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Solid waste management in internally displaced persons IDPS camps in Maiduguri Borno state Nigeria

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ABSTRACT

The aim of this study is to examine the solid waste management conditions of Internally Displaced Persons (IDPs) camps in Maiduguri, Borno State. The research is descriptive in nature qualitative approached were used. The primary data for the research was sourced through the use of questionnaire and interview using a combination of purposive and convenience sampling. While books, journals, newspapers, magazines and internet materials made up the secondary data. The data collected were coded, edited, presented and analyzed using descriptive statistics through frequency tables and percentages. A total of 197 IDPs participated in the study. The findings revealed that almost half of the respondents (45.7%) revealed that food waste is the highest type of solid waste generated in the camps this is because the food is the basic needs for the livelihood of the IDPs in the camps. And also (36.5%) of the respondents indicated that fine was the second largest type of solid waste generated in the camps. Therefore, the burning of fuelwood as a source of energy can produce fine and this is environmentally not friendly which generate air pollution and environmental degradation. The study revealed that majority 122(62.0) of the respondents perceived air pollution was the consequences of solid waste disposal in the camps. While 38(19.3%) of the respondents reveals that the spread of germ is the consequences of solid waste disposal. Similarly, the study found that incineration was used for managing waste in the camps. Some NGOs contributed in sanitation through Water Sanitation and Hygiene (WASH) committee which conducts regular sensitization on the danger of poor waste management. The study recommends among others the need for intensive education to promote positive attitude for solid waste management among the IDPs.

Keywords— *Solid Waste, Management, Sanitation, Polythene*

1. INTRODUCTION

Waste may be defined as substances or objects discarded, worthless, unwanted, and defective, of no value from a manufacturing or production process. They may also be defined as substances or objects, which are disposed of, according to the provision of a national law (Ayuba 2005). This generally results in an increase in waste generation typically in plastics and metals. It should also be noted that poor solid waste management is often a problem that increases after the immediate response period as more resources and people are made available during the emergency. Poor or no disposal of garbage and waste increases serious risks such as the pollution of surface water, groundwater and the environment in general. This is a perfect breeding ground for flies and will attract rats and other rodents that are vectors for various diseases (WHO, 2005). Solid waste disposed of in landfills is usually subjected to a series of complex biochemical and physical processes, which lead to the production of both leachate and gaseous emissions (Usman et. al, 2016). Solid waste comes from a variety of sources in the period following a disaster. Immediately following the disaster event, solid waste is composed of destroyed and damaged infrastructure downed vegetation, and other sources Green Recovery and Reconstruction Toolkit (GRRT 2010).

Poor or no disposal of garbage and waste increases serious risks such as the pollution of surface water, groundwater and the environment in general. This is a perfect breeding ground for flies and will attract rats and other rodents that are vectors for various diseases (WHO, 2005). As long as refuse is removed from the streets, the average individual seems completely satisfied with the

state of the environment, not wanting to be bothered by other aspects of life that might be infringing on the well being of the individual in the neighborhoods or the society at large (Bailey, 2008).

Solid waste management practices can differ from developed and developing nations, for urban and rural areas, and for residential and industrial producers. Management of non-hazardous metropolitan areas is usually the responsibility of the local government authorities, while management of non- hazardous commercial and industrial waste is usually of the responsibility of the generator subject to local, national or international authorities (Hoornweg, Lam & Chandhry, 2005). Waste management simply means the collection, evacuation, processing or disposal, managing and monitoring of waste materials to minimize its consequences on humans and the environment. There are several methods of managing all the various types of waste, (Hoornweg, 2005). For low-density refugee camps, the best waste disposal option is the family solid waste pit similar to those used in rural communities. If the plot size is too small for family pits, treat the camp like an urban area by using communal pits or larger disposal sites away from the camp.

