

Domestic Waste Management in Unguwan Sanusi, Kaduna South L.G.A Nigeria

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Abstract

Waste management is the processes and actions required to manage waste from its inception to its final disposal. Waste can be solid, liquid, or gaseous and each type has different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological, household, municipal, organic, biomedical, radioactive wastes. In some cases, waste can pose a threat to human health. This paper will examine the domestic waste management in Unguwan Sanusi, Kaduna South L.G.A Nigeria. The specific objectives were to identify the types of domestic waste generated as well as identifying the methods of domestic waste disposal in the area, and to identify the challenges faced by the inhabitants resulting from waste. The study revealed that the Domestic waste management in Unguwan Sanusi area is the responsibility of both the government and the private organizations as it affects both parties in one way or the other based on the result obtained from the field study. Domestic Waste disposal methods in the study area appeared to be influenced by the lack of provision of adequate dumpsites by the relevant agencies. In all the 166 questionnaires that received valid responses, the analysis was done and presented using frequency and percentage tables, pie charts, histogram and bar graphs. The findings showed that the respondents were found to have cut across different socio-economic characteristics. It also showed that the residents are not satisfied with the methods used in waste management and many of them are not aware or do not know the body/agency responsible for managing the waste.

Keywords: *Environment, Waste, Community, Chemicals, Technology, Equipment, Domestic.*

1. Introduction

One of the greatest hazards of man today is the poor sanitary condition of his environment, which is being caused by his daily activities, such as waste generation, increase in population, and attendant increase in agricultural, industrial, and commercial activities.

Wastes are substances, materials, or objects discarded as worthless or unwanted, defective, or of no further value for human economic productive activities, or processes (kabiru M.A, 2014).

U.S AD-Hoc Group for Science and Technology (2012) and Adegoke (2010), defines waste as substances and materials or objects which are disposed of according to the provision

of the nation's law. Wastes can exist in three different states; gaseous, liquid, and solid, the people are more sensitive to solid waste than to others. This is because solid wastes have the potential of accumulating and physically insulting the environment.

Solid waste is unwanted materials that cannot flow directly into streams or rise immediately in the air. They are non liquid, non gaseous residues of manufacturing, construction, cooking, agriculture, and other activities that are used and then discard materials. They include glasses, bottles, outdated newspapers, cartons, plastic bottles, abandoned automobiles and automobile parts, discarded cooking utensils, wraps, dead animals, etc.

Waste is anything that is no longer of use to the disposer. It can also be defined as any unavoidable material resulting from any activity which has no immediate economic demand and which must be disposed of (NISP, 2003). According to United Nations Statistical Division (UNSD, 2009), waste is material that is not a prime product (that produces for market) for which generation has no further use in terms of his/her purpose of production, transformation, or consumption and in which the owner wants to dispose of. Section 30 of the control of pollution ACT, USA 2007 (Cop) put to waste as;

- a. Any substance which constitutes a scrap material or an effluent or other unwanted surplus substances arising from the application of any process.
- b. Any substance or article which requires to be disposed of as being broken, worn-out, contaminated, or otherwise spoiled.

The UK Environmental Protection Act, 2011 defined waste as

- a. Any substance which constitutes a scrap material or effluent or other unwanted surplus substance from the application of any process.
- b. Any substance or article which requires to be disposed of as being broken, worn out, contaminated, or otherwise spoiled.

The circular accompanying the Regulations provide detailed guidance as to the interpretation of the meaning of waste. Generally, waste is considered to be something that poses a significantly different threat to human health or the environment, partly because of how it may be disposed of and partly because the holder no longer has the same sense of obligation to it. Waste, therefore, is something that falls out of the normal commercial circle or utility. The Circular suggests four broad categories which may be considered—deciding the question of whether an object is a waste:

- a. Worn but functioning substances or objects which are still usable (albeit, after repair) for the purpose for which they were made are not to be considered waste.
- b. Substances or objects which can be put to immediate use otherwise than by a specialized waste recovery operation or undertaking are likewise not to be considered waste.
- c. Degenerated substances or objects which can be put to use only by establishments or undertaking specializing.
- d. Substances which the holder does not want and which he has to pay to be taken away are waste, where the holder intends that the objects are to be discarded.

