

Assessment of the Long-Term Health Effects of Exposure to Landfill Sites in the Lagos Metropolitan Area: A Case Study of the Olusosun Landfill and its Surrounding Communities

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Abstract

In urban areas of developing countries globally, prolonged exposure to municipal landfill sites, notably their impact on human health, is turning into a serious issue. The study focuses on the residents perceived long-term health impact of exposure to the Olusosun landfill site in Ojota, Lagos State. The study adopts a self-designed questionnaire administered through an online survey. A convenience sampling technique was adopted and sampled to participants residing within a 2-kilometre radius and analysed using descriptive statistics. The residents overwhelmingly agreed at a percentage of 99% and 91% that the environment and physical health, are the two main effects of the landfill site on surrounding communities, including effects like odour and foul smell, especially in the mornings and during the rainy season. The residents also identified indiscriminate disposal of waste in the neighbourhood proximate to the waste sites, stalled garbage trucks queuing to dispose of waste, among others. Particular concerns of the residents are the related health implications of the observed health issues, with 232 reporting skin irritability, 210 diarrhoea/dysentery, and 198 reporting other water-related diseases caused by contaminated groundwater. Despite the perceived health and environmental effects of the landfill, the study shows no statistical correlation between proximity to the landfill site in Olusosun and the residents' self-assessed health status. A longitudinal study of the area is advised to provide adequate comprehension of the proximity and health dynamics. A more effective, robust and environmentally sustainable waste management policy should be implemented to ensure the fulfilment of the Sustainable Development Goal (SDG) of guaranteeing everyone's health and well-being, as well as access to clean water, improved sanitation, and sustainable urban and rural areas.

Keywords: Landfill sites, Long-term exposure, Municipal Waste, Lagos

1. INTRODUCTION

Rapid population growth and increasing waste production have created global issues, particularly regarding waste management and its effect on the environment and human health (Agboola *et al.*, 2025). Since they are the simplest, most convenient, and least costly methods of disposing of solid waste, state and local governments in

Nigeria often rely on landfills or garbage dumping to address the issue of waste management. However, the majority of these landfills and rubbish pits are unlicensed, poorly managed, and situated in unpleasant areas (Nkwacha and Emeribe, 2004). One of the additional tactics utilised to address the issues with municipal waste is waste dumping in public areas and waterbodies.

In Nigeria (Ogwueleka, 2003) and Sub-Saharan African cities (Tomito *et al.*, 2020), including Lagos Metropolis, almost 70% of all waste is disposed of in landfills (Aliu *et al.*, 2014). These landfill sites are often poorly situated and managed, which devalues property and results in health, social, and environmental issues as well as the eviction of residents (Akoteyon *et al.*, 2011).

In addition to being an unattractive nuisance that harms the environment, landfills can harbour viruses that spread disease to those living nearby (Poole and Basu, 2017). Air pollution, groundwater contamination, surface water contamination, detrimental impacts on human health, and soil contamination are only a few of the environmental repercussions of landfills on the surrounding environment (Gouveia & Prado, 2009; Abdul, 2010; Bobeck, 2010; Srivastava *et al.*, 2015; De & Debnath, 2016; Mishra *et al.*, 2019; Vivan *et al.*, 2020).

Studies have shown that distance plays a key role and often affects how these landfills impact the ecosystem and human health (Vivan *et al.*, 2020; Abiola *et al.*, 2021). This is a situation that the study aims to investigate and either confirm or refute. Public awareness of the risks associated with exposure to these hazardous landfills continues to be a key consideration (Slovic, 2000). However, there are conflicting conclusions about how residents around the landfill perceive its impact and other dangerous waste management techniques (Etea *et al.*, 2021), as well as the relationship between landfills and public health. While studies by Addo, Adei & Acheampong (2015) and Babs-Shomoye & Kabir (2016) assert that environmental contamination from landfills has been linked to poor health, other research contests the connection between the general public's perception of municipal trash and detrimental health effects (De & Debnath, 2016).

Long-term exposure to landfills, according to Faniran *et al.*, (2025) and Alimba & Adesida, (2026), greatly increases the chance of death, which is a serious concern for residents around major landfills in Lagos metropolis. These

residents are often located near the landfills as is practical in the Lagos Metropolis, because of the enormous demand for land brought on by population growth. A major challenge is how to manage landfills properly (Abiola *et al.*, 2021). The population of Lagos metropolis has increased substantially from more than 5 million at the beginning of the 1990s to 12.9 million in 2006, and to a projected population of more than 21 million in 2022. With the highest population density in Nigeria and one of the highest in the world, with an area of around 2910 km², population explosion is a serious issue for authorities in the Lagos metropolis (Osoba, 2012). Having a robust waste management system is also essential.

Understanding how residents perceive the consequences of the Olusosun landfill in Ojota, Lagos, on their health and overall well-being, as well as their nearby environment, is essential to helping create workable recommendations that would aid both the residents and government agencies in properly managing the situation resulting from the landfill. The results of the research could act as a wake-up call for the government to take into account the needs of people who live near landfills as they work to improve overall living conditions and put in place a more efficient waste management system.

Justification of the Study

Numerous studies have been conducted on the Olusosun landfill, including those on the socioeconomic and environmental effects of residential structures (Olawoye *et al.*, 2019), groundwater contamination (Oyeku & Eludoyin, 2010), waste effluents (Adedosu *et al.*, 2013), and others (Nmema *et al.*, 2017; Omotayo *et al.*, 2019). However, there are few studies on the perceived health effects of prolonged exposure to landfills; this research aims to address that gap. Waste management in Lagos Metropolis is a difficult problem that has recently taken centre stage in the priorities of the state and municipal governments, as it is in other cities in Nigeria and sub-Saharan Africa in general. Considering this context, the

study's goal is to find out how long-term exposure to garbage sites in Lagos Metropolis may affect one's health.

The Olusosun landfill was chosen for the study for many reasons, one of which is its proximity to different urban land use characteristics: The Olusosun Grammar School, the Olusosun/Ojota residential neighbourhood, the Ojota-Oregun Industrial Area, the Kudirat Abiola Way commercial area, and all these places are adjacent to the location (Olawoye *et al.*, 2019). This would make it possible to analyse how different urban land-use activities are perceived. Additionally, the Olusosun landfill collects between 8000 and 11000 metric tons of rubbish every day, which is more waste than any other landfill in Lagos (Apollo Mapping, 2014). A lot of studies in Lagos (Ijase *et al.*, 2012; Olawoye *et al.*, 2019), Nigeria (Ogunde *et al.*, 2018), and West Africa (Yoda *et al.*, 2014) have used questionnaires in perceptive studies on waste, making it a very relevant and scientific method of gathering information on people's perspectives on current issues. Toledo *et al.*, (2015); Chong *et al.*, (2019) & Shekoo *et al.*, (2022) highlighted the preference of online resources because of their efficiency, simplicity and its potential and inherent benefits in health research.

