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Religious Camps or Waste Haven: A Study of Waste Management Techniques in Religious Camps along Lagos-Ibadan Express Way

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Abstract
This paper examines solid waste management techniques employed in religious camps along Lagos – Ibadan Expressway. It identified the types of waste and quantity of waste generated in the selected camps. A total of two hundred and sixty one (261) questionnaires were administered to respondents in the three (3) camps using simple random sampling technique. Chi square (x^2) was used to relate the significance of frequency in solid waste collection and quantity of waste generated while Regression analysis was used to examine relationship between quantity and volume of waste generated. Likhert scale was used to rank opinion of respondents on waste generation and disposal method as well as their satisfaction with service rendered by waste collection bodies in the study area. The study revealed that a bulk of waste generated is food waste (89.5%) and the least generated is metal (8%). Also majority of the respondents (39.6%) have their waste collected daily, some have their waste collected weekly (32.7%), anytime (22.7%) and monthly (5%). The highest quantity of waste generated in the selected camp is 27kg and the least quantity generated is 0.5kg. Waste generated during special programmes is very high and majority of the respondents are merely satisfied with final disposal method in camp especially in Redeem camp. The study recommends that waste generated particularly by residents should be collected regularly and also disposed in a suitable location. This will undoubtedly prevent littering of waste, offensive odour as well as poor aesthetic value in the camps. Appropriate waste management method like sanitary landfill and structured control tipping should be adopted respectively.
Keywords: Waste, Management, Technique, Religious Camp, Sustainability.

1. Introduction

It is worth nothing that cities especially in developing countries are less environmentally conducive for healthy human living due to the plethora of problems evident in most of them (Afon, 2006). Among these problems are flooding, pollution, traffic congestion and poor solid waste management (Rushbrook and Pugh, 1999). Paramount among these problems is the issue of solid waste management, rapid urbanization, increasing industrialization, rising incomes and a more sophisticated form of consumerism, leading to an increase in the amount and toxicity of waste generated especially in cities.

The problem of solid waste management is a vital municipal responsibility which requires more attention than it is receiving particularly in developing countries like Nigeria. Governments in both Federal and State levels have taken some drastic steps like establishment of Ministry of Environment, Waste management Board, among others in making sure that this problem is tackled. However, it is daunting to observe that, efforts of Governments towards this malaise is not yielding fruitful results when compared to her interventions in the provision of other essential utilities and infrastructures, such as water supply, energy, transport and housing. The rate at which heaps of solid waste continue to deface the landscape of these cities, coupled with the fact that 87% of Nigerians use open disposal methods adjudged as insanitary is alarming (NESP, 2005). Apart from the fact that solid waste are disposed indiscriminately without prior sorting or treatment, the method of garbage collection systems eventually pose serious health hazards on human population (WHO, 1999). Another perplexing feature of solid waste management challenges is the communicability of its imperil features. Its menace is no longer exclusive to the urban environment but had significantly extended to the rural and urban hinterland in which the suburban areas along Lagos-Ibadan expressway are part.

Among the most widely plied roads in Nigeria is Lagos-Ibadan expressway. This road is by far the most important artery carrying lifeblood into the country's heart as it serves as the major transit that connect Lagos (the commercial hub of the country whose seaport handles over 80 per cent of all imports and exports to the country) to other states in the country (Fagbenle, 2012). The road had led to the making of new towns and opening of new suburbs along its route. Among these new towns and suburbs are Mowe, Ibafo, Ogere, Magboro and the respective religious camp communities which are the major focus in this study. These camps serve as centrifugal forces attracting people from within and outside the country especially during annual conventions and monthly programmes. The resultant environmental effects of the agglomeration of people in these areas are the problems of traffic congestion, loss of biodiversity, increased waste generation among others. This is not far-fetch having known that there is a positive correlation between population and waste generation in other words, waste generation increases with increasing population.

