PERCEIVED HEALTH IMPLICATIONS OF SOLID WASTE IN LAFIA METROPOLIS, NASARAWA STATE, NIGERIA.

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ABSTRACT
The study examines environmental problems and adverse impacts on the health of urban households in the Lafia metropolitan area, Nigeria. The results showed that majority (50%)of the respondents in Tudun-kauri disposed solid waste in open dumps and allow it to decompose naturally while (24.8%) others use burning as the way of disposed their solid wastes. Poor handling, evacuation and disposal of waste have numerous negative impacts on the environment such as proliferation of mosquitoes and flies, bad odour, visual pollution. These negatives impacts on the environment in turn have negatives impacts on the health of the residents. Dysentery and diarrhea (81%) appears the most encountered disease followed by Malaria (78%) and cough and sore throat(36%) among others. The major causes for the inefficient solid waste management systems in Lafia are the lack of social awareness/ community involvement and sound legislative policy. There is a need for greater government involvement, community participation and orientation with private sectors involvement in waste management in Lafia with a view to building capacity for effective delivery of waste management services and ultimately improve the sanitary state of the city thereby reducing preventable disease burden on the populace as. It is recommended that Nasarawa State environmental protection agency (NSEPA) should introduce house to house sanitary inspection, monthly environmental sanitation with strict penalty against defaulters. Other recommendations if strictly put to use, it will go a long way reducing the menace posed by solid wastes to human health and his environment.

Keywords: Health, Solid Waste Management, Environment Impact.

INTRODUCTION

The old saying out of sight, out of mind definitely does not apply when it comes to getting rid of personal waste. For many people, though, sending old items including electronics made with potentially harmful metals to the garbage bin is done without thought for what the trash will have on the environment. Waste has been defined by Tchobanoglous et al, (1993) and Weitz et al,(2002) as any solid or semi-solid substance or object resulting from human or animal activities which holder discards or intends or is required to discard and constitutes a hazard for living being and all that sustain life. Ladu et al, (2011) reported that rapid population growth and the widespread use of disposable containers contribute significantly to solid waste accumulation. A World Bank (2012) report on the state of solid waste around the world estimates that, the amount of Municipal Solid Waste (MSW) will rise from the current 1.3 billion tonnes per annum to 2.2billion tones per annum by 2025, with much of the increase coming from rapidly growing cities in developing countries. Human activities create wastes and it is the way these wastes are handled, stored, collected and disposed off, which can pose risks to the environment and to public health (Zurbrügg, 2002). Access to improved sanitation contributes to human health, dignity, security and wellbeing of people (Sida, 2012). On the other hand, poor sanitation is one of the most accurate indicators of health problems (Prasad, 2013). Due to rapid urbanization, environmental sanitation problems are at the heart of the woes of African countries. The proliferation of urban population comes with its rising demand for food and other essential services which in turn increases the waste generated daily by each household (Zhu *et al.*, 2008).

Municipal solid waste management therefore continues to be a major headache for local governments in both urban and rural areas across the world (Wang *et al.*, 2011). The effects of ineffective waste collection and poor waste management is countless. Insufficient collection and poor disposal practices generate serious health related problems to humans and the environment (Loboka *et al.*, 2013). In Sub-Saharan Africa for instance, poor disposal practices have aggravated health related problems (Zhu *et al.* 2008). Abul (2010) found dumpsites to be in smelly and unsightly conditions. The negative effects are also found to be exacerbated during the summer where extreme temperature speeds up bacteria reaction and bio-degradation.

Boadi and Markku, (2005), also revealed that high incidence of diarrhea in children under six is interrelated to food contamination by flies who

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had fed on wastes (Boadi and Markku, 2005). Hygiene related diarrhea alone is thought to cause 30,300 deaths per year and is considered one of the commonest outpatient cases (Domfeh, 2009). Another poor waste management practice has shown to be disposal of waste into water bodies. This contaminates the environment (Aibor *et al.*, 2006), contributes to flooding and serves as potential means to increasing transmission of communicable diseases; malaria, dengue and hemorrhagic fever, blood borne viruses such as hepatitis B and C, tuberculosis, yellow fever and West Nile Fever. The practice of 'water body-dumping does not augur well for healthy population and productivity. The World Health Organization (WHO, 2000) and United Nations Environmental Programme (UNEP,1996) contended that residents who live closer to exposed and unmanaged waste dumps are subject to more bouts of cholera, an acute intestinal infection, skin diseases, blood and eyes cancer and respiratory infections. Human development and health is greatly influenced by the environment in which they live in (Centre for disease control, 2009). Most of the generated wastes are mixtures of both biodegradable and non-biodegradable wastes which pose the greatest problems of disposal (Oyelayo, 2000). The municipal waste challenges are going to be enormous or ever greater than the challenges we are facing with climate change (Foray, 2012). Solid waste constitutes a major source of environmental hazard. The environmental hazards accounts for an estimated 25% of the total burden of disease worldwide and nearly 35% of ill-health in sub Saharan Africa is caused by environmental hazards (WHO, 2009).

