



**Comparative Analysis of Household Solid Waste Generation in
Federal Low Cost and Government Reserve Area (G.R.A)
Gombe Local Government Area of Gombe State**

by

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Abstract

This study focused on “Comparative Analysis of Household Solid Waste Generation in Federal Low Cost and Government Reserve Area (G.R.A) Gombe Local Government Area of Gombe State”. The research set out to achieve the following objectives: to determine the quantity of waste generated in Federal Low cost, Gombe and Government Reserve Area (GRA), Gombe. to determine problems of waste generation and disposal in the study areas and to examine the methods of waste disposal practiced in the study areas. Survey research method was used to collect data with the use of questionnaires. In the course of collecting data 383 questionnaires were administered to the respondents but on return 290 questionnaires were received. Data were analyzed with simple percentage on frequency distribution tables, mean and standard deviation. The results revealed that, Federal Low-cost generate more solid waste than GRA. This may not be unconnected with the fact that Federal Low-Cost has more population than GRA. Furthermore, the major problems associated with solid waste generation and disposal are improper disposal of generated waste where majority of household dispose refuse on water ways, dump waste on road sides, solid waste accumulation in abandoned dump sites and inadequacy of approved government collection centers among others. The study also found out that, the methods used in waste disposal are; use of refuse bin, burying waste, use of government approved dumpsite, employment of waste management companies and use of incinerators On the basis of these findings it was recommended that, Strategies to improve household solid waste management in the studied areas must take into consideration all the deficiencies identified with the view of increasing knowledge on health and the environmental implication of improper waste management among the populace.

Key words: Household Solid Waste, Generation, Strategies, Methods of Waste Disposal, Waste Management

1. Introduction

Solid waste management has emerged as one of the greatest challenges facing municipal authorities worldwide especially in developing countries. The volume of solid waste generated has continually increased at a faster rate than resources available to contain it. In developing nations, the situation is more critical since their resources are usually meagre and more priority issues like health and education beat municipal solid waste management (MSWM) to the top of the list. The consequence is ill conceived and operated epileptic MSWM systems that leave monuments of solid waste adorning the streets of urban centers in countries like Nigeria posing serious risk to both human and environmental health. Municipal solid waste (MSW) includes refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste and street sweepings. MSWM refers to the collection, transfer, treatment, recycling, resources recovery and disposal of solid waste in urban areas. The goals of municipal solid waste management are to promote the quality of the urban environment, generate employment and income, and protect human and environmental health and support the efficiency and productivity of the economy (Ogwueleka, 2009). Igoni *et al.* (2007) defined solid waste as all waste collected by private and public authorities from domestic, commercial and some industrial (non-hazardous) sources. Urban solid waste is a heterogeneous material and its generation rate and composition vary from place to place and from season to season (Gidaracos *et al.*, 2006). The composition and volumes differ between high and low-income locations (Ogwueleka, 2009). According to Ogwueleka (2009), solid waste is wetter, heavier and more corrosive in developing nations, making its management more difficult. The poor state of solid waste management in urban centers of developing countries is now not only an environmental problem but also a social handicap (Daskalopoulos *et al.*, 1998). Solid waste management in Nigeria is characterized by inefficient collection methods, insufficient coverage of the collection system and improper disposal despite huge budgets that are committed to MSWM. Local authorities in developing countries spend 77-95% of their revenue on collection and balance on disposal but can only achieve 50-70% collection of MSW (Ogwueleka, 2009). The quantity and generation rate of solid waste in Nigeria have increased at an alarming rate over the years without corresponding efficient and modern technology for managing the waste (Babayemi and Dauda, 2009). The indiscriminate and improper dumping of MSW in developing countries is increasing and is compounded by a cycle of poverty, population explosion, decreased standards of living and poor governance and low level of environmental awareness. Hence, waste generated is illegally disposed of into any available open space hence the term “Open Dump Site”.

