Social Survey Report

INTEGRATED SOLID WASTE MANAGEMENT MASTER PLAN FOR GUJRANWALA

Lean and Green
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Background

Japanese International Cooperation Agency (JICA) initiated a development project related to municipal solid waste management in Gujranwala city. The project would lead to development of "Integrated Solid Waste Management Master Plan" for the city. It involves some field surveys and studies. Social survey is one of the field surveys within the framework of the project contracted out to Lean & Green (Pvt) Limited by the JICA Project Team.

As per terms of reference of the survey and discussions between JICA project team (the Client) and the project team of Lean and Green (Pvt) Limited (the Contractor), the Contractor conducted a social survey in the area. The survey focused on gathering information from different stakeholders in the city about the state of affairs with regards to Solid Waste Management (SWM). During the survey, the Contractor worked in close liaison with the major stakeholders and partners of the JICA Project Team for the project, i.e., the Urban Unit Lahore and Gujranwala Waste Management Company (GWMC), Gujranwala.

Importance of this survey cannot be emphasized enough as the best of the SWM systems might become ineffective in absence of people's awareness about the subject. Moreover, the Integrated Solid Waste Management Master Plan for Gujranwala cannot be devised without the knowledge of current system and practices of different stakeholders in place. The survey focused on gathering information on both of these aspects.

The key stakeholders included the following categories:

A. Households (including High, Middle, and Low – Income Groups)
B. Business Entities (including Markets, Schools and Universities, Commercial Establishments, Restaurants, Hotels, Shops, Factories, and Hospitals)

This baseline survey would delineate existing practices of solid waste management situation in Gujranwala city and would provide solid background to make informed policy decisions for the long-term Integrated Solid Waste Management Master Plan for Gujranwala.

1. Gujranwala

Gujranwala is an industrial city located in the North-East of Punjab Province, Pakistan. More specifically, Gujranwala is located at 32.16° North and 74.18° East, and is 226 meters (744

feet) above sea level. Punjabi is the main language of the inhabitants. Climate of Gujranwala is hot during summer as temperature reaches above 40°C and cold in winter as temperature drops to below 10° C. Gujranwala is surrounded by Gujrat and Sialkot towards north and northeast, by Sheikhupura towards south and southeast, and by Mandi Bahauddin and Hafizabad towards west.

Demographics

The population of the city was approximately 1.67 million in 2013[1].It is the fourth-most populous city of Pakistan having the status of a district with the following towns under its administration: Khiali Shahpur, Aroop, Nandipoor, Qila Didar Singh, Wazirabad, Kamoke and Nowshera Virkan. The city of Gujranwala is divided into 64 Union Councils. For the city's strategic location on both sides of the Grand Trunk Road (GT Road), economic activity has understandably been easier both in the form of industrialization and agricultural produce. On the industrial front the city manufactures ceramics, fans, electrical switchgears, engineering tools and textile products like sweaters, hosiery products etc. Major agricultural produce of Gujranwala includes: rice, sugarcane and melons.

According to the Punjab Development Statistics 2013[2], adult literacy rate (15+ years of age) is 56 in Punjab whereas it is 68 in Gujranwala. 1981 and 1998 housing censuses claimed that there were 306,000 and 449,000 household units respectively in Gujranwala district. According to the 1998 census, population of Gujranwala was 1,927,000 (table 208, pp. 286, Punjab Development Statistics) and the estimated population as on 30 June 2013 is 4,592,000 (table209, pp. 290). According to 1998 census, population density was 359 persons per square km at Punjab level whereas it was 993 in Gujranwala. The table below shows some social indicators of Gujranwala.

[1] Punjab in Figures 2013 www.bos.gop.pk

[2] http://www.bos.gop.pk/?q=system/files/Dev-2013.pdf

Table 1: Demographic Statistics

Indicator / Area	Estimated Population 2013 (Thousand Persons)	Literacy rate (2007-08) $\frac{Literate\ 10\ year\ and\ above}{Total\ Pop.\ 10\ year\ and\ above}$	Literacy among young women (15-24 years) 2011	Improved drinking water (*Percent) (2011)*	Infant mortality rate (2011)
Punjab	98223	59 percent	66 percent	94.1	82
Gujranwala Division	14885	-	83.9	95.2	69
Gujranwala District	4628	72 percent	85.9	95.6	69

Source: Bureau of Statistics, Punjab.

2.Survey Methodology

The main purpose of social surveys is to collect quantitative as well as qualitative data from a representative sample. This end can be achieved through different methods, for example, postal, telephone, verbal responses to well-structured questions presented by interviewer or self-reporting questionnaires. Drop-off (self-reporting) or the telephone may reduce the response rate. Secondly, in the social context of Pakistan, a priori, we believe it is better to have a one-to-one contact with the respondent as it is the most personal form of survey, so the questionnaire method (face-to-face interview) was adopted for this study.

Another crucial parameter of the survey is the sample size. Beyond doubt, larger the sample size more reliable the results are. However, there is trade-off. The larger the sample size, more the resources required conducting the survey. Against this backdrop, the viable solution is to have a "reasonably large representative sample". Keeping in mind the general characteristics of the population of Pakistan which belongs to three classes with respect to their socioeconomic condition – high income, middle income and low income group, the

sample was made representative of these income brackets. Moreover, as middle income is high in proportion so is the case in our sample, which was formulated in proportionate manner. Table 2 shows income and area wise (location) number of sample.

Table 2: Household Sample Distribution

Town	Areas*	Area			Samples
		Low	*Middle*	*High*	
Aroop	A	12	20	10	85
	B	13	20	10	
Nandi Pur	C	12	20	10	85
	D	13	20	10	
Khiali	E	40	5		85
	F	35	5		
Qila Didar Singh	G	15	25		85
	H	20	25		
Rural	I	30			60
	J	30			
(Sub Total)		220	140	40	400 Households

*Areas specified later with discussions between JICA Project Team and the Contractor.

The selection of areas were also done on the above mentioned lines that they represent high, middle and low income households. During the discussion with the stakeholders, the teams working in operations with GWMC as well as that of the Urban Unit highlighted the fact that while designing the SWM operations one of the ways to categorize the area according to socioeconomic segregation is the type of access road. Geographically many of our low income areas are characterized by narrow streets. Similarly in middle income areas streets are wider but it is only in high income areas that we observe wide carpeted roads. For the purpose of social survey in Gujranwala, access to the particular area through road size was also considered the major yardstick.

Areas to be surveyed are color coded in the following map.

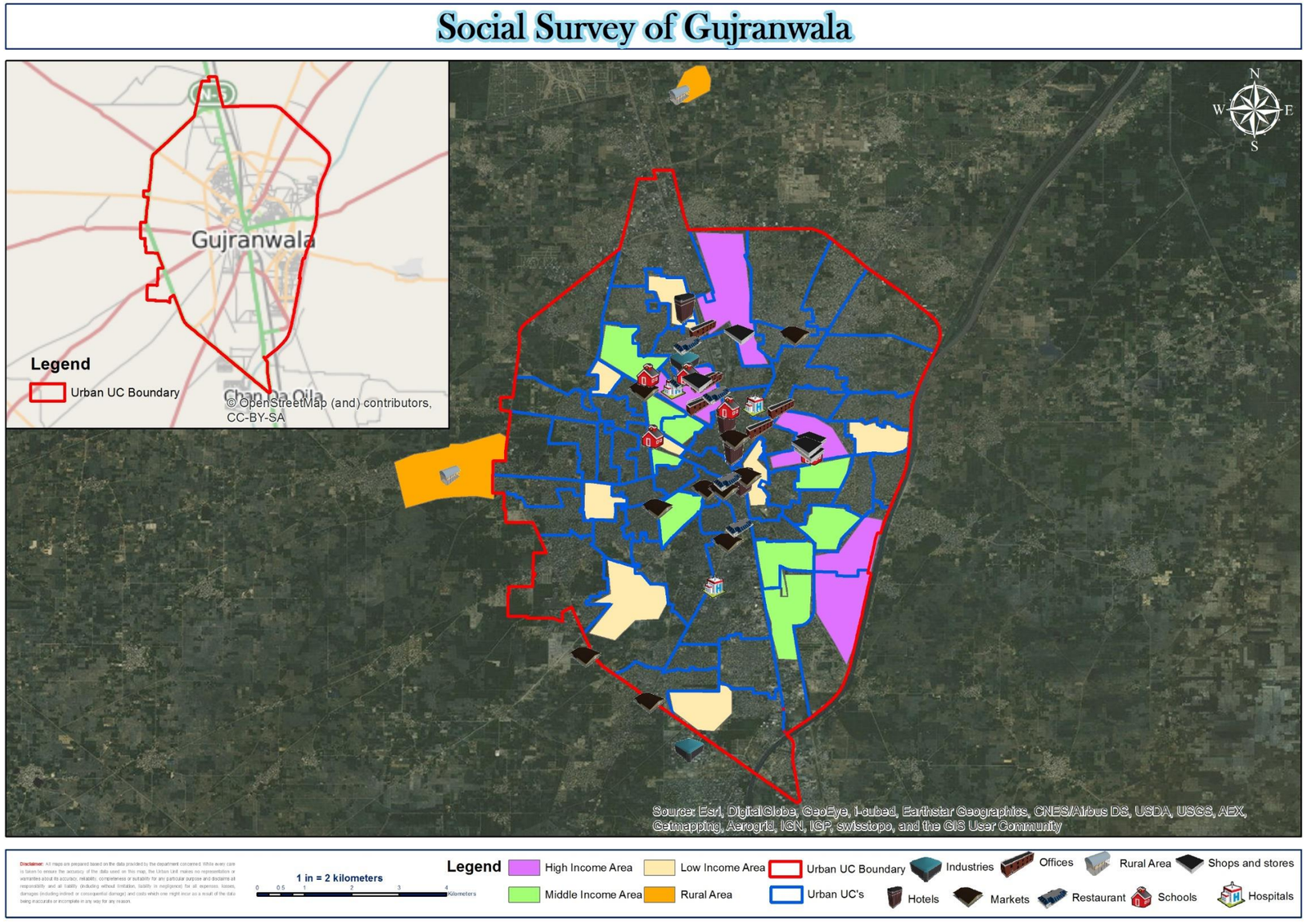


Figure 1: Location of Areas selected for Social Survey

Figure 2: Some Pictorials of Existing Situation of Solid Waste in Gujranwala

Along Railway Tracks

Model Town Market

	
Chappar UC 64	WASA Disposal UC 08
	
Near Bhag wala UC 58	Near ALLAH ho Masjid UC 62

City Park UC 1

City Park UC 1

Islam Pura UC 01

Islam Pura UC 01

Besides this, the task was done in consultation with the representatives of GWMC. Being local members of the society they are well placed to identify the high, middle and low

income areas. In short, the sample size and the selection of area was guide by sampling techniques and the local wisdom along with the consultation with JICA project team.
To design a good questionnaire is essential for good analysis so that objectives of analyzing the relevant parameters can be achieved. As the prime objective of the survey was to get information about social situation in general and awareness about solid waste management practices in particular, so questionnaire was designed keeping in view this objective. It was kept in mind that nothing is assumed by the interviewer rather many options are given to the respondent so that accurate information could be had. Definitely, each question should be clear and precise so that doubts or beliefs of the interviewer or the respondent do not creep in.