The rate of solid waste generation increases by the day in Nigeria with increase in urban population. An estimated 20kg of solid wastes is generated per capital per annum in Nigeria, equivalent to 2.2 million tons a year (Olafusi, 2004). A greater percentage of these waste are collected and dumped on the surface of the ground, thereby posing severe threat to the health of the populace. Thus waste is said to be transferred rather than disposed in Nigeria (Nigeria Environmental Action Study Team, 1989). The situation of waste management in religious camps along Lagos-Ibadan expressway is in no wise different. One could readily observe different municipal wastes indiscriminately disposed on camp grounds with collection and final disposal as just a mere transfer from one surface of the camp ground to the other without any effective management technique. A bid to create and maintain a healthy and sustainable solid waste management in these camps, raise the following questions: what are the components of solid waste generated in the religious camps? What are the source(s) of these wastes? What is the volume of the waste generated in these camps daily? Which technique is adopted for solid waste management in the camps? How effective are these techniques? What are the environmental effects of the adopted waste management strategies? How can solid waste management be improved in the study area? This study therefore seeks to provide answers to these questions by evaluating solid waste management techniques employed in the study area and subsequently proffer possible sustainable measures for solid waste management for the study area.

2. Review of Literature

Waste, generally known as anything no longer useful to the disposer has been conceptualized by several scholars (Olafusi, 2004 Adedibu 1993,88,89, Afon 2006). (NISP 2003), defined it as any unavoidable material resulting from an activity, which has no immediate economic demand and which must be disposed off. Similar to this is the definition given of Oyediran, (1991). He defined waste as useless, unwanted or defective material resulting from normal activities (domestic, industrial, agricultural, institutional, commercial etc) which is of no further value for a manufacturing or production process and therefore must be disposed off. Some waste materials are normally safe but can be hazardous if not managed properly. One gallon (3.75 liters) of used motor oil, for example, can contaminate one million gallons (3,750,000 litters) of water.

Waste exist in solid, liquid or gaseous forms, nevertheless this study focuses on solid waste. Solid waste according to Cointreau, (1982) is defined as non-air and sewage emissions created within and disposed-off by a municipality, including household garbage, commercial refuse, construction and demolition debris, dead animals, and abandoned vehicles. The majority of substances composing solid waste especially in municipalities include paper, vegetable matter, plastics, metals, textiles, rubber, and glass (USEPA 2003). The quantity and composition of solid waste generated in an area is known to be affected by residents' socio-economic, cultural and demographic attributes, coupled with climatic factors (Cargo et al., 1978). Therefore one expects to find different waste components in different residential and other activity areas as well as different climatic zones. In developing countries, waste generated is composed of higher proportion of organic and considerably less inorganic components (Cointreau, 1982). The large amount of organic material makes the waste denser, with greater moisture and smaller particle size (Cointreau 1982). However, studies, findings and reports have confirmed that what constitutes waste in a particular locality at a particular time may not be waste in another locality, but rather a resource. This reflect how difference in culture, economic status as well as level of technological advancement constitute to the various definition of waste from place to place and from time to time.

Of much concern is not the issue of what constitute waste but rather how to manage it sustainably. The overall goal of solid waste management is to collect, treat and dispose solid waste in an environmentally and socially satisfactory manner using the most economical means available such that the public and the environment is protected from potential harmful effects of the waste (World bank, 2011). Nevertheless, Tchobanoglous et al., (1993) opined that the knowledge of the source(s), quantity and component of wastes generated in an area is required to design an appropriate solid waste management system for that particular area. Cointreau, (1982) further observed that often times, technologies used in industrialized countries are inappropriate for developing countries. Even garbage trucks are less effective because of the much heavier, wetter, and more corrosive quality of their burden. In addition to these assertions, other technologies such as incinerators, recycling among others are often far too expensive to be applied in poor nations. There is therefore a dare need to design a suitable waste management technique for a particular place and at a particular time.

3. Material and Methods

Both primary and secondary data were used in the study. Three camps: Assemblies of God (i.e Bethel camp), Mountain of Fire and Miracles Ministries (aka Prayer City), and the Redeemed Christian Church of God (Redemption camp) Laburo, Mowe village, km 46 were purposively selected for sampling. The target population for questionnaire administration include: camp residents, camp traders and camp management. The estimated number of residents in each camp was acquired from the camp management of each camp. The number of

residents in assemblies of God Bethel camp is fifty five, MFM is one thousand five hundred and five, and Redeem camp has the largest population of two thousand eight hundred and sixty four apart from temporary residents (i.e. those that reside only during special programmes). This population data was used to determine the number of questionnaires that was administered to residents in each camp. In Assemblies of God camp, a representative faction of one third of the estimated population was sampled but in MFM and Redeemed camp, a fraction of 0.04 of the estimated population was determined and sampled, this constituted this sample size. The number of questionnaire administered to traders was obtained by taking a ratio 1:2:3 of the number of questionnaires administered to residents of each camp. The proportion of questionnaire distributed is due to the population size of each camp that is, the larger the population, the larger the number of respondents sampled and vice versa.