2. MATERIALS AND METHODS

This section describes the criteria used to select the sample population, the gathering and analysis of data adopted for the study.

Study Area

The Olusosun landfill lies within longitudes 3°22'30"-3°24'20" East and latitudes 6°34'35"-6°37'11" North (Figure i). The landfill gets between 8 and 11,000 metric tons of rubbish every day and is one of the three major landfill sites in Lagos (Apollo Mapping, 2014; Majolagbe *et al.*, 2016). The landfill is the most active site and is in a part of the Lagos Metropolis that is both densely inhabited and very demographically varied, in contrast to the other two landfill sites in the Lagos Metropolis at Abule Egba and Solous

(Olorunfemi, 2009). The area covers about 42 hectares of land surrounded by residential, commercial and industrial neighbourhoods (Olawoye *et al.*, 2019). The site directly surrounds the Olusosun community and about 100 meters from Ojota, however, the sampling was restricted to the Olusosun community. About 15000 residential homes exist near and around the site, occupied by substantial populations who work on the site and in the industries around the area (Ogungbemi *et al.*, 2022). The proximity of the landfill to the inhabitants of Olusosun and the Ojota area necessitates a study on the health impact of long-term exposure to the landfill among residents.

Survey Description

The design and structure of the questionnaire was achieved from the analysis of several literatures. The study's data were gathered through an online survey hosted on Microsoft Forms as well as a face-to-face interview. Web-based survey tools or online survey tools are common data collection techniques in today's networked society (Vadantha & Harinarayana, 2016). Since the beginning of the COVID-19 outbreak, there has been a growth in studies collecting data using online surveys, showing that academics are turning their attention to internet-based data collection techniques (Akintunde *et al.*, 2021). This could be due to the ease of data collection online compared to doing conventional in-person interviews while following the COVID-19 pandemic travel restrictions and distancing guidelines. Additionally, it provides a quicker and cheaper means of data collection when compared to other remote data collection techniques, such as telephone interviews (with no need for an interviewer and automatic data entry). Both of these elements are essential for collecting findings fast to guide the creation and application of public health initiatives (Singh & Sagar, 2021). Web-based surveys are developed and designed using Microsoft Forms, a cloud-based data management tool. Microsoft Forms, one of the most widely used and successful online survey platforms, was chosen for the research because,

like other platforms of its ilk, it is free to use and easy to set up (Vadantha & Harinarayana, 2016). It is also renowned for its intuitive layout, mobile

phone compatibility, and software support for a wide range of file formats, including SPSS, Excel, CSV, and PDF.

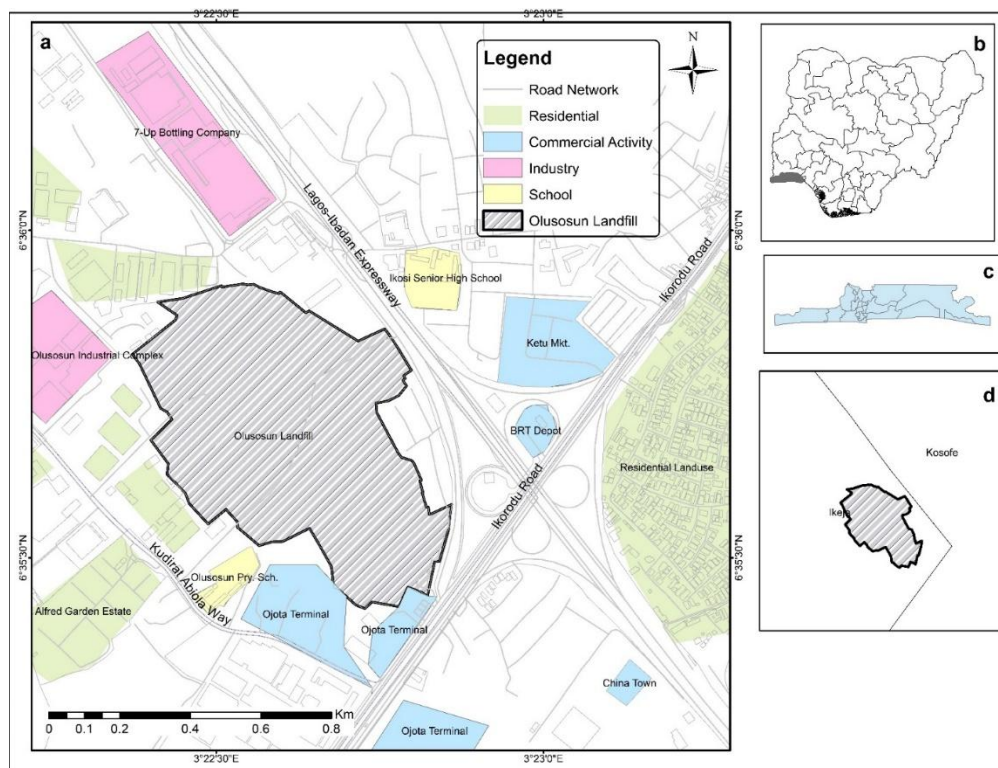


Figure i: Olusosun landfill, Ojota, Lagos (Olusosun landfill and surrounding land use; b- States boundary in Nigeria; c- Local Government Area in Lagos; d- LGA around Olusosun landfill). (Source: Author, 2022).

Study Plan

Olusosun landfill is about 200 meters from residential, commercial, and industrial land used by the Olusosun dump (Figure i). The goal of the research is to learn how residents feel about the consequences of the landfill on their health. The sample population are residents of Olusosun and its environs who reside fewer than three kilometres from the landfill. This research used a technique known as purposeful sampling, in which participants are chosen based on how well they meet the objectives of the study and how convenient they are in general (Gravetter & Forzana, 2012). Convenience sampling was adopted for this study to identify Olusosun

residents who live within 2 kilometres of the Olusosun landfill and are willing to take part in the survey.

Convenience sampling has been employed even though it isn't often recognised as a solid sample technique due to its advantages, such as time efficiency, lower costs, and continual representativeness of a study's goals, which are all pertinent to our investigation (Gravetter & Forzano, 2012). The study findings were obtained using this sampling approach, and the quality of the data will be preserved even if the convenience sample and sample size may not precisely reflect the sample size (Farrokhi & Mahmoudi-Hamidabad, 2012).

