

NATURE AND EFFECT OF WASTE GENERATED IN NASARAWA STATE, NIGERIA

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Abstract

The problem of indiscriminate waste disposal dates back to the earliest urban settlements in human society. The trend has been on the increase across many societies including Nigeria. This paper examined the nature and effect of waste generated in Nasarawa State, Nigeria. The study adopted the Reasoned Action Theory to explain the nature of waste generated in the study area. A cross-sectional survey design was adopted for the study. A sample of 400 respondents was drawn through simple random, systematic sampling, clustered and purposive sampling techniques in the selection of Local Government Areas, electoral wards, towns/villages, main streets, houses, households and individuals. Primary data were generated through the use of questionnaire and in-depth interview. The questionnaire copies were analysed quantitatively using simple percentage while test frequency tables, mean and in-depth interview were unbundled using content analysis. The findings revealed that decomposed food items, empty sachet water packs and water bottles, empty engine oil gallons, used and unused drinking straw, sachets of all kinds, biscuit, condemned zincs and building materials were the solid wastes indiscriminately disposed in the study area. The study recommends that the Nasarawa State Waste Management Board should intensify the collection of solid wastes from the doorsteps of residents for appropriate recycling to mitigate the associated health and environmental hazards associated with the indiscriminate disposal of solid waste in the study area.

Keywords: Indiscriminate Waste Disposal; Recycling; Solid Waste; Urban settlements; Waste Disposal.

Introduction

In recent years, humans generate more waste, not only because of an increase in population but also due to the change in the pattern of consumption and various composition of waste (Udo, Esezobor, Afolalu, Onovo, Ongbali & Okokpuji, 2018). Waste management has become an important issue confronting both developed and developing countries. The rate of waste generation has continued to increase, due to population growth, lifestyle choices, consumption, and technological advancement (Asase, Yanful, Mensah, Stanford & Amponsah, 2009). Waste generation and disposal are among the pressing environmental and public health issues in the world today. For instance, Miller (2005) observed that as more countries develop and population growth rates increase around the world, the amount of waste produced becomes a major environmental issue. The problem of waste is inextricably linked to changing life styles and consumption patterns occasioned by urbanization and emergence of modern civilization (WHO, 2004; Nwosu, 2002; Awoso, Taiwo, Gladebo & Arimoro, 2010; Momodu, Dimuna & Dimuna, 2011).

The generation and accumulation of waste are beginning to produce health, social, economic and environmental problems in significant proportions. The continuous dumping of refuse and open defecation has resulted in air pollution and attraction of unwanted insects such as flies and mosquitoes to the environment. Persistent dumping of both household and non-household wastes could lead to severe sanitation problems with increased risks of the spread of diseases such as cholera, malaria and typhoid among the residents in Nigeria. The indiscriminate dumping of waste along residential buildings, roads, on drainages, streets, etc. cause great health and environmental problems resulting in diseases such as cholera, typhoid and malaria, including the annual flooding in Nigeria (United Nations Environment Programme, 2020).

In sub-Saharan Africa, particularly in Nigeria, refuse generation and its likely impacts on the health, quality of environment and the urban landscape have become burning national issues. For example, Nigerian cities such as Lagos, Port Harcourt, Kano, and the suburbs of Abuja to mention a few, are grappling with mounting heaps of wastes dumped indiscriminately. These wastes emanate from household or domestic sources, markets, shopping and business centres, schools and eateries. Also, of concern is the dumping of hazardous commercial and industrial wastes which are a clear violation of clean air and health rules in the country's environmental sanitation laws, rules and regulation (UNEP, 2003). The United Nations in its August, 2004 report noted that while developing countries are improving access to clean drinking water they are not striving to meet sanitation goals. Makwara (2013) noted that a joint report by UNICEF and WHO said that about 2.4 billion people will likely face the risk of needless disease and death by the year 2015 and beyond, due to bad sanitation-decaying or non-existent sewage system, and toilets fuels the spread of diseases like cholera and basic illness like diarrhoea, which kills a child every 21 seconds. The worst hit by bad sanitation are the rural poor and residents of slum areas in fast-growing cities, mostly in Africa and Asia (Awoao et al, 2010).

