

# EFFECTIVE WASTE MANAGEMENT AS A CATALYST TO HUMAN HEALTH CHALLENGES (TOWN PLANNER'S PERSPECTIVE)

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DOI: <https://doi.org/10.5281/zenodo.8009901>

Published Date: 06-June-2023

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**Abstract:** This study assessed effective waste management as a catalyst for human health challenges (town planner's perspective). The generation of waste and its disposal, collection, transport, and processing are important for healthy ecosystems and the health of people as the ineffective management of this waste in their varied dumpsites possess adverse health impacts on humans in the surrounding. Three objectives were raised to guide the study while data collection for the study was obtained through secondary sources. The study made use of four dumpsites located in four strategic points in Ado-Ekiti which are the Mary immaculate dumpsite (Oye), Oke age dumpsite (Igede), Okutagokutaleri dumpsites (Ikere), and the Igaletere dumpsite (Iju). The study revealed that the major method of waste management technique utilized in the area are landfill, composting, recycling and incineration while the major health threat includes typhoid, malaria, and watery stool. It was therefore concluded that improper waste management and illegal waste shipments have negative impacts on both environment and public health of residents in Ado-Ekiti and recommended amongst others that dumpsites that possess as a major health risk to the residents shouldn't be located near human habitation, be well fenced and properly managed to minimize effects on the environment and human health.

**Keywords:** Waste Management; Human Health Challenges; Health Effects; and Landfilling.

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## 1. INTRODUCTION

Cities in developing countries have traditionally been hotspots for many new environmental and health risks due to the rapid, unplanned, and unplanned patterns of urban expansion and progressive population urbanization (WHO, 2007). At the crossroads of urban diversity, environment and health are typical public health concerns for waste treatment, clean water and sanitation, and injury prevention. Many remedies for these problems include economic development. However, new health agendas are emerging from large cities in industrialized nations, focusing primarily on non-communicable diseases and seemingly insurmountable health threats. In metropolitan areas, public health concerns are increasingly shifting to issues such as obesity, asthma, health inequalities, mental health, and loss of social support systems. Comparing air pollution across the country, urban pollutant concentrations are often much higher than expected from point sources such as industries and power plants outside the city. According to recent urban studies, people living in cities with significantly less air pollution may still have major health problems, although the prevalence of these diseases is arguably high in rural areas. Collecting, transporting, treating, and disposing of solid waste, especially in medium-sized and metropolitan areas, can be a daunting task for responsible personnel. The situation is much worse in economically developed countries, which usually lack important resources such as money and people (UNEP, 2005).

Another emerging country, Nigeria, is not excluded. The city of Nigeria is one of the cities with the lowest quality of life indicators in the world and is experiencing rapid environmental degradation. The study has highlighted various environmental issues in Nigeria, but less attention has been paid to the literature on its impact on sustainable development (Daramola and Ibem2010). Although Nigeria is still less aware of environmental management, only environmental management practices can ensure the sustainability of Nigeria's life (Uwadiogwu and Iyi, 2015). Against this background, Odunjo (2013) argues that Nigeria is still far from sustainable environmental management as human activity continues to damage ecosystems. If the country cannot pay attention to the cleanliness and protection of the environment, it cannot develop sustainably.

In Nigeria and other developing countries, some of the prominent waste management problems observed include indiscriminate dumping, inadequate storage facilities, inefficient transportation, and unsanitary disposal. All of these issues are a function of certain factors, such as population growth, people's attitudes towards waste management, and where landfills are open regardless of the surrounding land use, and in most cases, these locations are Very far from people. The problem of municipal waste management may seem difficult to solve, but the root cause lies in the fact that the rate of collection and emission is inversely proportional to the rate of occurrence, and the accumulation of solid waste in a city in Nigeria. (Uwadiogwu and Chukwu, 2013). For example, the amount of solid waste generated is about 0.43 kg/person per day, of which 60-80 percent is estimated to be organic (Ogwueleka, 2009). Lagos alone produces over 10,000 tonnes of solid waste each day (WHO, 2006). The amount of solid waste generated can exceed the city's administrative capacity to plan collection and disposal. Attempts to effectively solve this problem have resulted in a myriad of strategies that require significant capital and human resources. These strategies have little or no positive impact on the physical urban environment of Nigerian cities (Bakare, 2016). This inefficient management of generated waste poses major health challenges to both humans, animals, and the environment, which is the focus of this study.

