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Perceptions of Residents and Workers toward the Environmental Health Effects of a Dumpsite in Uyo, Nigeria

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Abstract
The research investigates the management of a public dumpsite and its effects on residents of Uyo village Road. The study employed the descriptive research design and is centered on Uyo Village Road dumpsite, located along Akpayak-Nduetong Community in Uyo Local Government Area. Simple random sampling technique was deployed to select a sample size of 150 residents of the adjourning communities from the population of 250 people. The researchers structured a questionnaire titled "Uyo Village Road Dumpsite Management and its effects on Residents' Questionnaire (UVRDAERQ) for data collection. The data gathered were analysed using mean statistics and standard deviation, while one sample t-test was employed to test the null hypotheses at 0.05 level of significance. From the results of findings, it was revealed that, there is a significant effect of dumpsite/ waste management planning on the health conditions of Uyo village road residents. Also, there is a negative and significant impact of siting of Uyo village road dumpsite on health and economic life of residents of the Area. In addition, the availability or adoption of dumpsite management practices exerted a significant effect on Uyo village road dumpsite and its environment. The study observes that observes that open dumpsites tend to be the most prevailing form of waste disposal in most developing countries including Nigeria. In these places, absence of proper waste management policies and strategies has led to indiscriminate dumping of waste. The failure of sustained waste management system in sanitary landfills in Nigeria has led to the spread of different kind of diseases such as Malaria, typhoid, cholera, dysentery and many others, posing threats to human health, as well as the contamination of land, air, water bodies and the environment. From the results, the study recommends that, timely and proper dumpsite/ waste management planning should be devised, adopted by the government to boost waste collection, resource availability and recycling methods. Actions should be taken towards the relocation of some dumpsites to mitigate the adverse effects of residents' proximity to it. Proactive strategies should be adopted, implemented and enforced for a sustainable dumpsite management practice to curb its deficiencies. The amenable and identified factors, challenges and problems affecting proper management of dumpsites and their ecosystem should be revisited and evaluated to address their defects.
Keywords: *Environment, Pollution, Dump Site, hazardous, Waste, Incineration, Landfill.*

1.1 Introduction

Man's daily activities have generated various kinds of wastes, and coupled with their attendant effects, pose a great deal of health risks to humanity. These wastes, often times are dumped indiscriminately along the road side, open spaces, drainages and canals pose great risks

to human health and the environment, especially in developing economies like Nigeria (Grace, Weje, Wachukwu and Akinbobola, 2024; Somani, 2023). This condition becomes worse in urban areas, where big developments have taken place with weak and effective waste management systems leading to the spread of contagious diseases and premature death, especially among children and women (WHO, 2023: Roy, Bose, Basak and Chowdhury, 2022).

According to Mor and Ravindra, (2023) and Stanley, Njoku, Arinze, Chizoruo and Blessing, (2021), waste dump sites are defined as refuse dumps situated either on land or on water where waste materials, such as solids, liquids, semisolids and gaseous materials are deposited. Wastes or refuses are unwanted and discarded materials from domestic, commercial and industrial operations. Wastes are generated from daily activities and cannot be eradicated, but refuse grounds and dump-sites can be turned into gold-mines (Oyedele, 2014). Thus, open dumping is very common in developing countries like Nigeria, and pose grave risks to human health and the environment. "The risk of potential health effects otherwise called health hazards emitted by dumpsites cannot be quantified owing to the danger resulting from exposure to environmental pollutants, such as asbestos or ionizing radiation, or to a life-style choice, such as cigarette smoking or chemical abuse (Fadhullah, Jafri, Jaafar and Abdullah, 2021). Dumpsites, irrespective of the type, (open or closed) should be sited at the outskirts of the city or community, because of the health effects on the residents. Flies, mosquitoes and rodents are vectors that transmit diseases from dump sites, which affects the human health (Akmal and Jamil, 2021; Ifeoluwa, 2018; Munyai and Nunu, 2020).

Wastes not properly managed has been known to have a negative impact on health, environment and aesthetic values. There are basically two options for waste disposal/dumpsites: operate a properly designed, constructed, and managed landfill or open dumpsites in which waste is burned in a controlled or an uncontrolled facility that converts waste to energy (United States Environmental Protection Agency, 2002). But in most developing countries, open dumps are the most preferred method of disposing waste regardless of the fact that it is unhygienic and unsafe and are usually sited on low lying areas of an open land. Nartey and Nyarko, (2020) stated that open and illegal dumpsites are indiscriminately sited, irrespective of the presence of infrastructural facilities available in those locations. This could be as a result of attitudinal problems from the public especially in developing countries who prefer a place within the shortest distance and the institutional constraint from the government that has no standing frame work to address this problem. This makes open dumping of waste the most prevailing form of waste disposal in developing countries.

Open dumpsites are favourable harbours for mosquitoes, cockroaches, rodents, houseflies etc. which serve as their hosts from which they cause malaria, typhoid fever, diarrhea, Lassa fever, dysentery, etc. The people living close to open dumpsites are often subject to direct transfer of contamination from hand to mouth or through inhalation of dangerous volatile compounds and aerosols (Oyedele and Oyedele, 2022). Constant exposure to dumpsite increases human health degradation as a result of indiscriminate dumping of waste along the road side, open spaces, drainages and canals. Globally, approximately 1.3 billion tons of solid waste are generated annually, and the volume is projected to reach 2.2 billion tons annually by 2025 (Peprah, Agyemang Duah, Morgan, Onyina, and Asare, 2024; Renu, 2022).

This trend places great stress on waste management facilities and the country's rapid population growth, in a perspective where chronic poverty and income inequality is prevailing. In order to effectively improve health and wellbeing in line with the Millennium Development Goals (MDGs), there is need for a sustainable development approach to address and reduce the enormous rise in the number of waste sites in Nigeria generally and Akwa Ibom State in particular. The majority of open waste disposals/dumpsites are located within the heart of the city (such as Mbierebe junction by new stadium road, Nung Oku, Aka-Etinan Road and Uyo Plaza by Nsasak Street). Increased urbanization, poor attitude of residents and migration, makes the problem acute (WHO, 2023; Kenekar, 2021; Nwanta, ; Ezenduka, 2020 and Ifeoluwa, 2018).

Uyo village dumpsite is the largest landfill with a transfer loading station managed by the Akwa Ibom State Environmental Protection and Waste Management Agency (AKSEPWA). Waste dumps which are common sights in developing nations' cities are sources of epidemiology and generate pathogens which are dangerous to people working or living in nearby environments (Oyedele and Oyedele, 2022; Ndukwe, Uzoegbu, Ndukwe and Agibe, 2019). Most cities in developing countries are facing a solid waste management crisis that they are finding difficult to resolve (PROPARCO, 2012). Of greater concern is the health implication of poor management of these wastes (UNEP, 2015). Due to lack of finance to install incinerators or lack of maintenance culture and lack of appropriate technologies to properly recycle wastes in developing nations, solid wastes are left in ubiquitous waste dumps to rot and in some cases, wastes are burnt in naked flames to reduce their volume (Roy, et al., 2022). This burning produces offensive gases that are dangerous to health of residents.

Improperly managed waste dumps have caused diseases and health problems to the people working on it. Over 30% of people resident in Southern Nigeria are exposed to health hazards from waste dumps in their daily activities without awareness (Mor and Ravindra, 2023). Hence, the World Health Organization (WHO) estimated that, about a quarter of the diseases facing mankind today occur due to prolonged exposure to environmental pollution. Indiscriminate and improper dumping of Municipal Solid Waste (MSW) has become a common practice in most of our cities today. This ugly trend can be associated with rapid growth in population, deterioration in public standards of living, bad governance and low level of public awareness on environmental management. Abiola, Fakolade, Akodu, Adejimi, Oyeleye, Sodamade and Abdulkareem, (2021), argued that, the standard criteria for the selection and location of a dumpsite based on the National Environmental Standards and Regulations Enforcement Agency (NESREA), is that built up areas for dumpsites should be placed on at least 1000m away from all settlements. Watercourse dumpsites should be placed on at least 1000m away from water courses to avoid hazardous emission from waste; Road dumpsites should be placed on at least 2000m away from an existing road so as to reduce transportation expenses; while elevation dumpsites should be placed on slopes with less than 9% inclination.

It is unfortunate to note that, these specifications are not adhered to or implemented by States. This has produced an unprecedented health effect on people. Poorly managed and wrongly sited waste dumping sites are pathogens and epidemiology centres for the breeding of germs and diseases. Viruses, bacteria and fungi which breed regularly in waste dumps, landfills, waste tanks and waste-bins can produce infectious diseases, toxic gases and radioactive elements. Waste dumps and land-fills may emit toxic compounds or harbour radioactive materials that are dangerous to human health and well-being. Drugs, medicines and medical wastes like drug remnants, syringes, needles and bottles should be professionally disposed because their reuse is dangerous as they can transfer diseases to the users. Nitrates which percolate into rivers and water-wells have been found to cause teeth coloration if drunk over a long period. Some herbicides (leachates) like Gamoline can be washed by rain and leached into rivers which in turn endanger aquatic life. Inhalation of poisonous gases over a long period of time can affect the immune system and can lead to cancer (Renu, 2022).

In urban areas like Uyo, with high density of dwellers, wastes are complex to define, since many of them have chemical characters and are difficult to manage. Rates of decomposition is lower to the rate of generation. The wastes also decompose to form chemical compounds and react with oxygen during burning to form toxic products which can cause havoc to living things in the air, water and land – the 'medium' to which pollutants are emitted or on which they are placed for disposal. The exponential increase in waste in developing nations calls for change in the practice of waste management. The World Health Organization (WHO, 2023) reported that over four million people die prematurely from illnesses attributable to the household air pollution due to cooking with solid fuels. Exposure to smoke from waste dumping sites over a long period of time is harmful.

The negative effects of waste disposal and poor dumpsite management to citizens' health are evidently explored by various scholars globally. In academic literature, many studies carried out to date in Nigeria, have focused on examining the harmful effects of indiscriminate waste dump and resident health in Lagos, Rivers and South East (Grace et al., 2024; Akpotareno, Weje, and Ameme, 2021; Wachukwu, Obinna, & Weje, 2020; Nwanta and Ezenduka, 2020; Ifeoluwa, 2018).