The issue of environmental and waste generation in Nigeria is on the increase due to the rise in population resulting from techno-economic development in cities and the pattern of economic production and consumption of materials (Gutberlet, 2018). Nigeria's estimated waste generation rate per capital per day is between 0.65kg and 0.95kg. This constitutes over fifty percent of the total amount of waste generated in sub-Sahara Africa (Edet & Maduabuchi, 2019). Indiscriminate disposal has resulted in blockage of drains, and obstruction of water ways. Inappropriate collection and disposal of wastes are gradually leading to an environmental disaster

as the nation presently lacks sufficient budgetary requirements for implementing integrated waste management systems across the states (UNEP, 2020).

In most developing countries like Nigeria, laws, policies, statutes, and regulations on waste management are underdeveloped, and even existing ones are poorly implemented due to the lack of enforcement of these environmental laws and policies. Generally, laws involving waste management were mainly formulated and articulated. The poor state of waste management system in the nation is a reflection of its laws and policies (Opodo & Oluwatayo, 2016). There are several loopholes in government policies on waste management. Though the public is encouraged to partake in the monthly clean-up exercise, however, the government has failed in providing disposal sites. In some of the states in Nigeria, it has been reported that there is no articulate piece of legislation that deals with waste management. Most government policies that are in place lack strategies for actualization. In addition, a review of the legislative aspect of waste management has been suggested in order to work towards achieving set objectives on sustainable waste management.

Furthermore, an all-inclusive management approach has been proposed which entails waste prevention, reuse, reclaim, recycle, composting, and generation of energy. Despite some good policies that are in place, proper implementation remains a significant challenge. For instance, a comprehensive environmental impact assessment that is supposed to be submitted during project planning before approval. However, this critical regulation is frequently overlooked. Several authors have criticized the implementation and enforcement of environmental laws in Nigeria. Enforcement of environmental laws remains an issue of concern, while control, and management of environmental legislation has achieved very little success (Alabi, Kasim & Lasisi, 2020). Based on the foregoing, the paper examined the nature of indiscriminate waste disposal in Nasarawa State-Nigeria.

Statement of the Problem

In Nigeria, there has been increasing cases of indiscriminate dumping of solid wastes resulting from increasing urban population and urbanization. In sub-Saharan Africa, particularly Nigeria, refuse generation and its likely impact on the health, quality of environment and the urban landscape have become burning national issues. Major cities in Nigeria are grappling with mounting heaps of indiscriminately dumped wastes. There is also a concern about those residues including the domestic wastes that may poison or damage the environment, adversely affecting species in the biosphere and destabilizing ecological balance. The modern Nigerian urban domestic waste is characterized by polythene materials, garbage, bottles, cans, papers or foil wrappings and throwaways of all sorts from the household. The volumes of these wastes are increasing greatly because of the constant desire of consumers to discard the old and acquire new items (Alabi, Kasim & Lasisi, 2020).

The UNEP (2020) revealed that wastes that are not managed properly, especially those from households and the community, are a serious health hazard that can lead to the spread of infectious diseases. The report further revealed that unattended wastes lying around attract flies, rats, and other creatures that, in turn, spread diseases. Normally, it is the wet waste that decomposes and releases bad odour. The ever-increasing consumption of household goods results in huge volumes of solid wastes from industrial and domestic activities, which pose significant threats to human health. Health deterioration, accidents, flood occurrences, and environmental pressures are just a few of the consequences.

These wastes are ultimately thrown into municipal disposal sites and due to poor and ineffective management, the dumpsites turn to sources of environmental and health hazards for people living in the vicinity of such dumps. The wastes cause pollution on both land, water and air. Open dumpsites are a major problem to the environment especially to the air that we inhale as oxygen. Health care waste and other medical waste disposed in dumpsites, mixed with household waste, increase the risk of Hepatitis B and HIV infections, and other related diseases (World Bank, 2020). Dumpsites emit obnoxious odours including smoke that causes illness to people living in, around, or close to them. Pollution is seen as a major environmental effect of dumpsites, which 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 via the medium of contaminated crops, animals, food products, or water. In addition to the aforesaid, the dumpsites also have smelly conditions. These conditions are worse in the summer because of extreme temperatures, which speed up the rate of bacterial action on biodegradable organic material.

