total	17.855	82			
Population size of household and waste generation	Between groups	1.353	1	1.353	5.720	.019
	Within groups	19.153	81	.236		
	Total	20.506	82			

Source: Fieldwork, 2019

Results of the statistical analysis of the 2-way ANOVA from Table 17 shows that the perception that environmental quality does not vary significantly among residences of the 3 Local Government areas of Oredo, Egor and Ikpoba-Okha in Benin City. In views of these analyses, the results of the study agree with previous studies on the menace of waste management in Benin City and that there exists a correlation of waste disposal on environmental quality in Benin City.

4.0. Conclusions

There is no doubt to the fact that there is a linkage between waste disposal and the state of the quality of the environment in Benin City. This is in terms of clean land, air, water and safety of human health. The menace from the practice of indiscriminate dumps of refuse materials anywhere and anyhow is part of the main causes of environmental challenges acrossed the in recent time. Pollutants and chemical substances from ill-managed waste resources resulted to poor aesthetic, environmental degradation and ill-quality of the environment. The recommended Acts, Standards and Measures of environmental quality needs to be uphold, sustain and abided. This will help humans to achieve and attained a balance of friendly and conducive environment for man's activities, health and safety. There should be a change and upgrade of the techniques of waste disposal from the rudimentary methods through the semi-modern and modern methods on waste management in Benin City. The rudimentary techniques of open dumping and open burning stimulate environmental ill-quality. These methods of waste disposal led to attraction of insects and rodents, land contamination, offensive odour, and poor aesthetics of the environment. These ill-environmental conditions results to atmospheric degradation and epidemic outbreak. Furthermore, the techniques of open burning needs to be stop due to its effects on air quality. In addition, the constraints from poor waste management such as; sanitary conditions, offensive odour, pollution and pollutants from water source and burned waste materials have negative effects on environmental quality of clean air, water, land, human health and safety. The study recommends that the agencies government and private sector practitioners should intensify and imposed better measures of enforcement on indiscriminate dumps of waste materials anywhere and anyhow and proffers better management of waste disposal in Benin City. There should be prompt environmental sanitation teams and programmes to managed waste items on daily, weekly and monthly bases. There should be also the routine house-to-house and market-to-market sanitation programmes in Benin City. Furthermore, Sanitary Health Officers needs to intensify their drives on sanitary matters in Benin City. Finally, there should be prompt waste evacuation, routine fumigation and remediation activities on regular bases as these practices will help to improves environmental quality in human health and safety and sustainability of future uses.

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