1.2 Statement of the Problem

Waste and dumpsite management in Nigeria, is considered unsuccessful, because it is affected by unfavourable economic, institutional, legislative, technical and operational constraints (Mohammed and Chukwuma, 2011). Nigeria with a population of about 197,848,805 million people, equivalent to 2.57% of the total world population (www.worldometers.info) is one of the largest producers of solid waste in Africa. It generates more than 32 million tons of waste annually, while only 20-30% are collected and 70% are dumped in unsafe places (Grace et al., 2024). 10,000 tons of municipal wastes are generated in Lagos alone, which makes an average of 3.65 million tons per year (Joshua Olu and Iyere, 2020; Oyedele and Oyedele, 2017). According to Ifeoluwa, (2018), with increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household (Foday *et al*., 2013). This waste is ultimately thrown into municipal disposal sites and due to poor and ineffective management, the dumpsites turn to sources of environmental and health hazards to people living in the vicinity of such dumps. One of the main aspects of concern is the pollution caused to the environment; be it land, air and water. According to Nguyen *et al*. (2011) many cities in developing countries face serious environmental degradation and health risks due to the weakly developed municipal solid waste management systems. The challenges associated with waste management across developing countries are expected to intensify, particularly in sub-Saharan Africa (Andrew et al., 2020).

The volume of waste, driven by unprecedented population growth and economic development in the Uyo, Nigeria has placed an additional burden on top of the existing challenges of waste generation and management. This is not a surprise but a fallout of population explosion in Africa generally. By 2050, the volume of waste is projected to triple from 174 million tonnes per year in 2016 to 516 million tonnes per year across sub-Saharan Africa (Norsa'adah, Salinah, Naing and Sarimah, 2020). With proper waste minimization and recovery implementation strategies in place; management of dumpsite entails that, waste is either incinerated or deposited in landfills as the final resort, with a large chunk of all waste being deposited in landfills. Considerable public attention has been directed to the challenges of waste management encountered by developing countries. Although high-income countries constitute only 16% of the global population, they disproportionately generate a third of the world's waste, estimated to be about 683 million tonnes each year. In addition to this inequity in waste generation, developing countries are often recipients of waste that originates from developed countries. Although, some of the waste generated, such as scrap, can potentially be advantageous for importing countries to gain access to cheaper raw materials and goods for manufacturing purposes, importing and hosting waste can also place them in a vulnerable position, if their health, safety, and environmental policies (especially dumpsite management) are weak and poorly implemented.

With these problems, achieving the targets of the UN Millenium Development Goals- 34 (MDGs) by 2030, which include; ending the tuberculosis epidemic and reducing the global burden of asthma, diabetes, and depression, seems difficult in sub-Saharan Africa, without addressing the considerable challenges of waste production and management that are fueled by urbanization, population growth, and economic development.

However, several studies have been conducted to examine the health and environmental effects arising from waste dumps (Grace, et al., 2023; Roy, et al., 2022; Akpotareno and Weje, 2021; Nwanta and Ezenduka, 2020; Abd'razack *et al.*, 2013; Aatamila *et al.,* 2010; Nwanta and

Ezenduka, 2010). Few of these studies (mainly from developed countries) examine the environmental and health implications of solid waste disposal to people living in close proximity of wastes dumpsites (Peprah, et al., 2023; Shammi, et al., 2023; Saha, Khan, Kundu, Naime, Karim and Ara, 2022; Abdulkareem, 2021; Norsa'adah, Salinah, Naing and Sarimah, 2020; Somani et al., 2021; Akmal and Jamil, 2021). None is related to waste or dumpsite management and its effects on residents of Akwa Ibom State, a gap in knowledge, which this work seeks to fill.

1.3 Objectives of the Study

The Main objective of this study is to examine the perceptions of residents and workers towards the environmental health effects of a dumpsite in Uyo, Nigeria. Other specific objectives of the study are to;

i. Examine how dumpsite/waste management planning affect the wellbeing of Uyo village road residents
ii. Examine the ways the location of Uyo village road dumpsite has impacted on the economic life and health of residents of the Area.
iii. Assess the availability and adoption of proper dumpsite management practices in Uyo village road dumpsite.
iv. Assess the challenges and problems affecting proper management of Uyo Village road dumpsite.
v. Recommend appropriate ways and measures of proper control and management of Uyo village road dumpsite ecosystem.

1.4 Research Questions

With the objectives of the study, the following Research questions are formulated;

i. How does dumpsite/ waste management planning affect the wellbeing of Uyo village road residents?
ii. In what ways does the location of Uyo village road dumpsite impacted on the economic life and health of residents of the Area?
iii. Are there in existence, proper dumpsite management practices in Uyo village road dumpsite?
iv. What are the challenges and problems affecting proper management of Uyo Village Road dumpsite ecosystem?

1.5 Research Hypotheses

To achieve the above objectives, these research hypotheses were formulated in a null form for the study.

i. There are no significant effects of dumpsite/ waste management planning on the wellbeing of Uyo Village Road residents.
ii. There are no significant impacts of the location of Uyo Village Road dumpsite on the economic life and health of residents of the area.
iii. There are no significant effects from the adoption of proper dumpsite management practices on Uyo Village Road dumpsite environment.
iv. There are no significant impacts from the challenges affecting proper waste management on Uyo Village Road ecosystem.

1.6 Scope and Limitation of the Study

The study is limited to the management of a public dumpsite and its effects on residents of Uyo village road in Akwa Ibom State, Nigeria.

1.7 Significance of the Study

Expressively, the researcher believes that the finding of the study will contribute, academically, in establishing the relationship between dumpsite management and health status of residents living within the vicinity of the environment. This study, will as well as enlarge the theoretical base and body of existing knowledge in the area of study. Also, the study will be of practical use to individuals, Community Leaders, agencies, organs, Institutions of Government including public health administrators by providing clear epidemiological perspectives for the understanding of their roles and involvement in the process, mitigation, utilization and management of waste and dumpsites for the benefits of to the citizenry.

To the society, the findings of this study would provide in-depth information on the consequences of indiscriminate waste disposal, collection; and outbreak of diseases, modes of transmission, prevention and treatment of the infections emanating from poor management waste dumpsites. The citizens generally will be guided on how to strengthen family-health core values through setting of standards, role modeling and effective discipline as a panacea to mitigating the spread of negative effects of poor attitude of the citizens leading to indiscriminate waste disposal. Parents would also acquire insight into the relevance of proper waste collection, disposal and recycle. This study will bring to the front burner the necessity that health workers, Parents, leaders, owe the masses the responsibility of guiding, educating, motivating, facilitating and supporting health-related issues that affects the hygiene and health status of the people.

1.7 Operational Definitions of Terms

Waste: Waste is a useless and unwanted products of human domestic and industrial activities released into the environment. It can be a solid material, liquid, semi-solid or container of gaseous material.

Hazardous wastes: These are wastes that are hazardous because they exhibit a certain physical property or characteristic. There are four characteristics that can make a waste hazardous: ignitability, corrosivity, reactivity, and toxicity.

A landfill: This is an engineered pit, particularly designed for receiving compacted solid waste and equipped with specific covering, so that the waste can be disposed of. There is a lining at the bottom of the landfill so to ensure that the waste does not pollute underground water.

Leachate: This is produced when water filters downward through a landfill and picks up dissolved materials from the decomposing wastes which can contaminate the groundwater and surface water, which are the sources of drinking water. It is comprised of organic and inorganic pollutants, which include phenols, toluene, benzene, ammonia, dioxins, polychlorinated biphenyls, chlorinated pesticides, heavy metals, and endocrine-disrupting chemicals. This contamination may enter the food chain and endanger public health.

Urban Area: This is usually referred to as cities, suburbs and towns. Urban areas have more development in terms of access to infrastructure and connectivity like airports, ports, railways, housing, roads etc.

2.0 Review of Related Literature

2.1 Conceptual Framework

2.1.1. The concept and Meaning of Waste and Dumpsite

There is no dumpsite without waste. Thus, a proper definition of dumpsite lies on the understanding of what constitutes waste. Wastes are unwanted or unusable materials. Waste is any substance discarded after primary use, or is valueless, defective and of no use. A bye-product, by contrast is a joint product of relatively minor economic value. Waste is any material that is undesirable or not useful. These are objects that have been discarded since these materials aren't functioning anymore. Waste can be in any form (liquid, solid or gas), although generally, waste is solid. There are various types of wastes like unwanted food, torn clothes, kitchen waste, etc.

Environmental waste is the excess of materials generated by human activities that are discarded or disposed of in inadequate, inappropriate, or uncontrolled ways. In other words, it's anything that is no longer needed and has been thrown away. Wastes are unimportant things that are discarded by human society. These include urban wastes, industrial wastes, agricultural wastes, biomedical wastes and radioactive wastes. Liquid wastes are wastes generated from washing, flushing or manufacturing processes of industries. Waste is everything that no longer has a use or purpose and needs to be disposed of. The term certainly applies to discarded materials. Classified meaning exists, but there are specific definitions for waste that affect how waste is regulated and must be handled, especially in professional settings. According to United Nations Statistics Division, waste is defined as materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. The accumulation of waste is what constitutes or is accumulated in a dumpsite in a certain environment.

A Dumpsite, therefore, is a piece of land where waste materials are dumped. It is usually referred to as garbage dump, rubbish dump, trash dump, waste-yard, or a landfill site. It is a site for the disposal of waste materials.

2.1.2 Types of Waste

There are various types of waste but primarily there are three kinds of wastes:

1.) **Municipal Wastes:** Municipal Waste commonly consists of items that are used on a daily basis then are discarded such as cloths, paints, wires, glasses, unwanted food, etc. All these come under municipal waste. These wastes come from schools, factories, but primarily come from our homes. The composition of municipal waste differs in each municipality and keeps changing with time. Municipal waste is further sub-divided into:

a) **Household waste:** this comprises of Materials like unused food, clothes, unwanted paper, damaged batteries, etc. Agricultural wastes also come under household waste.

b) **Commercial waste:** These are wastes coming from any kinds of businesses, trading factories, schools, etc.

c) **Demolition waste:** As implies from the word 'demolition', these wastes come from the destruction of any structure made of concrete, wood, bricks, etc. Although, sometimes demolition wastes can also be recycled.

d) **Hazardous Wastes:** Hazardous waste refers to solid, liquid, or gaseous wastes from industries that have either of the properties:

- Corrosiveness
- Ignitability
- Reactivity

- Toxicity

Treatment of these wastes is necessary before they are dumped. Hazardous wastes are unsafe for human health and the environment at large. Hazardous wastes are further divided into:

i. **Industrial Waste:** these are waste produced by industries and includes any material that isn't useful for the industrial manufacturing process. Wastes such are chemicals, pigments, ashes, metals, etc. come under industrial waste.
ii. **Biomedical Waste:** This includes any waste coming from medical facilities such as hospitals, medical colleges and research centers, among others.