Waste collection is irregular and restricted to major cities. Improperly sited open dumps deface several cities, thereby endangering public health by encouraging the spread of odours and disease. Furthermore, despite the establishment of Waste Management Board by Nasarawa State in an attempt to mitigate the menace of wastes generated, as well as clearance of such wastes, the board is overwhelmed by indiscriminately disposed wastes in the urban areas of the State. Also, other mitigating measures put in place by the State, have not yielded positive results due to weak enforcement and the state of the equipment used to clear the wastes to designated waste dump sites. In most remote parts of Nasarawa State, that are close to Abuja such as Mararaba, Masaka, Nyanya, it has been noticed that heaps of waste dumps are in virtually all market areas, outskirts of the urban areas and even on roadsides for weeks without waste collection either by the private sector or the government.

While Several studies in Nigeria (Alabi, Kasim & Lasisi, 2020; Emily, 2014; Salam, 2010; Nguyen, 2011; Makwara, 2011; Opodo & Oluwatayo, 2016; UNEPA, 2020; Udo, Esezobor, Afolalu, Onovo, Ongbali & Okokpuji, 2018; Asase, Yanful, Mensah, Stanford & Amponsah, 2009; Miller, 2005; WHO, 2004; Nwosu, 2002; Awoso, Taiwo, Gladebo & Arimoro, 2010, Momodu, Dimuna & Dimuna, 2011) have been undertaken on the nature of indiscriminate waste disposal, very few have explored the nature of indiscriminate waste disposal in Nasarawa State. Moreover, most of the studies have concentrated on the indiscriminate waste disposal in the Southern and Eastern parts of Nigeria, while only few focused on North Central Nigeria and Nasarawa State in particular. It is in view of the foregoing that this paper examined the nature of waste disposal in Nasarawa State.

Research Questions

The study was guided by the following research questions:

- (a) What are the methods of waste disposal in Nasarawa State-Nigeria?
- (b) What are the types of wastes indiscriminately disposed in urban Settlements in Nasarawa State, Nigeria?

Objectives of the study

The paper examined the nature of waste generation in Nasarawa State, Nigeria. The specific objectives included:

- (a) To ascertain the methods of waste disposal in Nasarawa State –Nigeria.

- (b) To identify the types of wastes indiscriminately disposed in urban settlements in Nasarawa State.

Literature Review

Waste has been variously defined by experts and environmental studies scholars. The common denominator in their descriptions is that waste is any material that is no longer in use and discarded for their lack of perceived value. Waste may be in solid and fluid forms; it is this feature that defines its typology or categorization. Makwara (2011), further described waste as any movable substance or material that is perceived to be of no further use and therefore should be discarded. Waste is any material that is discarded because it has served its purpose or is no longer useful. Solid waste comprises all the wastes arising from human and animal activities that are normally solid, discarded as useless or unwanted. Waste according to Ezechi, Nwabuko, Enyinnaya and Babington (2017) is a useless and unwanted product of human domestic and industrial activities released into the environment. It can be a solid material, liquid, semi-solid or container of gaseous material.

Wastes as opined by Oluwade (2009) are refuse (empty containers, papers rubbish etc.) sewage (faeces, water urine) and industrial waste (chemical nuclear) that result from the manufacturing of certain substances, materials and equipment. The interaction of organisms and their environment leads to the generation of waste. Waste is non-beneficial materials discarded; therefore, all these have to be properly disposed. Refuse are waste materials that have been thrown away. The statutory definition of refuse is not based on the physical form of materials, that is, whether or not it is solid, as opposed to liquid or gas but on the fact that the material is a waste.

The United State Environmental Protection Agency (2011) defines solid refuse as any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant or air deed material, including solid, liquid, semi-solid or contaminated gaseous material and agricultural operation and from community activities. Humans have always produced waste that included not only the discarded bones of animals slaughtered for food. Refuse according to Clesceri (2008) can be divided into two main groups: that which is mainly dry and can be put directly in the dustbins and that which is liquid and may be drained away through pipes. The dry household refuse can be disposed using galvanized iron or plastic bins having a well fitted lids and two handles for easy transportation. The bins are placed away from the kitchen or the back door. The only waste that should be put in these bins are dusts, waste papers, leaves, nylon or cellophane wrappers tins and bottles. The other type of wastes includes faeces, urine and water wastes from our kitchen and bathroom. For the purpose of this study, waste is defined as items that are ready to be discarded after being used which could be in a solid or a liquid form.