Solid waste in Nigeria poses many problems including blockage of drainage and channels causing flooding and presenting breeding grounds for mosquitoes and other vectors and pathogens (Igoni *et al.*, 2007). According to Ogwueleka (2009), more than 25 million tonnes of solid waste is generated in Nigeria annually with an average rate of generation ranging from 0.44 kg/cap/day in rural areas to 0.66 kg/cap/d in urban areas.

Gombe metropolis has a strategic position of being at the centre of the North Eastern States and as such serves as a hub for the influx of people from neighbouring states

and coupled with its position as a commercial center for food crops that are being transported to the Eastern and Southern parts of Nigeria. The influx of these people increase the generation of solid waste which poses a threat to environmental sanitation and health of the town. It is against this background that this study intends to carry out a comparative study of solid waste generation in Federal Low cost and Government Reserve Area (GRA) in order to find out the quantity of household waste generated from these areas of Gombe metropolis and to determine the relationship between waste generation and disposal and also identify the methods of waste disposal adopted in Gombe metropolis.

2. Objectives of Study

- i. Determine the quantity of waste generated in Federal Low cost, Gombe and Government Reserve Area (GRA), Gombe
- ii. Determine problems of waste generation and disposal in the study areas
- iii. Examine the methods of waste disposal practiced in the study areas.

3. Study Area

Gombe metropolis is a central geographical location within the state and is on latitude $10^{\circ} 15' N$ and $11 09' 60.00'' E$ and longitude $10 16^{\circ} 60.00$ AND $11.167 E$. It has an average altitude of about 500 meters above sea level and covers an area of 175.94 kilometers square. Gombe metropolis is well linked by road to the regional centers like Biu (Maiduguri) to the east, Potiskum (Yobe) to the north, Bauchi to the west and Taraba to the South.

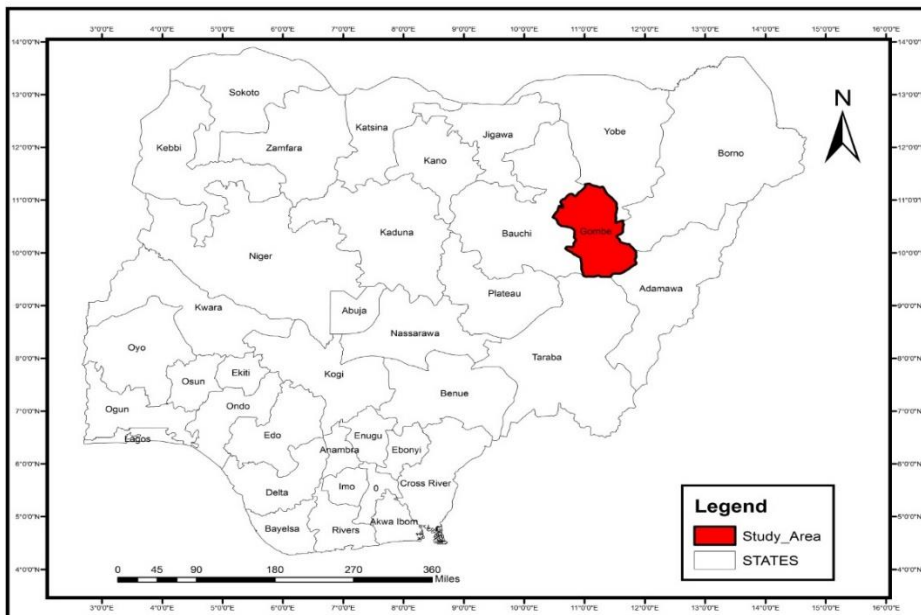


Fig 1: Map of Nigeria Showing Gombe State

Source: Modified from map of Gombe State (2020)