2.1.3 Categories of Wastes

Wastes are further divided into various categories i.e. Solid Waste or Liquid Waste.

a) Solid Waste: Solid waste includes any kind of garbage coming from households, factories or hospitals. Solid wastes are only solids or semi-solids. These solids/semi-solids can be dry or wet.
b) Wet Waste: Any dissolved liquid-based waste or sludge coming from wastewater plants, households, etc. come under wet waste. Examples are leftover curries, juices; rotten vegetables will come under wet waste
c) Dry Waste: This is a kind of Waste that does not dissolved in any form or in liquid form. They come under dry wastes. Examples are plastics, glasses, etc.
d) Biodegradable Waste: Any organic material that can be synthesized into carbon dioxide, water, methane or organic molecules by organisms in the soil come under biodegradable waste.
e) Non-biodegradable Waste: any material that cannot be synthesized into carbon dioxide (CO2) water or chloride (CH4).

2.1.4 Methods of Waste Disposal

The common methods of waste disposal exist apart from the dustbins. Dustbins aren't the only method to throw waste away. Here are few alternatives.

1) **Burial Pits/Landfills:** Throwing daily wastes into burial pits or what are also known as landfills is an alternative for dustbins and is the popular waste disposal method. It involves burying waste in the ground and eliminating foul smell coming from the wastes.
2) **Incineration:** Burning of waste at high temperatures and converting them into residue or gaseous products is known as 'incineration'. It is a better alternative to dustbins since the volume of waste here decreases by 20-30%.
3) **Recycling:** The process of reusing the discarded materials and converting them into something new is known as 'Recycling'. It's the third main element in the process of 'reduce, reuse and recycle'. Recycling reduces the harmful effects of greenhouse gases and helps in conservation of resources for the future.
4) **Composting:** When organic wastes are kept in a pit for a long period of time the microbes start decomposing the waste. If the compost is nutrient rich then it becomes a better manure for plants.

2.1.5 Waste and Dumpsite Management in Nigeria

Waste and dumpsite management in Nigeria which is characterized by open dumping of waste has posed a serious threat over the years. Empirical studies have given accounts of these situations. Open dumpsites in developing urban cities involve indiscriminate disposal of waste. They are uncontrolled and therefore pose major health threats which affect the landscape of urban cities (Oyedele and Oyedele, 2022). WHO, (2023) and Renu, (2023), stated that wastes that are

not managed properly, especially solid wastes from households and the community, are serious health hazards and can lead to the spread of infectious diseases. The report further stated that, unattended wastes lying around attract flies, rodents, and other creatures that, in turn, spread diseases.

Normally, it is the wet waste that decomposes and releases bad odor. The bad odor affects the people settled next to the dumpsite, which implies that the dumpsites can have serious negative effects on people settled around or next to them. The group at risk from this unscientific disposal of solid waste includes the population in areas where there is no proper waste disposal method. This includes pre-school children, waste workers and workers in facilities producing toxic and infectious materials. Other high-risk groups include the population living close to the waste dump (Shammi, et al., 2023; Akmal and Jamil, 2021). In particular, organic domestic waste pose a serious threat, since they ferment, creating conditions favorable to the survival and growth of microbial pathogens. Direct handling of solid wastes can result in various types of infectious and chronic diseases on the waste workers and scavengers. These are the most vulnerable (Ojuri, Ayodele and Oluwatuyi, 2022; Siddiqua, Hahladakis and Al-Attiya, 2022). Similarly, Amugsi, Haregu and Mberu, (2020), argued that, exposure to hazardous waste in dumpsites can affect human health, children being the most vulnerable to these pollutants. Direct exposure can lead to diseases through chemical exposure as the release of chemical waste into the environment can lead to chemical poisoning (Iddrisu and Debrah, 2021; Muleya, Hinchliffe and Petterson, 2021).

According to Mor and Ravindra, (2023) and Khoiron, Probandari, Setyaningsih, Kasjono, Setyobudi and Anne, (2020), pollution, being a major environmental effect from dumpsites, is not directly transferred from land to people, except in the case of dusts and direct contact with toxic materials. Pollutants deposited on land usually enter the human body through the medium of contaminated crops, animals, food products, or water. In addition, the dumpsite has smelly and unsightly conditions. These conditions are worse in the summer because of extreme temperatures, which speed up the rate of bacterial action on biodegradable organic material. Disposal sites can also create health hazards for the neighborhood (Nartey and Nyarko, 2020; Kar and Basunia, 2023; Foday *et al*., 2013). A number of health surveys indicates a wide range of health problems. Respiratory systems, irritation of the skin, eyes and nose, gastrointestinal problems, psychological disorders, and allergies, have been discovered. In addition, dumpsites closer to residential areas do become feeding places for stray dogs and cats. These pets, together with rodents, carry diseases with them to nearby homesteads (Kar and Basunia, 2020). Research and anecdotal evidences advanced that, municipal solid waste landfills remain the most preferred and commonly used solid waste disposal option adopted by some countries. This is mainly due to its perceived cost-effectiveness and the absence of more innovative waste management technologies. However, solid waste disposal at landfill sites has raised concerns about possible adverse health effects on nearby people (Ofori, 2021).

2.1.6 Poor Waste and Dumpsite Management and its Impacts on Residents of Nigeria

According to Peprah, et al., (2023), open dumpsites are a major problem to the environment, especially in the air that people inhale. Dumpsites emit obnoxious odour and smoke that cause illness to people living in, around, or closer to them. Dumpsites may be a source of airborne chemical contamination due to offsite migration of gases and the particles and chemicals adhering to dust, especially during the period of active operation of the site. Contamination of soil and groundwater may lead to direct contact or pollution of indoor air, for example in the case of volatile organic chemicals into the basements of nearby homes and in the case of consumption of home-grown vegetables as well.

Siddiqua, et al., (2022), further stated that in some sites, volatile organic chemicals have been detected in indoor air of homes near dumpsites. In a number of community health surveys, a wide range of health problems, including respiratory symptoms, irritation of the skin, nose, and eyes, gastrointestinal problems, psychological disorders, and allergies, have been discovered. A

number of researches have been carried out in response to concerns from the public, often triggered by nuisances caused by emissions of volatile organic compounds. For example, according to Peprah, et al., (2024), dump sites closer to residential areas are always feeding places for stray dogs and cats. These pets, together with rodents, carry diseases with them to nearby homesteads. Affirming this, Andrew, Diego, Jonathan, Frank and Rob, (2020) stated that, wastes that are not properly managed, especially excreta and other liquids and solid wastes from households and the community, are a serious health hazard and could lead to the spreading of diseases. The study further revealed that unattended wastes lying around attract flies, rats, and other creatures that, in turn, spread diseases.

Waste disposal seriously affects the health of residents located close to dumpsites. The effect of solid waste disposal in African countries causes serious problems. Some countries in Africa have taken bold steps in tackling this menace. The focus of such strategy is to move towards a holistic approach in waste management, in line with the internationally accepted principles, but taking into account the effects with regard to the institutional and legal framework, as well as land tenure and resource constraints. Integrated waste management, thus, represents a move away from waste management through impact management and remediation to a proactive management system that focuses on waste prevention and minimization (Somani, Navaneethan and Thangaiyan, 2021). Dumpsites are known for their smelly and unsightly conditions. These conditions are worse in the summer because of extreme temperatures, which speed up the rate of bacterial action on biodegradable organic material.

Most developing countries, like Swaziland and Nigeria, use such dumpsites rather than properly managed and environmentally safe landfills. Lack of capital and poor government policies regarding wastes contributes to such conditions. There is therefore considerable public concern over the possible effects of dumpsites on the health of people living nearby, particularly those where hazardous waste is dumped. Most solid wastes are disposed on the land in open dumps. Disposal of solid waste on the land without careful planning and management can present a danger to the environment and human health. The environment should be clean and less polluted by all means. This means that waste should be managed at all costs to limit its effects to the environment (Siddiqua, et al., 2022; Roy, Bose, Basak and Chowdhury, 2022).

Moreover, the health risks associated with proximity to poorly managed landfills are diverse and extensive. For instance, previous studies have revealed that residents living close to landfill sites suffer from many health conditions, such as asthma, eye problems, reproductive diseases, and many others, more than people who live far away from those sites (Ojuri, Ayodele, Oluwatuyi, 2022). Health disorders such as cancer, infections and other reproductive issues have also been clinically and reportedly linked to landfills in some areas in developed countries (Khoiron et al., 2020; Norsaadah, Salinah, Naing and Sarimah, 2020) and developing countries (Ogbuehi, Orji and Afolabi, 2022; Iddrisu and Debrah, 2021). Other toxic exposure symptoms such as irritation of the eye, throat, and nose, headaches, fatigue, and running nose have been reported (Aman, Kumari and Ghani, 2022; Ofori, 2021). Residents in Lagos State, Nigeria, living near landfill sites, reported higher occurrences of respiratory and skin disorders, including wheezing, frequent sneezing, unpleasant odours, fever, and skin rashes, than those residing farther away (Abiola, et al., 2021).

Corroborating this assertion, Singh, Chokhandre, Salve and Rajak, (2021) discovered that increased exposure to the dump sites in Mumbai, India, resulted in a higher prevalence of respiratory illness (12%), eye irritation (8%), and stomach problems (7%). Multivariate analysis indicated that the respondents from the exposed group were significantly more likely to experience respiratory illnesses, eye infections, and stomach problems.

