



HEALTH IMPACT ASSESSMENT OF SOME LANDFILL IN BENIN CITY NIGERIA



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Abstract: This study looked at the health impact of open dumpsite on the peoples in part of Egor local government area (L.G.A) of Edo State. Specifically, the study was to develop a scientific survey questionnaire, assess inform on the health impact of open dumpsite in the study area, analyse the feedback, and report the findings. Respondent's opinions were gathered through a pilot study. A total of 150 inhabitants in the study area were part of this study. The study data gathered was analyzed using SPSS Version 27. The study found that indiscriminate dumping of wastes in the study area is still a serious issues and posing health challenges to inhabitants living in the study area. The study therefore recommends that the enabled authorities in charge of waste evacuation in Egor/Edo state should properly map and register houses for waste evacuation purposes. The mapping of urban households has left other part of residential with the need of dumping household waste in street and along major roads.

Keywords: Health impact, dumpsite, waste evacuation, `indiscriminate dumping of waste, Survey questionnaire

Introduction

Environmental health is the science and practice of preventing human injury and illness and promoting well-being by identifying and evaluating environmental sources and hazardous agents and limiting exposures to hazardous physical, chemical, and biological agents in air, water, soil, food, and other environmental media or settings that may adversely affect human health (NEHA, 2022). It is a branch of public health which focuses on the interrelationships between people and their environment, promote human health and well-being, and to foster healthy and safe communities, (Oladipupo, 2017; Adetunji *et al.*, 2015).

Healthy environments could prevent disease outbreak often occurring at different settings. Clean air, stable climate, adequate water, sanitation and hygiene, safe use of chemicals, protection from radiation, healthy and safe workplaces, sound agricultural practices, health-supportive cities and built environments, and a preserved nature are all prerequisites for good health (WHO, 2022).

Thesis of Prüss-Ustün *et al.*, (2016) shows that more than 12 million people around the world die every year because they live or work in unhealthy environments. The global death toll for environmental hazard stood at 13.7 million deaths a year amounting to 24% of global deaths, 3.8 million deaths every year as a result of human being exposure to smoke from cooking, 4.2 million deaths from ambient air population (WHO, 2022). Waste is an inevitable by-product of human activities. It takes the form of solid, liquid and gas. Waste, over the past years, has been defined and considered as matter that has no monetary or economic value and discarded or thrown away if it fails to meet its primary function (Aniekan and Ikechukwu, 2016; Kanu *et al.*, 2013). These accumulated wastes act as environmental pollutants.

Environmental pollutants can cause health problems like respiratory diseases, heart disease, and cancer (Brusseau *et al.*, 2019). People with low incomes are more likely to live

in polluted areas and have unsafe drinking water where children and pregnant women are at higher risk of health problems related to pollution, (Landrigan, 2017; Jaradat, and Al-khashman, 2013).

One of the aims of environmental health is to protect the public by tracking environmental exposures in communities. Tracking environmental pollutants is key to figuring out where and how people are exposed, (Kanu *et al.*, 2013).

Research has shown that people living closer to landfill sites suffer from medical conditions such as asthma, cuts, diarrhea, stomach pain, reoccurring flu, cholera, malaria, cough, skin irritation cholera, and tuberculosis among others compare to the people living far away from landfill sites (Sankoh *et al.*, 2013; Thada, 2012). The causes of the health problems may be as a result of continuous exposure to chemicals; inhalation of toxic fumes and dust from the landfill sites.

Landfill operation is usually associated with contamination of surface and groundwater. Landfills are a major contributor to the world's gas emissions, an enormous amount of CH₄ and CO₂ are generated from the degradation process of deposited waste in landfills areas, resulting in health impact on its inhabitant (Kanu *et al.*, 2013). Landfill generates pungent odour, loud disturbing noise from landfill evacuators; volatile organic compounds (VOC). The continuous inhalation of CH₄ by humans can cause loss of coordination, nausea, vomiting and high concentration can cause death (Health Protection Agency Impact, 2016). Recent advances in technology and a better understanding of materials have been applied globally in the reduce, reuse, and recycling process that adds both monetary and economic value to waste matter while simultaneously mitigating the adverse effects of unchecked waste in the environment (Ikpe *et al.*, 2019; Igbinomwanhia, 2012).