The questionnaire was finalized in consultation with the JICA project team. As mentioned earlier, the objective of the survey was to assess the awareness about the solid waste management, therefore, due space was given to questions related to general understanding and awareness about solid waste management.

The questionnaire was designed carefully so that it could be related to the objectives of the study. As the main objective of the project is to formulate a *master plan for integrated solid waste management* so the questionnaire included following types of queries: general information about the household, waste collection services and behavior of disposing off. The questions not only focused on the behavior of consumers but also involved their understanding regarding the working of the department. These questions included their comprehension on the kinds of waste collection services they have, who collect the waste and are they satisfied with the current waste collection system. Furthermore, their willingness to cooperate was also assessed with questions highlighting if they separate the waste at home or not and if it is required by the government would they cooperate.

The questionnaire also included selective questions regarding the awareness of populace about recycling. Some of the questions were asked about their willingness to pay if the government decides to provide improved facilities of waste collection. Frequency of waste collection, what do they do with the different types of wastes are basically building blocks for the formulation of a better solid waste management plan.

The purpose of all these questions is to compile comprehensive data about the status of waste collection, awareness of general public regarding solid waste management issues, their capacity and willingness to pay for clean environment so that the data could be

helpful for the formulation and implementation of *master plan for integrated solid waste management*.

3. Data Analysis and Interpretation

3.1. Domestic Survey

As the survey has been divided into three socioeconomic groups, we will present their data interpretation accordingly. In each sub-class various indicators are presented and discussed separately. The survey areas are marked in following map.

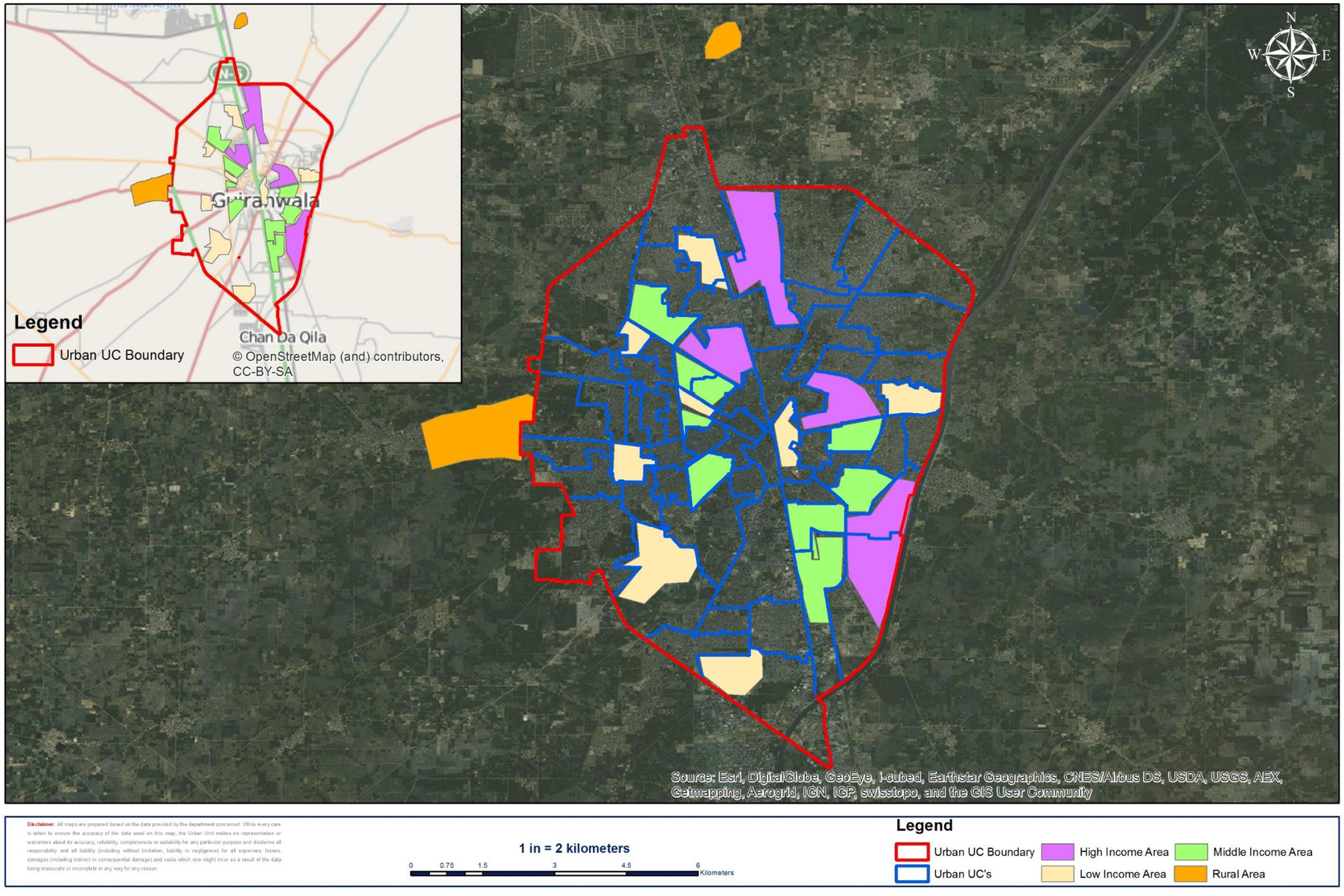
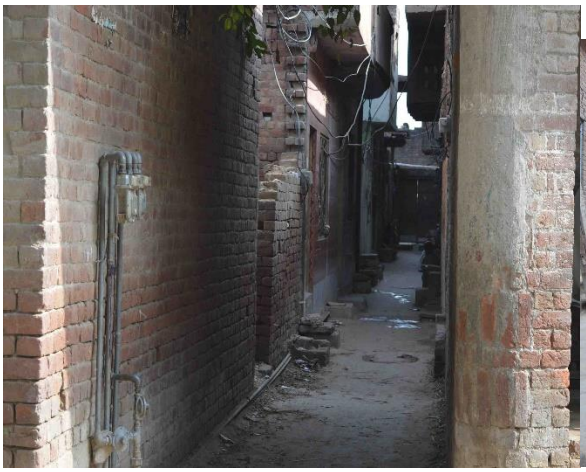


Figure 3: Location of Residential Survey

Figure 4: Some Pictorials of Social Survey in Domestic Areas

High Income Households
Satellite town high income area UC 16.
 
Middle Income
Nearby Saabri chowk Middle income area. UC 17.
 
Low Income
Bhaag Wala UC 62.

Nearby Rata Road low income area.



3.1.1. High – Income Group

For the purpose of analysis, we have segregated our variables (questions) into three categories. In the first category we will analyze basic information about the income group and the household, in the second category analysis will be made about current situation of waste management system, general level of awareness among people about the solid waste management and some other related issues. The last category will talk about financial matters regarding solid waste management.

3.1.1.1. General Information on High – Income Group

For the High – Income areas of Gujranwala, total number of 40 questionnaires were filled in the door to door survey. The survey team had been provided with the maps of selected areas, while the questionnaires were filled on random selection of the households.

The areas selected for social survey among high income residential settlement is presented in map below.