Similarly, Bauza, Clasen, Medlicott, Tudor, Zurbrugg and Vaccari, (2021) identified an elevated risk of mortality, respiratory diseases, and adverse mental health effects in individuals living near landfills. The study also provided some evidence of an increased mortality risk associated with residing near incinerators. In the same vein, Bachok Norsa'adah, Salinah, Naing and Sarimah, (2020) highlighted that, the significant association between dumpsite exposure and

diabetes and hypertension was related to the presence of heavy metals in the dumpsite, such as arsenic, lead, cadmium, and mercury. The implication is that, many industrial products, such as batteries and electrical equipment, contain heavy metals that can end up in the solid waste dumpsite. Heavy metals pose a risk to the health of persons exposed during collecting and handling by inhalation or ingestion or through skin contact. The impact on human health can also occur along the food chain, such as in vegetables grown or animals raised on contaminated soil. Environmental monitoring at landfills in many developing countries have identified various emitted gases dominated by high levels of hydrogen sulphide, which caused significant complaints of headache, eye irritation, and sore throat among residents living within a 3km radius from the landfill (Suleman, Darko and Agyemang-Duah, 2015). From these studies, it is clear that living near a landfill could reduce the functioning of the immune system and lead to an increased risk of infections due to the direct exposure to chemicals. Children living near waste sites, whether landfills or contaminated bodies of water, tend to be hospitalized more frequently due to acute respiratory infections. Children living near waste sites also had significantly increased rates of asthmatic attacks (Oyedele and Oyedele, 2022).

2.1.7 Location of Dumpsites

The location of Uyo village road dumpsite for about a decade now in Akanya Community in Uyo Local Government Area, a few kilometers away from the seat of power of Akwa Ibom State has generated series of concerns due to the enormity of negative physical, environmental and health problems arising therefrom. With the cosmopolitan nature of Uyo City, over 18,000 tons of waste is generated daily (Nta, et al., 2020; the guardian, 2022). Olu and Iyere, (2020), posited that dumping sites are the most common ways of disposal of municipal solid wastes in cities. Generally, they are found on the outskirts of the urban areas, turning into sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents. These vectors, are disease transmitters that affect the children health, which organic defenses are in a formative and creative state.

Decomposition of organic compounds by micro-organisms is a common phenomenon. Most organic materials, such as food, wood products, or other remnants of plants, decay, and finally return to the environment in the form of simple compounds, such as carbon dioxide, water, or ammonia. Surprisingly, it has been found that most synthetic organic polymers, including the majority of plastics, are extremely resistant to biodegradation. This phenomenon starts to create significant economic and environmental problems when landfills sites overflow with plastics. According to Andrew, et al., (2020), an increasing number of dumpsites are identified signposts of health hazards and environmental epidemiological threats. The location of dumpsites have proven to be a problem to nearby residents in most parts of the world, particularly in Africa. These include the development of unofficial dumpsites and littering. In cases where there is a dumpsite, it is either unmonitored or creates an unsightly surrounding. For example, the dumpsite at Uyo village road is partially poorly managed, yet it is very close to the residential community of Nduetong Oku, barracks road and other nearby communities. There are homes which are hardly 200 meters away from the dumpsite.

According to Siddiqua, Hahladakis and Al-Attiya, (2022) and Ncube and Voyi (2017), the location of the dumpsites should be properly planned and managed to avoid risks to human health and the environment. To achieve this goal, corrective and appropriate measures are likely to be expensive, complex, and if not undertaken, the situation can pose serious threats to the environment and its habitants. Chemicals contaminating groundwater vary among dumpsites. But the most common contaminants found in groundwater near these dumpsites are chlorinated solvents. Some of these solvents, such as tetrachlorethylene, trichloroethylene, and vinyl chloride, can pose risk of cancer at high exposure levels.

2.1.8 Dumpsite and Waste Management Systems in Nigeria

According to Ifeoluwa, (2018), Waste management and disposal in Nigeria requires a joint effort and this must start at the household and the family level. The government must focus on collection of waste from the household. Packing wastes into plastics, polythene bags, glass and so on is a good method to start keeping the environment clean. Government should push aside non-essential things and focus on implementing more initiatives to have a cleaner and healthier environment. There should be full financial support to help each state and local governments in waste disposal, focusing on households. Waste bins should be placed in strategic areas on streets and communities with effective monitoring and supervision by sanitation workers. There should be daily waste collections and thorough advocacy to the public to create awareness of the negative implications of an unkempt, dirty environment.

Moreover, poorly managed municipal waste creates many environmental and health-related issues, especially in the neighborhoods of dump sites. Poor urban slum dwellers are particularly vulnerable and are acutely affected by waste dumping (Akmal and Jamil, 2021). Waste collection is an essential first part of the process of waste management as ever-growing volumes of solid waste create serious issues in handling and disposing particularly in the face of resource constraints in less-developed countries. In most developed countries, a door-to-door collection system is commonly used, but municipalities in developing countries can provide this service to only a limited proportion of the population due to financial and administrative incapacity. As a result, waste is thrown into open landfill sites and dumpsites, which evolve into sources of health and environmental threats for people living in the neighborhoods. Because of poorly designed municipal waste management systems, many urban areas in developing countries experience significant environmental deterioration and health threats. Various studies have investigated the health and environmental impacts of waste dumping and have shown that waste and health variables are closely linked (Somani, 2023).

Data from WHO, (2023) and Kenekar, (2021), revealed that more than 250 million people are infected with the Hepatitis B virus, 70 million with Hepatitis C, and 38 million with immune deficiency infections worldwide, primarily due to exposure to infected syringes and blades. There are monetary resources in the country which are more than enough to have well-paid waste workers and also provide the necessary amenities such as vehicles for collections, materials for storage facilities, modern sanitary landfill areas for recycling, transportation of municipal, institutional, and domestic wastes. Governments need to make this a priority because most of these unlawful wastes dumping contaminate water channels and make humans vulnerable to infections. In view of this, integrated waste management practices are highly recommended and useful including recycling, organic waste management, energy recovery, and sanitary landfills (Nta, et al., 2020).

2.1.9 Dangers of landfill sites to the Environment

Waste dumpsites such as landfills have multifarious effects on citizens or residents in a number of ways;

- Landfills are one of the causes of climate change.
- They can cause fires or explosions
- They can contaminate soil and water
- Landfills alter the fauna
- Landfills reduce the value of the surrounding areas
- Accidents sometimes occur in landfill sites

Open dumps pose the following health, safety, and environmental threats:

- Fire and explosion.
- Inhalation of toxic gases
- Injury to children playing on or around the dump sites
- Disease carried by mosquitoes, flies, and rodents.
- Contamination of streams, rivers and lakes
- Contamination of soil and groundwater.

The effects of dumpsite waste elements abound in differs ways. These effects emanate from various sources as shown below:

Name of element in Dumpsites	Percentage	Effects to human beings
Lead from Diode batteries	0.1%	If inhaled, can cause lung infection Burning can cause acidic gas.
Metals	3%	Sharp objects can cut scavengers and allow tetanus infection
Glass and glass bottles	7.5%	Sharp objects can cut scavengers and allow tetanus infection
Agricultural and food wastes	23%	Can cause sooth, carbon dioxide and carbon Monoxide when burned
Plastics	13%	Can cause sooth, carbon dioxide and carbon Monoxide when burned
Papers and cardboards	18	Can cause sooth, carbon dioxide and carbon Monoxide when burned
Cloth	8%	Can cause sooth, carbon dioxide and carbon Monoxide when burned
Medical wastes	5%	Can cause sooth, carbon dioxide and carbon Monoxide when burned. Re-use of needles can transfer deadly diseases
E-wastes	7%	Can cause sooth, carbon dioxide and carbon Monoxide when burned
Others	15.4%	Can cause sooth, carbon dioxide and carbon Monoxide when burned

Source: Oyedele and Oyedele, 2022.

2.2 Theoretical Framework

2.2.1 The Theory of Environmentally Responsible Behavior (ERB)

The reasoned and responsible action theory is otherwise called the theory of planned behavior, environmental citizenship, the model of human interaction with the environment and the value–belief–norm theory of environmentalism. The ERB theory was originally formulated by Hines, Hungerford and Tomera in 1986 (Stanley, et al., 2021). The theory argued that, having an intention to act is a key factor that influences responsible behavior for taking care of the environment. Dumpsite management encapsulates that premise. Moreover, it argues that the intention of acting, the locus of control, the attitudes, the sense of responsibility at the personal level, and knowledge are key tenets influencing the overall ERB (Grace, et al., 2024; Oyedele and Oyedele, 2022).

According to the Environmentally Responsible Behaviour theory, the internal control center has an influence on the intention of people to act. In the management of waste, no single factor exists that brings about a change in current behavior. For instance, despite the existence of stiff regulations forbidding people from dumping waste materials, some people still damp waste or other materials in large cities. With this externality, knowledge of the dangers of indiscriminate waste dumping on its own is not adequate enough but the responsible actions to trigger and propel prompt decisions can lead to appropriate behaviors towards the environment. The

reasoned/responsible action theory was initially introduced by Martin Fishbein in 1967 and advanced and extended by Fishbein and Icek Ajzen (Renu, 2022). The theory maintained that, the various human behaviors are influenced and shaped by rational thoughts. According to this theory, there is a link between intentions to act and the final behavior of an individual as predicted by the attitudes. They are the subjective beliefs and norms that shape these attitudes. The theory of reasoned action is used to account for the time when individuals are guided by good intentions, but ensuring that these intentions are translated into good actions is affected by inadequate confidence.

2.3 Empirical Framework

Peprah, et al., (2024) studied the differences in physical and mental health symptoms among residents living near municipal solid waste sites of Ashanti Region, Ghana. Using a cross-sectional data from 827 residents living near three municipal waste sites, the findings revealed that, Health symptoms, including sleep problems/insomnia, frequent extreme tiredness, low mood, loss of appetite, stress, anxiety, and depression, were reported by the majority of the participants. This implies that, residents near open dumpsites exhibit significantly higher likelihoods of experiencing various health symptoms such as extreme fatigue, depression, psychological disorders, thinking and concentration problems, low mood, and loss of appetite.

Grace, et al., (2024) conducted a study on socio-economic effects of Open Waste dumpsite on residents of selected Communities in Rivers State, Nigeria. The research used Mixed Method Research approach and the cross-sectional survey research design. Findings indicated that, some of the impacts of open waste dumpsite on residence living around include bad smell, unhealthy environment (breeding ground for disease vectors). Further analysis revealed that, the location of waste dumpsites in the study area do not conform to appropriate planning standards.