According to Lawal and Zubairu (2010), ‘waste includes predominantly household (domestic waste) with sometimes the addition of commercial wastes which are either solid or semi solid form and generally exclude industrial hazardous wastes. Increasing population levels, booming economy, rapid urbanization, and the rise in community living standards have accelerated the municipal solid waste generation rate in developing countries (Minghua et al., 2009). Municipalities, usually responsible for waste management in the cities, have the challenges to provide an effective and efficient system to the inhabitants. However, the often faced problems beyond the ability of the municipal authority to tackle (Sujauddin et al., 2008) mainly due to lack of organization, financial resources, complexity, and system multi dimensionality (Burntley, 2007). Solid waste management is a challenge for the cities’ authorities in developing countries mainly due to the increasing generation of waste, the burden posed on the municipal budget as a result of the high costs associated with its management, the lack of understanding over a diversity of factors that affect the different stages of waste management and linkages necessary to enable the entire handling system functioning. Solid wastes could be defined as non liquid and nongaseous products of human activities regarded as being useless. It could take the forms of refuse, garbage, and sludge (Leton and Omotosho, 2004). Cities in India and Nigeria, being among the fast-growing cities in the world (Onibokun and Kumuyi, 2014) are faced with the problem of solid waste generation. The implication is serious when a country is growing rapidly and the wastes are not efficiently managed. The waste generation scenario in Nigeria has been of great concern both globally and locally. Of the different categories of wastes being generated, solid wastes had posed a hydra-

headed problem beyond the scope of various solid waste management systems in Nigeria (Geoffrey, 2005), as the streets experience the continual presence of solid waste from commercial activities.

Effective solid waste management is achievable only when socio-economic factors are integrated into solid waste management studies. This approach would, according to Hudson and Marks (2000), make it possible to predict not only the expenditure pattern of a household and how much waste would be generated by each particular item consumed, but also the qualities of waste generated by a household. The first noteworthy attempt at studying this problem based on this approach was made by Boyd and Hawkins (1999), with limited success, it would be argued that this approach may make it possible to transform the data generated into an input a national solid waste generation projection since that household is the basic unit of consumption and waste generation. Research of this nature would assist urban environmental planners to better and rationally tackle this problem of waste in urban areas.

Waste is usually classified according to (a) its source (b) its harmful effect on humans and the environment. (c) The control which is appropriate to deal with it.

With regards to the source classification, it either comes out of the shop (market) or office commercial waste or, out of the factory industrial waste, or out of the home household or domestic waste.

Domestic waste includes that from domestic premises, caravan sites residential homes, educational establishments (schools), and nursing homes (and probably hospitals). It can be organic or non-organic. Organic waste can decay. Waste food from the household can be composted and returned to the soil. Domestic waste such as tin cans and plastic

and bottles is inorganic and cannot be treated in the same way.

Domestic waste can pollute the environment and be indirectly dangerous to humans. It can enter the atmosphere or water supplies causing damage to plants and animals.

Some items of domestic waste may in themselves be harmless; e.g. packaging waste is not poisonous if touched and does not enter the atmosphere or water supply. Yet the sight is unattractive and may in time produce nauseating and rancid odor and may attract rats if it contains food waste thus constituting a hazard to human health. Some may acquire dangerous properties; such items may react with other substances, thus becoming dangerous. Domestic waste may be corrosive, that is, it may eat away and destroy solid materials. These distinctions are important in determining the management strategies which are appropriate to deal with it. Solid waste may be divided into two broad categories depending on its origination: municipal solid waste (produced by various institutions, businesses, and homes) and industrial solid waste. This study will focus on the municipal solid waste that is generated by homes (households or domestic).

2. Materials and Methods

2.1 Description of the Study Area

2.2.1 Location

Unguwan Sanusi is a ward located in Kaduna South Local Government Area of Kaduna State, one of the four Local Governments that make up the Kaduna Metropolis. It is located on latitude 10°31'42N and on longitude 7°24'21E.

It shares boundary to the East by Kaduna Polytechnic, to the West by Asikolaye, to the North by Badiko and to the South by Sabon Garin Tudun Wada.