In most African cities, less than 20% of urban waste is disposed of in landfills. The remaining waste ends up in illegal dumps (Barrett, 2014). Despite the methodological limitations, the scientific literature on the health effects of landfills provides some indication of the association between residing near a landfill site and adverse health effects. WHO (2007) reported that population's resident that are close to toxic waste sites have a high chances of cancer incident. Consequently, it has become very necessary to assess the health status of people living close to open dumpsite. This study is therefore aimed at studying the health impact assessment of open dumpsite parts of Egor LGA of Edo State in order to create awareness on the inhabitants about the possible dangers of living around the dumpsite.

Description of the Study Area

Edo State is one of the 36 states of Nigeria, located in the southern region of the country. Edo State is the 22nd largest State by landmass in Nigeria (19,559 km²). Edo State is located at Latitude of 6.3383^o N, and longitude 5.5722^o E. This account for why the study area (Asoro Landfill) in Evbuotubu has excessive rain during the rainy season, proximity to Gelegele river and slope topography. Evbuotubu community is predominately dominated by persons who are engage in petty-trading. The community is blessed with land resources that the inhabitation utilizes for their agricultural purpose. There is a major express road through the community to other towns. One dumpsite was

located at Asoro hill not far from Evbuotubu market. Heterogeneous wastes such as wastes from homes, offices, factories, industries, markets, etc., collected from the community by authorized and non-authorized agents are disposed at this site, and the dump site is not incinerated so as to mitigate against environmental pollution.

Materials and Methods

Design of the Study

The study is designed to obtain information regarding the health status of the people living in and around open dumpsite sited in Asoro, part of Egor Local Government Area of Edo State.

Population of the Study

The target population includes all those who are living in and around Asoro open dumpsite with the aim of assessing its impact on public health. The area covers a total landmass of 340,287 Km² (NPC, 2006).

Sample and Sampling Techniques

The sampling method was based on simple random survey through the design and administering of questionnaire to assess the needed information. The settlers from the sampled areas where selected in other to ascertain the health impact of waste dumped on open site on the inhabitants living in and around the site. In other to obtain the actual sample size of respondents in the study area. A total of 33 households with 150 inhabitants was the sampled respondents and a spatial distribution of respondents is shown below:

Sampled Houses	Houses Sampled (No.)	Inhabitant Per Houses	Total Inhabitant Sample
Asoro Dumpsite (24)	1, 3, 5,7,9,10,12, 14, 15, 17, 19, 22,25,27,31, 21,3,5,7,9,11,13,14, 1	3,4,5,3,5,3,4,7,2,3,4,5,2, 8, 6, 5,3,5,3,2,3,4,2,7,4,4, 6, 5, 9, 4	130
Evbuotubu Axis (4)	2, 8, 16,17	3, 2, 3, 2	10
Ugbiyoko (5)	1,4,5,7,9	2,1,1,2,1,3	10
Total (33)			150 Sampled Respondents

Field Survey (2022)

Instrument for Data Collection

The questionnaire and the structured interview method were used in this study to elicit respondent's responses on the subject under discussion. The questionnaire has organized questions design to reflect on the research questions formulated to guide the study. The questionnaire was ordinal in scale, rank and ordering without actually establishing variations among questions. The questionnaire was arranged in a four point Likert scale (Strongly Agree, Agree, Disagree and Strongly Disagree). The questionnaire has four sections (A, B, C and D).

1. Section A: Social demographic Characteristics
2. Section B: Methods of waste management disposal in study area.
3. Section C: Health impact of open dumpsite on inhabitants
4. Section D: Possible solution of environmental impact on inhabitant

Validity of Instrument

In survey, a rating scale could be more adequate than a questionnaire, or a questionnaire could be more adequate than a structured interview. It should also be noted that the validity of research data must be ascertained to ensure data quality. Validity of instrument is said to be valid if it enables a researcher elicit the correct responses from sample subjects. Content validity was used in this study. Content validity tends to measure what it ought to have measure. In other to ascertain the content validity of the research objectives and questionnaire questions formulated to guide this study. Study by the India Health Service (HIS, 2016), shows that content date established in a study could help over time, changes to site characteristics may occur as a result of additional waste disposal activities or clean-up.