- **Generation of Waste** The growth of human population coupled with increased economic activities in the city and communities of Bayelsa state had resulted in a high rate of solid waste generation. A fundamental attribute of solid waste is that it is inevitable as almost every human activity involves the generation of waste in solid, liquid and gaseous forms. Social dynamics such as modernization and economic resource allocation had forestalled a mismatch between the rate of waste generation, the rate of collection and disposal (Johnson, 2010).
- **Waste Storage, Collection, Transportation and Disposal Methods** Refuse storage, collection and management have continued to pose a major challenge to both developing and developed countries. Transport of waste from households, and other generation sites is a growing problem. The management of solid waste is far from being satisfactory in Bayelsa state. Many parts of the city and communities do not benefit from any organized waste management services and therefore wastes are unattended to, buried, burnt or disposed of haphazardly. In areas where the Authority does the collection, it is often irregular and sporadic. Recycling of waste is negligible while the methods used for collection, evacuation, and final disposal are unsatisfactory (Johnson, 2010).

2. MATERIAL AND METHODS

Maiduguri is located in the North Eastern corner of Nigeria between latitudes 10° N and 14° N and longitude 11° 30 E and 13° 14 45 E. It occupies an area of 30,355Sq km sharing boundaries with the following LGAs, Konduga, Jere and Mafa. Maiduguri serves as the commercial nerve center serving not only the state but includes three neighboring countries namely Cameroon, Chad and Niger (Waziri, 2009). Maiduguri was made to be the state capital of Borno in 1976 from the split of North Eastern State. The town is divided into many political wards and shares borders with many LGAs of the state. Majority of the inhabitants are Kanuri speaking and they depend on agriculture (Waziri, et al., 2009). The research is descriptive survey design; it is a survey that enables the researcher to study a sample of the population while the findings from the research are generalized to the entire population.

2.1 Sources of data collection

In any research collection of relevant data required for the investigation of problems stated cannot be over-emphasized. Research results are meaningful when accurate and relevant data on specific problems are logically and carefully assembled. Thus the sources of data collection in this research are basically two:-namely primary and secondary data.

2.2 The population of the study

In this study, the target populations were all the IDPs living in four sampled camps in Maiduguri which includes, Teachers Village camp (4,426), NYSC camp (5,125), Bakkasi camp (16,767) and Dalori 1 camp (22,000) with a total number of (48,318).

2.3 Sampling methods and procedure

Internally Displaced Person Camps within Maiduguri were purposively selected based on security consciousness compared to the high risk involved in accessing other camps outside Maiduguri. The study employed two types of sampling techniques including purposive sampling and convenience sampling. All the four IDP Camps were included in the study. The convenience sampling method was used to select IDPs which are the sampling units of the study. All IDPs in the four sampled Camps of Maiduguri were included as sampling unit having an equal chance of being selected. The sampling frame was the list of registered IDPs of the camp and this list was obtained from registration performed by the camp management committee in each camp and used for the selection of IDPs. A total of 200 copies of questionnaires were administered to the four purposively sampled IDP camps and convenience sampling techniques were applied. Thus a total of fifty (50) copies of questionnaires were administered to each of the four (4) purposively sampled IDP Camps. Using the convenience sampling method, IDPs were selected randomly by means of the numbers from the registered list of IDPs in each of the four Camps which is the sampling frame. The first number was selected from the 15th registered list of the IDPs and given an interval of 15 numbers of IDPs. During the data collection, respondents from the 15 intervals which are systematically selected IDPs that were eligible and willing to participate in the study was made to take part in the study.

2.4 Data analyses

All responses to the research data collection instrument of questionnaire and interview schedule were first checked, edited and coded. Afterward, data were entered using SPSS (version 21) statistical package. Descriptive statistics were performed by means of frequency distribution and percentages and these were displayed using tables. These provided the researcher with an evidence to justify the claim of solid waste management in the IDP Camps.

3. GEOGRAPHICAL DISTRIBUTION OF THE IDPS BY PLACE OF ORIGIN

Borno has been directly affected by the insurgency with parts of its territory about 21 LGAs out of 27 LGAs in Borno state occupied by Boko Haram. These LGAs include Bama, Gwoza, Marte, Konduga, Mafa, Mobbar, Nganzai, Ngala, Gubio, Damboa, Dikwa,

Kala Balge, Guzamala, Askira/Uba, Abadam, Kukawa, Monguno and Chibok which are fully occupied. The IDPs have been displaced because of the insurgency. There are 15 IDP camps officially recognized by the Borno State Government later some of the camps were migrated to others because of the government of the schools. The camps are located in Maiduguri Municipal Council and Jere LGAs. The population of internally displaced persons in camps across Borno State is fluid, depending on the frequency of violence in other parts of the state. The total number of IDPs residing is fluctuated and currently about 105,275 living in the camps.