Improper handling, storage and disposal of wastes are major causes of environmental pollution, which provide   breeding grounds for pathogenic organisms and encourages the spread of infectious diseases. For instances in Lafia, Nigeria, the presence of houseflies in the kitchen during cooking correlated with the incidence of incidence diarrhea. in addition, an association was found between waste burning and the incidence of respiratory health symptoms among adults and children, Owaduge (2010). Lawrence et al, (2004) were right to said that how the environment is managed has a direct bearing on the quality of life of every living being. The greatest obstacle to effective management of solid wastes in most towns and cities in the developing countries particularly Nigeria, is lack of waste management facilities and records of wastes generation and disposal activities. in consequence, therefore quality of the urban environment is fast deteriorating and thus, posing a serious health hazards to man, of which many people still remain

ignorant. The aim of this paper is to examine the environmental and health implication of solid waste on human in Lafia metropolis, Nigeria. People know that poor sanitation affects their health, especially in developing and low-income countries, where the people are the most willing to pay for environmental improvements (Rathi, 2006; Sharholy, 2005). Lafia is the Nasarawa State Capital in North Central Nigeria. Lafia is located within the guinea savannah ecological zone on Latitude 0.8^0N and Longitude 0.8^0E of the Greenwich Meridian. The study area is known for its agricultural activities mainly the production of yam, maize, millet, melon, rice, cassava, groundnut and rearing of domestic animals. (Bako and Osuagbalende, 2016). It has an annual mean temperature of 32^0C and mininium temperature of 21-24^0C annually. The mean annual rain distribution in Lafia is 101.6 – 127cm. It is bounded by Obi Local Government area in the South, Doma Local Government area in the West, Nasarawa Eggon Local Government area in the North and Quanpan Local Government area of Plateau State in the East. The local Government Area has a land area of 27,373km and the main occupation of the city dwellers is farming, rearing of animals and trading.

The settlement pattern is nucleated in the core of the town and has high congestion of buildings that lack modern planning; the outskirts are sparsely populated with modern buildings that are relatively planned. The highly congested areas of the town consist of both the medium and low income earners while sparsely populated area consists of the relatively high income earners. Indiscriminate dumping of solid waste in Lafia, particularly in the congested areas of the town, is a common practice, and solid wastes could be seen on streets, marketplaces, restaurants, abattoirs, residential areas and in drainage channels. Ironically, such unwholesome practice has rendered most of these affected areas totally unfit for human habitation. Unfortunately, many residents are exposed on daily basis, to so many health risks which could have been prevented if well informed of the consequences of their waste disposal attitudes.

METHODOLOGY

A survey was first carried out in the study area to identify the specific study location and to map out strategies for the actual field exercise. During the reconnaissance survey, field observations were made about the sanitary conditions of the study area and, household were identified and marked for the administration of questionnaires. For the purposes of this research work, the instruments used for data collection were questionnaires, camera and measuring tape. The questionnaires were

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designed to get information on socio-demographic data, solid waste and the effects of solid waste disposal on health and the responses to problems of solid waste disposal. Measuring tape was used to measure distance between dumpsites and households. Tudun-kauri residential area of Lafia town was chosen as a sample for the study, using purposive sampling technique. The choice of Tudun-kauri became necessary because it is one of the most congested and polluted areas with indiscriminate disposal solid wastes. A total of two hundred and forty-six (246) copies of the questionnaires were administered in Tudun- kauri areas in a systemic non-random sampling method, that is, every fifth household on the selected major streets was picked for questionnaire administration. The respondent involved are the only residents who have attained 18 years and above. This age category was used because it is believed that at this age the individual is matured to give information on how solid waste disposal impact on his or her health. The systemic sampling technique was used to select individual respondents. The administration of the questionnaires was done in such a way that, those who could not read, had the questionnaires read and interpreted to them and they supplied the answers.