Structured questionnaires were randomly administered to both the camp residents and the traders, while interview guide was used to obtain relevant information from camp management. A total of 185 camp residents (18, 60 and 107 in Bethel camp, Prayer City and Redemption camp respectively), 77 traders (3, 20 and 54 in Assemblies of God, Mountain of Fire and Redemption camp respectively). Purposive sampling was used to sample traders in each camp since their population cannot be ascertained during the course of this research. The quantity of waste generated was determined with use of weighing scale in kilogram. Data collected were analyzed using cross tabulations, frequency and charts were used to summarize and illustrate nominal variables. Chi square and Regression analysis were used to determine the level of significance between variables in the hypothesis. Likhert scale was also used in ranking respondents' level of satisfaction with the services of the waste collection bodies. Although a total number of 262 questionnaires were administered to both traders and residents, analysis was based on 261questionnaires because one of the questionnaires was not answered

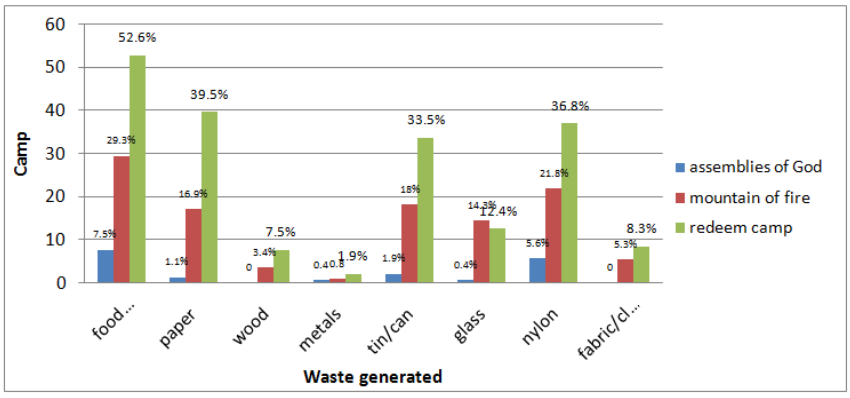
4. Results and Discussion

4.1. Types and Volume of Waste Generated

Food wastes constitute the highest percentage of waste generated in the camps as illustrated in Figure 1: Redeem (52.6%), Mountain of Fire (29.3%) and Assemblies of God camp (7.5%). While paper is the penultimate in the three camps, metal waste is the least type of waste generated. This distribution is expected since most respondents are temporary residents and mostly depend on food vendor for their daily needs and feeding especially during special programmes. Coupled with this fact is that predominant proportion of traders in the selected camps engage in selling of food items, to worshippers during retreat programmes since they are not permanent resident.