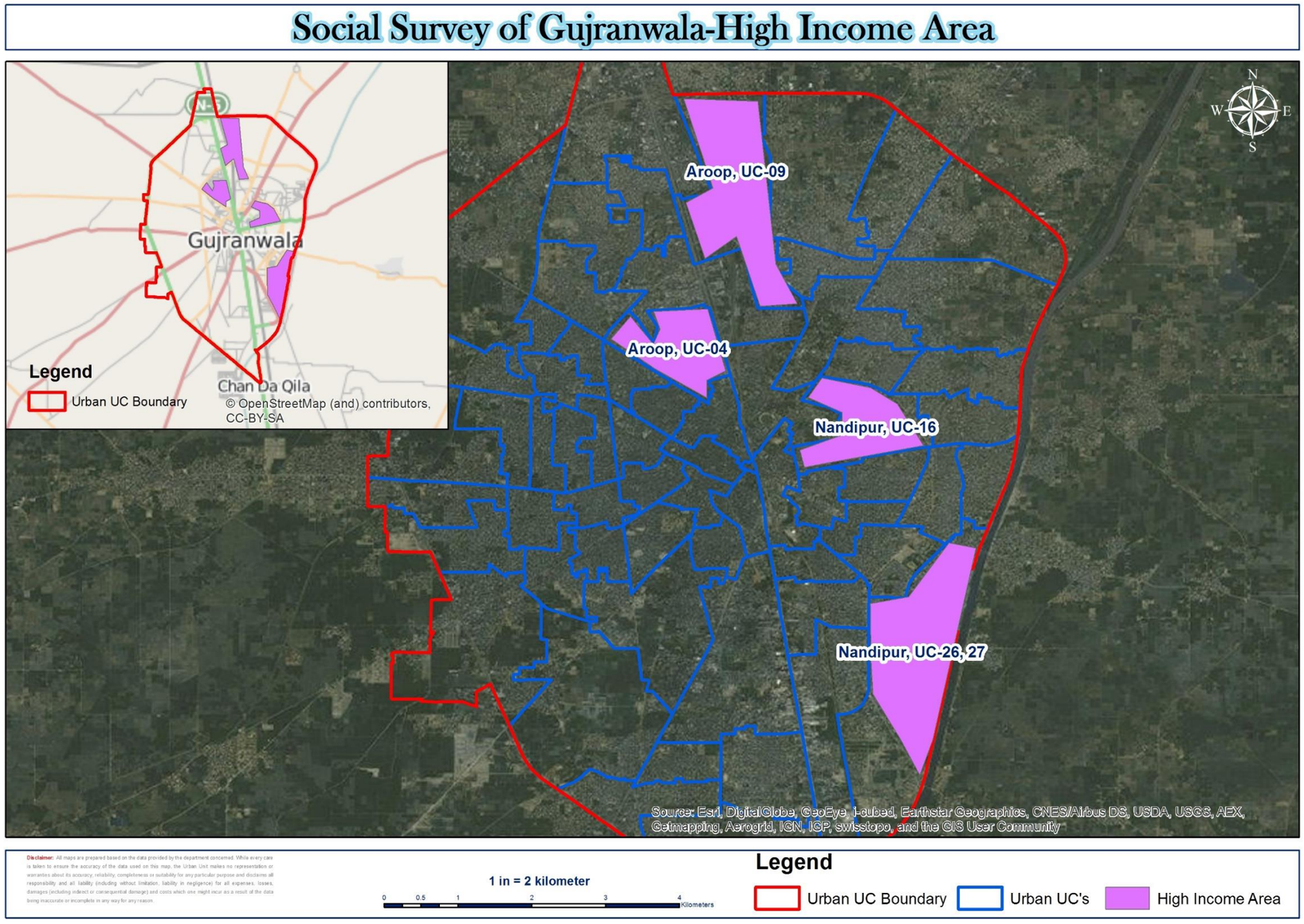


Figure 5: Area Location of High Income Group

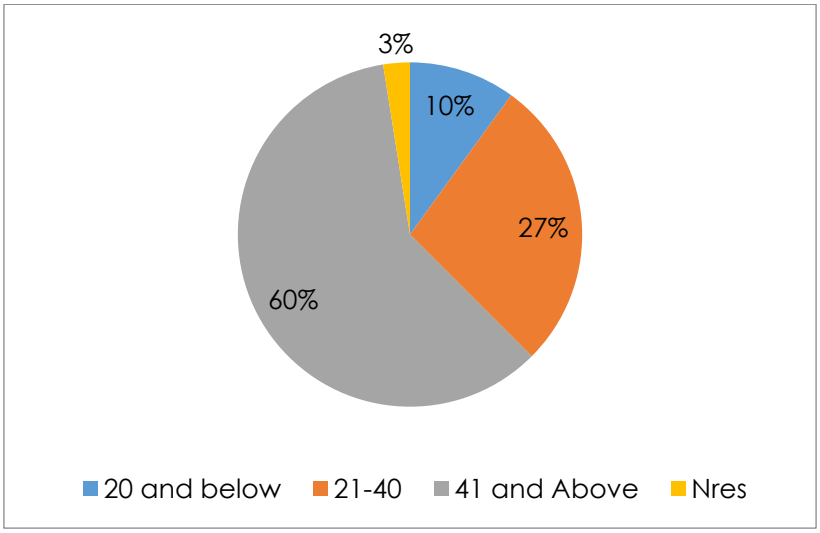
The basic comparison starts with the gender subdivision of the respondents as tabulated below.

Table 3: Distribution of respondents according to gender and relationship

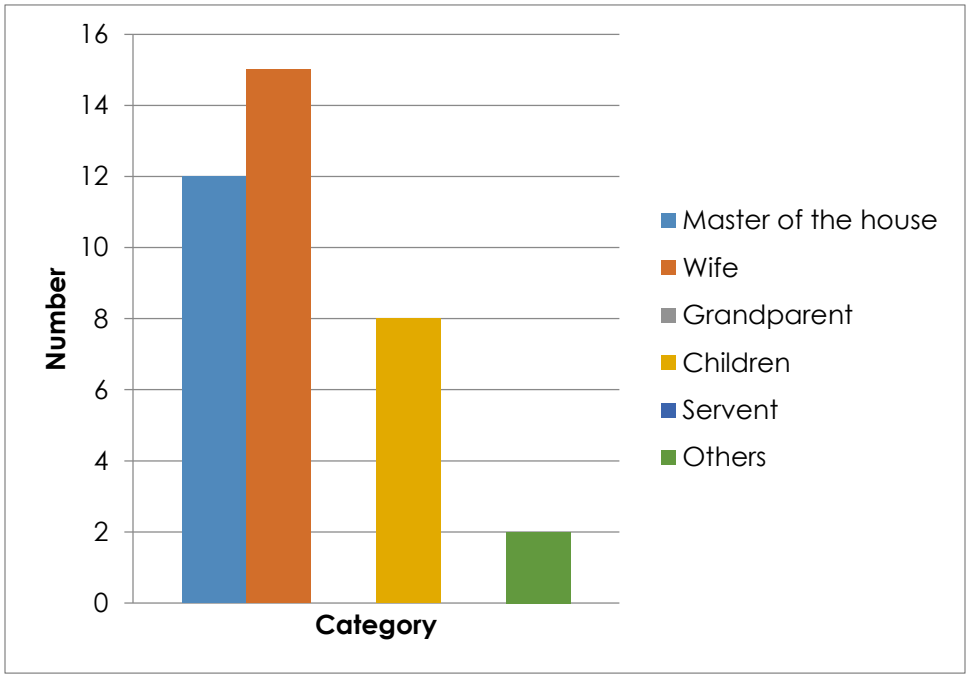
Respondents	Male	Female	Relation with The Master			Other
			Master	Wife	Children	
40	20 (50%)	20(50%)	12	16	8	4

The table shows that there is 50-50 representation so for as gender is concerned thus the chance of gender bias in responding is absent. Similarly the diverse nature of relationship with the master of the household is also appreciable. This makes the results more reliable.

Looking through the age group of the respondents, we divided the groups as 20 years and below, 21 years to 40, and 41 and above. Graph 1 shows the age-wise distribution of respondents. It is clear from the chart that 87.5 percent respondents were of 21 year or above. This indicates the confidence on data analysis in relation to seriousness of the respondent. Only one of the respondents preferred not to indicate her age, which may be considered negligible in relation to remaining known age groups of the respondents.

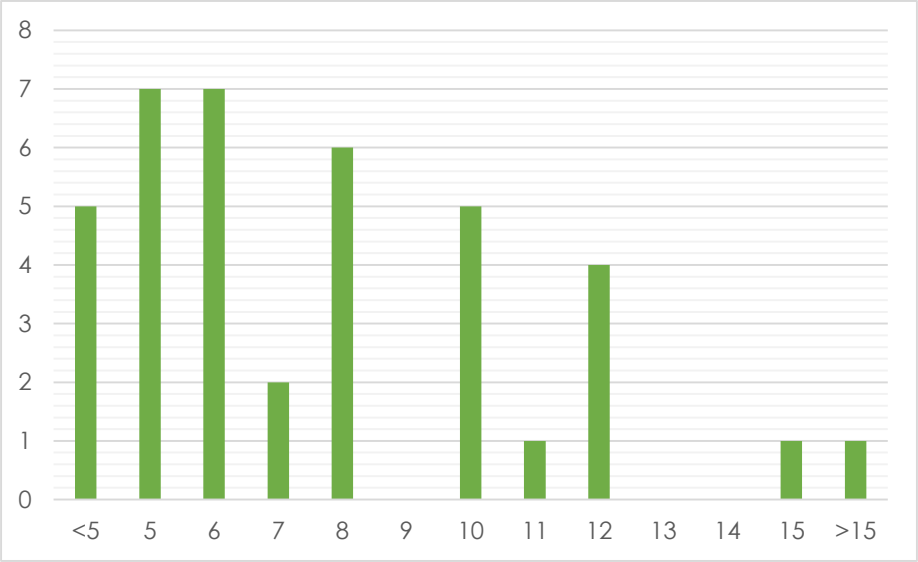


Graph 1: Age wise distribution of Respondents

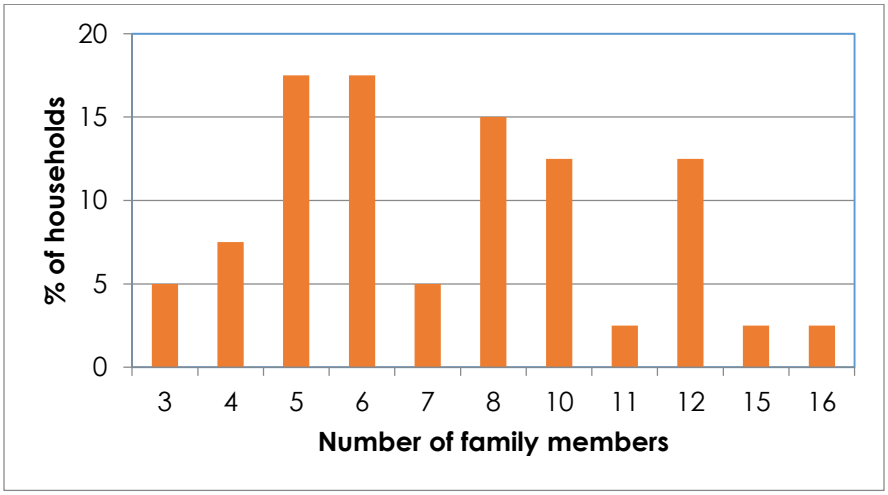


Graph 2: Relationship of the interviewee with the Head of the Household

Besides this, the average size of the high income household is also an informative variable. If any organization wants to launch a program in Gujranwala and is interested in knowing the population of high income household, the average family size of high income group can give her a fair idea about the population falling in this income category. Keeping this in mind this report has added Graph 4 which shows frequency distribution of number of family members.



Graph 3: Frequency Distribution of Family Size



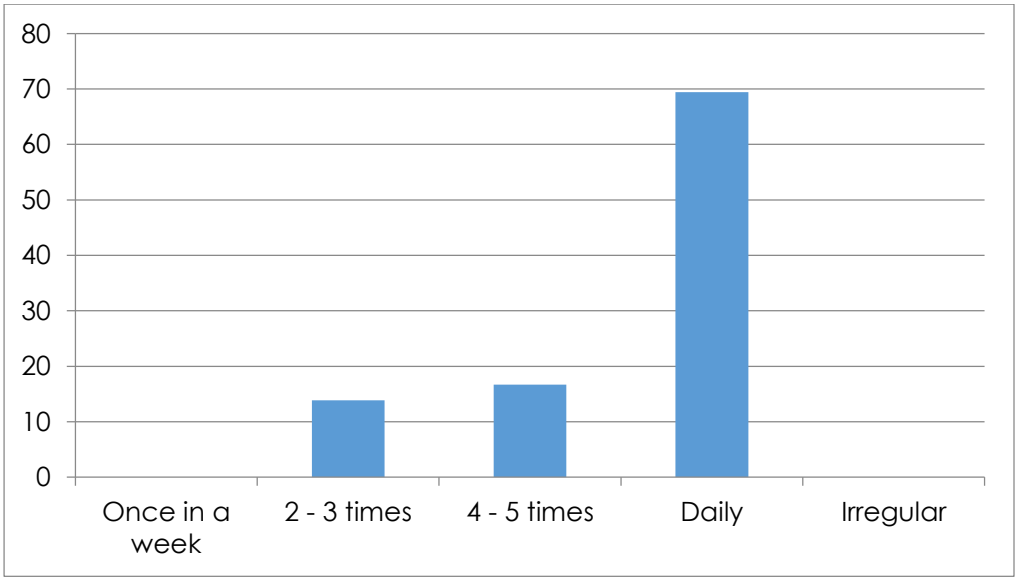
Graph 4: Family Size in High - Income Households expressed in Percent

The average family members per household turn out to be 7.725 which may be referred to as on higher side keeping in mind the family composition in high – income groups. Perhaps the two outlier one household with 15 and other with 16 members have jacked up the average. If we exclude these two outliers the average family size drops to 7.31.