Parin Somani, (2023) investigated the health impacts of poor waste management in the 21st century. Results revealed that poor solid waste management comprising of waste generated by human beings and animal activity, result in the following: a spread of infections and diseases through attracting rodents and other creatures, pollution from chemicals released from landfills and greenhouse gas, plastic waste and respiratory diseases. Global societies should be educated on the importance of implementing appropriate strategies towards good solid waste management. Siddiqua et al., (2023), assessed the health status of people adjacent to temporary waste disposal sites in Khulna city, Bangladesh. Findings showed that, the main concern for residents in both communities was the odor emanating from the dumpsites, with 74% of respondents identifying this as their primary concern. Also results indicated that, the smoke from burning waste had the most severe impact on their health. The most common health problems manifested were dysentery, diarrhea, pulmonary diseases, asthma, and allergies. Participants living close to the dumpsites were found to be statistically significant victims of health problems, water pollution and unpleasant odor.

Bachok Norsa'adah et al., (2020) conducted a Community Health Survey of residents living near a solid Waste Open dumpsite in Sabak, Kelantan, Malaysia. The findings indicated that, residents living near the dumpsite had a significantly higher risk of having sore throat, diabetes mellitus, and hypertension compared to residents in the control area. However, the study did not detect a significant association with other outcomes. These findings were supported by a number of self-reported health symptoms such as fatigue, sleepiness, and headache among residents living near waste sites with poor air quality related to the landfill. Influenza-like illness, eye irritation, and body weakness were frequently reported by participants living close to the landfill than those living far from the landfill. This study provides evidence that, unsanitary solid waste disposal in countries like Malaysia is hazardous to the health of residents in the surrounding 1 km, and that efforts were needed to minimize the hazards.

Olu and Iyere, (2020) investigated the perceptions of residents and workers toward the environmental health effects of a dumpsite in Solous Igando, Lagos, Nigeria. Using a descriptive

analysis approach, the findings of the study revealed that, dumpsites are an ideal breeding ground for disease vectors such as rats and mosquitoes, which may channel severe health issues to the nearby residents and dumpsite workers. Test of independence indicated a significant correlation between the perception of the dumpsite workers and community dwellers toward the dumpsite as a source of health-deteriorating agents. Thus, Dumpsite odor, insect and rodent infestation, and burning activities could predict the ill health status of the dumpsite workers. According to the results, the human settlements in the vicinity of the dumpsite were discontented with the landfill and its adverse health effects (e.g., malaria, typhoid, skin infection).

Andrew et al., (2020) studied the exposure to waste sites and their impacts on health. Using panel data from the South African National Income Dynamics Study (SA-NIDS) to investigate the association between exposure to waste sites and asthma, tuberculosis, diabetes, and depression. Findings of the study showed that, rapid population growth, urbanization, and economic development have led to an unprecedented number of waste sites in developing countries. This situation has become a contentious international relations issue, with an unsustainable amount of waste and its health consequences often being borne by developing countries. The relationship persisted even after controlling for multiple socioeconomic factors with multiple adverse health outcomes in individuals living close to waste sites.

Akmal, T.; Jamil, F., (2021) assessed the health effects of improper disposal of solid waste in Metropolitan Islamabad–Rawalpindi, Pakistan. Findings of the study showed that, disposal of municipal waste predominantly comprising household and commercial refuse had become a daunting task for local governments and municipalities. Also, irregular disposal in the vicinity of residential areas caused illness and chronic problems to residents living within 100m of the dumpsites. They become more vulnerable to malaria, dengue, and asthma than those living more than 500m away. Moreover, the findings highlight that lack of public enlightenment, waste level, lack of knowledge of waste hazards compounded the problem.

Nta, et al., (2020) examined the composition of municipal solid waste in Uyo and vector-borne diseases associated with municipal solid waste within the vicinity of the dump- sites (less than 1km) and controlled site (above 1 km). Findings revealed that, a significant number of respondents were aware that the origin of municipal solid waste is residential, commercial, industrial sectors. Also, that rats, flies, mosquitoes, birds, pigs and cockroaches are vectors that carry diseases associated with municipal solid waste. The study recommends the treatment of wastes using techniques such as composting, gasification and energy recovery in for further reduction of waste.

Ejati, Vincent, Anita, and Amina, (2018) studied the application of remote sensing and Geographic Information Systems in estimating the potential health effects of solid waste dump sites located close to residences within Jalingo town in Taraba State, Nigeria. The findings of the study revealed that, proximity analysis of a 500m and 1000m standard demonstrated that residences within 7.857 km2 and 31.439 km2 of each dumpsite, respectively, were in danger of dumpsite related diseases. Because out of the total built-up area of 61.479 km2; most of the dumpsites located within 31.439 km2 of the area do not conform to the NESREA standard criteria of siting a dumpsite.

RESEARCH METHODOLOGY

3.1 Introduction

The methodology used in the study is described in this section. This section outlines the research design, the target population, sample size and sampling procedure, research instruments, instrument validation and reliability, pilot study, method of data collection, method of data analysis and ethical considerations.

3.2 Research Design

The study employed the descriptive research design. This design is appropriate for the study because it allows investigation of possible relationships between variables as well as data collection from broader categories and comparisons between variables. More so, data from the sampled group was sought using the questionnaire. The questionnaire enabled collection of data which was easily drawn directly from the respondents to give the needed results which could be inferred on the general population of the study.

3.3 Area of the Study

The study is centered on Uyo Village Road, Uyo, Nigeria. Uyo Village Road has a waste dumpsite, located along Akpayak Community. It is one of the largest official waste dumping sites in Akwa Ibom State. The site is directly in the heart of the city and close to barracks road, the seat of power, and is situated between Akpayak, Ikot Afia and Nung Uyo Communities. It is situated at 5.03° North latitude, 7.93° East longitude and 196 meters elevation above sea level. The average annual temperature in Uyo is 26.4ºC. The rainfall here averages 2509 mm. Dumping at the site is unrestricted and industrial, agricultural, domestic and medical wastes (including used syringes and needles) are regularly dumped at the site.

3.4 Population of the Study

The population of the study consisted of 250 members of the surrounding communities. These are the residents who lived less than 1 km from the boundary of the waste dumpsite.

3.5 Sampling Procedure and Sample Size

The sample size consisted of 150 residents of the adjourning communities of the dumpsite. The sample size was chosen using simple random sampling method where every sample has equal opportunity of being selected.

3.6 Instrument for Data Collection

The researchers structured a questionnaire titled "Uyo village road Dumpsite Management and its effects on residents' Questionnaire (UVRDAERQ) for data collection. It has two sections; section 'A' for respondent's demographic data while section 'B' elicited information on the effects of dumpsite management. Section B was in the cluster of four. Each cluster had five items giving the total of 20 items. All the items were structured under four point rating scale of Strongly Agree (SA); Agree (A); Disagree (D) and Strongly Disagree (SD). Respondents were expected to choose from the options that is most suitable to their opinion.

3.7 Instrument Validation and Reliability

A draft of the instrument was presented to three (3) research experts for face validation. During the process, items used for this study were vetted critically to ensure their level of correctness, internal validity, relevance and relatedness to variables used for the study. Comments made by the experts on the questionnaire were used accordingly.

3.8 Pilot Study

The validated instrument was tried-out on residents of the communities living further away from the boundary of the municipal solid waste dumping site at Uyo village road, who were

not part of the sample but shared the same characteristics with the target population. The data instrument from the survey test was analyzed using Cronbach Alpha and it yielded the coefficient of 0.89 which signified that the instrument has high internal consistency. Thus, was suitable for the study.

3.9 Method of Data Collection

The researchers presented introduction letter to the respondents seeking their consent to participate in the study. Upon acceptance, the researcher also assured the respondents of confidentiality on their responses. The researcher administered the instrument to 150 randomly selected people and retrieved it on the spot in order to ensure 100% return rate. Secondary sources were collected from textbooks, journals and the internet.

3.10 Method of Data Analysis

Research questions were answered using means statistics and standard deviation, while one sample t-test was employed to test the null hypotheses at 0.05 level of significance. In testing the null hypotheses, the p-values were compared at significant level of 0.05. When the p-value is greater than the significance level of 0.05, the null was rejected. On the other hand, when the p-value is less than the significance level of 0.05, the null hypotheses is retained. The alternative hypothesis is rejected.

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

In this section, research hypotheses were tested and findings from the analyses are discussed.

4.1 Results

Results of data analyzed are presented on tables on the basis of the research questions and testing of the hypotheses.

4.1.1. Research Questions 1

What are your views on dumpsite/ waste management planning at the Uyo Village Road dumpsite?

Table 1: Mean Score showing views on dumpsite/ waste management planning at the Uyo Village Road dumpsite.

	Items	$\overline{X}$	SD	Decision
1	Waste collection method is key to proper management	3.50	.51	Agreed
2	Planning of human resource availability enhances dumpsite management	2.78	.93	Agreed
3	Residents' health condition is an output of waste management planning	3.53	.73	Agreed
4	Transportation, storage and recycling stems from proper dumpsite planning	3.35	.65	Agreed
5	Residents knowledge of good waste disposal/management is a function of planning	3.92	1.65	Agreed
	Cluster Mean	**3.67**	**.83**	**Agreed**

N = 150

Table 1 shows the mean responses on dumpsite/ waste management planning at the Uyo village road dumpsite. In the perceptions of the residents, waste collection method is key to proper management ($\overline{X}$ = 3.50), Planning of human resource availability enhances dumpsite management ($\overline{X}$ = 2.78), Residents' health condition is an output of waste management planning ($\overline{X}$ = 3.53), Transportation, storage and recycling stems from proper dumpsite planning ($\overline{X}$ = 3.35) as well as Residents knowledge of good waste disposal/management as a function of planning ($\overline{X}$ = 3.92). What this means is that, dumpsite/ waste management planning can have a positive effect on the health condition of Uyo village road residents.

4.1.2 Research Question 2

In what ways has the location of Uyo village road dumpsite impacted on residents of the Area?

Table 2: Mean Score showing the impacts of sitting or location of Uyo village road dumpsite on the residents of the Area.