Between the 21st of August and the 7th of September 2022, the survey was carried out using a mix of face-to-face interviews and surveys because of the proposed sample size. The research uses face-to-face survey procedures because respondents are more easily accessible (Saarijarvi & Bratt, 2021) and because there are conflicting perspectives on the advantages of face-to-face interviews for the quality of respondent data. Olsen & Bilgen (2011) indicate a negative connection between the quality of the data and the greater rapport may affect the respondents' replies; however, Haan *et al.*, (2017) and Sun *et al.*, (2021) demonstrate a favourable link between high rapport and the quality of the data. The survey was created with structured questions that allow minimal space for ambiguity to reduce interviewer and respondent bias. Additionally, residents with an internet connection who are willing to complete the questionnaire at their convenience were sent URLs to the Microsoft Form platform. When accessible, the household head or persons (over the age of 18) who know about household activities, particularly the financial situation, were given the questionnaires.

Study Population

The research used a quantitative data-gathering approach and a self-designed, structured questionnaire that was based on relevant literature. Participants in the study must reside within a 2-kilometre radius of the landfill and must have lived or worked in the area for more than a year to qualify. The author would conduct in-person interviews with the aid of trained field workers after randomly selecting the households. This is because face-to-face interviews provide a noticeably higher response rate and allow for convincing skeptical respondents, despite the ubiquitous use of online surveys (Ongena & Dijkstra, 2021). To guarantee a certain level of involvement from Olusosun residents, the author discusses the nature of the activity with the local landlord association representative, who helps to facilitate access to residences in the neighbourhood.

A version of Cochran's method was used to calculate the sample size to ascertain the population size. This method is preferred because it allows for the calculation of ideal sample size at desired confidence and precision levels and a statistically significant estimation of the proportion of the attribute present in the total population of the study. The Cochran's method is preferred for the study because it is suitable for survey research, the population size is known and relatively large, as in the case of the Olusosun area (Uakarn *et al.*, 2021).

$$n = \frac{\frac{Z^2 pq}{d^2}}{1 + \frac{1}{N}} \left(\frac{Z^2 pq}{d^2} - 1 \right)$$

(Adapted from Shekoohiyan *et al.*, 2022)

Where: n is the sample size, Z is the statistics for a level of confidence (1.96 at a 95% confidence interval), d is the margin of error (0.05), N is the population size (3600), and P is the predicted prevalence (0.5), and q is equal to one minus the p (0.5).

The 2006 National Population and Housing Census do not provide values for community or settlement levels, but according to the 1991 National Population Census, 5104 people were living in the Olusosun village (NPC, 1991). To get a recent number, high-resolution population density maps from 2020 from Meta (https://data.humdata.org/organization/facebook?q=high%20resolution%20population%20density&ext_page_size=100) were used to estimate the current population size (N) for the Olusosun area. The Conversion tool (Raster to Point) function on the Arc Toolbox of the ArcGIS 10.3.1 program was used to extract the population raster for the Olusosun area for the research and convert it to point features. Following this, it was decided that 3600 people would constitute the target demographic for the Olusosun region. Cochran's sample size formula (Eqn. 1) was used to calculate the sample population with a 95% confidence level. This method led to a sample population

estimate of 347.2 (~347) respondents, which formed the basis for the number of questionnaires administered for the research. Purposeful sampling technique, was then adopted where participants are chosen from Olusosun community and commercial activities proximate to the site based on how well they meet the objectives of the study, especially their length of residency within 2 kilometres of the landfill site and their willingness to participate in the survey.

Data Analysis

The data were analysed using IBM SPSS Statistics 23 and Microsoft Excel. Due to its accessibility, acceptance in scientific research, versatility in analysis, and data translation, the study favours the SPSS software suite. For this research, the SPSS software program was chosen over alternatives because it supports a wide range of statistics, from simple descriptive statistics to intricate analyses of multivariate matrices. Combining files, modifying already-existing variables, and creating new ones are all permitted (Arkkelin, 2014). In the context of univariate, bivariate, and multivariate analysis using both parametric and non-parametric statistical approaches, the SPSS software also conducts comparison and correlational statistical tests (Ong & Puteh, 2017).

Using the Chi-square test for association, also known as Pearson's chi-square test, which is used to examine if there is a link between two categorical variables, the research hypothesis for the study was tested (Boduszek, 2016). The following presumptions guide the Chi-square test for the association:

- two variables were assessed at the ordinal or nominal level.
- Variables consist of 2 or more independent groups from different categories.

The research uses two variables in its analysis:

- i. the distance between Olusosun residents and the landfill, and
- ii. the residents of Olusosun's assessment of their health.

With the use of a formula that compares the observed and predicted frequencies, the chi-square test of independence determines how the actual frequency pattern deviates from the expected frequency pattern. The chi-square probability may be used to calculate the probabilities for the test statistics, enabling hypothesis testing. The chi-square test of independence statistic is theoretically calculated by adding the difference between the predicted and observed frequencies for each cell in the table, divided by the anticipated frequencies for each cell. From the SPSS statistical output, the researcher determines the value and probability of the test statistics (Franke *et al.*, 2012; Boduszek, 2016).

Ethics in Research

The researcher employed the highest level of ethical consideration during the survey and interaction with the residents of Olusosun and environs. Residents who volunteered to participate in the study were assured of the confidentiality of the information provided and that it would only be used for academic purposes.

Study Limitations

For the researcher to safely assert that what is occurring in the sample is also occurring in the population, collected samples typically need to be representative of the community (Cohen *et al.*, 2007). If not, the study's validity is in jeopardy since it is based on conjecture. Given that only those who have lived in Olusosun for more than a year and who live within 2 kilometres of the landfill were included in the research, it may be impossible to know with confidence if the sample is representative of the whole community. For the research, 346 samples were gathered, and some have claimed that this relatively small sample size may restrict the kinds of information that may be obtained, allowing for a more comprehensive approach and higher-quality interviews with each participant (Fiedler & Juslin, 2006). Evans & Buehner (2011) contend, however, that there is no advantage to doing so and that the only real justification for doing so is to save money. Thus,

quality rather than quantity of data serves as the investigation's foundation. Although there is no reason to question the veracity of the results, a focus group of residents may have added to them.

The bias of the selected respondents and participants may also be influenced by their own opinions, which might skew the study's findings. It is critical to keep in mind that the authors' perspectives, attitudes, and abilities influence the gathering, interpretation, and analysis of data (Blasco, 2012). The researcher attempts to adopt a neutral mindset and preserve impartiality throughout the inquiry by being conscious of this process.