Similarly, 5 households with 10 family members also put upward pressure on the average. There is also need to be sure about the definition of the household and the average high income group family size in Punjab. It is quite intriguing that when information about average family income per month was sought none of the respondents shared it. To some extent it is understandable that in low income countries people generally are skeptic about surveys and with less documented economy they tend to avoid disclosing their income. Furthermore, the credibility issue of the government also plays role in this regard. However, in contrast with the income, 8 households out of 40 did disclose their expenditures.

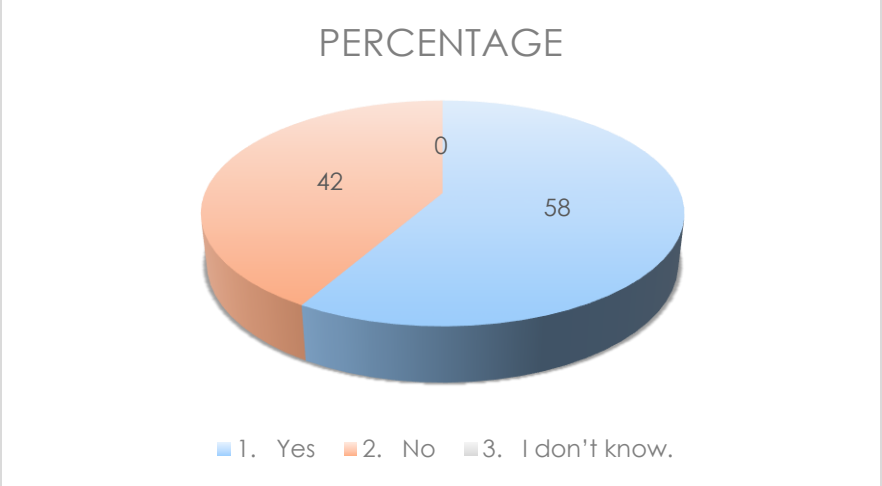
3.1.1.2. Information on Existing Solid Waste Management System

Second section of the questionnaire dealt with the understanding of the consumers of solid waste management system and the service they are offered by the relevant department. When it comes to the waste collection system 37 out of 40 (92 %) responded "Yes" when asked that "*do you have waste collection services?",* and 3 (8%) households responded "No". Out of these 37, 35 households who agreed to having a service further answered that they have door to door collection system (95%). And when it was asked "*who collects the waste?*" all the households, who are receiving SWM services, responded "waste collector with handcart / donkey cart".



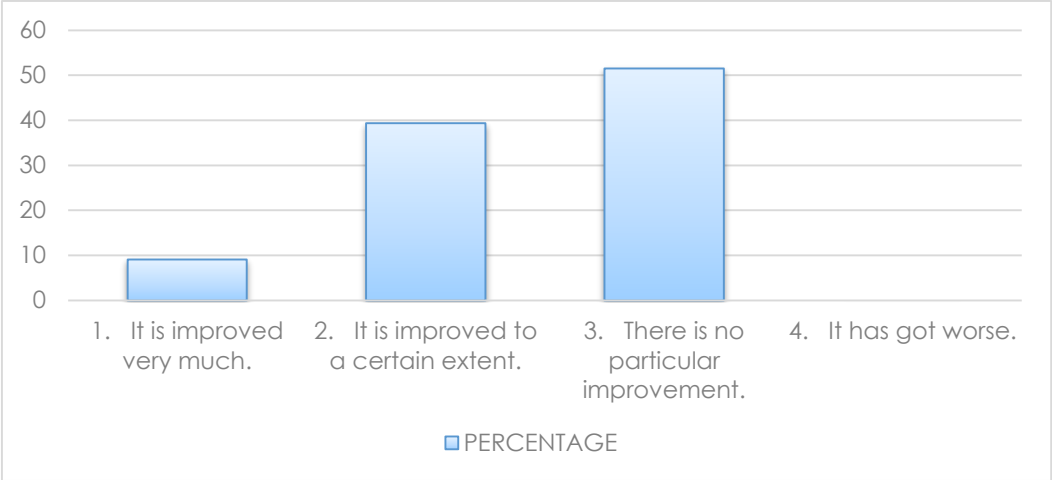
Graph 5: Waste Collection Frequency in High - Income Households in Percent Proportion

Moreover, waste collection frequency seems quite reasonable as 25 households (69%) reported that waste is collected daily. When asked *"do the waste collector come at fixed time on specific days of week?"* 22 households (60%) responded "Yes" whereas 15 responded (41%) "No".



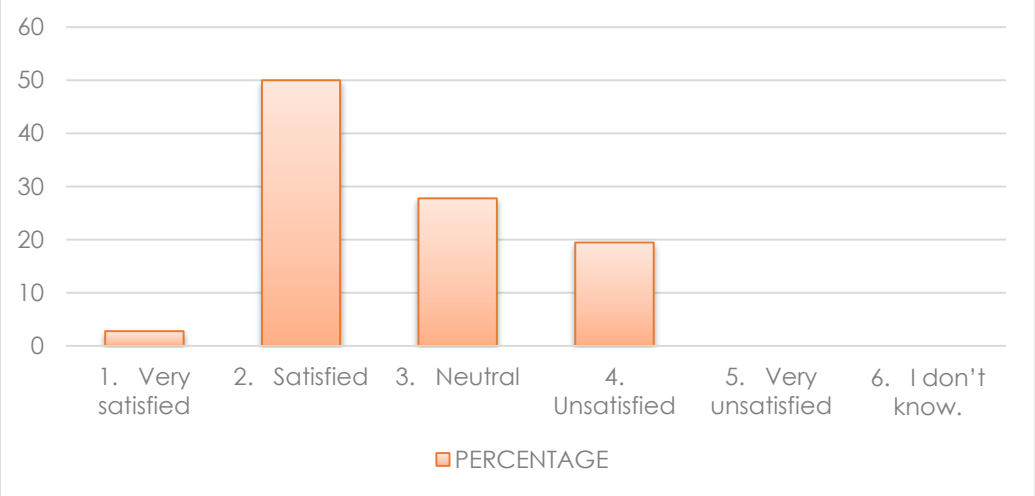
Graph 6: Waste Collection Schedule in High - Income Group

It is worth mentioning that 18 households (49%) replied that there is no particular improvement in the trend of collection services, whereas 13 (35%) were of the viewpoint that there is little improvement and 3 of the respondents (8%) admired that it is very much improved. As shown in Graph 7, the response which might be heartening for the service provider is that not a single respondent said that the service has got worse.



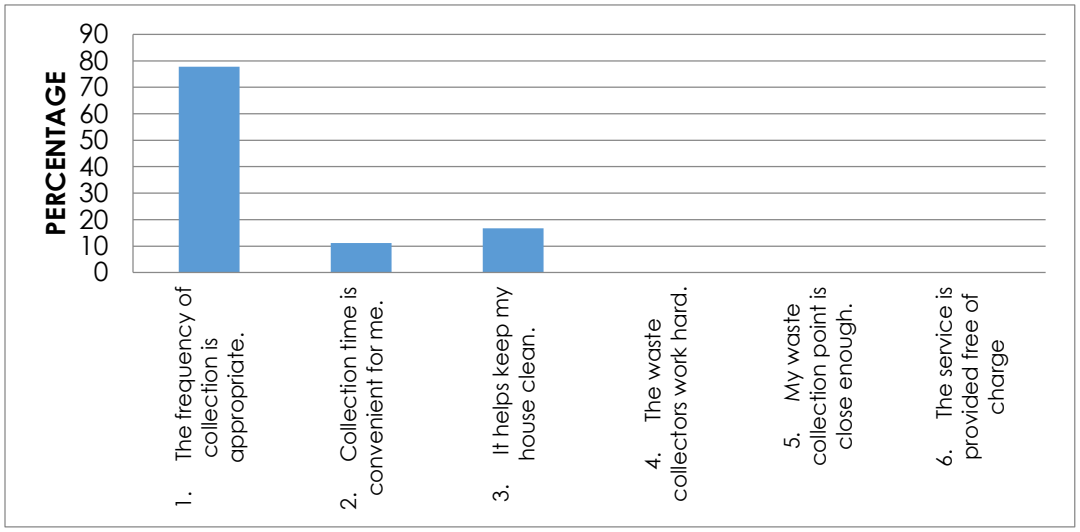
Graph 7: Perception of System Improvement

Similarly, 18 households (50%) responded that they are satisfied with the current waste collection system, 10 responded they are neutral and 7 households (19%) said they are not satisfied with the current waste collection system.