Indiscriminate Waste Disposal

Indiscriminate waste disposal refers to unlawful disposal of waste in undesignated spaces such as open or vacant land, sources of water and other areas (Achi et al. 2012; Okechukwu et al. 2012; Machete and Shale 2015). According to Abdullahi, Ajibike, Man-ugwueje and Ndububa (2014) defined indiscriminate waste disposal as the disposal of solid and liquid waste without taking necessary measure. Indiscriminate waste disposal is a process in which waste is disposed of by dumping in open spaces, water bodies and surface drains as a result of inadequate infrastructure and ignorance of inhabitants (United Nations Environmental Programme, 2010). Indiscriminate waste disposal according to Ifeoluwa (2019) is define as the unlawful manner of dumping these refuses such as garbage, sludge from water supply or manufacturing waste, air

pollution control facilities and other un-useable materials without considering the adverse effect on human health. For the purpose of this study, indiscriminate waste disposal is conceptualizing as the inadequate dumping of refuse which could pose a challenge on the health of the populace.

Nature of Indiscriminate Waste Disposal

The unprecedented increase in world population growth rate particularly in the developing countries coupled with technological advancements, has compounded the problem of waste disposal and management in societies. In rapidly urbanizing cities, the problems and issues of solid waste management are of immediate importance (Momoh & Oladebeye, 2010). Irrespective of the size of countries that make up the developing countries, the nature of the solid waste problem remains similar. Urban growth in some of these countries (Nigeria, Zimbabwe, Kenya, etc.) continues at a much faster rate than the provision and expansion of infrastructure and services. Demographic changes and economic growth contribute to the generation of waste. Consequently, waste management has become inadequate as evidenced by the rise in illegal dumping and the proliferation of the now seemingly permanent piles of rubbish (waste) in some commercial, industrial and residential areas of the urban areas (Miller, 2005).

For instance, Nairobi citizens generate approximately 1000 tons of waste daily. However, Aurah (2013) points out that at most 10% (≤ 100 tons) of the total waste generated was collected by the local authority. The remaining 9900 tons of generated waste is unaccounted for. It is evident from these studies that indiscriminate dumping of waste remains the main approach used for final disposal of municipal and hazardous wastes in most developing economies and will continue to be a challenge (Oyoo, Leemans, & Mol, 2010). Furthermore, two separate studies conducted in Nigeria and Ghana came to the same conclusion that approximately 80% of solid waste in African countries was disposed of through indiscriminate dumping (Ogwueleka 2009; Aziale & Asafo-Adjei 2013). The prevalence of indiscriminate dumping and its spread across African communities is therefore clear. However, although indiscriminate dumping is more prevalent in developing countries, developed countries are not an exception. A study in Italy revealed that indiscriminate dumping of hazardous waste and open burning of hazardous and municipal solid waste has been practiced since the 1980s (Fazzo, de Santis, Mitis, Beneditti, Martuzzi, Comba & Fusca, 2011).

In two studies conducted in the United States of America (Crofts, Morris, Wells and Powell (2010) and Laundra (2011), it was found that indiscriminate dumping of municipal solid waste is a common challenge in rural America. Furthermore, it is evident from the literature that indiscriminately dumped waste contains a mixed stream of waste materials as previously pointed out by Machete and Shale (2015).

A cross country survey on waste disposal in sub-Saharan Africa reveals that waste collection has virtually collapsed due to chaotic and rampant illegal dumping (United Nation Environmental Program, 2003). The media is awash with reports of how accumulated waste such as metals, polythene, wood, vegetative matter, tins, glass, cans and other municipal refuse litter the streets and major roads. One key factor responsible for this uncoordinated waste disposal is the attitude of city residents to environmental protection and human health. As observed by Makwara et al (2013). Urban residents characteristically dispense of the waste they generate without regard for the environment since it is treated as common property (Miller, 1994). The concoctions generated by these wastes are hazardous. This is because improper handling and/or disposal of waste causes substantial harm to human health, death of smaller animals and plant organisms and a general breakdown and loss to the immediate ecological systems.