RESULT AND DISCUSSION

The results of research have identified five main types of solid wastes in the study area and these include agricultural, domestic, industrial, medical and domestic wastes (Table 1) The result in Table 1 show that 45.1 percent of the respondent opined that domestic wastes were most commonly generated within their residential areas, while 36.2 percent believed that commercial wastes were common in their areas. This contrast to the 11.8 percent who believed that agricultural wastes were most common, and the 2.0 percent who believed that medical wastes were most common. The dominance of the domestic wastes was not unusual since the area is largely residential and commercial with urban farming activities taking place. The solid waste storage equipments identified in the study area include polyethne bags, sacks and dustbins, plastic containers, among others (Table 2). The use of polythene bags and sacks is due to its relative availability and affordability by local residents. Neither the state government nor the municipal authoritative make available these storage facilities. Other storage facilities include drums, empty sacks and damaged buckets. Three categories of refuge collectors, identified in the study area, include the household members, hire labour and Local Government refuge collectors. Table 3 shows that only 22.8% have the financial strength to hired labour. The Local government is not a significant agent for collecting refuse in the area.

The households (67.9%) were directly responsible for collecting and disposing of their refuse. Four period of refuse collection and disposal were observed in the study area include, daily, weekly, two-week and monthly collection (Table 4). The result in Table 4. Showed that refuse collection were mostly done daily and this involves mostly the personal households. The conventional place to dispose the waste might be the problem of those that did not fall on the category of daily disposal of waste. The distances of refuse disposal sites from residential households were classified as less than 25m, 25-50m, 51-75m and above, as showed in the Table 5. Table 5 shows that most of the households were located less than 25m away from the dump sites. This implies the proximity of the households to the dump site, indicating higher probability of health effects of wastes dumped. As contended by WHO (2000), residents who live closer to unmanaged dumpsites are exposed to lots of diseases. This implies that outbreak of diseases in communities surrounding dumpsites can be heightened or reduced depending on the management of the dumpsites.

Lawrence et al, (2004) were right to said that how the environment is managed has a direct bearing on the quality of life of every living being. Table 6, showed the five refuse disposal methods identified in the study area, in which the open dumping method being the dominant. Table 7: The common health risks observed due to improper refuse disposal in the area include infections, discomfort, bites, suffocation and stings of insect. Table 7 shows that the commonest perceived health ailments associated with improper waste disposal are infections followed by bites and stings of insects. The open dump sites provide convenient breathing grounds for flies and insects. The infections that the people, mostly complained about are dysentery and diarrhea (81) and malaria (78) as shown in (Table 8). Boadi and Markku, (2005), also revealed that high incidence of diarrhea in children under six is inter related to food contamination by flies who had fed on wastes (Boadi and Markku, 2005). Hygiene related diarrhea alone is thought to cause 30,300 deaths per year and is considered one of the commonest outpatient cases (Domfeh, 2009) Table 9 shows that from November, 2015 to April 2017, the period of the survey.12.4 percent of the people did not visit hospital for any of the health problems and infections identified in   Table 9. Those who visited the hospital more than twice and who are the dominant, have their houses close to the open dump sites. The result shows that the methods of waste disposal used by the residents determine the level of exposure to health risks. This is particularly so when the dumpsites are closer to residential households as it was the

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case in Tudun-kauri aea of Lafia town. This confirms the argument of WHO (2000) and UNEP (1996) that residents living closer to dumpsites suffer from various waste related diseases.. This research work also revealed that the open dumping of solid waste in the residential areas is of serious health hazard, because majority of the people, who dispose solid wastes in open dumps around their residential households, admitted being infected with malaria, diarrhea or cholera, considered as threats to their health. It was observed that garbage dumps and human faeces around the residential households in the Tudun-kauri area constitute serious threats to the health of the residents. This is because wastes openly dumped solid wastes would always attracts flies and insects, capable of transmitting germs from the garbage dumps and human faeces to human food , water and eating dishes.