The total number of IDPs identified in Borno 2014 is 389,281 and IDPs (105,399 IDPs in the camps). Bama local government has the highest number of IDPs (35,275 IDPs), followed by Gwoza (13,687 IDPs), Marte (13,517 IDPs) and Konduga (12,135 IDPs). The situation is different in Bama since the majority of the 35,275 IDPs identified were displaced because of the Boko Haram insurgency that occurred. The second largest IDPs are in Konduga (13,687 IDPs) and Marte (13,517 IDPs) were also displaced by the same insurgency. In Borno, IDPs originate mainly from Bama and Damboa which are also occupied by the insurgents. The vast majority of IDPs in the state live with host community while the remaining live in camps and camp-like sites. All sites have an official established Camp Management Committee (CMC) composed of members from the displaced community at the site. The most common types of shelter identified are schools and government buildings later government decides to reopen schools they watch with other camps. The other types of shelter include tent, self-made tents, and bunkhouses DTM, (2015). The situation is more critical in Maiduguri where IDPs do not have access to electricity. The total number of IDPs residing in the 4 sampled IDP camps include; Teachers Village camp (4,426), NYSC camp (5,125), Bakkasi camp (16,767) and Dalori 1 camp (22,000) with a total number of (48,318) USAID (2015).

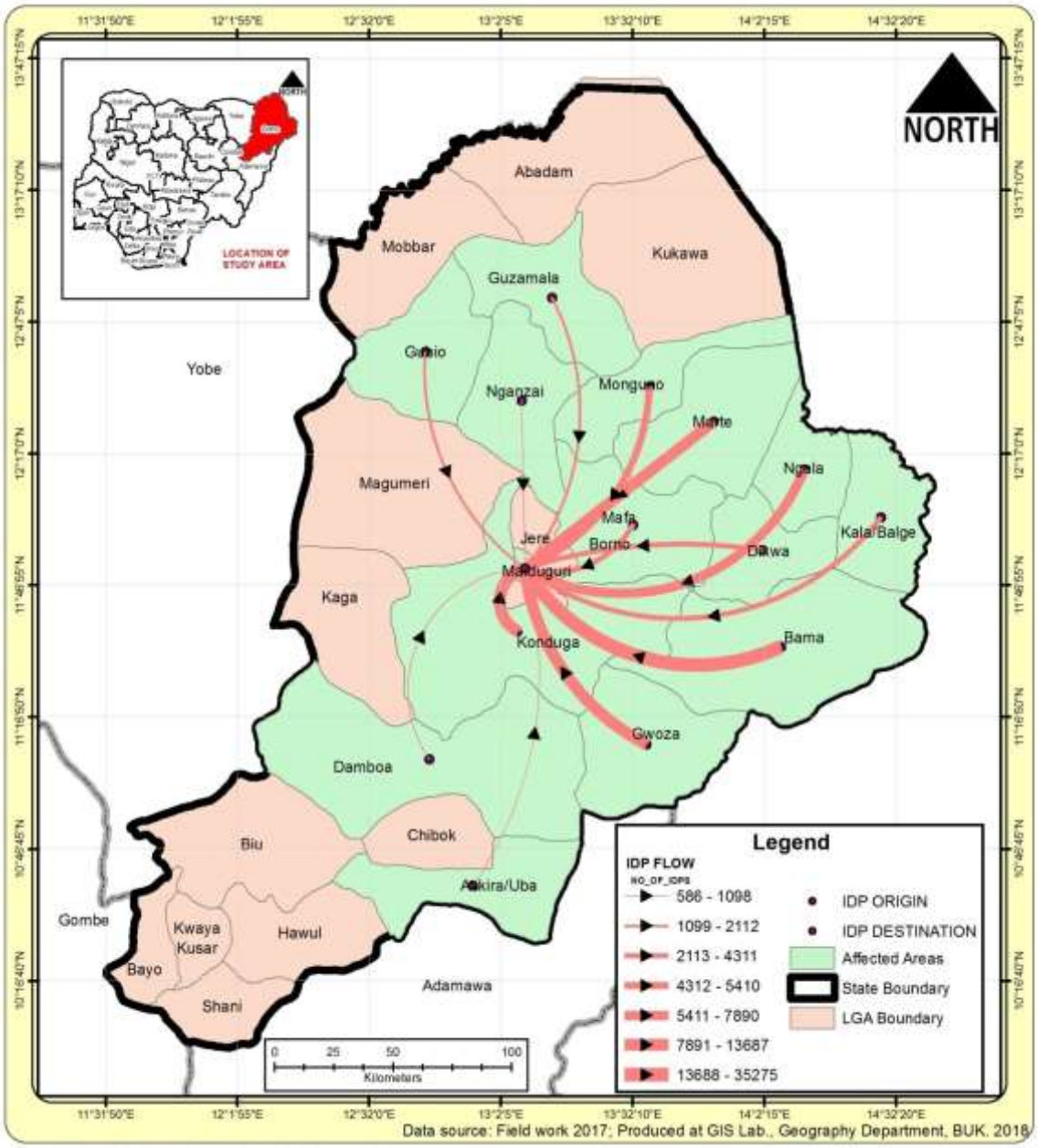

Fig. 1: Flowchart of IDPs by LGAs (Maiduguri, Borno State)

Source: Field Survey (2016), Produced at GIS Lab Department of Geography BUK (2018)

4. RESULTS AND DISCUSSION

4.1 Solid waste generation

Table 1 below shows the types of solid waste generated in the Camps. 45.7% of the respondents revealed that solid waste generated in the camps was food waste, 36.5% of the respondents reveal that fines (ashes, dust & sand) was the type of solid waste generated,