Reliability of Instrument

The Cronbach Alpha was used to estimate the reliability of the instrument. A small sample size was administered with

a specimen of the questions. The pilot study carried out on 10 respondents and yielded a co-efficient of 0.59. The pilot test was aimed at finding out the health impact assessment of landfill in Asoro Hill and environ. First, two-week duration was set for this study, second, respondents were identified (10) and two questions generated;

Question 1: do ask “how often do you feel sick in a month: Response {Often [], Rarely [], Weekly []}.

Question 2: Your closeness to Asoro hill dumpsite has any effect on your health: Response {Yes [], No [] I don't know []}.

After due analyses, the responses show that Asoro hill dumpsite increases mosquitoes breed in the area which transmits malaria and other related diseases.

Methods of Data Collection

The study questionnaire and structured interview methods of data collection were used in this study. Both methods were administered by the researcher on her target respondents. The structured questionnaire and interview

Research Question 1: Does dumpsite in the study area has significant impact on social demographic characteristic of dwellers?

	Frequency	Percent
Gender		
Male	61	40.7
Female	89	59.3
Total	150	100.0
Age Distribution		
13 -18	36	24.0
19-25	51	34.0
26 – 35	28	18.6
36 – 45	19	12.7
46 – 50	16	10.7
Total	150	100.0
Academic Qualification		
Primary	48	32.0
Secondary	62	41.3
Tertiary	40	26.7
Total	150	100.0

Source: Field Survey (2022)

The task in table 1 was to examine if social demographic variables of inhabitants living in the study area have significant influence on open dumpsite in the study area. Demographic variables such as gender, age distribution and academic qualification were examined. The study found that academic qualification has significant influence on the state of open waste dumping in the study area. The researcher noted that the more educated and awareness respondents are the lower the level of indiscriminate waste

were administered in two weeks by the researcher along with 2 volunteers in the study area, which help to speedy the processes. A total of 150 questionnaires were administered to sampled respondents in the study area, all administered questions were retrieved at point of administration.

Method of Data Analysis

Data collected was analyzed using descriptive statistics. That is the use of table, percentages and frequencies. Data collected were analysed using SPSS Version 27. This method allows the researcher to describe and interpret qualitative data into quantitative ones.

Results and Discussion

This displays the various data collected to guide the study “the health impact assessment of landfill in part of Egor LGA of Edo State.” It is organized under data presentation, answering of research questions, and test of hypotheses and discussion of findings. The decision rule was set at less 0.1 – 2.9 (Rejected) 3.0 - 5.0 (Accepted)

dumping. Age and Gender have on significant influence no open waste dumping in the study area. This finding is in agreement with a study carried out by Fredrick *et al.*, (2018), which concludes that awareness and knowledge of the impact health of open dumpsite will help inhabitants in the study area keep to safe environment.

Research Question 2: What health impact has open dumpsite on inhabitants living in the study area?

S/N	Items	N	Mean (x) ²	Std. Deviation	Decision
2.1	Diseases are easily transmitted amongst inhabitants living closer to open dumpsite in the study area	150	2.5	1.5	Reject
2.2	Children living in the study area do experience environmental health impact due to indiscriminate waste dumping in the study area.	150	2.6	1.6	Reject
2.3	Degradation of the environment because of open burning, pollutes the atmosphere and groundwater which causes diarrhea and asthma amongst inhabitants in the study area	150	2.1	1.4	Reject
2.4	Exposure to open dumping is associated with health problems such as respiratory symptoms; irritation of the skin, nose and eyes; gastrointestinal problems; fatigue; headache; psychological disorders; and allergies	150	3.3	1.8	Accept
2.5	Open dumping cause diarrhea, Cholera and order related diseases amongst inhabitants in the study area	150	3.5	1.8	Accept

Source: Field Survey (2022)

The task in research question two (2) was to examine the health impact of open dumpsite on inhabitants living in the study area. Five (5) research questions were formulated to guide the study question. Two of the questions were accepted while three were rejected. The accepted questions asked if exposure to open dumping is associated with health problems such as respiratory symptoms; irritation of the skin, nose and eyes; gastrointestinal problems; fatigue; headache; psychological disorders; and allergies and if open dumping cause diarrhea, Cholera and order related diseases amongst inhabitants in the study area. Respondents unanimously agreed with the research questions which yield a Mean (x)² of 3.3 and 3.5. This indicates that open dumping posed a serious health challenges on residential living close to refuse dumpsites in the study area.