RECOMMENDATION

It is recommended that government should
- Emphasis on local waste management issues to be taught at all levels of formal and informal education.
- Improve adult education through national media, educational institution, town meetings organization of official and popular symposia etc.
- Help people to understand the connection between waste management and environmental health by enlightening them how what they do in their house-backyard.
- Promote waste management approaches, including engaging stakeholders in priority setting and implementation.
- There is urgent need of public awareness about waste generation. There should be awareness at all levels of society, which will motivate them to change their casual habits which creates waste.
- Promotion the production of goods which minimize waste generation after use.
- Materials recycling and recovery should be the increased.
- Nasarawa State environmental protection agency (NSEPA) should introduce house to house sanitary inspection, monthly environmental sanitation with strict penalty against defaulters.
- The location of these sanitary facilities is an issue of concern, that it should be far away from the residential areas, but accessible to the residents.

CONCLUSION

Indiscriminate dumping of solid wastes is a serious problem which requires urgent attention, if it is to be tacked. The perception of the

heads of household respondents is that accumulation of solid waste in close proximity to residential areas constitutes a pathway to many diseases including malaria, typhoid fever, intestinal, cancer, diarrhea and hepatitis The households adopted the use of skip containers, pit at backyard and burning of wastes as processes of disposing off their wastes. Improper management of these approaches affected the health status of the households. Household residents living near dumpsites were prone to more bouts of solid waste related diseases as a result of exposure to toxic pollutants from the open dumpsites. The physical observation of wastes at collection points in the sampled communities revealed that most of the collection centers were not collected on time from the households and exacerbated in the indiscriminate disposal of waste in the communities. Challenges faced by waste managers included; high operation cost, inadequate funding equipment and personnel. Adherence to proper sanitary practices should be promoted at all cost to improve the health status of all household residents.

Table 1: Types of Solid Waste Generated

Types of solid wastes	Agricultural	Commercial	Medical	Industrial	Domestic
Number of respondents	29	89	5	12	111
Percentage (%)	11.8	36.2	2.0	4.9	45.1

Source: Jonah, 2017.

Types of solid waste generated

45.10%

36.20%

11.80%

2.00%

4.90%

Agricultural   Commercial   Medical   Industrial   Domestic

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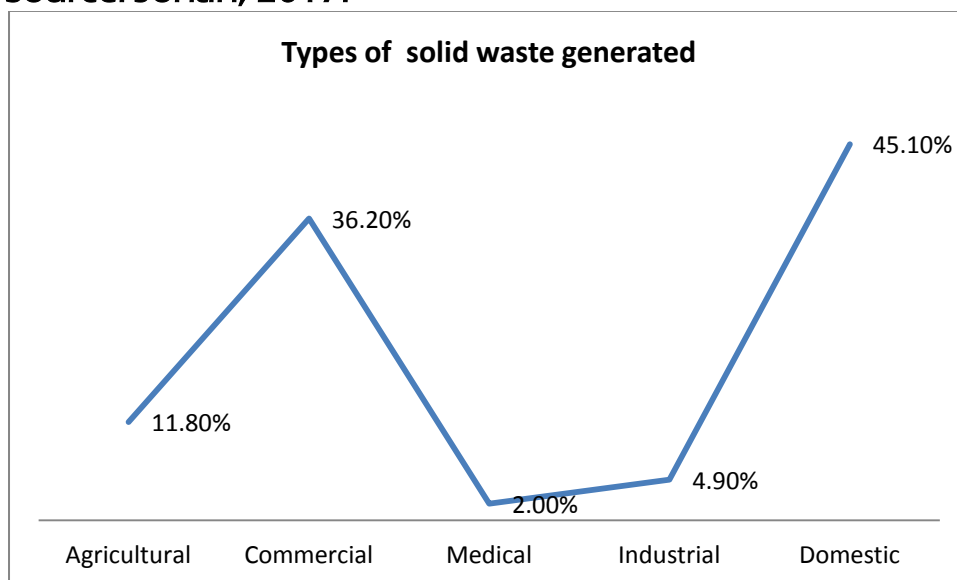
Table 2: Wastes Storage Facilities

Facilities	Polythene bags and sacks	Dustbins	Plastic containers	Others	Total
Number of respondents	68	33	49	96	246
Percentage (%)	27.6	13.4	19.9	39.1	100

Source: Jonah, 2017.