### Statement of Problem

The management and disposal of waste, which is seen as being dispersed and littered everywhere, is one of the major issues that man is currently facing. Although no one likes to think about waste, it is a pressing issue in our contemporary society. The amount of waste produced has steadily increased over time, in part due to a rising population, but more so due to shifting lifestyles and rising disposal of material usage. This waste presents difficulties because it is produced at a rate that is much faster than the means that are available to manage it. In contrast to the 30% of efficient management and disposal techniques, waste generation is increasing at a rate of 70%. The issue of waste management has grown to be a major concern for local town planners and is made worse by the steadily growing urban population.

In Ekiti, the Ekiti Waste Management Authority (ESWMA) exists as the only public agency responsible for state waste management. The status of waste treatment at Ado Ekiti was "nothing special" at the time of its establishment, and it was thought that individual local governments could not perform the function of waste treatment, so the Waste Management Bureau was established. I did. It's embarrassing for the population (Abdul, 2010). But now, on the streets of the state, there is an unsightly scene of a pile of rotting and semi-corrupted household waste. Studies show that uncollected debris contributes to floods in Nigeria, the proliferation of insect and rodent mediators, and the spread of diseases such as cholera, malaria, and typhoid fever. (Akinremi and Samuel, 2014). This delays the collection of waste by the Waste Management Bureau, and residents dump the waste on the streets and in the sewers, polluting the environment with garbage. This is evident in the popular Ojaoba market in the capital Ado Ekiti. The Ekiti Waste Management Authority has not been very successful in the effective collection and management of waste in the state for a variety of reasons, including Lack of funds, lack of human resources, lack of awareness, etc. However, problems such as lack of funding can be mitigated by involving informal waste departments in the waste management process. The success that most countries have achieved by engaging in the informal waste sector cannot be exaggerated. With this in mind, this paper explores the challenges of solid waste collection and management in Ado Ekiti.

### Aim and Objectives of The Study

The study aims to assess effective waste management as a catalyst for human health challenges in Ado-Ekiti (Town Planner's Perspective). Its objectives include;

- To evaluate the health effects of an ineffective waste management system on the residents of the Ado-Ekiti.
- To examine waste management techniques explored by the government in managing generated waste in Ado-Ekiti.
- To assess the health effects of the waste management technique employed by the Ado-Ekiti waste management Agency.

### Significance of the Study

This research is a follow-up to current trends in the desire for relevant information on waste management, and it offers a package of information that will be extremely helpful to the public especially the Ado-Ekiti people since everyone is affected by the issues with trash generation and management. Environmental sanitation, developers concerned with good town design, academics, and lawmakers of Ado-Ekiti who might want to do more research on the same issue can all greatly benefit from this study. The pace of fresh garbage creation, the types of resources available to deal with waste, and local and state regulatory measures addressing the generation and treatment of waste are some of the factors that will influence the success or failure of waste management projects. Cities all around the world will be inspired by information regarding trash management in terms of health, transportation, and land use challenges.

## 2. LITERATURE REVIEW

### Waste Management

Human interaction with the environment (human activity) has always resulted in the production of waste. However, Lam & Chaudhry (2005) reported that waste generation and management was not a major issue until people started living together in the community. It should be noted that as the world's population grows and people's purchasing power grows, more commodities are produced to meet increasing demand, which produces more waste. Loredana & Maria (2010) pointed out that these continuous waste streams from human activity are overloading the environment. Demirbas (2011) describes waste management as the process of collecting, transporting, and treating waste before disposing of the remaining residue. Similarly, Imam *et al.* (2007) describe waste management as effective management and handling, storage, collection, transportation, treatment, and disposal of waste in a way that protects the environment and the public. Fakere *et al.* (2012) added that waste management skills are used and incorporated. Knowledge from various disciplines such as law, finance, and administration regarding the day-to-day implementation of waste management issues Demirbas (2011) is the main source of waste management. The reason was to ensure a safe environment, suggesting that the method is often preferred over others. For example, energy generation through reuse, recycling, composting, and incineration is often preferred over the landfill. But Mark. (2006) argued that even some of the preferred management methods often produce hazardous materials such as incinerator residues. Odumjo (2002) reported that landfills are the final destination for most waste from waste treatment and treatment plants. Curiously, he adds that other techniques are simply for volume reduction or pre-disposal treatment.