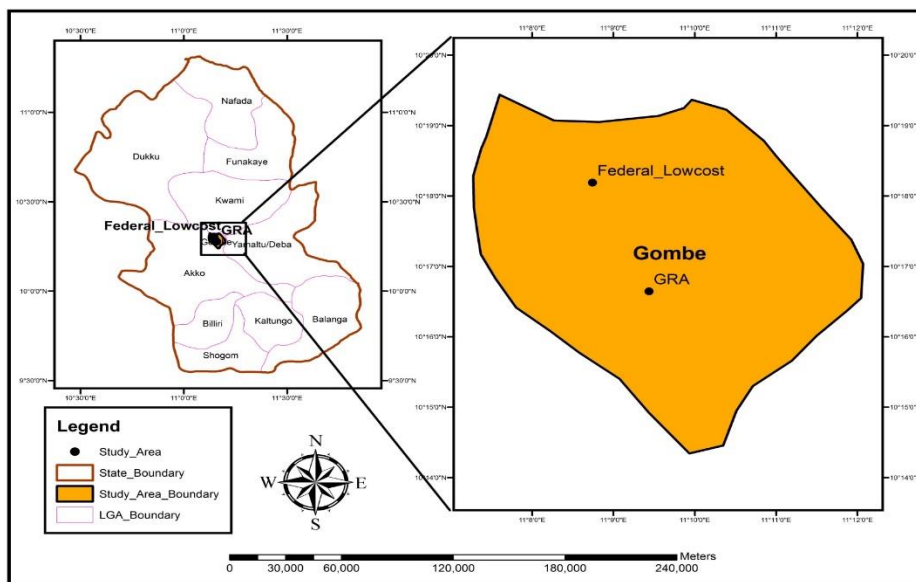


Fig 2: Map of Gombe Metropolis showing Federal Low Cost and GRA
Source: Modified from map of Gombe State (2020)

2.3 Climate

Gombe is located within the sub-sudan climate zone. It is characterized by two distinct seasons that is, dry season (November to March) and wet season (April to October). The average annual temperature is 24.5°, April is the warmest month, January has the lowest average temperature of the year. With an average of 254 millimeters, the most precipitation falls in August. The relative humidity levels are quite high reaching an average of 86% in July to September, which also experience more rain days than other months of the season. Average annual temperature for the various months are generally high but March to April with about 93° F (34°C). Also wet season temperature is high with mean value of 80° F (27°C). That is the cooling effects of the rains is the only moderating factor (Mabunguje, 1988).

2.4 Geology, Relief and Drainage

Gombe is located within the lower Benue trough which is surrounded by the Precambrian basement complex to the east and south. A series of sedimentary rock have been deposited over the basement complex. The area is under line by Gombe sandstone and Pindiga formation, there are estuaritic grits sandstone, kaolinite deltaic sandstone, shale and stone that belong to the Paleozoic and Cenozoic age. Tumfure section of Gombe town is relatively higher than surrounding environment except for the crop of the Liji Hills (Abubakar, Umegu and Ojo, 2010).

2.5 Vegetation and Soil

The vegetation of Gombe metropolis can be described as sudan savannah with open grassland which dries up during the dry season. The annual vegetation has been greatly affected and modified over most of the area by human activities such as over grazing, bush burning, construction and agriculture. The predominant tree species constitute of neem tree, mango tree, baobab tree, tamarind etc.

The soil of Gombe is developed on the sand stone parent material of Bima sandstone. The soil has excess organic matter because of the waste disposal in the town. Iron stone dominates most of the area thereby giving the soil of Gombe reddish to reddish brown color (ferrosols), the soil is shallow to deep loamy, sandy, clay, vertisol soil and cracking clay that have weathered thus, making the area fertile to support agriculture (Birna, 2016).

2.6 Population

The population of Gombe consist of various ethnic groups. The estimated year since Gombe was founded in 1919, the population grew approximately 300 to 320,000. The pattern of population growth in 1963 and 1996 at about 4.8%. Since the creation of Gombe in 1996 however, the population growth became as of 2006 population census it was estimated that the population of Gombe metropolis is 268,000. The population growth after the creation of Gombe State became rapid with an estimated growth rate of 2.4%.

Gombe metropolis has an area of 52km² and a population of 266,844 persons according to 2006 population census, (NPC, 2006). The population is projected to be 399,531 persons in 2018 using 3.2% growth rate (NPC, Gombe state Office). The metropolis shares common borders with Kwami in the North, Akko in the South and Yamaltu Deba Local Government Area in the East. It has eleven (11) wards, nine districts and a number of hamlets under each district. Major tribes of the area are Fulani, Bolawa, Kanuri, Tera and Hausa, Tangale, waja.