Waste storage facilities
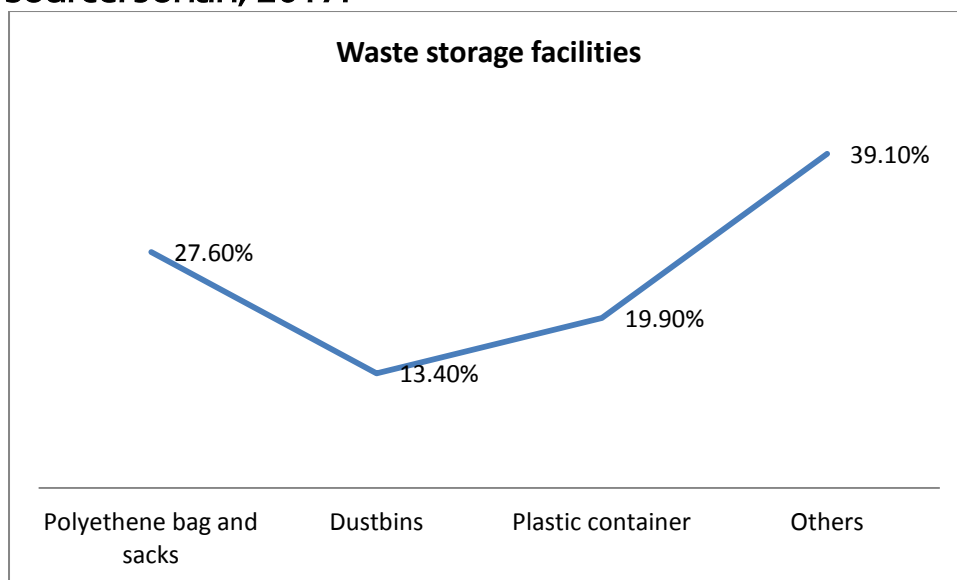
Table 3: Refuse Collection Agents

Solid waste collector	Local Government	Household members	Hired Labour	Total
Number of respondents	23	167	56	246
Percentage (%)	9.3	67.9	22.8	100

Source: Jonah, 2017.

Storage collection agents

67.90%

22.80%

9.30%

Local government   Household memebers   Hired Labourer
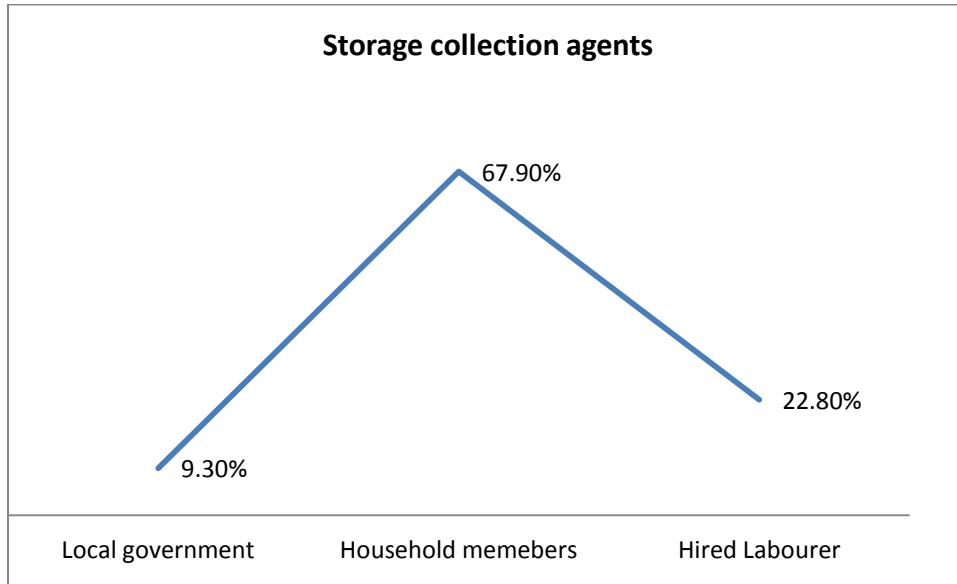
Table 4: Frequencies of Refuge Collection and Disposal

Frequencies	Daily	Weekly	Two-week	Monthly	Total
Number of Respondents	116	75	33	22	246
Percentage (%)	47.2	30.5	13.4	8.9	100

Source: Jonah, 2017.