3. RESULTS

Socioeconomic Characteristics Around Olusosun Landfill

The socioeconomic data of the Olusosun population and their surroundings were gathered via the survey, which included topics including age, residential distance from the landfill, educational background, length of residency, projected household income, and household size. Table i presents the findings. About 23% of the Olusosun and surrounding area residents who were tested live within 100–200 meters of the Olusosun landfill. Approximately 20, 19, 16, 15 and 7% of the sampled population live within 200–300 meters, within 100 meters, between 300–500

meters, within 500–1000 meters, and within 1-2 kilometers of the Olusosun dump, respectively.

Approximately 42% of the surveyed residents were between the ages of 26-35, 19% were between the ages of 18-25 and 36-45, 11% were between the ages of 46-55, 6% were between the ages of 56-65, and 4% were beyond the age of 66. According to the selected residents' educational backgrounds, 53% had completed their senior secondary education, 21% had completed their primary education, 20% had attended a higher institution, and 6% had not completed any formal education.

According to the length of time residents have been there, 19% have lived there for more than 8 years, 7% have been there for less than 2 years, and 45% have lived there for between 2-4 years. About 30% have lived there for between 5-7 years. The household income of residents of Olusosun and its environs is comparatively equal, with slightly more than 2% earning less than 40,000 naira, roughly 8% above 200,000 naira, 17% between 41 and 70,000 naira, 18% between 151 and 200,000 naira, 23% between 71 and 100,000 naira, and 32% between 101 and 150 000 naira, respectively. The average household size for Olusosun citizens is between 2-4 people, while 29% of residents live in homes with 5-7 people, and between 5 and 4% live in households with 1 person and more than 8 people, depending on the situation.

Table i. Socio-economic characteristics of residents of Olusosun and environs.

Categories	Frequency	Percentage	Valid Percentage
Distance of respondents from the Olusosun landfill (n=346)			
1-2 kilometres	24	6.9	6.9
100-200 meters	79	22.8	22.8
200-300 meters	68	19.7	19.7
300-500 meters	56	16.2	16.2
500-1000 meters	52	15.0	15.0
Less than 100 meters	67	19.4	19.4
Total	346	100.0	100.0
Age of respondents (n=341)			
18-25 years	63	18.2	18.5
26-35 years	143	41.3	41.9
36-45 years	64	18.5	18.8
46-55 years	37	10.7	10.9
56-65 years	20	5.8	5.9
66 years & above	14	4.0	4.1
Non-response	5	1.4	100.0
Total	346	100.0	
Educational qualification (n=343)			
No Formal Education	20	5.8	5.8
Pry. Sch.	72	20.8	21.0
Sec. Sch.	181	52.3	52.8
Tertiary Education	70	20.2	20.4
Non-response	5	1.4	100.0
Total	346	100.0	
Period of residence near the Olusosun landfill (n=346)			
2-4 years	154	44.5	45.0
5-7 years	104	30.1	30.4
Above 8 years	65	18.8	19.0
Less than 2 years	19	5.5	5.6
Non-response	4	1.2	100.0
Total	346	100.0	
Household income (n=342)			
101-150,000 (₦)	112	32.4	32.4
151-200,000 (₦)	63	18.2	18.2
41-70,000 (₦)	59	17.1	17.1
71-100,000 (₦)	78	22.5	22.5
Above 200,000 (₦)	26	7.5	7.5
Below 40,000 (₦)	8	2.3	2.3
Total	346	100.0	100.0
Household size (343)			
1 resident	17	4.9	5.0
2-4 residents	210	60.7	61.2
5-7 residents	101	29.2	29.4
Above 8 residents	15	4.3	4.4
Non-response	3	0.9	100.0
Total	346	100.0	

(Source: Authors' Fieldwork, 2022)

The Perceived Effect of the Landfill on Residents' Health

The viewpoint of Olusosun and nearby inhabitants about the landfill's effects on the environment and their health is presented in this section. Figure ii-v shows the outcome. The variables investigated in this section includes the environmental impact (water, air, and soil pollution, noise and odor), Social relationship (the tendency to congregate in the area as well as the tendency/likelihood of guest to visit respondents), psychological impact (Comfortability, frequency of bad mood, and general stress from continuous exposure to the landfill situation), Physical health (all health conditions relating to exposure to the landfill, like skin irritation, water-borne diseases, diarrhea/dysentery, asthma etc.).

According to Figure ii, the people of Olusosun and the environs think that the Olusosun landfill has a significant negative impact on their overall wellness. Specifically, 91% (313) of the locals stated that the location and activities on the Olusosun landfill influenced their physical health, while 99% (341) of the respondents believed that the landfill has a significant environmental impact on the surrounding environment. While 36% (125), 14% (47) and 10% (33) of Olusosun locals said that the landfill has impacted the aesthetics, caused serious psychological effect on the population and resulted in other impacts like harbouring miscreants who often participate in unsavoury activities like using drugs, harassment of the residents as well as increase the general crime rate in the area. Furthermore, 52% (180) of Olusosun residents claimed that the landfill has affected their social interactions.

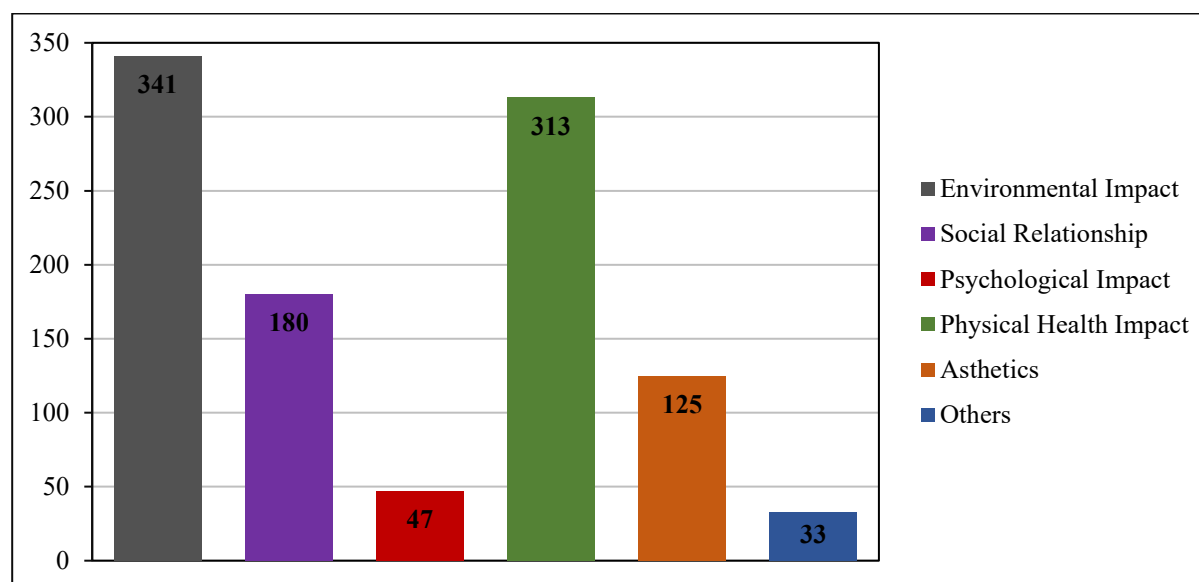


Figure ii: Impact of landfill on the residents of Olusosun and Environs. (Source: Author, 2022)