Socio-Economic Activities

Location of Gombe town within the sudan savannah gave it advantage of being in a productive farming area, producing large farm produce. Gombe is among the economic centers of the Northeastern region in terms of collection and distribution of cereal crops which are transported to Niger, Chad and Cameroon, the area also supply cattle, hide and skin to southern part of the country (Abubakar, Umegu and Ojo, 2010).

4. Materials and Method

For the purpose of this research data was collected through primary and secondary sources. Primary sources of data collection include; Questionnaire, Interview and Observation. Secondary sources of data collection include the consultation of books and Journals.

Sampling Size

The population of the study is 266,844 (NPC, 2019). Putting the above consideration, the sample size was determined through the use of Krejcie and Morgan table.

Based on this table a population size of 266,844 falls between 75,000 and 100,0000 under population (N), Therefore the average of 382 and 384 will be taken = $\frac{382+384}{2} = \frac{766}{2} = 383$

Therefore, the sample size for this study is 383.

Table 3.1
Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Note: N is Population Size; S is Sample Size

Source: Krejcie and Morgan (1970)

Based on the above calculation the sample size of the study is 383 households in Federal Low Cost and GRA in Gombe metropolis.

Considering the fact, the study is a comparative analysis of solid waste generated in GRA and Federal Low Cost Gombe, the appropriate statistical tool to use is the t-test. The formula for the two-sample t-test is shown below.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s^2(\frac{1}{n_1} + \frac{1}{n_2})}}$$

In this formula, t is the t-value, x_1 and x_2 are the means of the two groups being compared, s_2 is the pooled standard error of the two groups, and n_1 and n_2 are the number of observations in each of the groups.

A larger t -value shows that the difference between group means is greater than the pooled standard error, indicating a more significant difference between the groups.

Data Presentation and Analysis

The data analyses and the discussion of results gathered with the aid of the questionnaire from the study area is presented below.

The questionnaire response rate (QRR) calculated using:

$$QRR = \frac{\text{Actual Questionnaire Retrieved for analyses}}{\text{Total Questionnaire Administered during the study}} \times 100 \text{ ----- (1)}$$

$$QRR = \frac{290}{383} \times 100 = 0.757 \times 100 = 75.7 \approx 76\%$$

Demographic information of the respondents

Demographic information of the respondents is necessary in order to validate the reliability data being collected during the study.

Table 1: Demographic information of the respondents

SN	Variables	Frequency (F)	Percentage (%)	
1.	Age	Less than 25 years	78	27.0
		25-40 years	132	45.6
		Above 40 years	80	27.4
		Total	290	100
2	Gender	Male	218	75.1
		Female	72	24.9
		Total	290	100
3	Marital status	Single	57	19.9
		Married	195	67.1
		Widowed	29	10.0
		Divorced	9	3.0
		Others	–	–
		Total	290	100
4	Occupation	Civil Servant	22	7.5
		Mechanic (Artisans)	12	4.5
		Business	214	74.0
		Water Vendors	29	10.0
		Transportation	13	4.0
		Total	290	100

Source: Field survey, 2021

Table 2 above depicts the demographic information of the respondents. 218(75.1%) are Male, while 72(24.9%) are Female. 78(27%) of the respondents are less than 25 years old, 132(45.6%) of the respondents are within the age range of 25 – 40 years and 80(27.4%) of the respondents are above the age of 40 years. On marital status 57(19.9%) of the respondents are Singles, 195(67.1%) of the respondents are Married, 29(10%) of the respondents are Widowed and 9(3.0%) are divorced. On Occupation 22(7.5%) of the respondents are civil servant, 12(4.5%) of the respondents are mechanics (Artisans), 215(74%) of the respondents are Business men and women, 33(10%) of the respondents are water vendors and 13(4%) of the respondents are into Transportation Business.