### Concentration (mg/g) of heavy Metals in Soil from Dumpsites

**Table 1. Concentration (mg/g) of heavy Metals in Soil from Dump sites of selected locations in Ado-Ekiti**

Location/Mean Distance	Heavy metals								
	Cu	Mn	Fe	Cr	Pb	Co	Zn	Ni	
1	a Center of dump	12.38	246.28	248.28	10.17	313.35	10.62	98.22	ND
	b 10 m away	2.18	117.16	83.67	2.77	72.31	5.82	32.05	ND
	c 20 m away	1.45	62.60	70.54	1.85	6.01	ND	18.61	ND
2	a Center of dump	24.07	278.54	358.92	13.87	206.64	11.64	201.61	2.36
	b 10 m away	8.01	211.92	232.37	10.17	14.28	1.64	50.66	2.36
	c 20 m away	1.46	106.82	179.11	2.77	1.50	ND	129.24	ND
3	a Center of dump	3.64	296.35	311.89	22.20	149.53	3.49	72.47	ND
	b 10 m away	3.64	123.48	204.01	6.47	117.97	2.33	63.07	3.55
	c 20 m away	3.64	92.45	34.63	7.40	2.25	1.16	40.32	1.18
4	a Center of dump	67.78	53.41	208.16	5.55	51.85	4.66	95.12	1.18
	b 10 m away	57.5	45.37	112.72	4.62	18.79	2.33	58.73	1.18
	c 20 m away	5.09	4.02	127.94	2.77	0.75	1.16	57.90	ND
Mean	a Center of dump	42.21	231.55	297.03	10.82	158.05	8.18	205.40	4.92
	b 10 m away	15.56	112.85	149.49	6.16	32.56	4.93	20.65	1.18
	c 20 m away	4.37	69.20	110.65	3.65	2.15	1.55	66.86	0.59

1-Okutagbokutaleri dump.  
 2-Igbaletere dump.  
 3-Oke age dump.  
 4-Mary Immaculate dump.  
 ND- not detected.

Source: *ESWMA, (2020)*

Table 1 shows the average heavy metal concentrations in soil samples from all landfills. On average, manganese (231.5a, 112.85b, 69.20c), iron (297.03a, 149.49b, 10.65c), lead (158.55a, 32.56b, 2.13c) and zinc (205.40) concentrations (mg / g). ) A, 70.65b, and 66.86c) are very high. Similar observations have been reported at the Baudosi landfill and the Central Breakwater Landfill Site at Obafemi Awolowo University (Fakere et al., 2012). Table 1 also shows that heavy metal concentrations gradually decrease a few meters away from the center of the landfill at a particular site. For example, the iron concentration at positions 1a-c is 1a 248.27, 1b 83.86, and 1c 62.60 mg / g. This is a general trend for all landfills surveyed. All samples have the highest average iron concentration (297.03a, 149.49b, and 110.65c mg / g). This is because the landfill is rich in iron due to metal separation. It was also previously reported that iron is the most abundant mineral in Nigerian soil (Udoakah & Akpan, 2013). Surveys of heavy metal concentrations in landfill soil were limited to the top 15 cm. Soil surface is a better indicator of metal stress (Olowe, 2018). The concentration of heavy metals in plant roots and leaves (mg / g). The concentration of heavy metals examined was in the range of ND-341.94 mg / g. The highest iron concentration (341.94 Ng / g) was found in the roots of plants. In addition, manganese has the highest concentration (109.69 mg / g) of all heavy metals found in plant leaves. No cobalt was detected in any part of these plants. The undulating terrain on the premises is believed to enable effective cleaning of most heavy metals. This is especially detrimental to the lowland community, as the metal is eventually washed away by erosion into adjacent wells (Olowe, 2018). In addition, farmers rely on biodegraded landfills for composition without worrying about the impact of such unhealthy cost-cutting techniques.