The Olusosun landfill is believed to have several negative health effects on the residents of Olusosun and the surrounding area (Figure iii), including psychological disturbances, skin irritation from contaminated groundwater, water-related illnesses, diarrhoea and dysentery from contaminated domestic water sources, allergic rhinitis, asthma, and coughing and chest pain from smoke and fumes from burning waste at the

landfill, as well as non-communicable diseases like malaria and according to the survey, skin irritability (232 out of 346 respondents), diarrhoea/dysentery (210), water-related disorders (198), and asthma (186 out of 346) are the main health issues that Olusosun locals are worried about as a result of the landfill's location and activity. As additional health concerns of Olusosun people about the landfill site and

activities, 141, 116, 106, 104, and 57 of the 346 respondents additionally mentioned coughing/chest discomfort, psychological

disturbance, non-communicable illnesses, other diseases such as worm infections, and allergic rhinitis.

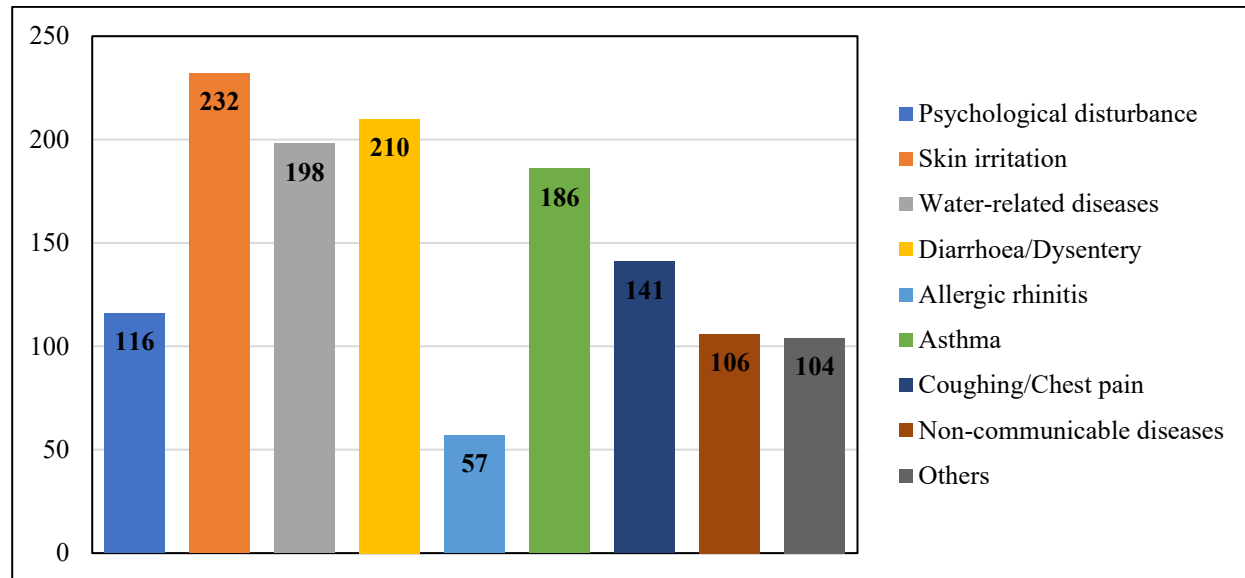


Figure iii: Health impact of Olusosun landfill on the residents. (Source: Author, 2022)

The perception of the Olusosun residents on their health, which are shown in Figure 4 indicates that, 36% (131) of residents rate themselves as having good health, 24% (88) as fair, 20% (72) as average,

and 12% (44) as having excellent health concerning their surroundings, economic status, and social standing.

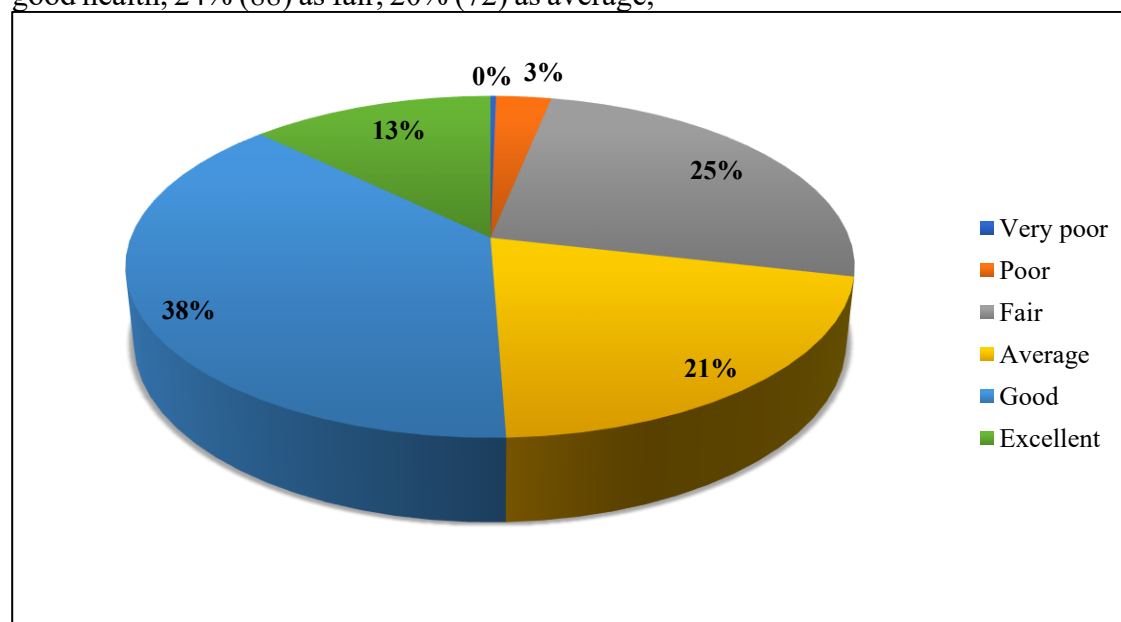


Figure iv: Self-health rating of residents of Olusosun and environs. (Source: Author, 2022)