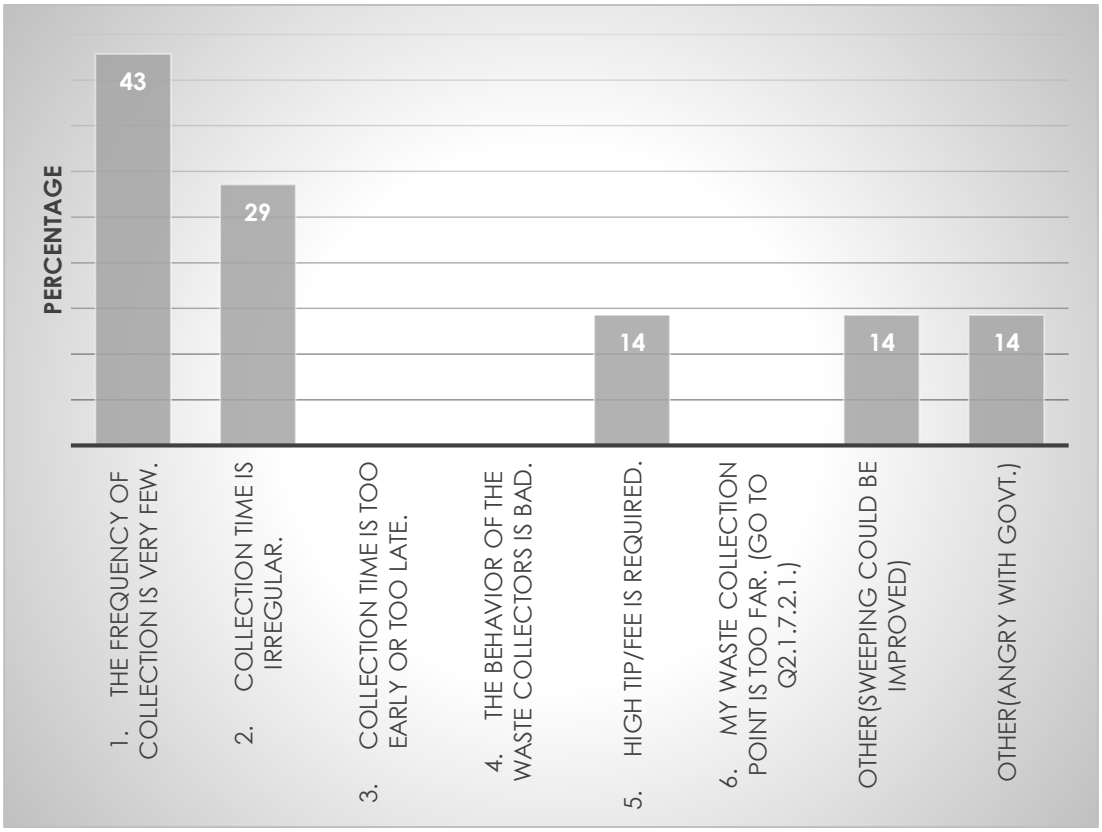
Graph 8: Level of Satisfaction for Waste Collection Services

Further investigation into the reason of satisfaction revealed that 78% of the consumers are satisfied because the service frequency is appropriate. Graph 9 highlights various percent responses for the reason of satisfaction.



Graph 9: Reason of Satisfaction for Waste Collection Services

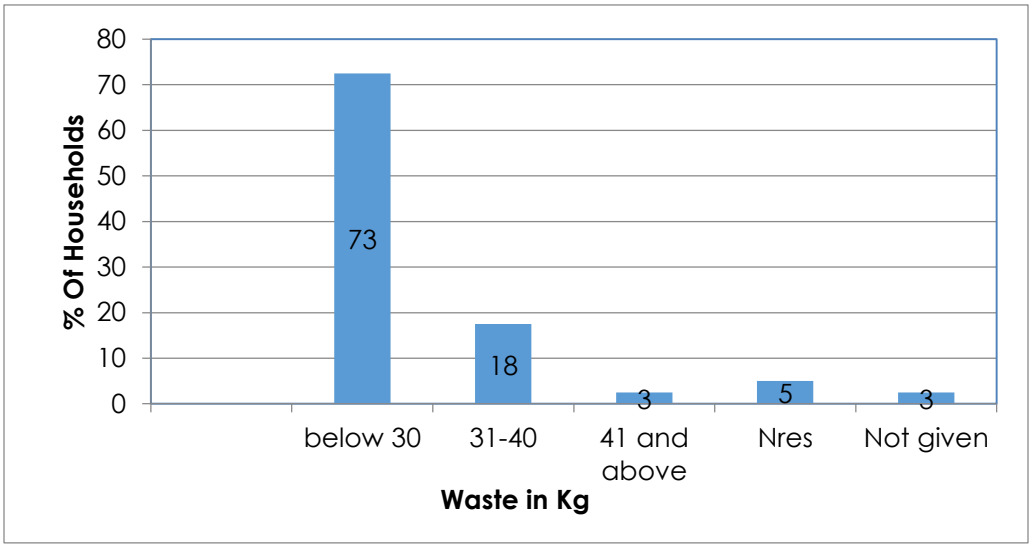
On the other hand when the respondents, who are not satisfied, were given the options to explain the reason of their no satisfaction. Comparison reveals that inadequate frequency of collection is the primary reason of displeasure of more than 40% of the consumers in high – income areas.



Graph 10: Problems with Waste Collection System

When asked "what do they use to discharge the waste?" 19 respondents (51%) shared that they use plastic shopping bags, and 20 (54%) said dustbins. However none of them accepted the use of large plastic bags, paper bags or carton boxes.

In the replies total responses are more than 37 as some of the respondents said yes to both dustbins and shopping bags.



Graph 11: Waste Discharge per Week (kg)

Another very important variable is quantity of waste discharge by the household. This provides us data about extrapolation that within this income group how much waste is expected to reach the final disposal site. This is quite essential to make informed decisions regarding the end of the line treatment or disposal of future solid waste management system.

Another important thing is to know the behavior of households towards recyclable articles. Do they separate these articles or not. If they do, do they give it to the waste collector or to the maid?

The data reveals that most of the households do not care about recycling material especially when it comes to its sale. For the treatment of pet bottles by the household please refer to Table 4 below. Like the used bottles, the households also responded to the separation activity of cans. Half of the households (50%) do not bother to separate cans from the other waste. 7 out of 40 (18%) did not want to respond to this question. One household said that it separates cans and from the rest 7 households (18%) said they do not use canned bottles or food, lastly 5 households (13%) responded that they give it to their maid. However, the situation is better when it comes to paper. Among the respondents 21 replied (53%) that they separate some or all of the paper from the other waste.

Table 4: Response to Bottle Recycling

Recycling Option	No. of Answers (Yes)	In Percent
1. I separate bottles from other wastes	13	33
2. I separate deposit bottles and disposable bottles from other wastes	3	8
3. I separate only deposit bottles and return them to shops		
4. I don't separate them and discharge them together with other wastes	9	23
5. I don't know		
6. Others(Specify) Give to Maid	15	38

When it was asked that in general do you support the idea of recycling, 23 households (*57 percent*) responded "Yes". Use of kitchen waste for any purpose was responded with a simple "no" by all the survey participants which highlights their ignorance or lack of interest to utilize the organic waste as a resource.

3.1.1.3. Financial Information

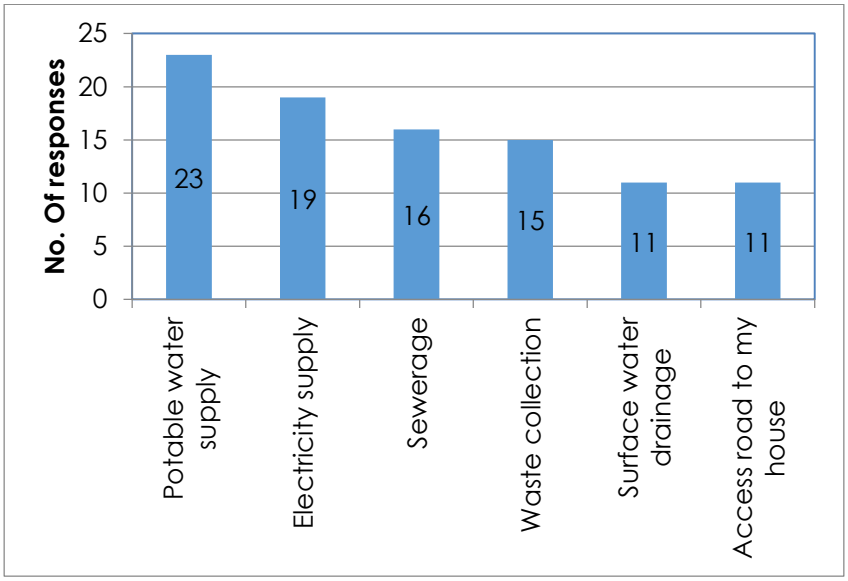
Table 5 shows the number of households with responses on how much they pay for different services like, waste collection, provision of water supply and electricity.

Table 5: Cost of Services in High - Income Group

Payment for waste collection		Payment for Water Supply		Electricity Payment	
No. of Households	Fee/Tips	Response	No. of Households	Response	No. of Households

1 (3%)	300	Not shared	12 (30%)	Not shared	14 (35%)
3 (8%)	0	Borehole	18 (45%)	Pay (3500 to 85000)	25 (63%)
3 (8%)	NA	Pay (100 to 375)	9 (23%)	No idea	1 (3%)
7 (18%)	50	No idea	1 (3%)	-	-
8 (20%)	No res	-	-	-	-
18 (45%)	100	-	-	-	-

From the above table it can be seen that 18 high income households (45%) pay Rs.100 per month for the services of waste collection. Seven households (17.5%) pay Rupees 50. It is quite intriguing that 3 households (7.5%) reported that they do not pay at all for this service.

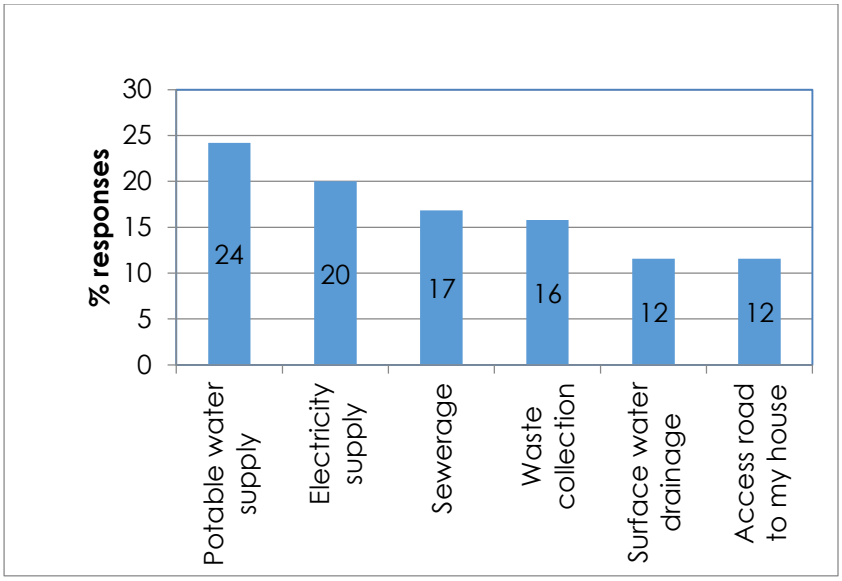


Graph 12: Household Order of Priority for Services

When it comes to the services of water supply as many as 18 households (45%) use borehole so they do not pay. Interestingly, 12 (30%) thought it was wise not to share it with the interviewer if they pay any charges or not. Nine households (23%) informed that they pay for this service and payment ranges from Rs. 100 per month to Rs. 375 per month.