A high correlation (0.9985) of metals in soil and plants in Igbalater landfills indicates similarities in metal origin. In addition, a feeling of alienation of 0.051 indicates a very close relationship between soil and heavy metal concentrations in weed plants. Finally, an incidence of 94.90% of the predicted efficiency showed that the reliability of the plant sample results was the plant's ability to take up metals through root or leaf adsorption as mobile ions present in soil solutions. (Nwaka, 2005). The uptake of metals by plants leads to the in vivo accumulation of these elements in plant tissues. Plants grown in soils with elevated metal levels due to pollution have been reported to have elevated levels of heavy metals. If the consumption of these plants is not carefully regulated, they can lead to human accumulation with associated health risks.

#### **Health effects of ineffective waste management system on the residents of the Ado-Ekiti**

Increasing resource consumption leads to large amounts of solid waste from industrial and civilian activities, which poses a significant threat to human health (Loredana & Maria, 2010). However, improper disposal of municipal waste has many disadvantages. Poor health, accidents, floods, and pollution are just a few of the negative effects. In many developing countries, solid waste dumps are located on the outskirts of the city. These areas are a source of pollution for children due to the hatching and breeding of flies, mosquitoes, and rodents. They are, in turn, a vector of diseases that affect the health of populations that have organic defenses in a formative and creative state. The above situations lead to gastrointestinal, dermatological, respiratory, hereditary, and several other types of infections. When uncontrolled, they pose a major health hazard affecting the cityscape (Lam & Chaudhry, 2005).

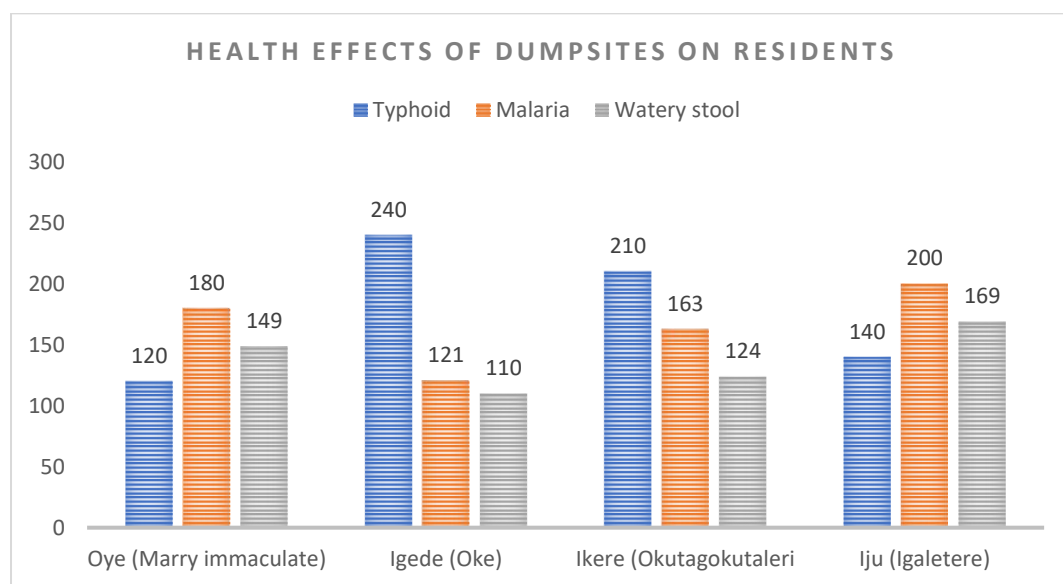
UNEP (2005) found that improperly disposed waste, especially domestic and community solid waste, poses serious health risks and contributes to the spread of infectious diseases. The report further states that unmanned debris attracts flies, mice, and other creatures, which spread the disease. It is usually moist waste that breaks down and gives off a foul odor. Stinks affect people who settle next to landfills, indicating that landfills have a serious impact on people who settle around or near them. Groups at risk of unscientific disposal of this solid waste include people in areas where proper waste management does not exist, especially preschool children, waste workers, and toxic and infectious substances. Includes workers in facilities that produce. Another high-risk group is the population living near landfills (Uwadiogwu & Iyi, 2015).