Olusosun Residents' Environmental Concerns about the Olusosun Landfill

Residents of Olusosun and the surrounding areas are concerned about some environmental issues related to the location and operations of the Olusosun landfill. The Olusosun landfill's odour and the indiscriminate placement of dirt along a community's main road by trash trucks and carts rank first and second among environmental concerns, respectively, as shown in Figure v. These are some additional issues that the locals have. 174 people (or 50%) are worried about the traffic snarls often brought on by the line of garbage trucks dumping trash at the landfill or by old, broken-down, or abandoned vehicles parked

nearby. Residents in these areas are worried about air pollution in proportions of 46% (154) and 42% (144), mostly due to garbage truck exhaust and rubber and plastic burning on the Olusosun landfill. Additionally, flies, rodents, and other vector infestations (43, about 12%), insect and cockroach infestation into homes (12, about 4%), noise pollution from trucks (129, about 37%), water pollution from polluted runoff and infiltration of minerals and metals into the aquifer (94, about 27%), and visibility problems brought on by smoke and fog from the burning of landfill waste (5, about 2%) are concerns of the locals.

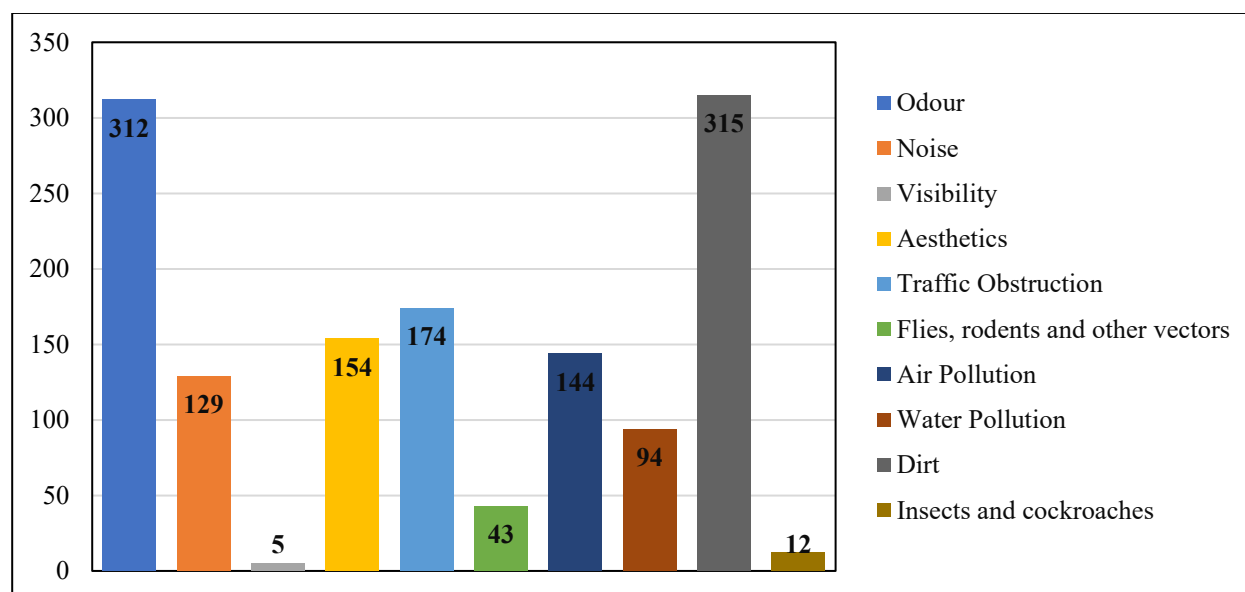


Figure v: Environmental concerns of Olusosun residents. (Source: Author, 2022)

The Relationship between the Inhabitants' Perceived Health Effects and their Proximity to the Olusosun Landfill

In Table ii, which is a cross-tabulation of respondents' distances from Olusosun landfills and respondents' self-health rankings, the relationship between residents' distances from the dumps and residents' perceptions and ratings of their health is shown. 72 (21% of the total aggregate) out of the

sampled 346 residents rated their health status as "Average". 44 (13%) perceived their health status as "Excellent", 88 (25%) ranked their health as fair, 131 (38%) opined that they are in "Good" health condition.

The perceived health effect plays a significant role in the public response to environmental exposures. The survey has identified environmental and health issues as major concerns of residents, and

they are more prominent among members closer to the Olusosun landfill. This section tries to statistically link the respondents' perceived health status with the distance of their residences from the Olusosun landfill. In the 6 areas considered for the study (i.e., less than 100 meters, 100-200 meters, 200-300 meters, 300-500 meters, 500-1000 meters and 1-2 kilometres from the Olusosun landfill), there are significant differences in self-health ratings among the respondents. Those who rated their health status as "Good", for instance, have the highest percentages in all zones, with 131 (38% of 346 respondents). The respondents' perceived health rating tends to decrease away from the landfill, similar to the work of Olorunfemi (2009) in the same area, which contradicts what he found

in residents around Abule-Egba landfill, also in Lagos metropolis.

88 (25% of 346) respondents who ranked their health status as "Fair" also show a similar trend with those who ranked their health as "Average", with the perceived health ranking decreasing away from the Olusosun landfill as seen in Table ii. A similar trend was also recorded with the 72 (21% of 346) residents who ranked their health status as "Average". This, according to Olorunfemi (2009) and observation from the field study, can be attributed to residents' reluctance to reveal their health status, mostly due to superstition, religion and the general tendency of Lagosians to exaggerate their social and economic status.

Table ii: Correlation between people's health scores and residential distance from the Olusosun dump.