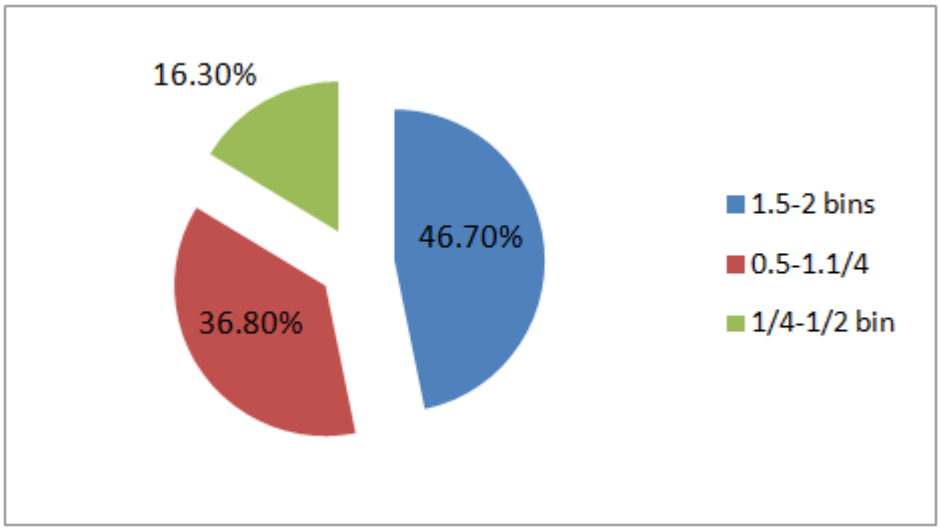
The method of storing waste generated by residents in all the three camps is the use of waste bin or waste baskets. The volume of waste generated daily was also determined with use of big-sized waste bins. The summary of the analysis in figure2 shows that the majority (46.7%) of respondents generate waste with volumes within ranging from of $1^1/_2$ – above 2bins, followed by $^1/_2$ - $1^1/_4$ bins (34.6%) and the least volume generated daily falls within $^1/_4$-$^1/_2$ bins (16.5%). This varied in the sampled camps. For instance, residents generate more waste daily (1.5->2 bins) in Redeem camp compare to Mountain of Fire (1.5-2 bins) and Assemblies of God camp (0.5-1bin). This is because the population also varied accordingly. Using weighing scale to determine the quantity of waste generated the findings from the analysis shows that quantity of waste generated varied from 1.5-3kg ($^1/_4$-$^1/_2$ bins), 3.0-7.5kg ($^1/_2$-$1^1/_4$) and 9.0-12.0kg ($1^1/_2$->2bins). Furthermore, regression analysis confirmed that there is a significant relationship between the volume of waste generated daily in the three camps as determined by the use of Regression analysis with value 0.000 i.e. ($p < 0.05$).

Figure 1: Types of Waste Generated in the Sampled Camps



Source: Authors Field work, 2012

Figure 2: Volume of Waste Generated (Daily) in the Sampled Camps



Source: Authors Field Work, 2012

4.2. Results of Regression Analysis on Relationship between Quantity of Waste and Volume of Waste Generated

Regression analysis was computed for the quantity of waste and the volume of waste generated daily in the three (3) camps. It was discovered from the findings that P value (0.000) is less than 0.05 for the quantity of waste generated daily and the volume of waste generated daily by respondents. This implies that there is a significant relationship between the quantity of waste generated daily and the volume of waste generated daily by respondents. The analysis in Table 1 showed that the quantity of waste generated by respondents daily depends on the volume of waste generated.

Table 1: Relationship between the Quantity and Volume of Waste Generated Daily by Respondents

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7341.700	1	7341.700	167.600	.000(a)
	Residual	11345.472	259	43.805		
	Total	18687.172	260			

a Predictors: (Constant), What is the volume of waste generated daily

b Dependent Variable: What is the quantity of waste generated daily

4.3. Waste management Practises in Camps

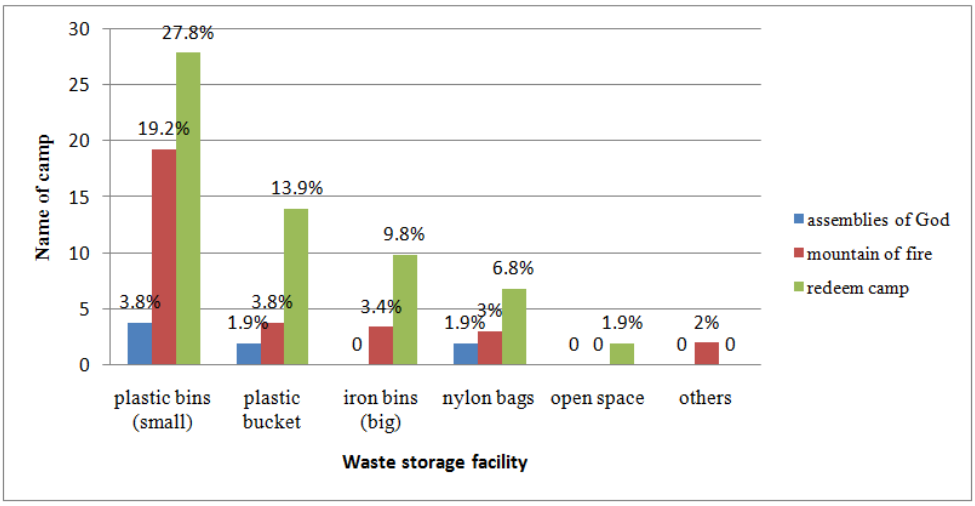
Storage facilities, mode of waste collection, transportation as well as disposal methods were used to assess the technique of waste management in the three camps. Plastic bins (plate 1,2)are the most widely used waste storage facility in the three camps (Figure 3). Nevertheless, other storage facilities such as iron bins (plate3), iron buckets and nylon bags are also utilized. Temporarily stored wastes are collected along road sides (front yard services) in front of the camps with exception of Assemblies of God camp where the door to door service is been rendered. Although the responsibility of waste collection has been vested on camp workers but individuals are also permitted to participate voluntarily. This is prominent in Assemblies of God camp where individuals are the dominant waste collectors.