In particular, domestic organic waste is a serious threat because it ferments, creating favorable conditions for the survival and growth of microbial pathogens. Direct handling of solid waste can lead to various types of infections and chronic illnesses, the waste workers and rag pickers being the most vulnerable (Lam and Chaudry, 2005). A study by Kaoje *et al.* (2015) shows that exposure to landfills to hazardous waste can affect human health and children are most vulnerable to these pollutants. Direct exposure can lead to illness due to chemical exposure, as the release of chemical waste into the environment leads to chemical poisoning. In his study linking health to hazardous waste, Marc (2006) showed that agricultural and industrial waste can also pose a serious health risk.

Other than this, co-disposal of industrial waste with municipal waste can expose people to chemical and radioactive hazards. Health care waste and other medical waste are disposed of in dumpsites, mixed with domestic waste, increasing the risk of

infection with Hepatitis B and HIV, and other related diseases (World Bank, 2005). Open dumpsites are a major problem to the environment, especially to the air that we inhale. Dumpsites emit obnoxious odors and smoke that cause illness to people living in, around, or closer to them. According to Marc (2006), pollution, a major environmental effect of dumpsites, is not directly transferred from land to people, except in the case of dust 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. Also, 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 (Lam and Chaudry, 2005; Imam *et al.*, 2015). Udumjo (2013) highlighted that in several health surveys a wide range of health problems, including 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 are always feeding places for dogs and cats. These pets, together with rodents, carry diseases with them to nearby homesteads.



**Fig 1: Health Effects of Dumpsites on Residents**

*Source: ESWMA, 2020.*

#### **Waste management technique explored by the government in managing generated waste in Ado-Ekiti.**

- **Composting**

Organic wastes are separated from the wastes and allowed to decompose by microbes for a long period in a pit. Then this becomes nutrient-rich compost and is used as manure for the plants. Soil fertility is enriched by these manures. Composting through biological technique progresses the fertility of the soil. The vermicomposting method reduces environmental impact and enhances the nutrient content of the soil (Bhat, *et al.*, 2020). Vermicomposting is an effective process for sustainable organic agriculture and for also to maintain a balanced ecosystem (Kaur, 2020). For a high level of organic waste reduction and rapid composting time, Black Soldier Fly (Larvae) was used. Then the residues were further treated with *E. Eugeniae* which results in the production of the best quality vermicompost (Bagastyo & Soesanto, 2020). Vermicomposting of onion waste with cow dump produces a valuable agricultural enriched nutrient circle (Pallejero, *et.al.*, 2020).

- **Landfilling**

Dumping the wastes in the soil is called Landfilling. Proper procedures should be adopted for landfilling such as lining the base with a protective layer, selecting a low groundwater level area, etc. Skilled manpower is needed for this process. In Nigeria, the construction of horizontal wells reduces leachate levels in landfills containing municipal solid waste (Marc, 2006). The physical, chemical and biological processes-based models control the Hg emission from landfills (Tao, Deng, Li & Chai, 2020). The results of co-incineration of sewage sludge and municipal solid waste showed more gaseous Hg<sub>0</sub> to



be oxidized to Hg<sup>2+</sup> during the cooling process. It leads to causes less environmental risk to the atmosphere (Pellejero, *et al.*, 2020).

- **Incineration**

Burning the wastes at high temperatures is called Incineration. Proper filters are used to avoid air pollution (caused by the burning of wastes). For handling sludge, the direct incineration method without anaerobic digestion was found to be the more preferred sustainable approach (Hao, *et al.*, 2020). For fossil fuel conservation and waste disposal, the technology of coal power plants along with the waste incineration method was considered a promising technology (Ye, *et al.*, 2020). Degradation technologies such as plasma, mechanochemistry, hydrothermal, photocatalytic, and biodegradation had proved that they have good purification effects and are considered the best resource of MSWI fly ash (Zhang, Zhang & Liu, 2020).