2.2.2 Climate

The Kaduna features a tropical climate that is classified as *Aw* by the Köppen Geiger system. The harmattan, which climatically influences many cities in West Africa, is very active in Kaduna. Kaduna's heaviest precipitation occurs during August with an average of 290 mm of rain. Rainfall is seasonal, variable and energetic. November to February are the driest months of the year; with an average rainfall of 1000mm. Temperatures throughout the year in the city is relatively constant, showing little variation throughout the course of the year.

The West African climate systems particularly rainfall is characterized by a seasonal wind movement facilitated by the thermodynamic differences between the Sahara and the equatorial Atlantic (Peyrille et al, 2014). Both the continental North Easterly and the maritime South Westerly blow over the airport driving various seasons of the year. These trade winds have been conditioned by the nature of their source regions having originated over the South Atlantic Ocean (Gulf of Guinea); the moist south-west wind transports its moisture to Nigeria. This air stream blows over the regions between the months of April and September. This is the period in which the region receives its rains. However, the north-east trade winds which are hot and dry, bring dry condition, having passed over Sahara desert to reach Nigeria from the north, this air stream blows over the study area between October and March, bringing about the change in season.

2.2.3 Soil

The soil of Kaduna is a typical red brown and red yellow tropical ferruginous soil. In the upland

area, are rich in red clay and sand (30%-40%), but poor in inorganic matter. (Saleh, 2015)

Kaduna plains have moderate to good fertility with the possible exception of certain floodplain soils. They are imperfectly drained, thus there is sufficient aeration at all times and water logging is brief if it occurs at all. They have sufficient rooting depth for most crops, except on and near iron-pan cropping and rocky areas together estimated at less than 9% of the total area; most are neither excessively coarse nor fine textured and the proportion of coarse material limits root development in only a few soil series. (Saleh, 2015)

2.2.4 Vegetation

The vegetation of Kaduna town falls within the Northern sub-zone of the Guinea Savannah (Udoh, 2013), that is characterized by savannah type of vegetation but man has greatly altered and modified the natural vegetation through his various activities. The natural northern guinea savannah consists of a mixture of woodland and grassland, which is dominated by scattered trees and grasses.

The savannah woodland has been severely exploited for grazing, cultivation, fuel wood, building materials, and construction purposes. As a result of modification over the centuries by man, the study area has become in most places open and park-like grassland (Saleh, 2015).

2.2.5 Geology

The relief of the study area is located on Kaduna plains, southernmost part of the northern plains. The plains lay almost entirely with Kaduna metropolis, incorporating only small parts of Plateau, Kano, Niger State and FCT Abuja. The area comprises of extensive tracts of almost level to gently undulating light

dissected land, broken in places by group of rocky hills and inselberg (Dzingina P.G, 2015).

Within the metropolis, Kaduna displays undulating plains with low hills and rocks mixed with granite. Process of weathering erosion, transportation and deposition of materials has worked to shape the landforms. In some part of the city there are protruding hard, resistant granite rocks which as a result of weathering process. Through the area of previously existing Precambrian rocks that have been exposed by agent of erosion and weathering, those erosive activities resulted in the outcrops of rocks forming inselberg and huge rock in some areas such as ones found in Tudun Nufawa area (Yusuf, 2016). Six major landforms are found in Kaduna with distinctive relief units. These include dissected hills, drift plains, pedi plains, dune plain and alluvial channel complex (Mahmud, 2010).

2.2.6 Drainage and Hydrogeology

One common characteristic of the rivers in Kaduna is that they are seasonal in nature (seasonality), which is as a result of varying degree and short duration of rainfall in the area. River Kaduna is the longest river in Kaduna, which originated from the Jos Plateau and drains its water to River Niger covering over 540km, making it the longest tributary of River Niger. The river crosses the Kaduna metropolis, dividing it into North and South.

The main tributaries of River Kaduna include the River Galma, River Kubanni and River Kangimi before reaching Kaduna town. Other minor tributaries are Rivers Mashi, Rigachikun, Keke, Dan Hono, Barnawa, Romi and River Rigasa (Saleh, 2015).

The river flows through a variety of geological formation, the younger granites on the Jos Plateau and the basement complex underlying the North

Central high plains. The basement aquifer is a combination of fresh rock fractures and the permeable base of the regolith. This minor aquifer is adequate for village supplies only, highly permeable and is recharged annually.