Distance from residence to the Olusosun landfills * Respondents' self-health rating Crosstabulation									
			Respondents' self-health rating					Total	
			Average	Excellent	Fair	Good	Poor		Very poor
Distance from residence to the Olusosun landfills	1-2 kilometres	Count	6	3	4	11	0	0	24
		% Within Distance from residence to the Olusosun landfills	25.0%	12.5%	16.7%	45.8%	0.0%	0.0%	100.0%
		% Within Respondents' self-health rating	8.3%	6.8%	4.5%	8.4%	0.0%	0.0%	6.9%
		% Of Total	1.7%	0.9%	1.2%	3.2%	0.0%	0.0%	6.9%
	100-200 meters	Count	25	8	21	23	2	0	79
		% Within Distance from residence to the Olusosun landfills	31.6%	10.1%	26.6%	29.1%	2.5%	0.0%	100.0%
		% Within Respondents' self-health rating	34.7%	18.2%	23.9%	17.6%	20.0%	0.0%	22.8%
		% Of Total	7.2%	2.3%	6.1%	6.6%	0.6%	0.0%	22.8%
	200-300 meters	Count	10	9	20	28	1	0	68
		% Within Distance from residence to the Olusosun landfills	14.7%	13.2%	29.4%	41.2%	1.5%	0.0%	100.0%
		% Within Respondents' self-health rating	13.9%	20.5%	22.7%	21.4%	10.0%	0.0%	19.7%
		% Of Total	2.9%	2.6%	5.8%	8.1%	0.3%	0.0%	19.7%
	300-500 meters	Count	13	5	14	21	3	0	56
		% Within Distance from residence to the Olusosun landfills	23.2%	8.9%	25.0%	37.5%	5.4%	0.0%	100.0%
		% Within Respondents' self-health rating	18.1%	11.4%	15.9%	16.0%	30.0%	0.0%	16.2%
		% Of Total	3.8%	1.4%	4.0%	6.1%	0.9%	0.0%	16.2%
	500-1000 meters	Count	6	13	13	18	1	1	52
		% Within Distance from residence to the Olusosun landfills	11.5%	25.0%	25.0%	34.6%	1.9%	1.9%	100.0%
		% Within Respondents' self-health rating	8.3%	29.5%	14.8%	13.7%	10.0%	100.0%	15.0%
		% Of Total	1.7%	3.8%	3.8%	5.2%	0.3%	0.3%	15.0%
	Less than 100 meters	Count	12	6	16	30	3	0	67
		% Within Distance from residence to the Olusosun landfills	17.9%	9.0%	23.9%	44.8%	4.5%	0.0%	100.0%
		% Within Respondents' self-health rating	16.7%	13.6%	18.2%	22.9%	30.0%	0.0%	19.4%
		% Of Total	3.5%	1.7%	4.6%	8.7%	0.9%	0.0%	19.4%
Total		Count	72	44	88	131	10	1	346
		% Within Distance from residence to the Olusosun landfills	20.8%	12.7%	25.4%	37.9%	2.9%	0.3%	100.0%
		% Within Respondents' self-health rating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% Of Total	20.8%	12.7%	25.4%	37.9%	2.9%	0.3%	100.0%

(Source: Author, 2022)

4. DISCUSSION

The survey showed that Olusosun residents are quite concerned about their health and general well-being due to the landfill's location and operations' impact on the environment. Residents of Olusosun and its environs exhibited socioeconomic tendencies that are comparable to those of Lagos State as a whole and a Nigerian city. Olusosun's population is tilted toward young people (26–35 years old), so those who responded were adults with the authority to speak on behalf of their family or home. This is an accurate depiction of the population of Lagos State, which the Lagos Bureau of Statistics (LBS) reports have a population pyramid that bulges between 20 and 40 years, which is fundamentally different from the national structure. This would present specific challenges for the state, among them the management of municipal waste, and specifically the need for landfill space, according to Arimah (1996) and Ijasa *et al.*, (2012).

According to Olusosun citizens' educational backgrounds, more than half of them attend secondary school, 20% earned higher degree certificates, and more than 90% participated in formal education. His or her socioeconomic development is influenced by the amount of education achieved, and the higher the level, the more exposed and cleverer the person is, as well as the prospects that arise in terms of economic gain. According to the Lagos State Government Household Survey, 2016, the educational level of the Olusosun community is comparable to that of the entire Lagos State, with 17% of residents earning their primary school diploma compared to 21% in Olusosun, 23% earning a higher degree certificate compared to 20% in Olusosun, and 52% of residents earning their senior secondary diploma compared to 35% of the population of Lagos state overall. The area's high level of education is a result of both the Lagos State Government's and the Federal Government's free basic education policies, as well as the state's

substantial higher education subsidies. This made it possible for families with middle-class to low-income incomes to send their kids to better schools while having a limited budget. The implication of the high literacy level of the residents of Olusosun and environs on the study is that it made it easier for the understanding and interpretation of the survey questions by the residents and therefore ensured more reliable responses.

Over 60% of Olusosun residents lived in households with 2–4 members, which is similar to the findings of Olorunfemi (2009) for the Lagos Metropolis and middle- to low-income residential areas in Nigerian cities, including even Ghana, where Yoda *et al.*, (2014) report that half of the households in that country had between 5 and 9 members. Over 90% of families, according to data on household income, make more than the monthly minimum salary of 30,000 in the country. According to the Lagos State Government's 2016 Household Survey report, the average monthly income for Lagos State is ₦34,584, whereas the average monthly spending is around ₦34,339, even if this amount is modest by worldwide standards. Residents' distance from landfills has a big effect on how they affect the environment and their health (Vivian *et al.*, 2020). The fact that more than half of Olusosun's population lived within 500 meters of the landfill raises concerns for the inhabitants' health since they are more exposed to the dump's negative effects on the environment and their health.

The research determined that the two main effects of the site of the Olusosun landfill on the population were on the environment and physical health. Environmental effects like odour and foul smell from the Olusosun landfill are a serious concern for the residents, especially in the mornings and during the rainy season. This concern is highly related to the distance from the landfill, especially for those living below 300 meters from the landfill, where the foul smell can occasionally be overpowering and

so strong that you can taste it. This agrees with Olorunfemi's (2009) research, which highlighted odour, noise, and water pollution as the main environmental worries of Lagos Metropolis residents who live near landfills. Other environmental difficulties raised by the locals include the careless disposal of dirt across the neighbourhood, stalled garbage trucks and those waiting in line to dispose of their trash, which lowers the value of nearby houses by obstructing traffic and causing aesthetic problems (Akinjare *et al.*, 2011). However, this situation has improved greatly in the last few years with better management and upgrades and gentrification of the area.

Residents worried about groundwater pollution are a problem that needs immediate attention, particularly for those who live close to the landfill, approximately 500 meters away. Residents believed that the groundwater had been greatly contaminated by the Olusosun landfill, which is corroborated by the works of Oyeku & Eludoyin (2010), who reported that the groundwater within 2 kilometres of the Olusosun landfill is severely contaminated with heavy metals due to the dispersion of chemical components from leachates produced at the landfill.