- **Recycling**

Recycling is the recovery of materials for melting, re-pulping, and reincorporating them as raw materials. It is technically feasible to recycle a large number of materials, such as plastics, wood, metals, glass, textiles, paper, cardboard, rubber, ceramics, and leather. Besides technical feasibility and know-how, demand determines the types and amounts of materials that are recycled in a particular region. Recycling renders social, economic, and environmental benefits. It provides income to the scavengers who recover recyclable materials. Factories that consume recyclable materials can be built for a fraction of the cost of building plants that consume virgin materials (Ye, *et al.*, 2020). Organo-mineral fertilizer, high- and low-density polyethylene bags, egg crates, tissue paper, notebooks, and business cards are some of the products of waste recycling. It saves energy, and water, and generates less pollution than obtaining fresh raw materials, which translates into lower operating costs. It also reduces the number of wastes that need to be collected, transported, and disposed of, and extends the life of disposal facilities, saving the municipalities money. Recycling results in a more competitive economy and a cleaner environment. This contributes to a more sustainable development

### Health effect of Solid Waste Management Method on Residents

- **Incinerators**

- **Health Effects**

Emissions from incinerators have been much changing over time and this entails changing health impacts, and it is difficult to formulate overall considerations on the health effects. The available evidence is therefore specific to the period of investigation and to the different types of incinerators analyzed (old generation versus new generation plants) (. On the other hand, the improvement in exposure assessment methods mentioned above can help summarize the health risks. Health effects of incinerators active consistently report a detectable risk of some cancers in the populations living nearby, through high-quality studies, as reported in different reviews. Quantitative estimates of excess risks of specific cancers in populations living near solid waste incinerator plants were provided (Ye, *et al.*, 2020) for all cancers, including stomach, colon, liver, and lung cancer. Viel *et al.*, (2000) indicated some suggestive but not consistent results for non-Hodgkin lymphomas and soft tissue sarcomas as a result of residing near incinerator sites. Zhang *et al.*, (2020) also found out that Congenital anomalies like the risk for urinary tract defects are one of the health dangers of staying near incinerator sites.