In assemblies of God, the collection of waste any time (5.3%), this is followed by 1.9% daily and 0.4% weekly. Residents in Assemblies of God are responsible for their waste collection, hence the variation in how often waste is collected in the camps. In Mountain of fire, majority of the respondents get their waste collected daily (15.4%), this is followed by weekly (9.4%), anytime (4.1%) and monthly (1.1%). In Redeem camp, majority of the respondents get their waste collected weekly (22.2%), followed by daily (21.4%), anytime (12.8%) and monthly 3.8%. 5.3% of respondents in Assemblies of God subject their uncollected waste to burning. 1.5% disposes it anywhere. I Mountain of Fire, majority of respondents have no such occurrence of uncollected waste (16.9%), (6%) of the population who experience it dispose it anywhere, (5.3%) burn theirs while (1.9%) dispose it in open spaces. Majority of respondents in Redeem camp have no such occurrence of uncollected waste (18.4%), this is followed by the proportion of respondents that result to burning (16.9%), anywhere (15.4%) and open space dumping (9.4%) (Figure 5). The environmental implications of this include air, water and or land pollution. The processes of burning waste in open air often release obnoxious smells, residue of leachate, encroachment and

disruption of biotic components like flora and fauna. This may have serious implication on sustainability of ecosystem and valuable spaces.

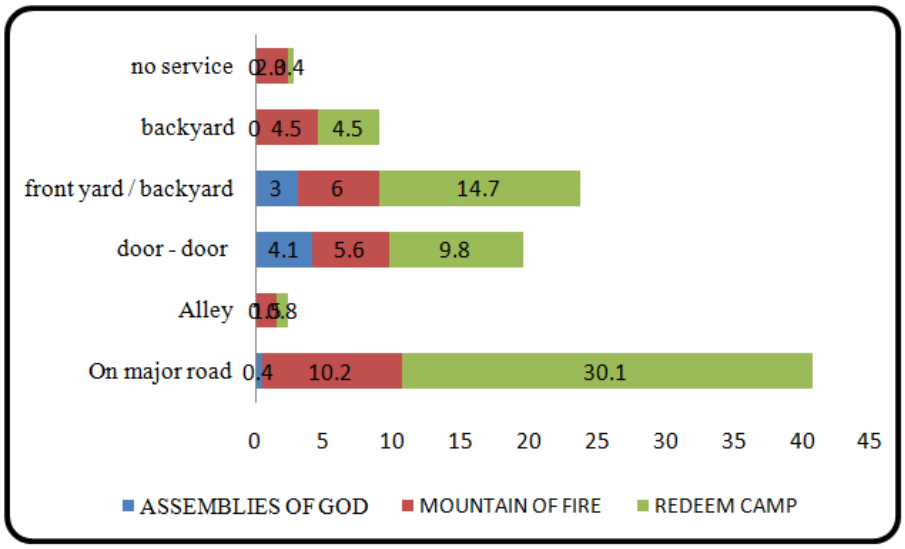
The major medium used to transport waste in Redeem camp (39.1%) and Mountain of fire (19.5%) is open truck. Although sometimes closed truck are used in the camps (i.e Redeem camp and Mountain of fire). There is no record of the use of open truck and closed truck in assemblies of God. On the contrary, the proportion of respondents who use sac/nylons is larger (6.4%) in assemblies of God compared to the other two camps while the remaining proportion in Redeemed camp and Mountain of fire use push cart and sac/nylons. Further analysis using Regression with value 0.000 i.e. ($p < 0.05$) shows that there is a significant relationship between how waste is transported in the three camps.