10.7% responded polythene, 6.1% indicated packaging materials and 1.0% responded to another source of solid waste generated in the camps. It can be observed from the below table that, almost half of the respondents 45.7% revealed that food waste is the highest type of solid waste generated in the camps this is because the food is the basic needs for the livelihood of the IDPs in the camps. And also (36.5%) of the respondents indicated that fine was the second largest type of solid waste generated in the camps. Therefore, the burning of fuelwood as a source of energy can produce fine and this is environmentally not friendly which generate air pollution and environmental degradation the study in agreement with the findings of Johnson, (2010) and Hoornweg, Lam & Chandhry (2005).

Table 1: Solid waste generated in the IDP camps

IDP Camps	food waste	packaging materials	Fine (ash, dust & sand)	polythene	Total
Teachers Village	33	4	4	7	48
	(16.8%)	(2.0%)	(2.0%)	(3.5%)	(24.4%)
NYSC	31	2	16	6	55
	(15.7%)	(1.0%)	(8.1%)	(3.0%)	(27.9%)
Bakkasi	17	2	18	6	43
	(8.6%)	(1.0%)	(9.1%)	(3.0%)	(21.8%)
Dalori1	9	4	34	4	51
	(4.6%)	(2.0%)	(17.3%)	(2.0%)	(25.9%)
	90	12	72	23	197
Total	**(45.7%)**	**(6.1%)**	**(36.5%)**	**(10.7%)**	**(100.0%)**

Source: Field survey, 2017

4.2 Perceived Consequences of inappropriate solid waste disposal

Table 2 reveals that 38(19.3%) of the respondents perceived spread of germs was the consequences of inappropriate solid waste disposal, 6(3.0%) responded perceived bad smell (odor) was the consequences of inappropriate solid waste disposal, 17(8.6%) of the respondents perceived clogging drains was the consequence of inappropriate solid waste disposal, 122(62.0%) responded perceived causes air pollution was the consequences of inappropriate waste disposal and 14(7.1%) of the respondents perceived breading sites for insects as the consequences of inappropriate solid waste disposal. Therefore, the study revealed that majority 122(62.0) of the respondents perceived air pollution was the consequences of solid waste disposal in the camps. while 38(19.3%) of the respondents reveals that spread of germ is the consequences of solid waste disposal and this can leads to disease outbreak within the IDP camps the study in agreement with the findings of Munir, (2015).