Regarding the amount of electricity bill per month, 14 households (35%) did not share and one replied that he had no idea. However, 25 households (63%) that shared the information

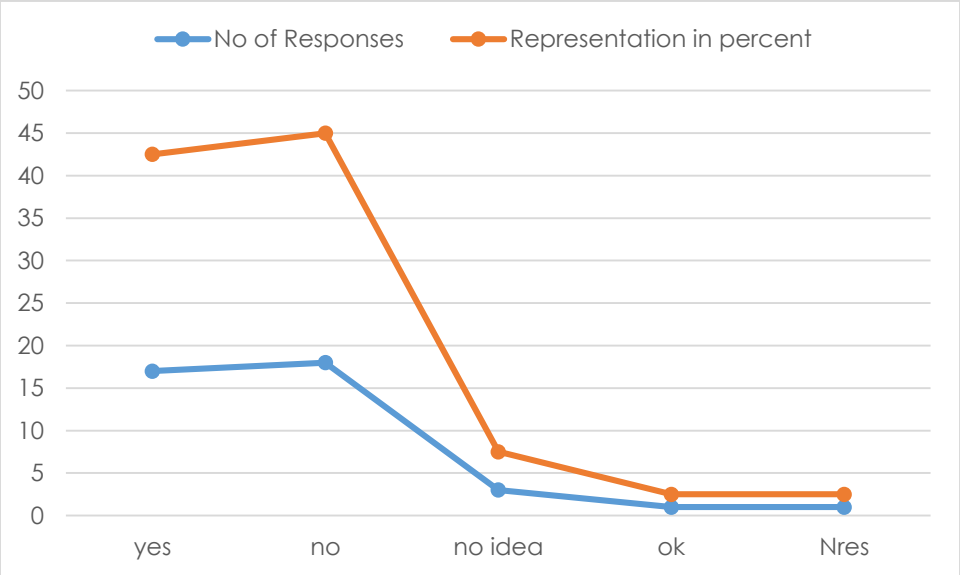
stated that the range of bill which they pay is very much vast. They told that their bill ranges from 3,500 to 85,000 per month.



Graph 13: Household Order of Priority for Services in Percentage

After these, the household was asked to choose among different amenities for their better living condition according to their priority. The results have been depicted in Graph 13. Nearly 25% of the group showed water supply as their first choice for access to services. Whereas, electricity touched first priority by 20% of the respondents. It is important to mention here that many households gave first priority to two different issues, that is to say that they ranked them equally. Nonetheless potable water supply emerges as the first priority, while surface water drainage and access road to my house take the last in ranking. It makes sense as the data comprises high income households so it can be safely assumed that road network and drainage system already exists there. As the waste collection is not among the top three priorities, it reconciles with the data since 25 households reported that waste collection is on daily basis.

Regarding the cleanliness of the public areas such as roads and parks, 17 out of 40 (42 %) reported that they are clean, whereas 18 households (45%) responded in negative. 3 participants (7.5%) expressed that they have no knowledge about it while only one responded that it was neither bad nor commendable. Among the respondents, one household did not respond at all to the question (Graph 14).



Graph 14: Cleanliness of Public Places and Parks

Other than these parameters some other set of information was also gathered in the survey which is summarized in the form of figures below.

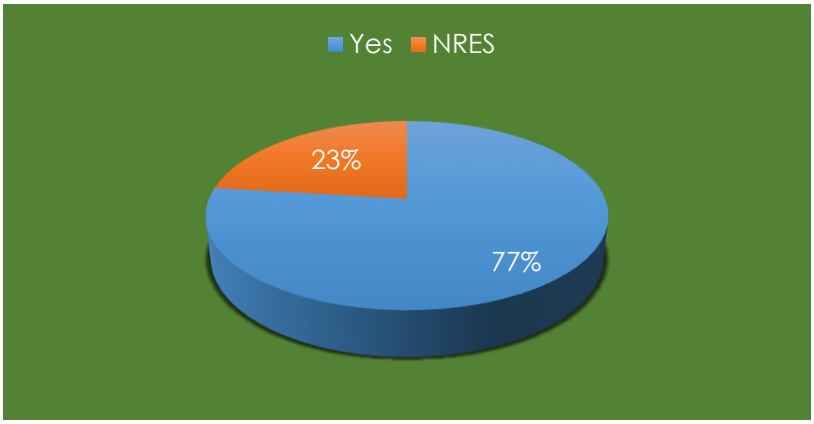


Figure 6: Availability of Vehicle at Home

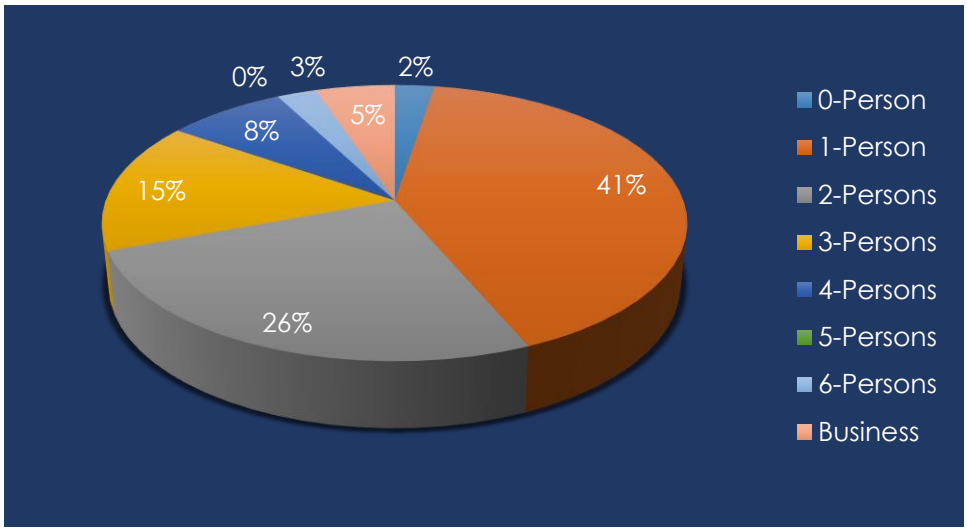
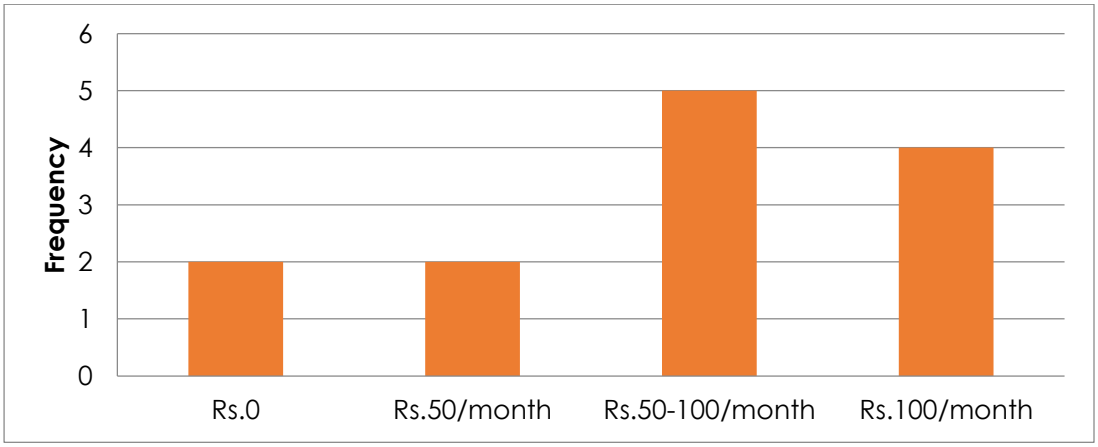
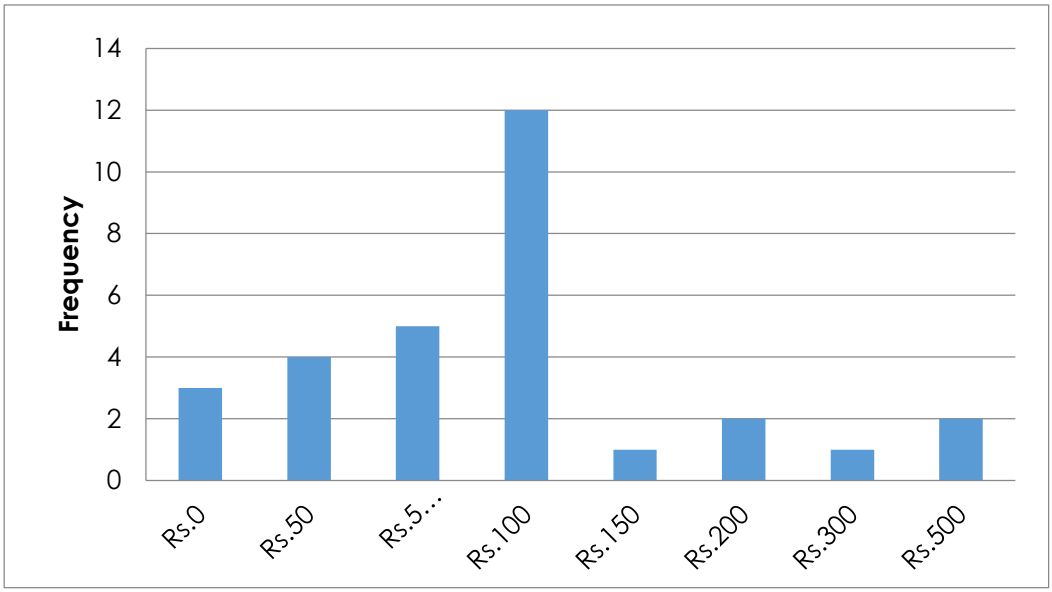