In a study by Njoku *et al.*, (2019) titled “Health and environmental risks of residents living close to a landfill: A case study of Thohoyandou landfill Limpopo Province, South Africa” the study found that landfill or open dumpsites are a contributor to anthropogenic greenhouse gas emissions. More so, open dumpsites are mostly associated with contamination of surface and groundwater by leachate from the landfill (mostly if the landfill lacks adequate liners), pungent odour, loud disturbing noise from landfill bulldozers, bioaerosol emissions; volatile organic compounds (De-Feo *et al.*, 2013). Sankoh *et al.*, (2013) study on the environmental and health impacts of the solid waste dumpsite in Freetown Sierra Leone, showed that the presence of the open dumpsite increases the amount of filth, garbage and litter of the nearby environment and communities. Fitaw and Zenebre (2003), showed that blowing litter from landfills have been found to be prevalent in areas closer to landfills and are easily carried to nearby residents by wind and has negative effects on the health of residents. This therefore shows that a controlled system of solid waste dumping and other precautionary

measures are very important to achieving a cleaner environment for communities residing next to a landfill (Sankoh, *et al.*, 2013). In this study, respondents interviewed report one or more of ailments such as skin disorders, asthma amongst inhabitants living closer to Asoro hill dumpsite.

When respondents were asked if “Diseases are easily transmitted amongst inhabitants living closer to open dumpsite in the study area” 27 (18.0%) respondents strongly agreed with the research question while 34.0% as agreed. 37.3% of respondents disagreed, and 10.7% strongly disagreed. 61 (41.3%) respondents strongly agreed, 12 (8.0%) agreed, 35 (23.3%) disagreed, and 41 (27.3%) strongly disagreed to whether “Children living in the study area do experience environmental health impact due to indiscriminate waste dumping in the study area.” Again, 23 (15.3%) of respondent strongly agreed, 15 (10.0%) of respondents agreed while 72 (48.0%) disagreed and 40 (26.7%) strongly agreed to whether or not “Degradation of environment because of open burning, pollutes the atmosphere and ground water which causes diarrhea and asthma amongst inhabitants in the study area” When put before respondents if “Exposure to open dumping is associated with health problems such as respiratory symptoms; irritation of the skin, nose and eyes; gastrointestinal problems; fatigue; headache; psychological disorders; and allergies” 78 (52.0%) of the respondent strongly agreed, 48 (32.0%) agreed while 16 (10.7%) of the respondent strongly disagreed and 8 (5.3%) strongly disagreed. 80 (53.3%) and 67 (44.7%) agreed that open dumping cause diarrhea, cough, odour, cholera and order related diseases amongst inhabitants in the study area with only 6 (4.0%) of respondent as those who disagreed. Majority of the respondents agreed that open dumpsite affects inhabitants living in the study area.

Research Question 3: What are the methods of waste management/disposal available in the study area?

S/N	Items	Questionnaire output				
		SA(4)	A(3)	D(2)	SD(1)	Total
3.1	Wastes are evacuated by the Edo State Waste Management Board (ESWMB)	76	51	13	10	150
3.2	I dump waste in government approved dumpsites in my area	27	59	36	28	150
3.3	I disposed wastes along road corners in the study area	3	16	61	70	150
3.4	Wastes are thrown in bushes and uncompleted buildings	11	3	71	65	150
3.5	Private Cart pushes do collect waste often in my house	41	12	61	36	150

Output: Table 3.1: As Example:

SA = 4*76 = [304], A = 51*3 = [153], 2 * 13 = [26], 1* 10 = [10]:

Grand Total = 304+153+26+10 = 493

Population (n) = 150

Mean (x) = $\frac{493}{150} = 3.2$

Std. Deviation = $(\sqrt{3.2}) = 1.7$

S/N	Items	N	Mean (x) ²	Std. Deviation	Decision
3.1	Wastes are evacuated by the Edo State Waste Management Board (ESWMB)	150	3.2	1.7	Accept
3.2	I dump waste in government approved dumpsites in my area	150	2.5	1.5	Reject
3.4	I disposed wastes along road corners in the study area	150	1.6	1.2	Reject
3.5	I drop or sometimes thrown waste in bushes and uncompleted buildings in my area	150	1.7	1.3	Reject
3.6	Private Cart pushes do collect waste often in my house	150	2.3	1.5	Reject

Source: Field Survey (2022)

The task in research question three was to examine the methods of waste disposal amongst inhabitants in the study area. Five questions were empirically tested in other to find out if inhabitants living in the study area has proper waste management system. It was noted that only those waste evacuations supported by the government were more viable. Larger number of respondents supported the Edo State Waste Management Board (ESWMB) in their waste evacuation. Despite the government efforts in waste collection and disposal, few of the respondents still favours throwing dirties along road sides and bushes due to convenience.

When respondents were asked if wastes are evacuated by the Edo State Waste Management Board (ESWMB) 76 (50.7%) respondents agreed with the research question while 51 (34.0%) agreed. 13 (8.7%) disagreed and 10 (6.7%) strongly disagreed. When respondents were asked

again if they dump waste in government approved dumpsites in their neighbourhood. 27 and 59 respondent agreed while 36 and 28 respondents disagreed as well as strongly disagreed. When asked 'if they disposed wastes along road corners in the study area' 19 (12.7%) agreed while 131 (87.3%) disagreed. However, 14 (9.3%) of the respondents agreed that their wastes are thrown in bushes and uncompleted buildings while 136 respondents disagreed. When asked 'if private Cart pushers do collect waste often in my house' 53 respondents (35.3%) agreed while 97 (64.7%) of the respondents disagreed. Respondent's responses show that respondents are aware of the imminent danger of open dumping of refuse. But their circumstance still limits their disposer of waste appropriately.

Research Question 4: What are the challenges of open dumpsite on health of inhabitants in the study area?

S/N	Items	N	Mean (x) ²	Std. Deviation	Decision
4.1	Surface and ground water contamination	150	1.9	3.1	Accept
4.2	Foul smell or odour	150	3.4	1.8	Accept
4.3	Release of greenhouse gases	150	3.3	1.8	Accept
4.3	Loss of vegetation and soil contamination	150	1.6	1.2	Reject

Source: Field Survey (2022)

The task here was to examine challenges open dumpsite can pose on inhabitants in the study area. The study found that foul smell and release of greenhouse gas (e.g. Methane (CH₄)) is a serious issue with open dumpsite in the study area. Njoku *et al.*, (2019) studies have established that cancer is an illness experienced by people living closer to a landfill or waste dump. Similarly, the Health Protection Agency (2011), showed that in several epidemiological studies performed by different scholars showing the relationship of cancer and landfill sites, cancer was a relatively complex illness to identify because of inadequate evidence to back up the claim of increased risk of cancer to communities living closer to landfill sites. Similarly, the review of Jarup *et al.*, (2012), by Small Area Health Statistics Unit (SAHSU) in 2011, showed that there was no excess risk of cancer in a people living closer to the landfill site. In this study respondents did not report any serious ailment except those who complain of continuous, spread of mosquitoes in the area which causes malaria and high fever.

Conclusion

Most of the methods used for collecting and storing household waste in Egor LGA attract flies, rodents and vermin that may be disease vectors and should be discouraged while community bins that is seldom used and composting encouraged. The infrequent collection coupled with relatively high number of households independently managing their own wastes may explain in part the littering of neighborhood streets in Egor LGA. Surface dumping and burning of waste should be discouraged and replaced with composting, a form of recycling of biodegradable kitchen and domestic wastes known for providing both economic and environmental benefits.

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