Research has shown that some wastes could stay up to 100 years before decomposing and degrading completely in the environment. Hence, if the decomposition process is completed, these materials cause inestimable pollution to the environment (Makwara, 2011, Federal Government of Nigeria, 2005). More importantly, this will disrupt normal cycles, nutrient flows and the interrelationships existing among biotic organisms. It must also be reported that chaotic dumping of both domestic and industrial waste has become a public health concern in countries of sub-Saharan Africa, including Nigeria. This practice has put the health and safety of both city and rural residents and that of the entire environment at great risk due to the toxic nature of some of the wastes.

In Nigeria, waste disposal is essentially the statutory function of municipal councils. The rapid increase in volume and types of solid and hazardous waste, due to continuous economic development, urbanization and industrialization is becoming a burgeoning problem for most governments in ensuring effective and sustainable management of wastes (Igoni, Ayotamuno, Ogaji, & Probert, 2007). It is estimated that in 2006, the total amount of municipal solid waste generated in Africa reached 2.02 billion tones representing 7% annual increase since 2003 (UNEP, 2002). It is further estimated that between 2007 and 2011, generation of municipal waste must have raised to 37.3%, equivalent to roughly 8% increase per year most especially those wastes categorized as hazardous. The UNEP (2002) estimated the total health-care waste per person per year in lowest income countries ranges from 0.5 Kg to 3 Kg.

Nigerian cities and towns are currently facing serious environmental problem arising from poor solid waste management. Solid waste is generated at a rate beyond the capacity of the city authorities to handle in order to maintain a sustainable urban environment. This has resulted in poor solid-waste management system that portends serious environmental crisis in most Nigerian towns and cities (Abel & Afolabi, 2007). Babayemi & Dauda (2009) reported high waste generation rate in Abeokuta without a corresponding efficient technology to manage the wastes. Of some 201 sampled respondents in Abeokuta Ogun State, (35.8%) used waste collection services, (64.2%) used other waste disposal options, (16.4%) used both, (68.7%) and (58.7%) were aware of waste collection service and waste management regulations respectively.

Okeniyi & Anwan (2012) reported that the of average wastes generated per day in Covenant University Ota, food waste exhibited the highest percentage of (26.2%), followed by polythene bag (19.3%); and plastic bottles (13.6%), metal cans (11.5%), paper (10.5%), plastic food pack (7.2%), other combustible wastes (5.6%) and polystyrene food pack (5.6%). This was attributed to inadequate resources, and the privatization scheme set up in 1995 to address the environmental issues. The study stressed the need for private partnership with government in providing adequate delivery services to the public.

Similarly, Nkwocha, Pat-Mano and Dike (2011) assessed the efficiency of solid waste collection services in Owerri municipality and observed that the level of efficiency in waste collection was only about 61%, a situation they attributed to a wide range of socio-economic and technical factors. Ogwueleka (2009) investigated solid waste management involving nine cities in Nigeria and discovered that a great majority of the total solid wastes generated in the cities are organic in nature. The study revealed that there is gross inefficiency in the solid waste management in practically all the cities. The poor performance was attributed to inadequate funding, personnel, equipment, and technological constraints. Onwughara, Nnorom, & Kanno (2010) examined the disposal habit, environmental impact of solid waste management in Umuahia, Abia State, Nigeria. It gave an overview about the various management practices and necessary rules to achieve sound management, with a population of about 1.2 million people who produced 250 metric tons of waste

in 2005 and 350 metric tons of waste in 2007 daily. The study revealed that (80.0%) of the solid wastes was generated from market traders consisting of mixed wastes containing hazardous and non-hazardous components which are separated, treated or recycled before disposal by the municipality.