Figure 7: No of Family Members who Earn with Percent Proportion of Total Sample

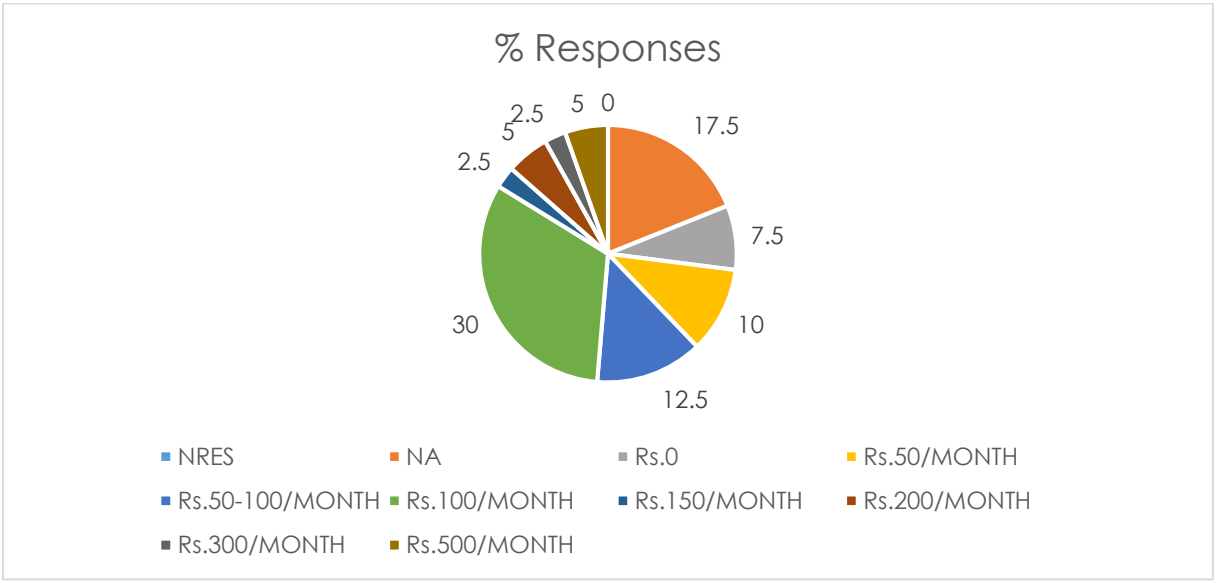


Graph 15: Cost of Service paid to Sweepers



Graph 16: Willingness and Ability to Pay for SWM Services

These responses when plotted at percent scale represent the answers as shown in Graph 17 below;



Graph 17: Willingness to pay in Percent Proportion

It is interesting to note here that only 7.5% of responded did not agree to pay for the waste collection services while the remaining respondents agreed to pay. So for we have analyzed the high income household, now we move to middle income household.

3.1.2. Middle – Income Group

As discussed earlier, the questionnaires to be filled in each sub-category of socioeconomic group were subdivided according to their population proportion. Accordingly total number of questionnaires filled in the middle income area was 139. Location of areas visited in low – income communities is marked in map below.

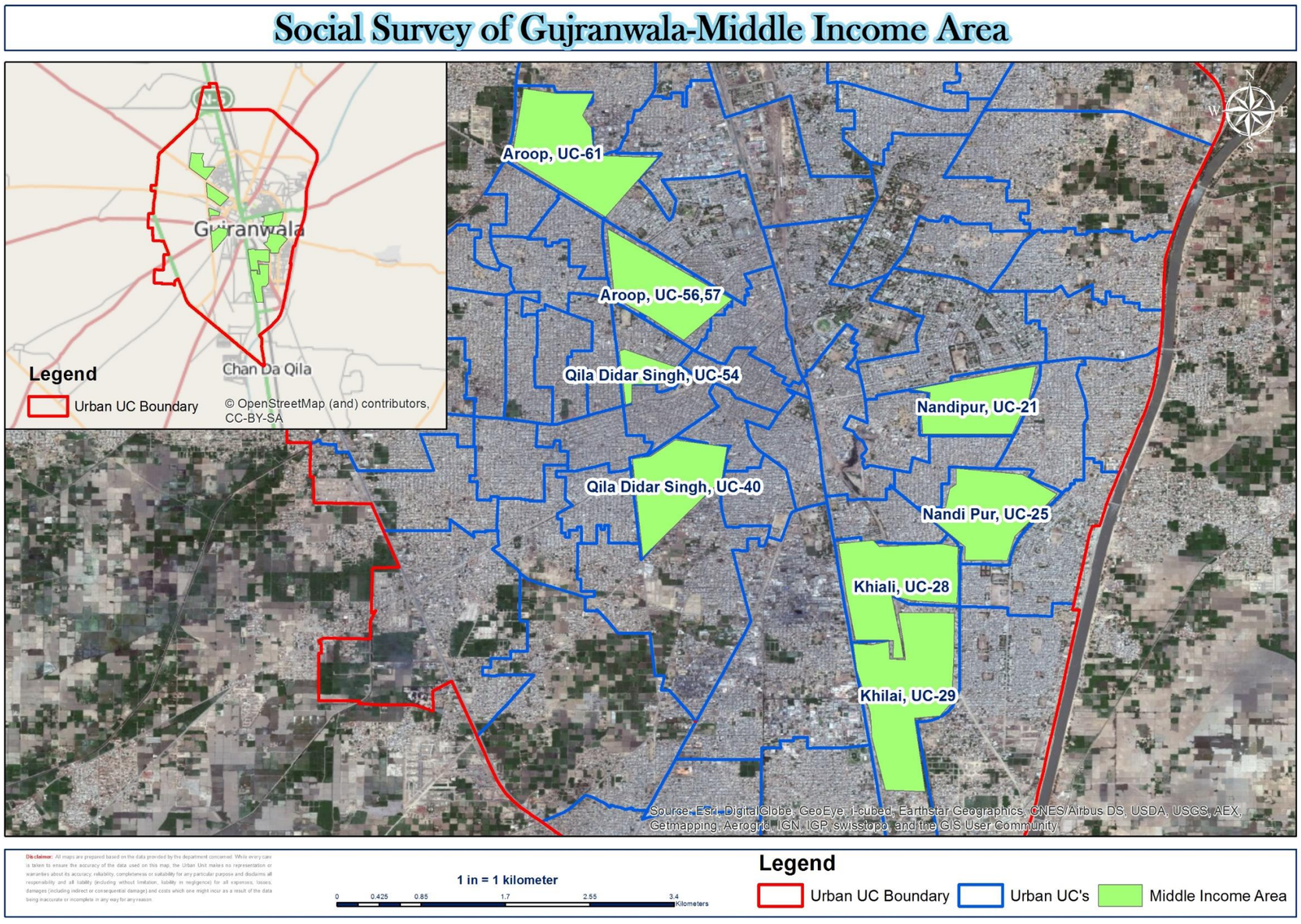


Figure 8: Location of Middle - Income Survey Areas

3.1.2.1. General Information on Middle – Income Group

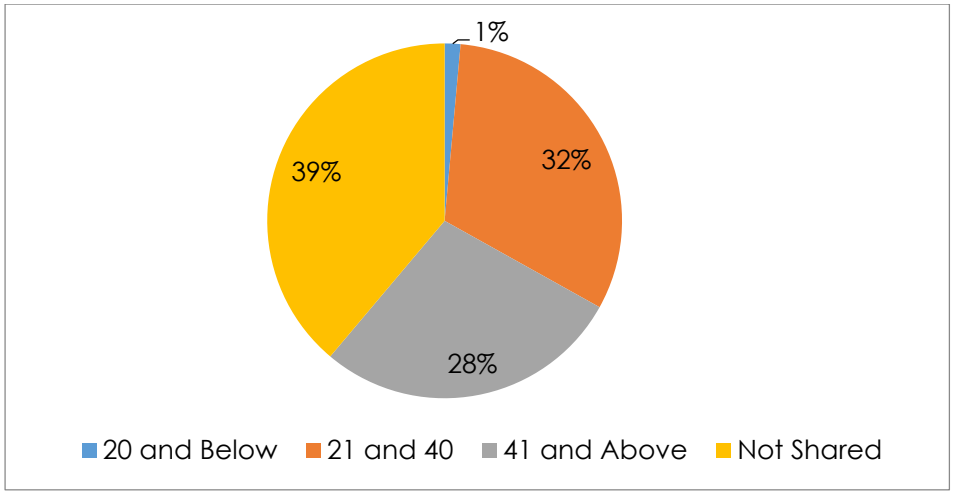
First of all when we look at the gender segregation of the respondents, interestingly, like the high income group, in the middle income sample too there is almost 50-50 representation of male and female so for as respondents are concerned.

Table 6: Distribution of Respondents according to Gender and Relationship

Respondents	Male	Female	Relation with The Master			Other
			Master	Wife	Children	
139	68 (49%)	69 (50%)	62 (46%)	40 (29%)	25 (18%)	9 (7%)

Note: On survey form against two households gender of respondent was blank and 3 did not respond about relations with the master

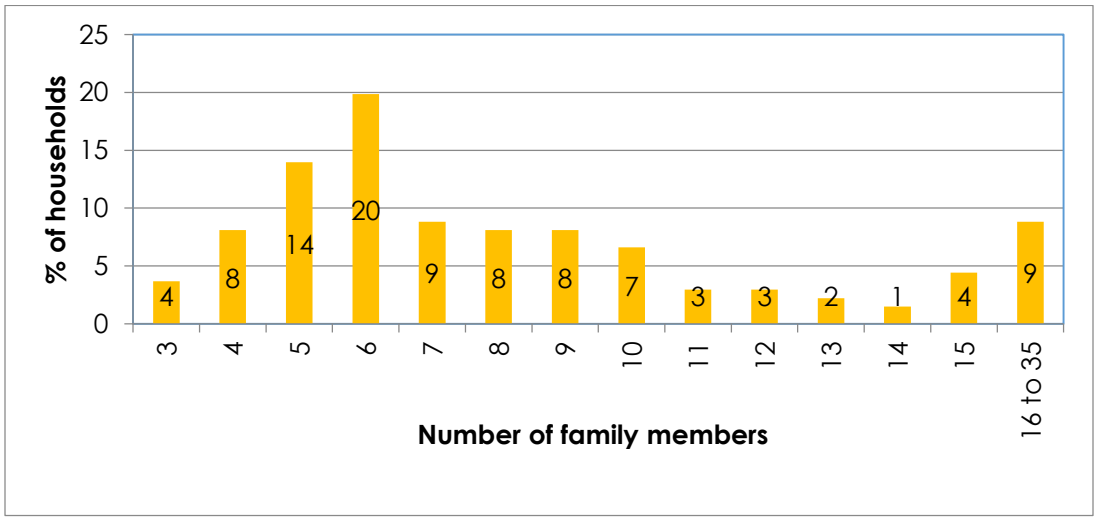
Table 6 shows that mostly the respondents are those who are well familiar with the functioning of the house and thus can provide accurate information if they would choose to do so. To capture the seriousness of the respondents we once again proxy age of the respondent and provide the age-wise distribution of the respondents. See Graph 18 below.