4.1.2 To determine the quantity of waste generated in Federal Lowcost, Gombe and Government Reserve Area (GRA), Gombe.

This objective was to determine the quantity of waste generated in Federal Lowcost and GRA Gombe. The responses record of solid waste collection for 2 weeks was obtained by the researcher as contained in Table 3. The data was used to compute the approximate waste generated in the two areas of study (Federal Low Cost and GRA) based on the population of each area. This data was later exposed to t-test to find out whether there is any significant difference in the solid waste generated in these areas.

Table 3 revealed in quantity of solid waste generated per day from each of the two areas of study and was multiplied with the estimated population of each area to arrive at the total quantity of solid waste generated within the period of 14 days.

Table 3: Solid Waste Generated in Federal Low Cost and GRA from Saturday, 10th April, 2021 to Saturday, 24th April, 2021. The estimated Population for each area is as below:

Federal Low Cost= 11,500 people GRA= 8,500

Source: Gombe State Bureau of Statistics, (2020)

Table 3: Solid Waste Generated in Federal Low Cost and GRA Areas of Gombe Metropolis.

Days	Solid Waste Generated Per Day (Kg)		Cumulative Solid Waste Generated Per Day (Kg)	
	Federal Low Cost	GRA	Federal Low Cost	GRA
1	1.5	1.2	1.5×11500=17,250kg	1.2×8500=10200kg
2	1.4	1.4	1.4×11500=16,100kg	1.4×8500=11900kg
3	1.7	1.3	1.7×11500=19,550kg	1.3×8500=11050kg
4	2.1	0.9	2.1×11500=24,150kg	0.9×8500=7650kg
5	2.2	2.1	2.2×11500=25,300kg	2.1×8500=17850kg
6	2.7	1.5	2.7 ×11500=31,050kg	1.5×8500=12750kg
7	1.5	1.2	1.5×11500=17,250kg	1.2×8500=10200kg
8	1.6	1.3	1.6×11500=18,400kg	1.3×8500=11050kg
9	1.5	1.1	1.5×11500=17,250kg	1.1×8500=9350kg
10	1.4	1.0	1.4×11500=161,000kg	1.0×8500=8500kg
11	1.8	1.4	1.8×11500=20,700kg	1.4×8500=11900kg
12	1.7	1.3	1.7×11500=19,550kg	1.3×8500=11050kg
13	1.6	1.4	1.6×11500=18,400kg	1.4×8500=11900kg
14	1.9	1.2	1.9×11500=21,850kg	1.2×8500=10200kg
TOTAL			282,900KG	155,550KG

Source: Field Survey, 2021

Table 4 shows the total quantity of solid waste generated in the two study area. The observed mean quantity of solid waste for the two areas was 282,900 kg for Federal Low Cost and 155,500kg for GRA. Thus, the solid waste generation rates were 20,207 kg/day, and 11,110 kg/day in Federal Low-cost and GRA, respectively. The study observed significant differences between the total waste quantities generated during the study period in the two areas. There were significant differences in the generation rates per households in all the areas. The similarity of waste generation rate between Federal Low Costs and GRA could be explained by the fact that, the areas are located within the same geographical area and therefore lifestyles of the inhabitants could be similar. Most of the inhabitants of these two areas were high profile government workers whose income were similar and could certainly have similarities in quantity of waste generated.

Table 5: Paired sample T-Test to Compare Solid Waste Generation in Federal Low Cost and GRA In Gombe metropolis.

Table 5: Paired Samples Statistics

		Mean	N	Standard. Deviation	Standard Error Mean
Pair 1	Federal_Lowcost	20207.1429	14	4200.35974	1122.59336
	GRA	11110.7143	14	2391.74691	639.22125

Source: Researcher’s Computation (SPSS, 2021)

Table 6: Paired Samples Test

		Paired Differences	T	standa rd Deviation	Standard error-mean. (2-tailed)
		95% Confidence Interval of the Difference			
		Upper			
Pair 1	Federal_Low cost – GRA	11334.69911	8.780	13	.000

Source: Researcher’s Computation (SPSS, 2021)