Theoretical Framework

This paper is positioned within the theory of reasoned action. The theory of reasoned action was postulated by Fishbein and Ajzen in 1975 and reviewed in 1980. The theory posited that a person's intention to perform a specific behaviour is a function of two factors: 1) attitude (positive or negative) toward the behaviour and 2), the influence of the social environment (general subjective norms) on the behaviour and that the attitude toward the behaviour is determined by the person's belief that a given outcome will occur if he or she performs the behaviour and by an evaluation of the outcome. The theory of reasoned action explains behaviour by identifying the primary determinants of behaviour and the sources of these determinant variables, and by organizing the relations between these variables. The theory is marked by a sequence of reformulations that build on one another in a developmental fashion. These are the theory of reasoned action, the theory of planned behaviour, and the integrative model of behavioural prediction. The theory's current formulation, is graphically displayed as the reasoned action approach to explaining and changing behaviour.

The most proximal cause of behaviour is behavioural intention (what one intends to do or not to do). Behavioural intention, in turn, is determined by attitude (one's evaluation of the behaviour) and subjective norm (one's evaluation of what important others think one should do), either of which might be the most important determinant of any particular behaviour. Usually, this is revealed empirically by the beta weights obtained from multiple regression analyses, where behavioural intention is regressed on to attitude and subjective norm. If the result is a larger attitude than subjective norm beta weight, the behaviour is deemed to be more under attitudinal than normative control, but if the reverse is true, then the behaviour is deemed to be more under normative than attitudinal control. In either case, then, it is desirable to know what determines attitude or subjective norm, respectively, if a researcher wishes to influence the behaviour. Attitude is determined by behavioural beliefs (beliefs about the likelihood of various consequences) and evaluations of how good or bad it would be if those consequences happened. Subjective norm is determined by beliefs about what specific important others think one should do and how much one is motivated to comply with those important others. Both attitude and subjective norm are assumed to be determined by summative processes. Thus, to form an attitude, people are assumed to sum behavioural belief-evaluation products (attitude), whereas to form a subjective norm, people are assumed to sum normative belief-motivation to comply products (subjective norm).

This applies to the study in that indiscriminate waste disposal is influenced by the waste managers' attitude and social environment. The waste managers' attitude towards waste management is guided by their belief and evaluation of the impact of waste management on health and environment. If they believe that poor and discriminate waste disposal will adversely affect health and environmental issues, they will be motivated to be committed to waste management.

Methodology

This study was conducted in Nasarawa State, Nigeria. The research design for this study was the cross-sectional survey design. This design is one in which a group of people or items is studied by collecting and analysing data from few people considered to be a representative sample

of the entire population. The survey design is suitable for this study because, the target population is large and it is obviously not possible to reach out to all of them. Nasarawa State has a projected population of 3,086,775 populations as at 2021 (National Population Commission, 2022). The study population comprises all adult (male and female) between the ages of 18 years and above, who resident in the three selected Local Government Areas of Nasarawa State-Nigeria to include Akwanga (Nasarawa North Senatorial District), Lafia (Nasarawa South Senatorial District) and Karu (Nasarawa West Senatorial District) respectively with population of 1,068,874 (National Population Commission, 2021). The Local Government Areas were selected using cluster sampling and this was necessitated by the high frequency of waste generation.

The Smith (1984) sample technique was used to estimate a sample size for the study population. The Smith (1984) formula is given as:

$$n = \frac{N}{3 + Ne^2}$$

Where:

N = Population size

3 = Constant

e = Margin of error (5%)

$$n = \frac{N}{3 + Ne^2}$$

Substituting into the formula we have

$$n = \frac{1,068,874}{3 + 1,068,874 (0.05)^2}$$

$$n = \frac{1,068,874}{3 + 1,068,874 (0.0025)}$$

$$n = \frac{1,068,874}{2675,185}$$

$$n = 399.55$$

$$n = 400$$

This formula gives the degree of accuracy of the sampling technique. It gives an idea as to how many samples have to be studied taking into consideration the error. From the population of 1,068,874 respondents, the formula yielded a sample size of 400 respondents. The sample size of 400 was distributed proportionately across the three selected Local Government Areas of Nasarawa State. Of the 400 questionnaire copies distributed, 374 were retrieved. The analysis is therefore based on the returned copies. The study employed cluster sampling technique. The Local Government Areas were clustered based on the three senatorial districts in the State. Primary data were collected using questionnaire and in-depth interview. The questionnaire were administered to adults who are 18 years and above, residing in the study area, while, the in-depth interviews were conducted with health workers, Staff of Nasarawa State Waste management Board, community leaders and other relevant stakeholders. The Univariate analysis involved the use of mean, median, and simple percentage and the in-depth interview through content analysis.