Frequencies of refuge collection and disposal

47.20%

30.50%

13.40%

8.90%

Daily   Weekly   bi-weekly   Monthly

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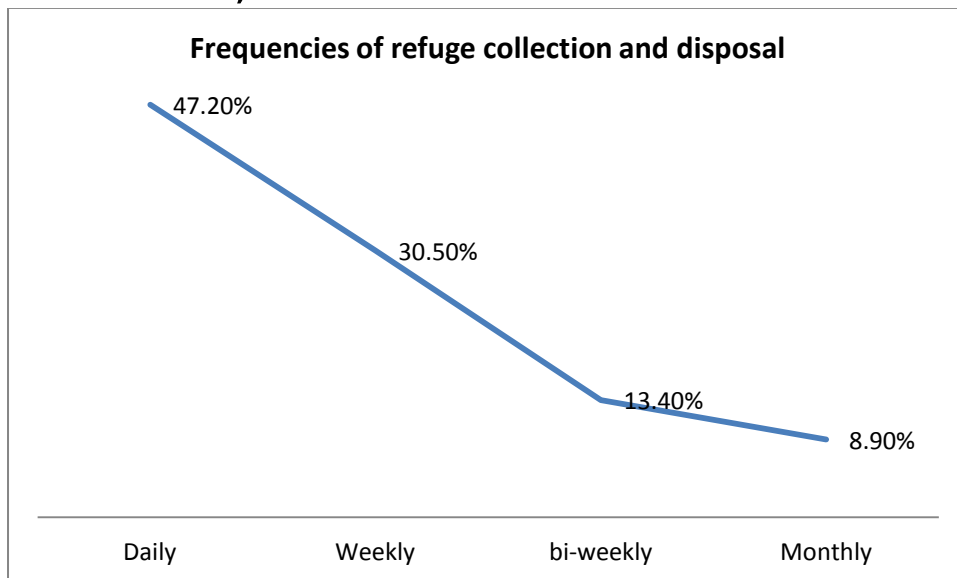
Table 5: Distances of Refuse Disposal Sites from Households

Distance(m)	Less than 25	26-50	51-75	76-100	Beyond 100	Total
Number of Households	89	78	50	21	08	246
Percentage (%)	36.2	31.7	20.3	8.5	3.3	100

Source: Jonah, 2017.

Distance of refuse disposal sites from households

36.20%
30.50%
13.40%
8.90%
3.30%

| Less than 25m | 26- 50m | 51-75 | 76-100 | 100 Above |
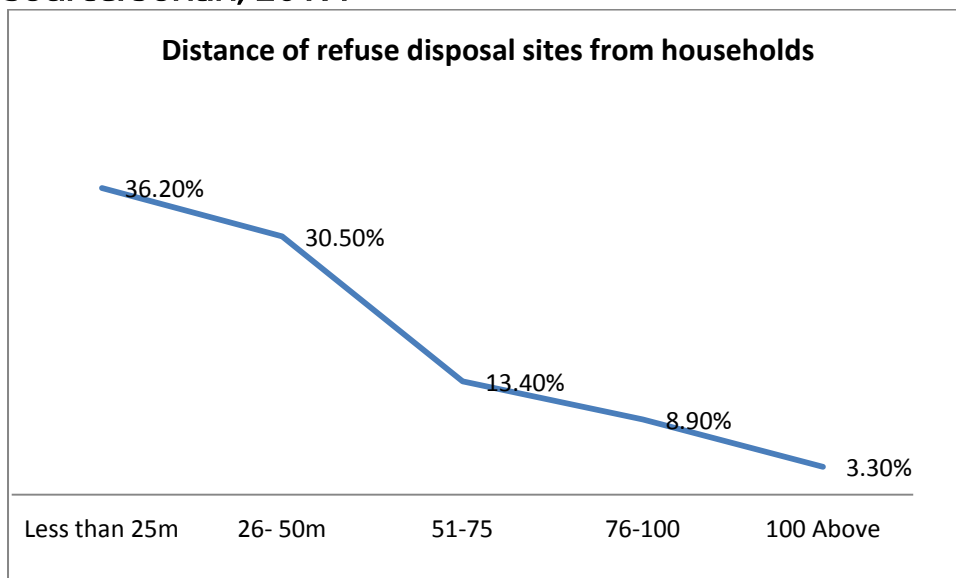
Table 6: Refuse Disposal Methods

Disposal method	Pit Dumping	Burying	Open dumping	Burning	Streams dumping	Total
Number of Households	28	26	123	61	08	246
Percentage (%)	11.4	10.6	50.0	24.8	3.2	100

Source: Jonah, 2017.