2.2.7 Population

According to 2006 national census, the population of Kaduna was 6,066,562 million. By 1963, the population of Kaduna was less than 250,000 but the 1991 census put the population at 1,307,311. Kaduna State is populated by about 59 to 63 different ethnic groups if not more with the exactitude of the number requiring further verification through a genuine field work.

2.2.8 Socio-Economic Characteristics

The 1991 political reorganization and the successful take off of local government councils and state civilian administration are indications of good economic climate for well-meaning entrepreneurs wishing to invest in Kaduna State. It has instituted agencies to cater for the interest of local, national, and foreign entrepreneurs/industrialists. (Kaduna State Ministry of finance and Economic Planning, 2013)

The economy of Kaduna State is agriculture based supplemented by various non agricultural traditional industries. Some of the main agricultural crops include; yam, coco-yam, cassava, maize, millet, cowpeas and guinea corn.

Although agriculture has received significant attention in the past 10 years, the dominance of crude oil in the growth of national income has caused a decline in peasant agriculture, which today no longer contributes significantly to Gross Domestic Product.

Furthermore, Kaduna serves as a centre for commercial activities, such as Banking Insurances, Hospital, Printing Industries,

Shopping Malls and Complex, Transportation and Communication Network. Kaduna town is served with trunk "A" federal well surfaced road that stretches from the Northern part of the metropolis to its Southern part, this road radiate from Kaduna city in four cardinal

directions. Westward to Tegna Northward to Kano Eastward to Jos, and Southward to Federal Capital Territory (FCT) Abuja (Saleh, 2015).

2.2.9 Economic Activities

The economic activities of Kaduna State people are Commercial Services, Administrative, Industrial, Transport and Professional need of the state and Northern Nigeria. Kaduna is endowed with heavy industries which have grown rapidly, except for the textile industries. Other industries include Peugeot Auto mobile Assembly Plant (PAN), Defence Industry Cooperation of Nigeria (DICON), Breweries Industry, Nigeria National Petroleum Cooperation (NNPC) etc. which are all concentrated in Kaduna.

2.2.10 Educational Institutions

Kaduna Metropolis has a number educational institutions which raised it high among it's equals in the entire region north of the Niger-Benue valley. Prior to the acceptance and liberalization of formal Western education by the government of the Northern Region, the efforts of Voluntary Agencies in establishing schools at both primary and secondary levels, gave the present Kaduna State an enviable advantage of early educational infrastructural establishment.

There is a wide range of tertiary institutions established to produce high-skilled manpower needed by the state and indeed the entire former

Northern state. In Kaduna Metropolis, there are Kaduna State University, Kaduna Polytechnic, College of Forestry Mechanization, National Water Resources Institute, Federal Cooperative College and College of Agriculture and Animal Science, Nigerian Defence Academy which is the premier military university in West Africa. (Yusuf, 2004)

2.3 Sources of Data

2.3.1 Primary Source of Data

These are data collected from original source. They are usually free from second opinions, reviews and contributions of any sort. For examples, questionnaires,

interview, group discussions and observations. For the purpose of this project, the questionnaire was used to obtain the required data.

2.3.2 Secondary Source of Data

These consist of data collected that are a step away from the original source. For example book review, students B.Sc., M.Sc. These s, newspapers, journal, internet etc.

2.4 Method of Data Collection

2.4.1 Primary Data

Data was collected using a questionnaire that contains relevant questions. The questionnaire was administered to households and people doing business around the study area. Individual responses obtained from the questionnaire was gathered and analysed.

2.4.2 Secondary Data

This involves documents from both published and unpublished works. Reviews of related literature such as those from Conferences, Journals and the internet were also employed.

2.5 Method of Data Analysis

The frequency of the respondents given in each questionnaire were counted and the percentages found regarding such responses were put together to form statistical tables.

Simple frequency table was also employed by tabulating some of the data obtained which were expressed in percentage.

2.6 Method of Data Presentation

Data was presented using statistical tables, charts and graphs

3. Results and Discussion

3.1 Questionnaire Administration

In carrying out the survey, 200 questionnaires were randomly distributed in the study area and 166 were treated and returned which account for 83%.