Results and Discussions**Table 1: Responses on the Nature of Waste Disposal in Nasarawa State-Nigeria**

Response	Frequency	Percentage (%)
High	197	52.7
Moderate	98	26.2
Low	79	21.1
Total	374	100.0

Source: Field Survey, 2023

Table 1 indicates that the majority of respondents acknowledged that the nature of waste disposal in the study area is high as reported by 52.7 percent of the total respondents. This implies that the area has witnessed more indiscriminate waste disposal at regular intervals and has significantly affected the environment of the State. A participant in the IDI said this:

The nature of waste disposal in this community is on the high side and uncontrollable. This has devastating effect on the well-being of the society. We have been experiencing indiscriminate waste disposal regularly especially when it seems to be about raining and this has become a recurrent decimal. In this area, a day cannot be passed without people engaging in indiscriminate waste disposal and this has affected the community greatly. This is hitting hard on the wellbeing of the residents in the Local Government Area and NN the State at large (IDI/Male/42years/ Lafia-Nasarawa State).

Table 2: Response on Respondents Methods of Waste Disposal in Nasarawa State-Nigeria.

Responses	Frequency	Percentage (%)
Dumpsite	31	8.3
Along the highways	118	31.5
Water canals	52	13.9
Road site/drainages	74	19.8
Waste vendors	39	10.4
Rivers/streams	48	12.8
Others	12	3.2
Total	374	100.0

Source: Field Survey, 2023

Table 2 demonstrates that 31.5 percent of the respondents affirmed that they dispose their waste in an open area in Nasarawa State. Data also revealed that 19.8 percent of the respondents dispose their waste by road sites, 13.9 percent of the respondents on water ways, 12.8 percent of the respondent at the market square, 10.4 percent of the respondents at waste collection services, 8.3 percent of the respondents for dumpsite and 3.2 percent of the respondents for others. This implies that the larger proportion of the study population acknowledged that open area is the common waste disposal sites utilized by the respondents in the study area.

This was further corroborated by a participant who confirmed that open area is the main place for the disposal of waste in Nasarawa State-Nigeria. The participant noted that:

In this State, open area or space are the places people dump their wastes. It is a common thing in this area. Any open area ultimately becomes a dumpsite. Check all the open space today they have become places for dumping waste and it is done

indiscriminately. From Masaka to Karu, all the open space has been turned to dumpsite. This is a serious problem (IDI/Female/34years/ Karu-Nasarawa State).

Table 3: Responses on whether Wastes Are Indiscriminately Disposed in Nasarawa State-Nigeria

Response	Frequency	Percentage (%)
Agree	323	86.4
Disagree	51	13.6
Undecided	0	0
Total	374	100.0

Source: Field Survey, 2023

Table 3 indicates that most of the respondents believe that wastes are indiscriminately disposed in Nasarawa State. This is reported by the overwhelming majority representing 86.4 percent of the respondents. This suggests that a larger percentage of the respondents confirmed that wastes are indiscriminately disposed.

Table 4: Types of Wastes Indiscriminately Disposed in Urban Settlements in Nasarawa State.

Item	SA	A	UD	D	SD	FX	N	\bar{X}	Rank
	1	2	3	4	5				
Empty Sachet water packs and water bottles	97	88	18	115	56	1067	374	2.85	1st
y plastic and tin can of assorted minerals	94	116	23	98	43	1002	374	2.68	7 th
Sachet of all kinds of biscuit	120	89	8	67	90	1040	374	2.78	3rd
Used and unused take away plates	106	132	32	55	49	931	374	2.48	9 th
Different kinds of noodles sachets	89	101	20	100	64	1071	374	2.23	12 th
Polythene bags	121	132	13	59	49	905	374	2.42	2nd
Breakable plastic chairs	121	163	6	45	39	840	374	2.25	11 th
Empty engine oil gallons	96	101	23	81	73	1056	374	2.82	5 th
Used and unused drinking straw	113	92	9	72	88	1056	374	2.81	4 th
Different kinds of Empty bottles	102	135	7	61	69	982	374	2.62	8 th
Condemned zincs and building materials	105	114	5	80	74	1038	374	2.77	6 th
Rotten food items	89	101	20	100	64	1071	374	2.86	10th
Used diapers and sanitary pads	97	88	18	115	56	1067	374	2.12	13 th