Refuse disposal methods

50.00%
24.80%
11.40%
10.60%
3.20%

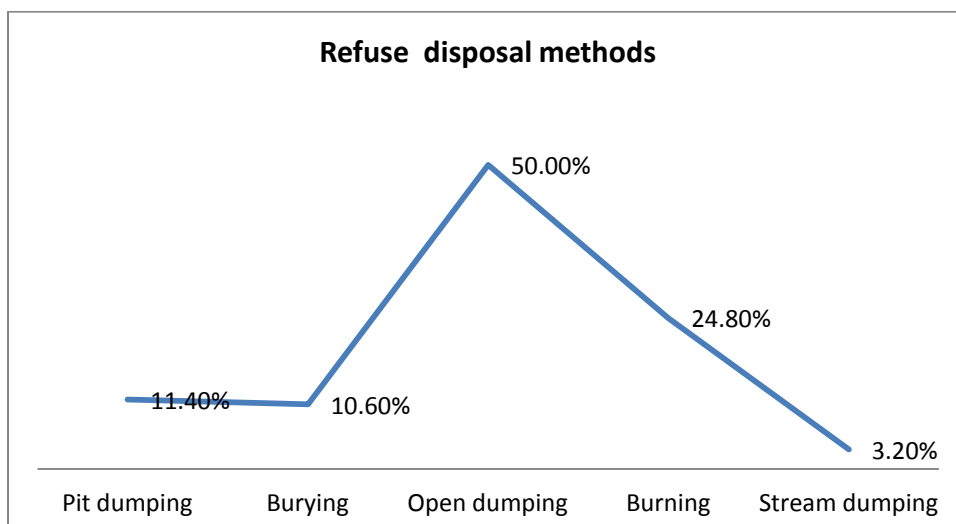| Pit dumping | Burying | Open dumping | Burning | Stream dumping |

Table 7: Common Health Risks Linked with Improper Refuse Disposal.

Health risks	Infection	Suffocation	Bites and stings	Injuries	Discomfort	Total
Number of affected respondents	67	63	55	13	46	244
Percentage (%)	27.5	25.8	22.5	5.3	18.9	100

Source: Jonah, 2017.

Common health risks linked with improper refuse disposal
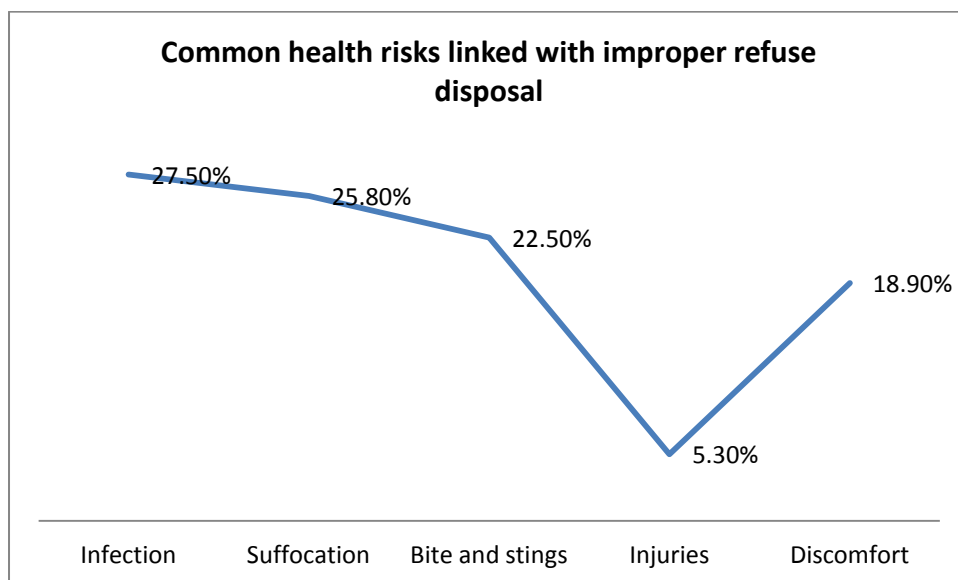

Table 8: Common Infections Associated with Refuse Disposal.

Common infections	Dysentery and diarrhea	Cholera	Malaria	Cough and sore throats	Skin infections	Total
Number of affected respondents	81	18	78	36	25	238
Percentage (%)	34.0	7.6	32.8	15.1	10.5	100

Source: Jonah, 2017.