3.2 Socio-economic Profile of The Respondents

This sought to know the gender, age range, educational level and the nature of residence of the respondents. Of the 166 responses, 50.6% and 49.4% were male and female respectively 53% of the respondents are in the age range of 18-26 years, those between 26-35 years accounts for 27.7%, 13.3% for those between 36-45 years and 6.0% for those in the age ranges of 46-55 years. Also, 65% of the respondents have attended or are attending tertiary institutions, secondary school leavers accounts for about 24.6%, 4.2% and 4.8% accounts for those with Primary education and those with no formal education respectively.

On Nature of Residence, those in the 'Owner Occupier' category accounts for 19.9%, 50.6% for those in the 'Family House' category while those in the 'Rented Apartment' stands at 29.55%.

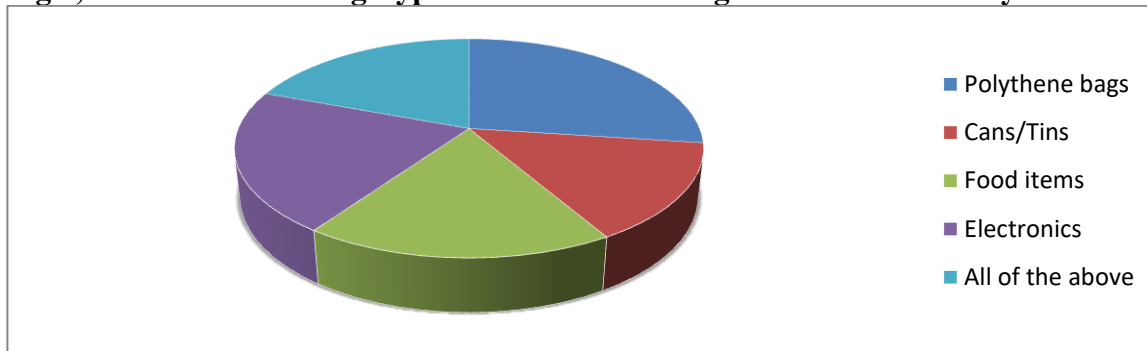
3.3 Type of Domestic Waste Generated

Of the 166 questionnaires treated and returned, 27.1% of the respondents generates Polythene bags, 14.4% generates Cans/Tins, 18.0% generates Food items, Electronic wastes

accounts for 21.0% and 19.8% generates All of the above. A picture on this is shown in appendix II plate 4.

The result is shown in the fig.4 below;

Fig.3, A Pie chart showing Type of Domestic Waste generated in the study area.



Source: Field Survey, 2017

3.4 Method of Disposal

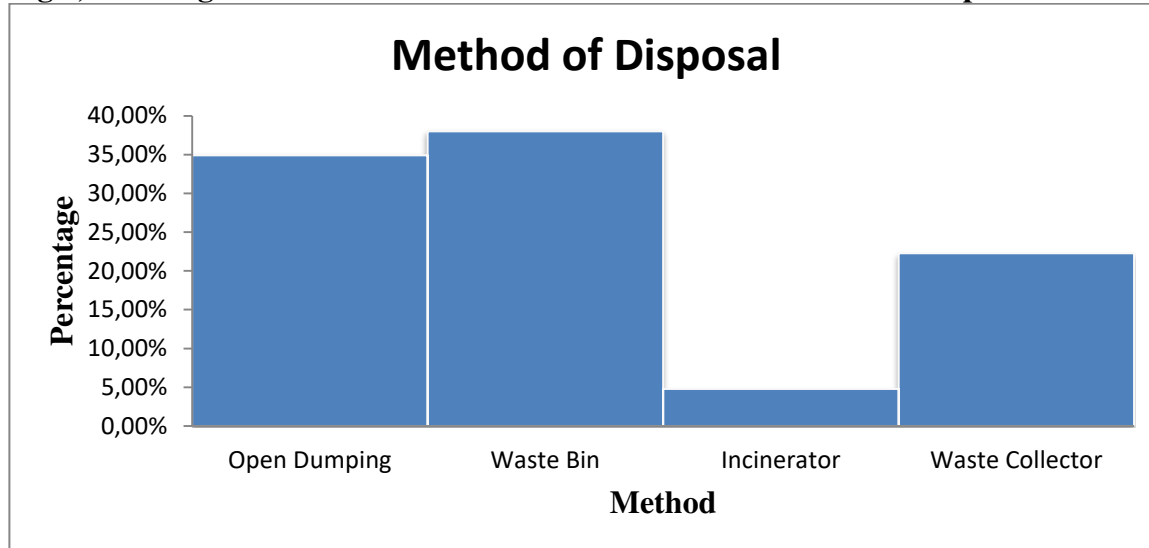
The methods of waste disposal in the study area are:

58 of the 166 respondents uses 'Open Dumping' as a method for disposal of domestic waste which is 34.9%, about 63 respondents which is

equivalent to 38.0% uses 'Waste Bin', 37 respondents uses 'Waste Collector' which is 22.3% and only 8 equivalent of 4.8% of the respondents uses 'Incinerator' as a method of domestic waste disposal. A picture on this is shown in appendix II plate 1.

The result is shown in fig.5 below

Fig.4, A Histogram that shows the methods used in domestic waste disposal in the study area:



Source: Field Survey, 2017

3.5 Are you aware of any waste collection centre and who manages the waste?

73 of the 166 respondents said 'YES' which accounts for 44.0% while 93 said NO which is 56.0% .

Also, of the 73 respondents that are aware of a waste collection centre in the study area, 49 respondents said 'Government' manages waste in the study while 12 said 'Private' and 12 respondents have 'No Idea' who manages the waste in the study area. A picture of waste collection centre is shown in appendix II plate 2.

This result is shown in appendix I table 1.

3.6 Are you satisfied with method of Waste Management in your area? If NO, why?

Appendix I table 2 shows the satisfaction of the respondents on the method of waste management in the study area.

49 respondents said they are satisfied while 117 respondents said they are not satisfied with the

method of waste management in the study area. They cited 'Insufficient Official Collection Centres', 'Poor Management', 'Lack of or No Supervision' and 'Careless Attitude of the People' as their reasons.

3.7 Is there any form of government intervention in waste management, what is the rate?

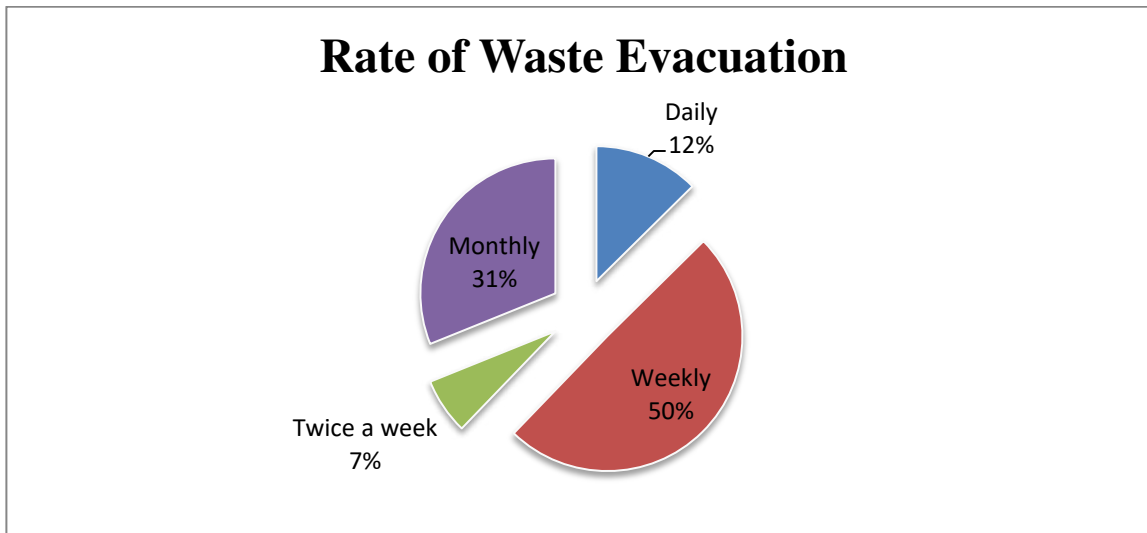
96 of the 166 respondents said there is while 70 respondents said there is no government intervention in waste management in the study area.

3.8 Rate of Waste Evacuation

In the study area, 50% of responses received on this states that waste is being evacuated on a weekly basis, 31% monthly, daily is on 12% while 'Twice a week' have the least with 7% of the responses.