Table 5 and 6 present a t-test result which shows that there is significant difference in the mean solid waste generated from the Two areas Federal Low-cost (M= 20207.1429, SD= 4200.35974) and GRA (M=11110.7143, SD= 2391.74691) standard error mean conditions $t(13)= 8.780, p=0.000$. The results suggested that the difference emanate from the population of two areas with Federal Low Cost having higher population as such high solid waste are generate

Objective Two: To determine problems of waste generation and disposal in the study areas

Objective two was to determine problems of waste generation and disposal in the study areas. The responses collected from the respondents were subjected to a five Likert-scales and analyzed using SPSS tool and draw the conclusion using mean scores, ranking, and decisions from table 5.

Table 5 revealed in descending order that all problems of waste generation and disposal in the study areas Area with all the mean scores from 3.3812 – 3.8511 all greater

than 3.0; and the standard deviation ranging from 1.1506 – 1.2660 showing low value hence the variability.

Table 6: Problems of Solid Waste Generation and Disposal in Federal Low cost and GRA

Variables	Mean	SD	Rnk	Decision
Waste generated are disposed on water ways	3.8511	1.2450	1	Accepted
Waste generated littered on roads	3.7601	1.1506	2	Accepted
Waste generated are not properly disposed	3.7376	1.1935	3	Accepted
Waste generated are left uncollected in dump sites	3.6532	1.2312	4	Accepted
No Waste management handlers to collect generated waste	3.3812	1.2660	5	Accepted
Grand mean score (GMS)	3.6052	1.43377		Accepted

Source: *Field survey, 2021. N = 201; SD = Standard Deviation; Rnk = Ranking;*

Table 6 above depicts problems of solid waste generation and disposal in Federal Low-cost and GRA, where the respondents agree that, waste generated are disposed on water ways, littered on roads, left uncollected in dump sites and absence of waste management handlers are some of the most pressing problems associated in solid waste generation and disposal in Federal Low-cost and GRA.

The grand mean score (GMS) of problems of solid waste generation and disposal in Federal Low-cost and GRA was high with a mean score of 3.6052.

This therefore answer research question two: What are the problems of waste generation and disposal in the study areas? The solid waste generation and disposal is faced with myriad of problems, the prominent ones are: waste generated are disposed on water ways, littered on roads, left uncollected in dump sites and absence of waste management handlers are some of the most pressing problems associated in solid waste generation and disposal in Federal Low-cost and GRA.

Objective Three: To examine the methods of waste disposal practiced in the study areas

Objective three was to examine the methods of waste disposal practiced in the study areas. The responses collected from the respondents were subjected to a five likert-scales and analyzed using SPSS tool and draw the conclusion using mean scores, ranking, and decisions from table 6.

Table 7 revealed in descending order that all the methods of waste disposal practiced in the Federal Low-cost and GRA with all the mean scores from 3.3345 – 3.9366 all greater than 3.0; and the standard deviation ranging from 1.26997 – 1.49537 showing low value hence the variability.

Table 7: Methods of households’ waste disposal in Federal Low-cost and GRA of Gombe Metropolis

Variables	Mean	SD	Rnk	Decision
I usually dispose my refuse into the drains and gutters	1.8511	1.9450	6	Rejected
I dump my refuse in an open space.	1.7601	1.8506	7	Rejected
I make use of refuse bin	3.7376	1.49135	2	Accepted
I dispose my refuse by the road sides and major streets.	1.6532	1.5312	8	Rejected
I bury my refuse in pits	3.3812	1.2360	4	Accepted
I employ the services of waste management company	3.6103	1.30057	3	Accepted
I use incinerator to dispose my refuse	3.3345	1.26997	5	Accepted
I use refuse dump provided by the government only	3.9069	1.15319	1	Accepted
Grand mean score (GMS)	3.6052	1.43377		Accepted

Source: Field survey, 2021. N = 201; SD = Standard Deviation; Rnk = Ranking;

Table 7 above depicts methods of households’ waste disposal in Federal Low-cost and GRA areas of Gombe metropolis, where the respondents agree that, they make use of refuse bin to dump their waste, they bury their waste, they dump their waste in Government approved dump site, they employ the services of waste management companies and they use incinerators to dispose their waste. The respondents also rejected the notion that, they dispose refuse into the drains and gutters, they dump refuse in open space, they dump refuse on road sides and major streets.