Figure 3: Distribution of the Waste Storage Facilities in Camps



Source: Authors Field work, 2012

Figure 4: Method of Waste Collection by Residents



Source: Authors field work, 2012.

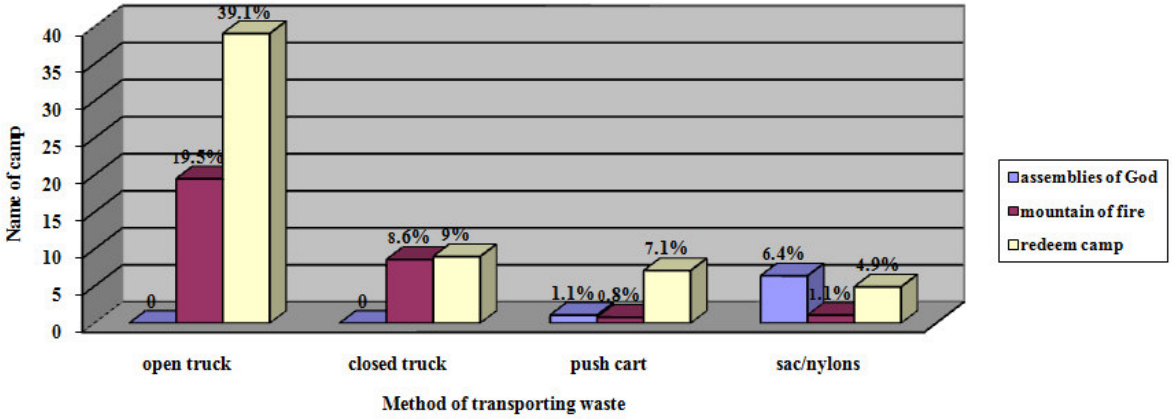
Plate 1: Iron Waste Bins in Mountain of Fire Camp

Source: Authors field work, 2012

Plate 2: Big Sized Waste Bins in the Camps

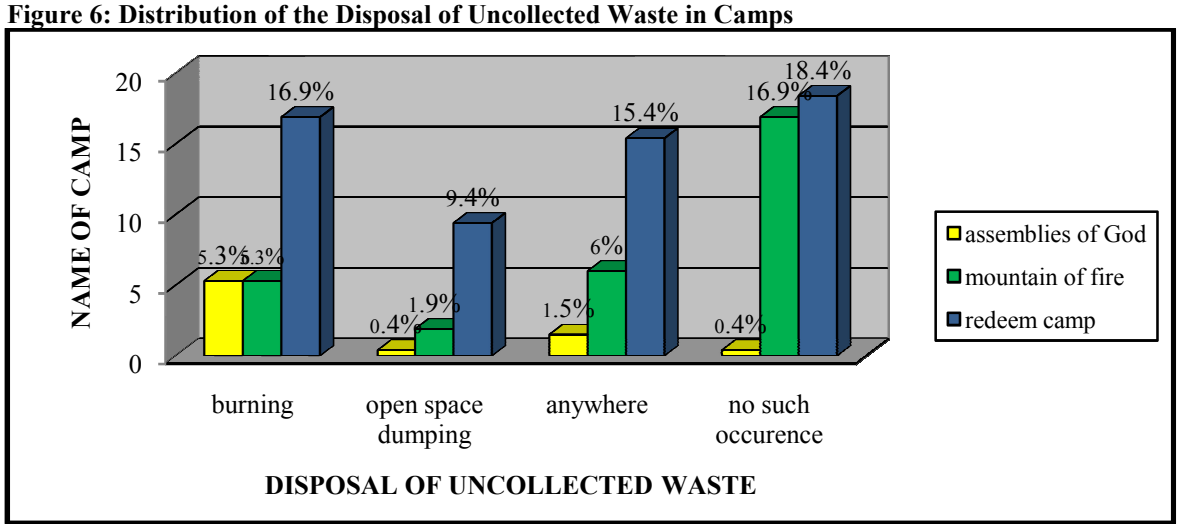
Source; Author's Field Work, 2012

Figure 5: Method of Transporting Waste in the Camps



Source: Authors field work, 2012

Figure 6: Distribution of the Disposal of Uncollected Waste in Camps



Source; Author's Field Work, 2012

Plate 3: Open Dump Site in Redemption Camp

Source; Author's Field Work, 2012

4.4. Chi (x^2) Test of Relationship between Frequency of Waste Collection and Quantity of Waste Generated Daily in the Camps

A chi square analysis was computed for the frequency of waste collection and quantity of waste generated in camp by respondents (Table 2). It was discovered from the findings that P value (0.945) is greater than 0.05 for frequency of waste collection in camp and the quantity of waste generated daily. This implies that frequency of waste collected in camp is not dependent on the quantity of waste generated daily in the camps.