	Items	$\overline{X}$	SD	Decision
1	The siting of the dumpsite was poor with adverse health outcomes.	3.52	.50	Agreed
2	The odor emanating from the dumpsite is infectious and dangerous.	3.31	.46	Agreed
3	The poor location of the dumpsite influences the outbreak of health disorders.	3.48	.07	Agreed
4	The closeness of the dumpsite increases risk of negative health conditions.	3.70	.80	Agreed
5	The site is affected by open dumping and unsanitary environmental exposure.	3.98	1.96	Agreed
	Cluster Mean	**3.67**	**.83**	**Agreed**

N =150

Table 2 shows the mean responses on impacts of location of Uyo village road dumpsite on the residents of the Area. In the perceptions of the residents, siting of the dumpsite was poor with adverse health outcomes ($\overline{X}$ = 3.52), odor emanating from the dumpsite is infectious and dangerous ($\overline{X}$ = 3.32), poor location of the dumpsite influences the outbreak of health disorders ($\overline{X}$ = 3.48), closeness of the dumpsite increases risk of negative health conditions ($\overline{X}$ = 3.70) and the site is affected by open dumping and unsanitary environmental exposure ($\overline{X}$ = 3.98). Hence, all these point to the facts that, sitting or location of Uyo village road dumpsite impacts negatively on the well-being of residents of the Area.

4.1.3 Research Question 3

Are there proper dumpsite management practices in Uyo village road dumpsite?

Table 3: Mean Score showing the existence and availability of dumpsite management practices in Uyo village road dumpsite.

	Items	$\overline{X}$	SD	Decision
1	There is residents' participation in waste management.	3.61	.74	Agreed
2	Bio remediation (fumigation) measures are adopted and applied.	3.23	.62	Agreed
3	There is the presence and implementation of waste recycling method in the Area.	3.30	.78	Agreed
4	Incineration and other modern waste treatment methods are present.	3.78	.85	Agreed
5	There is adoption and enforcement of government's zero waste management policy.	3.15	.19	Agreed
	Cluster Mean	**3.67**	**.83**	**Agreed**

N = 150

Table 3 shows the mean responses on the existence, and adoption of dumpsite management practices in Uyo village road dumpsite. It further reveals that, there is residents' participation in waste management ($\overline{X}$ = 3.61), Bio remediation measures ($\overline{X}$ = 3.23), presence and implementation of waste recycling method ($\overline{X}$ = 3.30), Incineration and other modern waste collection methods present ($\overline{X}$ = 3.78) and Government's adoption and enforcement of zero waste management policy ($\overline{X}$ = 3.15) stimulates the availability and adoption of dumpsite management practices in Uyo village road dumpsite.

4.1.4 Research Question 4

What are the challenges and problems affecting proper management of Uyo Village road dumpsite?

Table 4: Mean Score showing effects of challenges and problems on proper management of Uyo Village road dumpsite.

	Items	$\overline{X}$	SD	Decision
1	Waste management practices are unsatisfactory and indicates lack appropriate knowledge.	3.70	.93	Agreed
2	There are inadequate resources and waste management technologies.	3.54	.68	Agreed
3	There is poor enforcement of legal policies against indiscriminate dumping of waste	2.99	.47	Agreed
4	Absence of political will to protect the environment/ecosystem	3.73	1.29	Agreed
5	Complacent attitude of residents towards waste collection and disposal methods.	3.82	1.68	Agreed
	Cluster Mean	**3.67**	**.83**	**Agreed**

N = 150

Table 4 shows the mean responses on effects of challenges and problems affecting proper management of Uyo Village road dumpsite. In the perceptions of the residents, management practices are unsatisfactory and indicate lack of appropriate knowledge, ($\overline{X}$ = 3.70), inadequate resources and waste management technologies ($\overline{X}$ = 3.54), Poor enforcement of legal policies against indiscriminate dumping ($\overline{X}$ = 2.99), Absence of political will to protect the environment/ecosystem ($\overline{X}$ = 3.73) and complacent attitude of residents towards waste generation and disposal methods ($\overline{X}$ = 3.82). These challenges and problems affect proper management of Uyo Village road dumpsite.

4.2 Test of Research Hypotheses

4.2.1 Hypothesis 1

There are no significant effects of dumpsite/ waste management planning on the wellbeing of Uyo village road residents.

Table 5: Sample t-test Analysis showing the effects of dumpsite/ waste management planning on the wellbeing of Uyo village road residents

Variables	$\overline{X}$	SD	Df	Cal *t*-value	p-value	Decision
Dumpsite/ waste management planning						
And	12.43	2.56	39	52.37	.000	Rejected
Health conditions of Uyo village road residents						

N = 150, p> .05

Table 5 above indicates that the calculated t-value is 52.37 and the p-value is .000. Since the p-value is less than the 0.05 level of significance at degree of freedom of 39, thus the null hypothesis which states that there are no significant effects of dumpsite/ waste management planning on the wellbeing of Uyo village road residents is rejected. It can therefore be inferred that, there are significant effects of dumpsite/ waste management planning on the wellbeing of Uyo village road residents.

4.2.2 Hypothesis 2

There are no significant impacts of the location of Uyo village road dumpsite on the economic life of residents of the Area

Table 6: Sample t-test Analysis showing impact of the sitting or location of Uyo village road dumpsite on the residents of the Area

Variables	$\overline{X}$	SD	Df	Cal *t*-value	p-value	Decision
Siting or location of Uyo village road dumpsite And Economic life of residents of the Area	9.63	3.48	39	53.20	.000	Rejected

N = 40, p> .05

Table 6 above indicates that the calculated t-value is 53.20 and the p-value is .000. Since the p-value is less than the 0.05 level of significance at degree of freedom of 39, the null hypothesis which states that, there are no significant impacts of the sitting or location of Uyo village road dumpsite on the economic life of residents of the Area is rejected. The alternative hypothesis which infers that there are significant impacts of the location of Uyo village road dumpsite on the economic life of residents of the area is therefore accepted.

4.2.3 Hypothesis 3

There are no significant effects of the availability and adoption of proper dumpsite management practices in Uyo village road dumpsite environment.

Table 9: Sample t-test Analysis showing the effect of availability and adoption of dumpsite management practices in Uyo village road dumpsite

Variables	$\overline{X}$	SD	Df	Cal *t*-value	p-value	Decision
Availability adoption of dumpsite management practices and Uyo village road dumpsite environment.	14.33	3.68	39	33.47	.000	Rejected

N = 150, p> .05

Table 6 above indicates that the calculated t-value is 33.47 and the p-value is .000. Since the p-value is less than the 0.05 level of significance at degree of freedom of 39 thus the null hypothesis which states that, there is no availability and adoption of dumpsite management practices in Uyo village road dumpsite environment is rejected. It can therefore be inferred that, there are significant effects of the availability and adoption of proper dumpsite management practices on the wellbeing of residents of Uyo village road dumpsite.

4.2.4 Hypothesis 4

There are no significant impacts of the challenges and problems affecting proper dumpsite management on Uyo Village Road ecosystem

Table 10: Sample t-test Analysis showing impacts of the challenges and problems affecting proper management of Uyo Village road dumpsite ecosystem

Variables	$\overline{X}$	SD	Df	Cal *t*-value	Crit *t*-value	Decision
Challenges and problems affecting proper dumpsite management						
And	8.26	3.57	39	53.05	.000	Rejected
Uyo village road ecosystem						

N = 150, p> .05

Table 8 above indicates that the calculated t-value is 53.05 and the p-value is .000. Since the p-value is less than the 0.05 level of significance at degree of freedom of 39, thus the null hypothesis which states that there are no challenges and problems affecting proper dumpsite management on Uyo Village Road ecosystem is rejected. It can therefore be argued that, there are significant and negative effects of the challenges and problems affecting proper dumpsite management on Uyo Village Road ecosystem.

4.3 Discussion of Findings

The results in hypothesis one showed that, there are significant effects of dumpsite/ waste management planning on the wellbeing of Uyo village road residents. What this means is that, ineffective dumpsite/ waste management planning will negatively affect the wellbeing of Uyo village road residents and by extension, the citizens of Akwa Ibom State of living on the adjourning streets. This finding confirms the position of Somani (2023) and Norsa'adah, Salinah, Naing and Sarimah, (2020), that timely and proper dumpsite and waste management planning which involves proper waste collection and disposal, human/material resource availability, Transportation, storage and waste recycling, will help to ameliorate the negative effects of dump sites on the health of residents of an area. This is because dumpsite planning reduces the environmental exposure to indiscriminate and dangerous waste disposal and stem the tide of adverse health conditions. This position is in tandem with Norsa'adah, et al., (2020) that, proper planning helps to reduce the negative association between dumpsite exposure and chronic health problems such as diabetes and hypertension due to the presence of heavy metals and chemical contents in dumpsites. Dumpsites with chemical compounds, such as arsenic, lead, cadmium and mercury as well as industrial products, like batteries and electrical equipment, contain heavy metals that can end up as solid wastes and pose risks to the health of persons exposed during collecting and handling and as a result of inhalation, ingestion or through skin contact (Munyai and Nunu, 2020). The impact on human health can also occur along the food chain, such as in vegetables grown or animals raised on contaminated soil. Heavy metals produce free radicals that disrupt intracellular homeostasis and damage lipids, proteins, enzymes, and DNA in the human body.

The Second finding is that, there is a negative and significant relationship between the location of Uyo village road dumpsite and the economic life of residents of the area is consistent with the findings of Iddrisu and Debrah, (2021) that, as distance between a community and dumpsite reduces, the frequency of illnesses increases. Hence, the presence of poor sited, managed and controlled dumpsite on residential area is detrimental to the health and economic lives of residents of the affected vicinity. This also confirms the position of Peprah, et al., (2024) and Kar and Basunia, (2020) that, there exist a significantly likelihood of asthma, tuberculosis, diabetes, and depression in individuals residing within 5 km from waste sites. Also, there is a negative relationship between exposure to waste sites and poor health status because exposure to

hydrogen sulfide emitted from landfill sites was associated with greater mortality and admissions to hospital caused by respiratory diseases for individuals living within 5 km of these waste sites with increased risk of asthma, tuberculosis, diabetes, and depression (Mor and Ravindra, 2023). Thus, people living close to where dumpsites situate can be subjected to direct transfer of contamination from hand to mouth or through inhalation of dangerous volatile compounds and aerosols leading to considerable public health consequences such as, cholera, Malaria, Typhoid, Dysentery/Diarrhea and many others.