It has been shown that the continual dumping of municipal and industrial wastes at landfills poses a major hazard to the environment and human health due to the seepage of chemical components in leachate. Concerning health concerns such as skin irritation, diarrhoea/dysentery, water-related ailments brought on by exposure to polluted water, Asthma, and coughing/chest discomfort brought on by exposure to smoke and pollution from the infrequent burning of rubbish on the landfill (Owusu-Sekyere *et al.*, 2013; Aliyu & Amadu, 2017). The research supports the findings of various authors that landfills are a major contributor to environmental deterioration because they contaminate the water, air, and soil, act as hosts for pathogens, and harbour diseases and

illnesses that spread via vectors (Poole & Basu, 2017; Vivian *et al.*, 2020).

Skin irritation, diarrhoea/dysentery, and other water-related disorders, including cholera and typhoid due to heavy metal-polluted groundwater, are only a few of the health issues brought on by environmental degradation (Oyeku & Eludoyin, 2010). The research by Emmanuel-Akerele & Peter (2021), which found high levels of harmful bacteria in water sources near landfills in the state of Lagos because of factors related to waste disposal practices and landfill conditions, further supports the worries of the locals.

The influence on neighbourhood aesthetics and social ties is another issue that worries the locals. Residents, particularly children and young adults, are very concerned about the environmental problems caused by the landfill and how this has affected their social relationships since it is often impossible for them to have friends over due to the stench, filth, and traffic. The value of homes in the region is reduced as a result of the area's unattractive aesthetics and other environmental problems (Akinjare *et al.*, 2011). Similar to the work of Olorunfemi (2009), the study confirms a relationship between distance from the landfill on residents' perceptions of environmental and health risks, with those closest to the landfill being more concerned with environmental and health issues, particularly relating to bad odour, dirt, air pollution, and groundwater contamination and the concern decimating over distance.

The residents believe that the long-term exposure to the landfill can result in severe emotional and psychological reactions from living near the landfill, similar to the works of Etea *et al.* (2021). Other health concerns of the residents are related to the dump and bad waste management, which may promote the growth of mosquitoes and other disease vectors, which would then spread sickness (Yoda *et al.*, 2014).

Although the health and environmental effects of the Olusosun landfill are of significant concern to the community, there is no correlation between the distance from their place of residence and their self-rated health. The people of Olusosun, who have lived there for a long time and are used to the landfill, are positive by nature and have adapted to the current environmental scenario. A longitudinal study of the home is advised to properly comprehend the connection between the distance from the dump and the residents' health.

5. RECOMMENDATIONS

The research examines how Olusosun inhabitants and those in the surrounding area perceive the effects of the landfill's location and operations on the environment, their health, and their overall well-being. The research filled a vacuum in the body of knowledge on how locals see the impact of landfills on their overall well-being. The study's findings support the overall pattern of locals being concerned about the effects of landfills on their general health and well-being. A longitudinal study that would take into account residents' perceptions, environmental and ecological studies, as well as physiological studies of residents, would help us better understand the environmental and health situation. This would help us determine the real impact of the landfill on the neighbourhood.

The findings indicate that social and environmental scientists should further investigate the psychological risks associated with long-term exposure to and experience of the local environmental situation, how effective they are in their daily activities, and the financial, social, and capital implications of seeking out alternative ways of living or managing the situation, such as the impact of obtaining domestic water from a great distance. It is also important to take into account the quantitative data on the inhabitants' chosen coping mechanisms.

The study recommends to the Lagos state government, especially the Lagos Waste Management Agency (LAWMA), better management of the Olusosun landfill to place a greater emphasis on recycling waste rather than simply dumping it, as well as focus on more sustainable approaches like the harvesting of landfill gas (LFG) system, and other waste odor diluting agents to ensure a sustainable environment and meet the Sustainable Development Goals 3 (good health and well-being), 6 (cleaner water and sanitation) and 11 (sustainable cities and communities). The present waste management processes and regulations are not broad enough and are far from solving the difficulties mentioned by the research. Interventions intended to safeguard the public, including the implementation of buffer zones, are not executed and puts a considerable percentage of the inhabitants and the general population at high risk.

Recognising the magnitude of these constraints and obstacles, such as limits in current studies on the health and environmental consequences of the Olusosun landfill, limitations in policy implementation and environmental monitoring, and urban planning, as well as limited resources, is vital. There is a need to implement a comprehensive strategy at the local, community, and state levels that would help to highlight these issues and also feed into advocacy plans for public awareness raising among health officials, government agencies, and Olusosun residents (Ziraba *et al.*, 2016). This is important because the effects are not limited to those handling, or living near the Olusosun landfill site, but it is also a health challenge for the general public because of the proximity of the Olusosun landfill to the Ojota Bus terminal, which is a vital transportation hub of the State. Thus, a well-grounded approach is needed to ensure the management and disposal of waste in a safe manner. Based on these, the study further recommends the following:

- Public enlightenment campaign on citizens' role in the proper management of waste at the household level. Simple actions such as not littering on the road can go a long way in achieving a cleaner environment. A gradual transition to more specific measures like waste sorting at the source goes a long way in improving waste management. (Ziraba *et al.*, 2016). Recycling of waste should be promoted in order to help lower the amount of waste, since waste should be seen as a resource rather than as something useless.
- Involvement of communities in waste management, as well as strengthening the role played by civil society organisations in waste management, because of their closeness to the people.
- Waste management should be a priority as a social service by the government and supported with a suitable funding line.
- Environmental laws governing waste landfills and urban planning are effectively implemented.

6. CONCLUSION

A critical and present-day problem affecting cities in developing nations is the perception of urban dwellers on the effects of long-term exposure to landfill sites on the environment and their health. To localise this

phenomenon, the research assessed how landfills affected the residents around the Olusosun landfill in Ojota, Lagos, Nigeria. The study investigated the residential perception of issues related to the environment, such as odor, dirt, traffic, aesthetics, air pollution, noise, and other factors, as well as how these issues related to their health, such as skin irritation, diarrhoea or dysentery from contaminated water, asthma, coughing and chest pain from air pollution brought on by smoke and smog from waste burning, among other things. The research concludes that the proximity of the population to the Olusosun landfill has a substantial impact on its environmental and health conditions. The study recommends placing greater focus on the adoption of sustainable waste management strategies within the Lagos metropolis, and other cities in Nigeria, to ensure excellent health, better water and sanitation, as well as ensure the general welfare of the residents around the Olusosun landfill and other landfill sites across the state.

DECLARATION

The authors declare that no generative AI-assisted technologies were used in preparing or writing of the manuscript. All content of the manuscript was produced by the author.

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