- **Landfills**

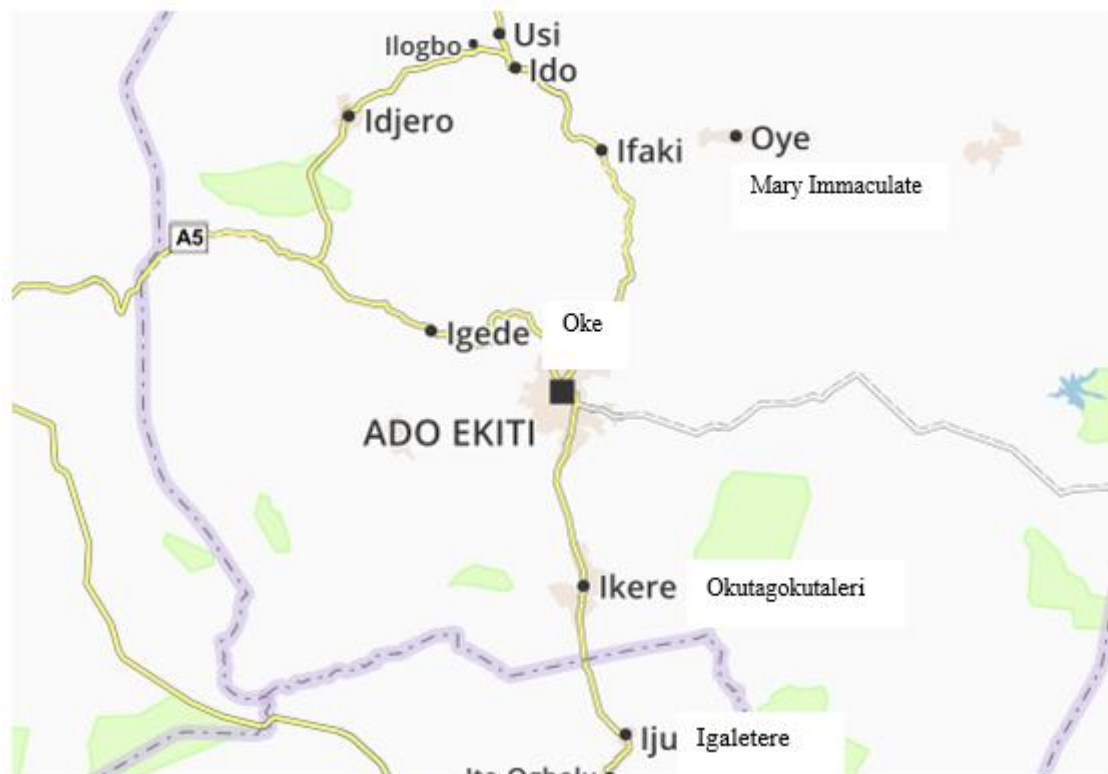
- **Health Effects**

The possible health effects related to residential proximity to landfills have been studied in several papers and summarized in systematic reviews. They mainly concern cancer and births outcomes; more recently respiratory diseases and annoyance were also investigated Excess for cancer has been found for different sites (e.g., pancreas, larynx, liver, kidney) and non-Hodgkin lymphoma.) (Zhang *et al.*, (2020). Statistically significant elevated risks were found for all congenital malformations, neural tube defects, abdominal wall defects, surgical correction of gastroschisis and exomphalos, and low and very low birth weight for births to people living within 2 km of the sites, both hazardous and non-hazardous waste. Although several alternative explanations, including ascertainment bias, and residual confounding cannot be excluded, estimates effects and their level of confidence suggest an increase in the risk of congenital anomalies due to landfills (Tao, *et al.*, 2020).

### 3. METHODOLOGY AND FINDINGS

Data for the study was collected through secondary sources. These sources include journals, the Department of Waste Management, Ekiti, and the National Bureau of Statistics. The study area is the ancient city of Nigeria, Ado-Ekiti, Ekiti, Ado-Ekiti, between latitudes 70331 and 70431 north of the equator and between longitudes 50071 and 50221 east of the Greenwich meridian. It covers an area of approximately 5888.9 km<sup>2</sup> and is surrounded by Kwara to the north, Kogi to the east, Osun to the west, and Ondo to the south. The state is primarily a highland area, over 800 feet (250 m) above sea level and characterized by rocky outcrops. As of the 2006 Census (NBC, 2007), Ado Ekiti had a total population of 313,690, and the region is becoming more urbanized. The projected population from 2022 with a growth rate of 2.5% is 651,553. Population growth naturally leads to an increase in the amount, complexity, and variety of waste generated (Amuda, 2014). In Ado Ekiti, a corresponding increase was apparent, and waste management authorities were unable to treat and manage the waste produced by the ever-growing population (Ibimilua and Ibimilua, 2019).

In the study area, which includes four landfills (Okuda Kuni Tareri, Igarere, Oke, Mary Immaculate), the main methods of waste disposal in the study area are as follows. Disposal in public units for collection by the State Waste Management (ESWMA), collection by vendors, incinerator, burial, composting, littering on the streets, etc.



**Fig 2: Map of Ado-Ekiti showing selected Dumpsite**

**Source: Google Map (2022)**

### 4. CONCLUSION

The study which assessed effective waste management as a catalyst for human health challenges (town planners' perspective) was able to denote that improper waste management and illegal waste shipments can have negative impacts on both environment and public health of residents in Ado-Ekiti. Negative impacts can be due to different handling and disposal activities resulting in soil, water, and air pollution. Inadequately disposed of or untreated waste may cause serious health problems for populations surrounding the area of disposal or dumpsites.

The study also concludes that even leaks from the waste may contaminate soils, water, and streams as well as cause air pollution through emissions of heavy metals and persistent organic pollutants (POPs), ultimately creating health hazards to

residents. Improper management caused by uncontrolled or mismanaged waste disposal which may affect citizens negatively includes impacts at local levels, such as landscape deterioration, local water, and air pollution, as well as littering. Managing waste properly and in an environmentally sound way is therefore important for health reasons which may deter proper settlements of people in Ado-Ekiti decreasing the rate of urbanization and development of the area.

## 5. RECOMMENDATION

From the findings of the study, it is recommended amongst others that:

- Environmental laws enforcement agencies and personnel must be well trained to boost the chance of proper handling, management, and enforcement of environmental laws and defaulters.
- Dumpsites which possess as a major health risk to the residents shouldn't be located close to human habitation and should be well fenced and properly managed to minimize effects on the environment and humans.
- An integrated waste management system must be adopted by governments at all levels. Waste management must go beyond mere collection and dumping at landfills. Government must begin the process to formulate and adopt an integrated waste management system to enhance the proper management and handling of municipal solid waste.

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