The third finding showed that, there are significant effects of the availability and adoption of proper dumpsite management practices on the wellbeing of residents of Uyo village road dumpsite. Proper dumpsite management helps to ameliorate the negative consequences arising from the disposal of wastes, and the sitting of dumpsites. Human exposure to harmful substances would be minimized and so also the contamination of the environment.

Findings from the fourth hypothesis shows that, there are significant and negative effects of the challenges and problems affecting proper dumpsite management on Uyo Village Road dumpsite on the ecosystem is in tandem with the findings of Nartey and Nyarko, (2020). Inappropriate solid waste management measures pose health concerns to humans, living near landfills as well as on the ecosystem. The inadequacy of information on the health-related consequences of landfills, lack of bio-monitoring, inappropriate disposal of solid waste can pose risk to the ecosystem often manifesting in the contamination of surface and ground water through leachate, air pollution as a result of burning of wastes, soil contamination through direct waste contact, uncontrolled release of methane by anaerobic decomposition of waste or spreading of diseases by different vectors such as birds, insects and rodents. In addition, indiscriminate disposal of waste results in environmental degradation which in turn leads to increase in the volume and diversity of hazardous wastes and the consequent contamination of water. Waste left unattended to for a long time constitute serious hazards and can produces offensive odours which can cause serious health challenges to those living around the site (Akmal and Jamil, 2021; Wizor and Mpigi, 2020).

Furthermore, uncontrolled burning of waste in open dumpsite like in the Uyo village road can not only result in air pollution but also increase greenhouse gas emissions which has been known to contribute to climate change. This is because air captured around waste dump sites is pathogenic and unsafe for breathing (Grace, et al., 2024; Oyedele and Oyedele, 2022). All these challenges and problems which are reflected in environmentally poor waste management practices contributes to the release a hazardous mixture of cancer-causing compounds and other toxic substances into the environment, which are injurious to human health and the ecosystem.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Findings

From the findings of the study and analysis of empirical results as presented in the previous sections, the following findings were obtained and summarized as follows that;

i. There are negative and significant effects of dumpsite/ waste management planning on the wellbeing of Uyo village road residents.
ii. There are negative and significant relationship between the location of Uyo village road dumpsite and the economic life and health of residents of the Area.
iii. There is a significant and positive relationship between the adoption of proper dumpsite management practices in Uyo village road and the dumpsite environment.
iv. There are significant and negative effects of the challenges and problems affecting proper dumpsite management of Uyo Village Road dumpsite on the ecosystem.

5.2 Conclusion

Open dumpsites are the most prevailing form of waste disposal in most developing countries including Nigeria, which has been battling with indiscriminate dumping of wastes for decades without feasible measures devised, adopted and implemented to enhance its proper management (Renu, 2022). The failure of waste management system and Sanitary landfills in Nigeria has resulted in an uncontrollable spread of different kind of disease epidemics such as Malaria, typhoid, cholera, dysentery and many others; posing threats to human health and causing the death of many people especially those residing within close proximity and as well as polluted and contaminated the environment (land, air and water bodies) (WHO, 2023: Somani, Navaneethan and Thangaiyan, 2021). Epidemiological evidence of the potential effects of poorly managed and controlled dumpsites on human health and ecosystem generally serve as the basis for concerted concern, efforts and mitigated approaches by all.

Hence, management of dumpsites requires an all-embracing culture and participatory dimensions, and it must be imbibed by all. The close proximity to open dumpsite is and remains a grave risk factor to human health due to population gradual explosion (Saha, Khan, Kundu, Naime, Karim and Ara, 2022; Njoku and Edokpayi, 2019). Open dumping coupled with improper waste and dumpsites not properly managed has been identified to have a negative impact on health, environment and aesthetic values. Educating residents living around the dumpsites on the alternative and more sustainable waste management strategies can ameliorate the enormous health hazards drastically. In addition, waste dumps which are common sights in developing nations/cities are sources of epidemiology and generate pathogens which are dangerous to people working or living in nearby environments. Improperly managed waste dumps cause diseases and affect the lifespan of the residents and people.

Uyo village road dumpsites should be properly managed and controlled by the authorities concerned. The waste dump should be relocated (if possible) inside buffers or green zones where they will not become an eyesore to residents. Series of remediation strategies applied by the government are not sustainable compared to the adverse effects emanating and emitted through the dumpsite to entire ecosystem and ecology of the area. Modern Incinerators and waste management techniques should be devised to properly burn wastes that cannot be recycled. There are waste management techniques that converts energy from incineration of waster for domestic and industrial usage. Such energy is fed into the national grid and used to power residents and factories. Developing economies would do well to invest in these kinds of technologies.

5.3 Recommendations

From the findings of the study, the following recommendations are made;

i. Timely and proper dumpsite/ waste management planning should be devised, adopted by the government to boost waste collection, and proper disposal.
ii. As the population of Uyo city enlarges, government should expedite action plans towards the sitting and relocation of the dumpsite to mitigate the adverse effects of residents living in proximity to it.
iii. There should be proactive adoption, implementation and enforcement of sustainable dumpsite management practices to curb its deficiencies.
iv. All the amenable and identified factors, challenges and problems affecting proper management of the dumpsite and its ecosystem should be revisited and evaluated with drastic measures taken to address their defects.
v. Government should invest in new technologies that captures energy through incineration for residential and industrial usage. In developing climes facing the challenges of constant power supply, this would be money well spent.

References

Abiola, A.H, Fakolade, F. C, Akodu, B.A, Adejimi, A. A, Oyeleye, O.A, Sodamade, G. A. and Abdulkareem, A. T.,(2021) Comparison of respiratory and skin disorders between residents living close to and far from Solous landfill site in Lagos State, Nigeria. Afr J Primary Health Care Fam Med. 2021;13(1):1–7. https://doi. org/ 10. 4102/ phcfm. v13i1. 2677.

Akmal, T. and Jamil, F., (2021) Assessing health damages from improper disposal of solid waste in metropolitan Islamabad–Rawalpindi, Pakistan, *Sustainability* 13 (5): 2717-2341.

Akpotareno, C. O., Weje, I. I., & Ameme, B. (2021). Location-Efficiency of Waste Collection Points Along The Obio/Akpor Stretch of Ikwerre Road, Port Harcourt, Rivers State, Nigeria. *World Wide Journal of Multidisciplinary Research and Development,* 40-46.

Aman, C. A, Kumari ,S. and Ghani, S., (2022) Estimation of landfill settlement using different models. In: Advances in geo-science and geo-structures: select proceedings of GSGS 2020. 2022 (pp. 1–10). *Springer Singapore*. https://doi. Org/ 10. 1007/ 978-981-16-1993-9_1

Amugsi, D. A, Haregu, T. N. and Mberu, B. U., (2020) Levels and determinants of perceived health risk from solid wastes among communities living near to dumpsites in Kenya. *International Journal of Environmental Health Resources* .30(4):409–420. https:// doi. Org/

Andrew, T., Diego, F. C., Jonathan, K. B., Frank, T. and Rob, S. (2020) Exposure to waste sites and their impact on health: a panel and geospatial analysis of nationally representative data from South Africa, 2008–2015. Centre for Rural Health, School of Nursing and Public Health, College of Health Sciences, University of KwaZulu-Natal, Durban, South Africa www.thelancet.com/planetary-health Vol 4(3):e223 - e234.

Atta, U.; Hussain, M. and Malik, R.N., (2020) Environmental impact assessment of municipal solid waste management value chain: A case study from Pakistan. *Waste Management Research*, **2020**, 1–10.

Ayesha Siddiqua, John, N., Hahladakis, G., Ahmed, W. K .A. and Al-Attiya, A. S., (2022) An overview of the environmental pollution and health effects associated with waste landfilling and open dumping. *Environmental Science and Pollution Research* 2(9):58514–58536

Fadhullah, W., Jafri, N. F, Jaafar, M. H. and Abdullah, H. (2021) Community pollution and health effects associated with waste landfilling and open dumping. Environ Science Pollution Research, 2022; 29(39): 58514–36. https:// doi.org/ 10. 1007/ s11356-022-21578-z.

Grace, I. A., Innocent, W. I., Wachukwu, F. C., Akinbobola, Moyin Sabainah, (2024) Socio-Economic Effects of Open Waste Dumpsite on Residents of Selected Communities in Rivers State, Nigeria. *International Journal of Innovative Science and Research Technology*: 9(1):292 – 304.

Iddrisu, T. I, Debrah, K. D. (2021) Consequences of poor landfill management on the people of Gbalahi in the Sagnarigu municipality of northern Ghana. *Journal of Geosciences & Environmental Protection,* 9 (8):211–24. https:// doi. Org/ 10. 4236/ gep.2021. 98014.

Ifeoluwa, O. B., (2018) Harmful Effects and Management of Indiscriminate Solid Waste Disposal on Human and Its Environment in Nigeria: (A Review). *International Journal of Social Science and Humanities Research,* ISSN 2348-3164 (online) Vol. 6, Issue 4, pp: (1427-1431)

Kar, R. and Basunia, P. (2020) Prevalence of diseases among people living near a landfill in kolkata: an exploratory survey. *Annotation in Tropical Medicine & Public Health. 23(3):231–762.*

Kenekar A., (2021) Negative Effects of Improper Solid Waste Disposal on Human Health. 2021. [Online]. Available from: https://organicabiotech.com/negative-effects-of-impropersolid- waste-disposal-on-human health.

Khoiron, K., Probandari, A. N, Setyaningsih, W., Kasjono, H. S, Setyobudi, R. H. and Anne, O. A., (2020) A Review of environmental health impact from municipal solid waste MSW landfill; Risk of malformations associated with residential proximity to hazardous waste sites in Washington State. Environ Resources. Annotation in Tropical Medicine and Public Health. ; 23(3):60–7.

Mor, S., and Ravindra K. (2023) Municipal solid waste landfills in lower-and middle-income countries: environmental impacts, challenges and sustainable management practices. Process Safe Environmental Protection. 2(3):174- 510.

Muleya, M., Hinchliffe, G., and Petterson M. (2021) The environmental impact of landfill fires and their contaminant plumes at the Chunga landfill site, Lusaka, Zambia. *African Journal of Environmental Science & Technology*. 2021; 15(12):569–79. https:// doi. Org/ 10.5897/ ajest 2021. 3008.