Table 2: Perceived consequences of inappropriate solid waste disposal

IDP Camps	Spread of Germs	Bad smell (odor)	Clogging of drains	Causes air pollution	Breeding sites for insects	Total
Teachers	0	2	0	47	0	49
village	(0.0%)	(1.0%)	(0.0%)	(23.9%)	(0.0%)	(24.9%)
NYSC	28	4	6	12	0	50
	(14.2%)	(2.0%)	(3.0%)	(6.1%)	(0.0%)	(25.4%)
Bakkasi	3	0	3	37	5	48
	(1.5%)	(0.0%)	(1.5%)	(18.8%)	(2.5%)	(24.4%)
Dalori1	7	0	8	26	9	50
	(3.6%)	(0.0%)	(4.1%)	(13.2%)	(4.6%)	(22.3%)
Total	38	6	17	122	14	197
	(19.3%)	**(3.0%)**	**(8.6%)**	**(62.0%)**	**(7.1%)**	**(100.0%)**

Source: Field Survey, 2017

4.3 Means of managing solid waste

Table 3 reveals the available means of managing solid waste in the camps. 36(18.3%) of the respondents indicate that evacuation was the available mean of managing solid waste in the camps, 47(23.9%) responded collection of waste was used to managing solid waste in the camps, 1(0.5%) of the respondents revealed that recycling is the means of managing solid waste in the camps, 106(57.4%) of the respondents shows that incineration is the available means of managing solid waste in the IDPs Camps. Therefore, the study revealed that an incineration was the highest mean of managing waste in the camps and this method could be detrimental or harmful to the health of the IDPs because it causes diseases such as cardiovascular disease, respiratory tract infection and skin rashes among other. Recycling was the least means of managing waste in the camps. As indicated in figure 2 metal container was open while children are exposed to it and therefore it is a threat to the health of the IDPs. Figure 3 dump site near the IDPs tents in Dalori 1 camp as shown in the Figure 3 IDPs were exposed to the dump site and this is a risk to the health of the IDPs the study in agreement with the findings of World Health Organization (1991).

Fig. 2: Metal Waste collection container in NYSC IDPs Camp

Source: Field Survey 2017

Fig. 3: Dumping site in Dalori 1 IDPs Camp

Source: field survey, 2017

Table 3: Means of managing solid waste

IDPs Camps	Evacuation	Collection	Recycling	Incineration	Total
Teachers village	3 (1.5%)	8 (4.1%)	1 (0.5%)	37 (18.8%)	49 (24.9%)
NYSC	10 (5.1%)	13 (6.6%)	0 (0.0%)	27 (13.7%)	50 (25.4%)
Bakkasi	9 (4.6%)	10 (5.1%)	0 (0.0%)	29 (14.7%)	48 (24.4%)
Dalori1	14 (7.1%)	16 (8.1%)	0 (0.0%)	20 (10.2%)	50 (25.4%)
Total	36 **(18.3%)**	47 **(23.9%)**	1 **(0.5%)**	106 **(57.4%)**	197 **(100.0%)**

Source: Field Survey, 2016

5. CONCLUSION

As has been demonstrated above, the situations of the IDPs to have full attainment of practice and managing solid waste to improved environmental sanitation is a challenge. From the findings of this study, it emerged that the majority of IDPs had respondents 45.7% revealed that food waste is the highest type of solid waste generated in the camps this is because the food is the basic needs for the livelihood of the IDPs in the camps. The situation with respect to waste management was adequate as a high proportion of IDPs

participate in environmental sanitation in the camps, the study indicated that incinerations were the high mean of managing solid waste in the camps and therefore, it is unfriendly to the environment. Thus, the inadequate level of service to the study area could be seen as an opportunity for further focused improvements towards the universal access to environmental sanitation practices in an innovative way.

6. RECOMMENDATIONS

Therefore, the following recommendations were made in order to alleviate the problems of solid waste management in the studied area based on the findings of this study:

- Promoting proper IDPs solid waste management during onsite handling, storage and collection and minimize the adverse effects caused by improper practices.
- Crude dumping and open burning of waste should be completely avoided by encouraging safe solid waste collection and disposal methods.
- Increased emphasis on improved basic sanitation and reducing environmental contamination should be made by promoting total Sanitation approach which aims to achieve universal access to sustainable sanitation.

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