This is shown in the in Fig. 5 below

Fig.5, A Pie chart for the Rate of waste evacuation in the study area



Source: Field Survey, 2017

3.9 Challenges Faced as a Result of Waste

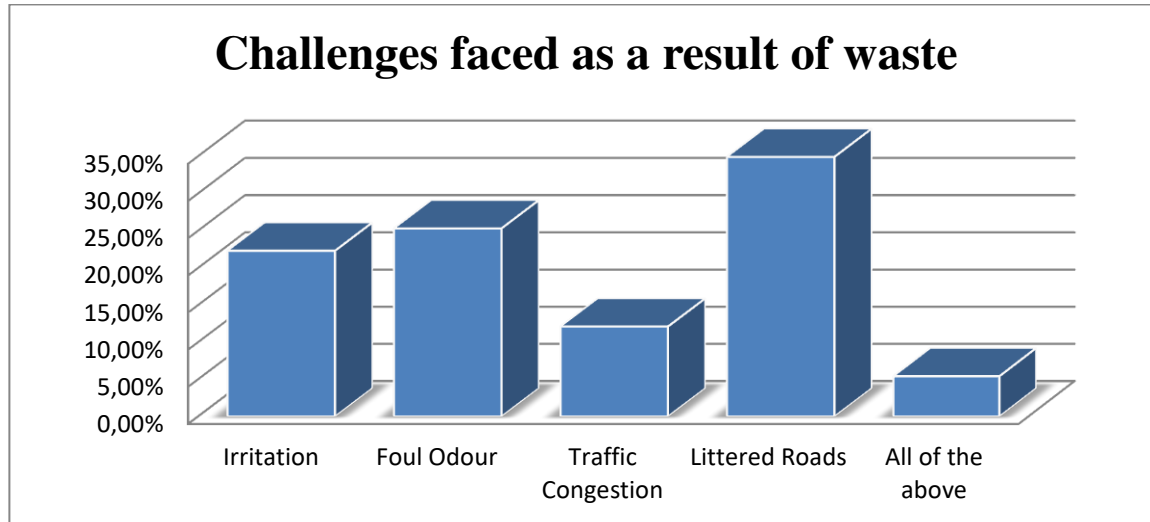
7 out of the 166 respondents cited 'Irritation' as the challenge they face as a result of the waste in the study area which is 22.3% while 42 cited 'Foul odour' which is 25.3%, 'Traffic Congestion' 20 which is 12.1%, 58 respondents, about 34.9% said 'Littered Roads while 'All of the above has the least number of people with 9 and 5.4% respectively.

The implication of the above findings is that roads are being littered which has the highest

percentage with 34.9%. This causes a lot of problem to residents and the environment; on one hand littered roads alter the aesthetic nature of the environment, cause unease to the residents and also give rooms for the spread of diseases. While on the other hand, it also gives room for the break up or creates small cracks in roads which will eventually expand if not taking care of. A picture on this is shown in appendix II plate 3.

The result is shown in fig.6 below:

Fig.6, A Histogram showing percentage of challenges faced by the residents of the study area as a result of waste.



Source: Field Survey, 2017

4. Conclusion/Recommendation

Going by the result obtained in this study, it can be said that the method of domestic waste management in the study area is inefficient. This is evident in the level of responses received especially on 'who is responsible and manages waste in the study area'. It is hoped that the recommendations given would be utilized and acted upon and new policies be enacted on waste management by the relevant authorities, therefore this paper recommend the following:

- Households in the study area should make provision of proper waste storage facilities so as to curtail the menace of improper waste disposals.
- They should also take it upon themselves in educating others on the dangers of keeping an unhealthy environment.
- There is also the need to introduce Environmental education courses at all levels in schools so as to

have an environmentally-educated society in the future.

- There is also the need to provide additional official dumping sites and be located not far away from each other.
- Community leaders in collaboration with relevant authorities should educate and enlighten the public on the importance of keeping their environment clean and tidy and also the importance of using the proper waste management processes in the study area.

5. Acknowledgement

From the review of this paper would like to express my deepest gratitude to my mentor, Dr. Suman Kumar, Assistant Professor, Water Resources and Environmental Management Department, Sharda University whose contribution in stimulating suggestion, guidance and encouragement from initial to final level in collecting and analyzing various data helped me alot in writing this review paper.

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