This therefore answer research question two: What are the methods of waste disposal in Federal Low-cost and GRA areas of Gombe metropolis?

The methods used for waste disposal are; use of refuse bin, burying waste, use of government approved dumpsite, employment of waste management companies and use of incinerators. The residents rejected the dumping of waste in drains and gutters, dumping in open space, dumping refuse on road sides and major streets as methods of refuse disposal.

4.2 Discussion of Results

4.2.1 Objective One: To determine the quantity of waste generated in Federal Low-cost, Gombe and Government Reserve Area (GRA), Gombe

The result of data collected from field revealed that Federal Low-cost generate more solid waste than GRA. This may not be unconnected with the fact that Federal Low-Cost has more population than GRA. Although these two areas have similarity in the socio-economic variables of their inhabitants, but due to concentration of more people in Federal Low Cost, it tends to generate more solid waste than GRA.

This result validates the outcome of Birma (2016) who found that socio-economic characteristics of the households in the study area have influence on waste generation, collection and disposal in terms of their educational levels, monthly income, households’ family size etc. At the high and medium income neighborhoods such as G.R.A and Federal

Low-cost the rate of waste generation is higher compared to the low income neighborhoods such as Ajjiya and Kagarawal.

4.2.2 Objective Two: To determine problems of waste generation and disposal in the study areas

The result shows that the major problems of waste generation and disposal in GRA and Federal Low-Cost are; waste generated are disposed on water ways, littered on roads, left uncollected in dump sites and absence of waste management handlers are some of the most pressing problems associated in solid waste generation and disposal in Federal Low-cost and GRA.

This result is supported by Adeniran, Nubi and Adelopo, (2017) who also discovered that, the major problems associated with solid waste generation and disposal are improper disposal of generated waste where majority of household dispose refuse on water ways, dump waste on road sides, solid waste accumulation in abandoned dump sites and inadequacy of approved government collection centers among others.

4.2.3 Objective Three: To examine the methods of waste disposal practiced in the study areas

The result revealed the Methods of waste disposal practiced by households' in Federal Low-Cost and GRA Areas of Gombe metropolis; which include; use of refuse bin, burying waste, use of government approved dumpsite, employment of waste management companies and use of incinerators. The residents rejected the dumping of waste in drains and gutters, dumping in open space, dumping refuse on road sides and major streets as methods of refuse disposal.

The findings validated the results of Ogwueleka, (2013) and Olukanni and Mnenga, (2015) who all agree that, waste generated have to be disposed of; they exist a handful of these methods of waste disposal which include; dumping in government collection centers, employment of waste management companies among others. Although their result revealed that despite these methods some residents still dump their waste improperly in water ways, road sides and culverts.

5. Conclusion and Recommendations

The research concludes that Federal Low-cost generated more solid waste than GRA and the problems associated with solid waste generation and disposal were improper disposal of generated waste where majority of household dispose refuse on water ways, dump waste on road sides and inadequacy of approved government collection centers among others.

The study also concludes that, methods used in waste disposal were; use of refuse bin, burying waste, use of government approved dumpsite, employment of waste management companies and use of incinerators.

Based on the findings of the study, the following were recommended for efficient and effective management of solid waste in the study areas.

- i. The Municipality should employ the use of tricycles and motor cycles in the collection of refuse from homes to hauling point for transportation. This would help minimize cost and ensure better containment of waste in the study areas to promote better financing and management of waste.
- ii. Educating inhabitants on the need to pay for waste disposal and the implementation of the daily payment for door-to-door waste collection service would be more appropriate for the study areas.
- iii. Strategy is to improve household solid waste management in the study areas must take into consideration all the deficiencies identified with the view of increasing knowledge on health and the environmental implication of improper waste management among the populace.

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