Table 2: Relationship between Frequency of Waste Collection in Camp and Quantity of Waste Generated Daily by Respondents

	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	77.575(a)	99	.945
Likelihood Ratio	85.522	99	.831
Linear-by-Linear Association	4.635	1	.031
N of Valid Cases	260		

Remarks: Not significant, Significant.

4.5. Level of Satisfaction of Respondents to Quality of Service Rendered by Waste Collection Bodies in Camp

Using the Likhert scale to ascertain respondents' satisfaction with quality of service rendered by waste collection bodies in camp, the response of respondents was examined by comparing the mean (x) with the weighted value (X). Responses were categorized into four (4) classes for the calculation of the Respondents Satisfaction Index (RSI), using eight (8) variables. The greater the respondent's satisfactory index compared to the mean, the greater the satisfaction of the respondent's. From Table 3, it can be deduced that respondents satisfaction with quality of service rendered by waste collection bodies in camp in relation to method of storing waste (2.31), duration of waste collection (2.30), method of waste collection (2.39) and method of transporting waste (2.37) is strong while level of satisfaction for rate of charges for the service (2.23), effectiveness of service delivery (2.21) is low because it is less than the mean value (2.26). The level of satisfaction of respondents on final disposal is also very low (0.23). Therefore, it can be deduced from the analysis that the level of satisfaction of respondents varies from very satisfied (method of storing waste, duration of waste collection, method of collecting waste and method of transporting waste) to non satisfied (charges for the service, effectiveness of service delivery) and to not satisfied (final disposal).

Table 3: Level of Respondents' Satisfaction to Quality of Service Rendered by Waste Collection Bodies in Camp

Satisfaction with quality of service by waste collection bodies in camp	Respondents Opinions				No of Respondents (NR)	SWV (a)	RSI a/NR	X – x	$(X– x)^2$
	4	3	2	1					
Method of storing waste	32	47	152	29	261	602	2.31	0.05	0.001
Duration of waste collection	23	61	149	27	261	600	2.30	0.04	0.002
Method of waste collection	25	74	141	20	261	624	2.39	0.13	0.017
Method of transporting waste	23	69	148	20	261	615	2.37	0.11	0.012
Effectiveness of service delivery	20	62	132	46	261	576	2.21	-0.05	0.001
Stability or punctuality of service	23	62	139	36	261	578	2.21	-0.05	0.001
Charges for the service	23	50	152	35	261	581	2.23	-0.03	0.001
Final disposal	26	35	121	78	261	529	2.03	0.23	0.053
Total							18.05		0.09

(4 – very much satisfied, 3 – very satisfied, 2 – satisfied, 1 – not satisfied)
Source: Author's Field work, 2012

5. Conclusions and Recommendations

Findings from study of the three camps have revealed the dare need for improved waste management. In order to develop a sustainable solid waste management, a flexible system which is capable of managing all types of solid waste materials from all sources must be designed.

First and foremost, proper storage facilities must be developed. Waste storage facilities used should always be water tight and dust resistance. Also this waste storage facilities should be covered. Residents in Redeem and Mountain of Fire suggest that waste should be stored in separate bags based on their components (source separation). This is to ensure easy collection, sorting and better disposal. Consequently, reuse, treatment and recycling of waste will be improved and more effective.

In addition to these, the frequency of waste collection should be increased and regulations should be formulated and enforced on how and where to dispose waste in the camps. Waste collected should be assigned strictly to camp workers in order to ensure effective, efficient collection and final disposal.

Finally, disposal methods which are more environmentally friendly should be adopted. Incinerators should be provided as suggested by respondents in Assemblies of God camp. This would help to prevent indiscriminate dumping of waste on open space and as well as prevent uncontrolled burning of waste. Sanitary landfill should be constructed in Redeem camp as proposed and the present open dump used should as well be converted to a sanitary landfill.

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