Municipal solid waste management and adverse health outcomes: a systematic review. *International Journal of Environmental Resources & Public Health*;18(8):4331. https://doi. Org/ 10. 3390/ ijerp h1808 4331.

Munyai, O. and Nunu, W. N. (2020) Health effects associated with proximity to waste collection points in Beitbridge Municipality, Zimbabwe. *Waste Management*. 105(3): 501–10. https:// doi. Org/ 10. 1016/j. wasman. 2020. 02. 041.

Nartey, A. K, and Nyarko, P. (2020) Solid Waste Management Practices in Ghana: Challenges And Prospects. *African Journal of Curative Medicial Resources*. 4(1):1–22.

Ncube F, Ncube E .J, Voyi K. A. (2017) Systematic Critical Review of Epidemiological Studies on Public Health Concerns of Municipal Solid Waste Handling. *Perspectives on Public Health*; 137**:** 102–08.

Ndukwe, V. A, Uzoegbu, M. U, Ndukwe, O. S and Agibe, A. N, (2019) Environmental and health impacts of solid waste disposal in Umuahia and environs, Southeast, Nigeria. Journal of Applied Science and Environmental Management. Vol. 23 (9) 1615-1620.

Njoku, P. O, Edokpayi, J. N. and Odiyo, J. O. (2019) Health and environmental risks of residents living close to a landfill: a case study of thohoyandou landfill, Limpopo province, South Africa. *International Journal of Environmental Research and Public Health.* 6(12):10–32. https:// doi. Org/ 10. 3390/ ijerp h1612 2125.

Njoku, P.O., Edokpayi, J.N. and Odiyo, J.O. (2019) Health and environmental risks of residents living close to a landfill: a case study of Thohoyandou Landfill, Limpopo Province, South Africa, Int. J. Environ. Res. Publ. Health 16 (12): 2125-2379.

Norsa'adah, B., Salinah, O., Naing, N. N. and Sarimah, A., (2020) Community Health Survey of Residents Living Near a Solid Waste Open Dumpsite in Sabak, Kelantan, Malaysia. *International Journal of Environmental Research and Public Health*.2 (3): 1-14.

Norsaadah, B., Salinah, O., Naing, N. N. and Sarimah, A.(2020) Community health survey of residents living near a solid waste open dumpsite in Sabak, Kelantan, Malaysia. *International Journal of Environmental Resource & Public Health*.17 (1):311–25.

Nta, S. A, Ayotamuno, M. J., Igoni, A. H., Okparanma, R. H. and Benjamin, E., (2020) Municipal Solid Waste Characterization and its Associated Vector-borne Diseases within the Vicinity of Dumpsite and Controlled Site.

Nwanta, J.A. and Ezenduka, E., (2020) Analysis of Nsukka Metropolitan Abattoir Solid Waste in South Eastern Nigeria: Public Health Implications. Arch. Environ. Occup. Health. 65(3):21–26.

Ofori, P. (2021) Waste disposal sites and residential rental values nexus: an appraisal of agogo asante akyem dumps. *African Journal of Science, Technology, Innovation & Development.* 13(2):223–33.

Ogbuehi, N. C, Orji, M. C, and Afolabi, O. O. (2022) Health exposure and environmental challenges of households living nearby an open landfill system in Nigerian Urban Centre. *Int Arch Public Health Community Medicine.* 6(3):1–7.

Ojuri, O.O., Ayodele, F.O. and Oluwatuyi, O.E., (2018) Risk assessment and rehabilitation potential of a millennium city dumpsite in Sub-Saharan Africa, *Waste Management.* 76(4); 621–628.

Olu, J. and Iyere, Anthony, (2020) Perception of residents and workers toward the environmental health effects of a dumpsite in Solous Igando, Lagos, Nigeria. *Journal of Advances in Environmental Health Research*. 8: 242-249.

Olufemi Adedamola Oyedele and Adeniyi, Olufolahan Oyedele, (2022) Impacts of Waste Dumps on the Health of Neighbours: A case study of Olusosun Waste Dump, Ojota, Lagos State, Nigeria.

Osazee, I. T. (2021) Landfill in a Sustainable Waste Disposal. European Journal of Environment & Earth Science: 2(4): 67–74.

Oyedele, O. A and Oyedele, A.O (2017) Impacts of Waste Dumps on the Health of Neighbours: A Case Study of Olusosun Waste Dump, Ojota, Lagos State, Nigeria, *Journal of Civil, Construction and Environmental Engineering* 2(1): 27-33.

Peprah P, Kwarteng, M.A, Asiedu, K., Agyemang-Duah, W., Morgan, A. K. and Adjei, G. A. (2023) Self-reported symptoms of ocular allergy and its comorbid factors among residents living near a landfill site in Ghana. Int J Environ Health Resources; 33(4):386–97. https:// doi. Org/ 10. 1080/ 09603 123. 2022. 20319 12.

Peprah, P., Agyemang-Duah, W., Morgan, A. K., Onyina, E. and Asare, E. S.,(2024) Differences in physical and mental health symptoms among residents living near municipal solid waste sites: a cross sectional study in the Ashanti Region, Ghana. *Journal of Health, Population and Nutrition (2024) 43:34.* https://doi.org/10.1186/s41043-024-00527-1.

PROPARCO, (2012). Wastes: the challenges facing developing countries. Available at http://www.proparco.fr/lang/en/Accueil_PROPARCO/Publications-Proparco/secteur-prive-et-developpement/Les-derniers-numeros/Issue-15-waste. Accessed on June 23, 2012.

Rana R, Ganguly R, Gupta A.K., (2015) An assessment of solid waste management system in Chandigarh city India. Electronic Journal of Geotechnical Engineering.3 (**20)**:1547-1572.

Renu, M. P., (2022) Strategies toward sustainable management of organic waste. In: Techno-Economics and Life Cycle Assessment of Bioreactors. Elsevier; 2(3):131-144.

Roy, S., Bose, A., Basak, D., and Chowdhury, I. R. (2022) Open Landfill Site and Threat to the proximity residents': Addressing perceived consequences of unscientific solid waste dumping using GIS Techniques. Research Square. doi: DOI: https;//doi.org/10.21203.

Shammi, A. T. A, Nazia, H. A., Golder, M. R. A., Hriday, M. C. and Islam, S. S., (2023) Health status assessment of people adjacent to temporary waste disposal sites in Khulna city, Bangladesh. HEliyon journal of *Environmental Science Discipline.2 (2): 1- 11* https://doi.org/10.1016/j.heliyon.2023.e19810.

Saha, T.R., Khan, M.A.R., Kundu, R., Naime, J., Karim, K.M.R. and Ara, H, (2022) Heavy metal contaminations of soil in waste dumping and non-dumping sites in Khulna: human health risk assessment, *Results in Chemistry* 4 (2022), 100434.

Siddiqua, A., Hahladakis, J.N., and Al-Attiya, W.A.K.A., (2023) An overview of the environmental pollution and health effects associated with waste landfilling and open dumping, Environ. Science Pollution. Control Service. (2022) 1–23.

Singh, S. K, Chokhandre, P., Salve, P. S. and Rajak, R. (2021) Open dumping site and health risks to proximate communities in Mumbai, India: a cross-sectional case comparison study. Clinical Epidemiology & Global Health. 9:34–40. https:// doi.org/ 10. 1016/j. cegh. 2020. 06. 008.

Soma, T.; Li, B.; Maclaren, V., (2020) Food Waste Reduction: A Test of Three Consumer Awareness Interventions. *Sustainability*. 12(2):907- 1023.

Somani P, Navaneethan R. D. and Thangaiyan S., (2021) Integrated solid waste management in urban India: A mini-review. *Journal of Physics*: Conference Series. 2021; 1913:012084. *Health Impacts of Poor Solid Waste Management in the 21st Century*. *DOI: http://dx.doi.org/10.5772/intechopen.1002812.*

Somani P., (2021) Impact of climate change and covid-19 on health. *Journal of Hunan University* (Natural Sciences). 48:184-193.

Somani, P., (2023) Health Impacts of Poor Solid Waste Management in the 21st Century. London Organization of Skills Development, UK. *DOI: http://dx.doi.org/10.5772/intechopen.1002812.*

Stanley, I., Njoku, V.O.N., Arinze, C.,Chizoruo, I. F. and Blessing, E.N., (2021)A Review: effects of air, water and land dumpsite on human health and analytical methods for determination of pollutants, *Analytical Methods in Environmental Chemistry Journal* 4 (3) (2021) 80–106.

Saha, T.R., Khan, M.A.R., Kundu, R., Naime, J., Karim, K.M.R. and Ara, H,(2022) Heavy metal contaminations of soil in waste dumping and non-dumping sites in Khulna: human health risk assessment, *Results in Chemistry* 4 (2022), 100434. The Guardian Newspaper, 7th July, 2022. https://guardian.ng.

Triassi, M., Alfano, R., Illario, M., Nardone, A., Caporale, O. and Montuori P. (2015) Environmental pollution from illegal waste disposal and health effects: a review on the "triangle of death". *International Journal of Environmental Research & Public Health*; 12**:** 1216–36.

United Nations (2023). UN Ghana Water, Sanitation and Hygiene Support Programme. Available at URL: https:// Ghana. UN. Org/ en/ 224267-unghana-water-sanitation-and-hygiene-support-programme. Accessed on 2 Jan 2024.

Vinti, G., Bauza, V., Clasen, T., Medlicott, K., Tudor, T., Zurbrugg, C. and Vaccari, M. (2021) Symptoms survey among residents in close proximity to a landfill in a tropical rural area. Journal of Sustainability Science Management; 16(4):128–43.

Wachukwu, F. C., Obinna, V. C., & Weje, I. I. (2020) Effects Of 2019 Flood And Willingness of Residents to Relocate in Parts of Obio/Akpor Local Government Area, Rivers State, Nigeria. *International Journal of Scientific and Research Publications,* 679-704.

Wizor, C., & Mpigi, G. (2020). Geospatial Mapping of Urban Flood-Prone Areas in Port Harcourt Metropolis: Implications for Effective Urban Physical Planning in Nigeria. *World Journal of Innoviative Research* Vol.8 Issue 1, 17-25.

World Health Organization, (2023) Compendium of WHO and Other UN Guidance on Health and Environment. Geneva: World Health Organization; 2023.