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Common infections associated with refuse disposal

34.00%   32.80%

15.10%

10.50%

7.60%

Dysentry and   Cholera   Malaria   Cough and sore   Skin infections
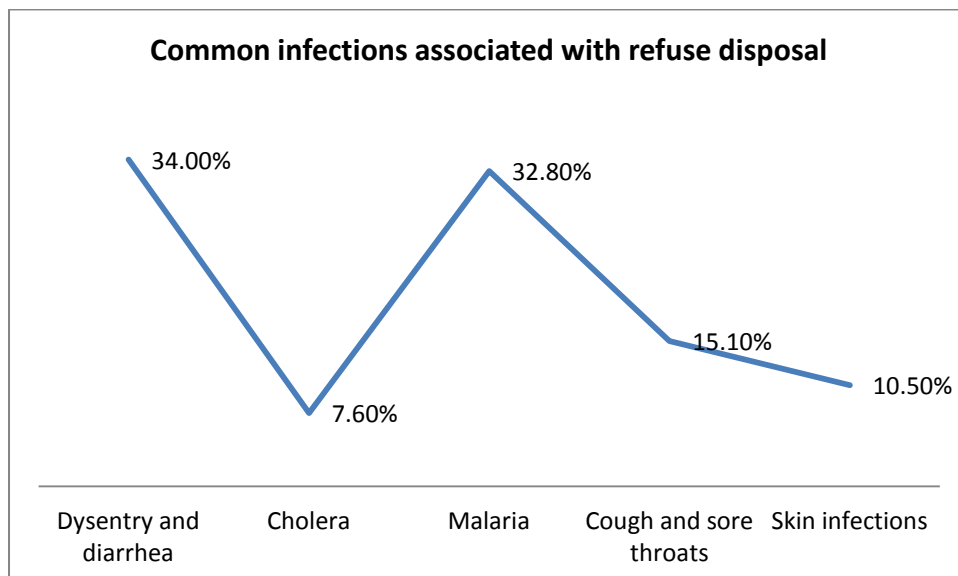diarrhea   throats

Table 9: Frequency of Visitation to Hospital, November (2016) to April(2017)

Frequency of hospital visits	Nil	Once	Twice	Three time	More than three times	Total
Number of respondents	29	41	92	57	15	234
Percentage (%)	12.4	17.5	39.3	24.4	6.4	100

Source: Jonah, 2017.

Frequencies of visitation to hospital

39.30%

24.40%

17.50%

12.40%

6.40%

Nil   Once   Twice   Three times   More than three
time
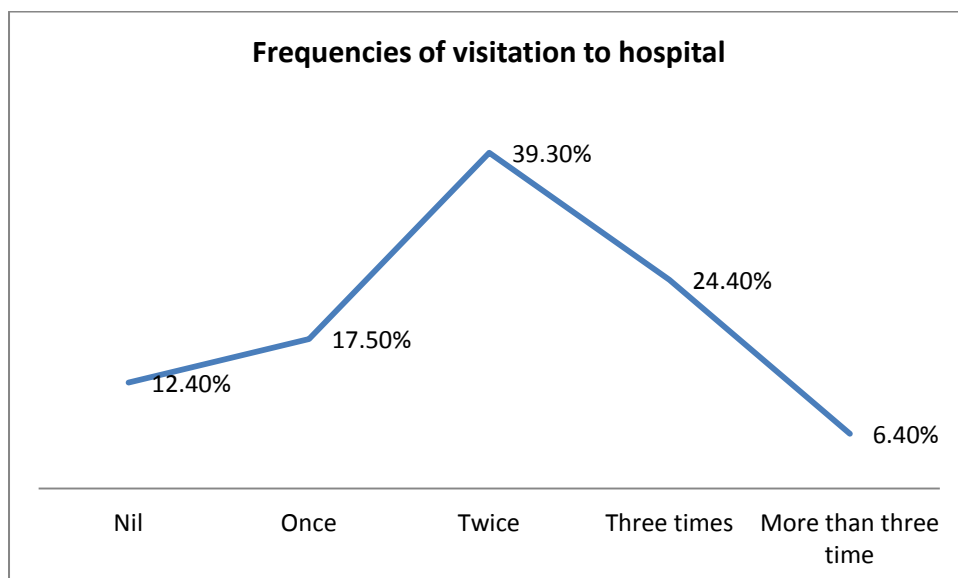
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