Source: Field Survey, 2023

Table 4 shows a collection of responses on the types of indiscriminately disposed wastes in Nasarawa State. The results indicate that empty sachet of water packs, water bottles are some of the waste that are indiscriminately disposed. Others included polythene bags and sachet of all kinds of biscuits, empty engine oil gallons, used and unused drinking straw, condemned zincs and

building materials. This indicated that rotten food items are the most common waste disposed indiscriminately by the respondents. This submission is in line with the in-depth interview results where participants identified empty sachets as the common wastes that are disposed indiscriminately in the area. Two of the participants noted thus:

The types of waste disposed here are usually empty pure water pack and polythene bags plastic containers. This is very common in this environment. You can see it littering everywhere in this community. This is very disturbing and unpleasant experiences. Even though, there are other wastes that are disposed indiscriminately here like used baby diapers, unused bottles, containers, pack of biscuits and others. But, the most common of all is empty water pack and polythene bags of all kind. You can move one metre in this area and you didn't see it. It is very undesirable thereby affecting the ecosystem (IDI/Male/45years/ Karu-Nasarawa State).

In this Local Government Area, in all the streets you can see polythene bags, empty pure water packs littering all over and making the environment dirty and unfriendly. This is the kind of wastes we are confronted with in this community. People will just be dropping their refuse in any open space and this is a recurrent decimal. No day passes without such experience in this area (IDI/Male/49years/Akwanga-Nasarawa State).

Discussion of Findings

Study findings established that empty water pack and polythene bags are some of the wastes that are indiscriminately disposed in Nasarawa State. This is in addition to empty engine oil gallons, used and unused drinking straw, sachets of all kinds, biscuit, condemned zincs and building materials. This was corroborated with the work of Makwara et al (2013) which identified sachet water packs and water bottles, empty engine oil gallons, used and unused drinking straw, sachet of all kinds of biscuit, condemned zincs and building materials as the wastes disposed indiscriminately.

Indiscriminate dumping of organic wastes constitutes sanitary hazards and poses public nuisance, particularly in over populated residential areas or cities. In Nigeria, Kenya, Zimbabwe, etc. waste dumps cause environmental problems like aesthetic intrusion, offensive stench or odour and serve as breeding grounds for vectors of communicable diseases such as diarrhea, dysentery and typical. During the rainy season, wastes dumped recklessly, are washed away. As a result of that, water channels and drainage are blocked, thereby causing excessive flooding, surface water contamination and ground water pollution. Urban residents characteristically dispose of the waste they generate without regard for the environment since it is treated as common property. The toxins generated by these wastes are hazardous. This is because improper handling and/or disposal of waste causes substantial harm to human health, death of smaller animals and plant organisms and a general breakdown and loss to the immediate ecological systems.

Conclusion

Indiscriminately disposed wastes are wastes arising from human activities that are normally solid and are discarded as useless or unwanted. They are also seen as non-liquid and non-gaseous products of human activities. Indiscriminate waste disposals arise from the exponential population growth in Nigeria and the increase in the production and consumption process, poor waste

management system, inadequate facilities for the disposal of wastes, as well as the inadequate of knowledge on the dire consequences of indiscriminate disposal of wastes by most residents.

Recommendations

Arising from the findings of the study, the paper recommends that;

- (a) There should be attitudinal change among residents in Nasarawa State towards waste and waste disposal in addition to compliance with environmental laws.
- (b) Government should collaborate with the various Local Governments, waste providers, waste vendors and other stakeholders, to effectively evacuate wastes from dumpsites to the recycling plant for the production of organic manure.
- (c) Monthly sanitation exercise should be reintroduced to curtail the littering of environments and indiscriminate dumping of refuse while offenders should be appropriately sanctioned.
- (d) Public enlightenment programmes, should be organized by governmental and non-governmental organizations. especially in schools, market places, eateries etc. on the dire consequences of indiscriminate waste disposal on human health and the environment

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