Graph 18: Age wise Distribution of Respondents (Middle Income Group)

The graph shows that 2 out of 139 are below 20 whereas a reasonable share (44 out of 139) is between 21 and 40 years old. 39 respondents are 41 or above. Keeping the Table 8 and Graph 18 in mind it is clear that respondents include males, females and all age brackets.

Graph 19 shows middle income household family size. The average number of members per household turns out to be 8.72 which is a bit higher than the average of high income household sample which makes sense. While most of the households informed about their family members. However, three households did not share their family size.



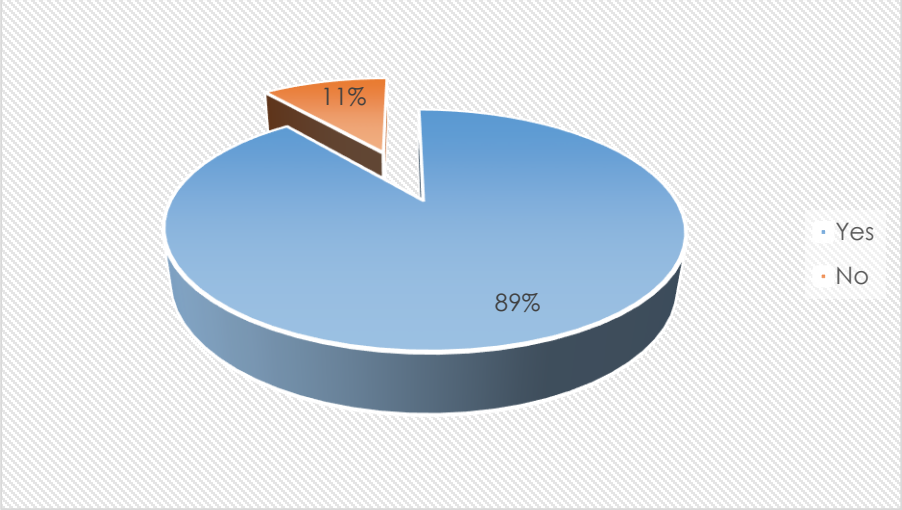
Graph 19: Family Size in Middle Income Group

The highest frequency corresponds to 6 family members per household. However, 12 households hold members ranging from 16 to 35, this distribution seems unusual. There could be one possible explanation to such a high number of family members that there are two or three families are living together who are blood relation, and therefore count themselves as one family.

When asked about the family income, like the high income household, middle income families too did not share the information. When expenditures were asked again the response was not revealing. However, 43 households (31%) reported their expenditures ranging from Rs. 4,200 per month to Rs. 85,000 per month. The average expenditures of these 43 households turned out to be Rs. 18,612 per month.

3.1.2.2. Information on Solid Waste Management System

Regarding the access to solid waste management system, 124 households out of 139 (89%) responded positively. Seeing this response, it can be safely said that there exists a waste collection system in the middle income group in Gujranwala.

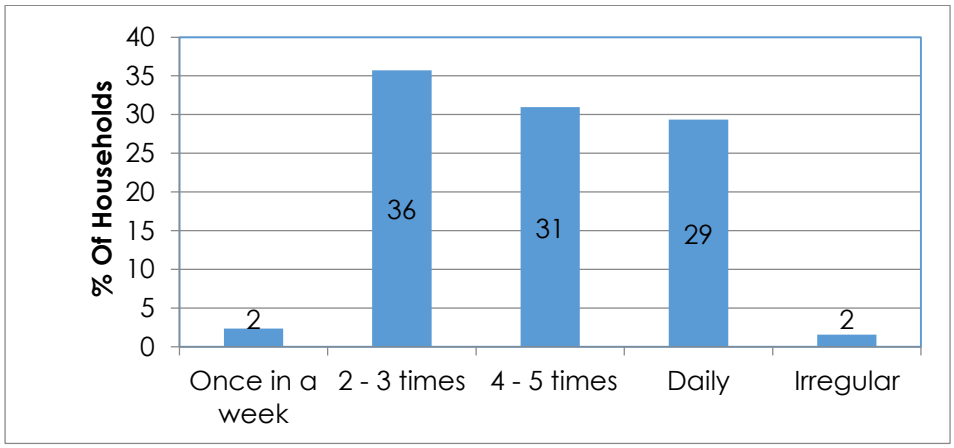


Graph 20: Access to Waste Collection Service

In response to the kind of waste collection services that they have, 82 percent of the sample responded that they have door to door collection system (hand waste to the collector) whereas 10 households (7%) responded that that they leave waste in front of their houses and collector takes it (this is curb side collection). In response to the question relating to who collects the waste? 124 households (89%) responded that waste collector with handcart / donkey cart does this. In the follow-up question that where they are from? Households responded that they are from GWMC, but it is worth mentioning that these workers are providing this service in their personal capacity and GWMC is not officially proving door to door services in these areas.

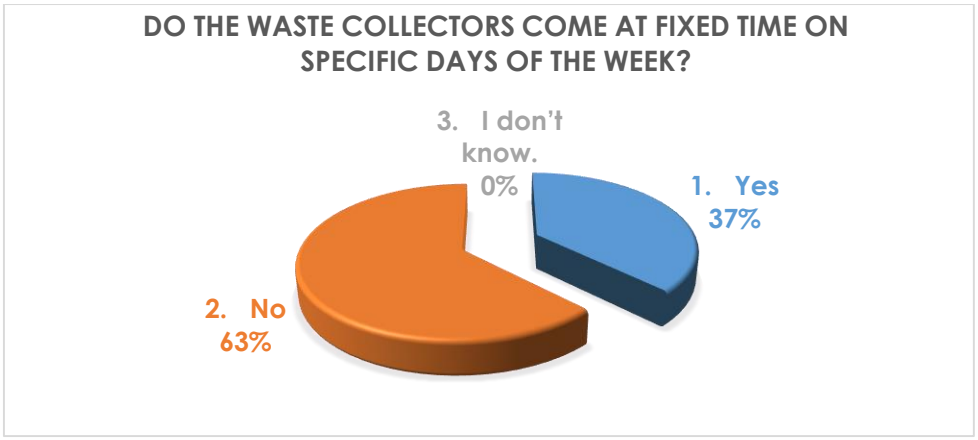
The other relevant issue is the waste collection frequency. How often do they collect the waste? The response of this question is being summed up in bar graph below which shows the waste collection frequency distribution. Graph 21 shows the frequency distribution of 126 households from where the waste is collected. 37 households say that waste is collected daily (it is 29 % of the households which reported yes waste is collected and 27% of the total sample). 45 households (36 %) say that waste is collected 2-3 times in a week. 89 households

(71%) say that waste is not collected daily. This high proportion warrants that daily collection of the waste is ensured in the middle income areas. It is relevant to mention here that daily waste collection is 67 percent in high income group.



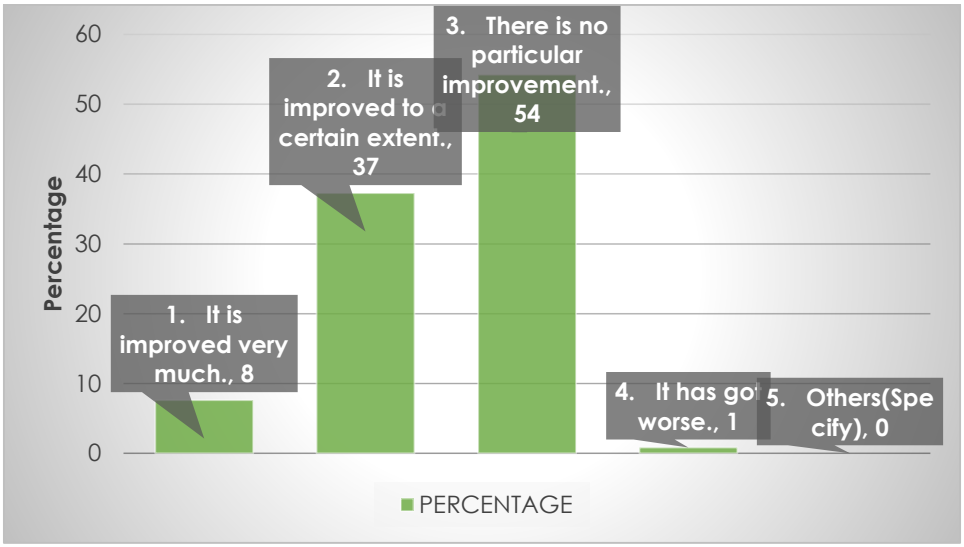
Graph 21: Waste Collection Frequency per Week (Middle Income Group)

However, when the same respondents were asked about the punctuality of waste collection crew, they opined that the crew was not punctual (Graph 22).



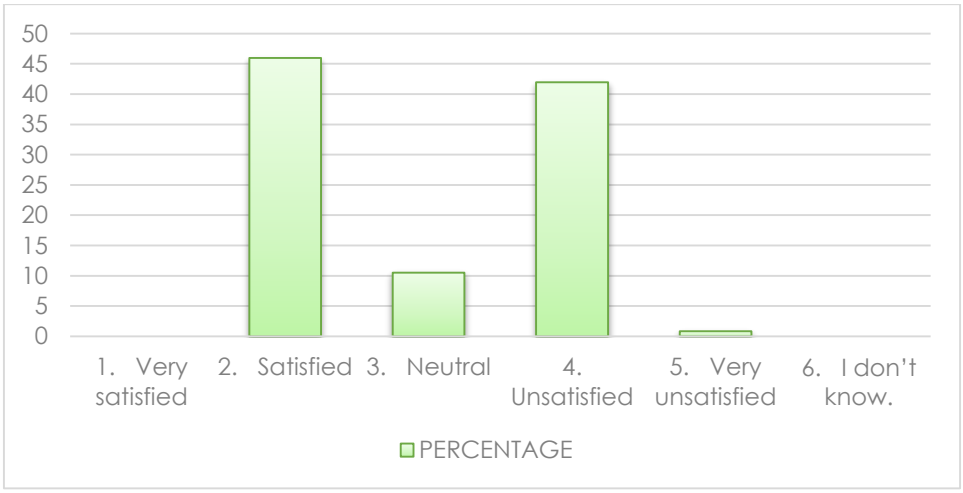
Graph 22: Waste Collection Schedule

Relating to the expectance of consumers on service delivery, they were asked if the waste management system has improved. 54% respondents were skeptical of any improvement, however, 45% responded positively (Graph 23).



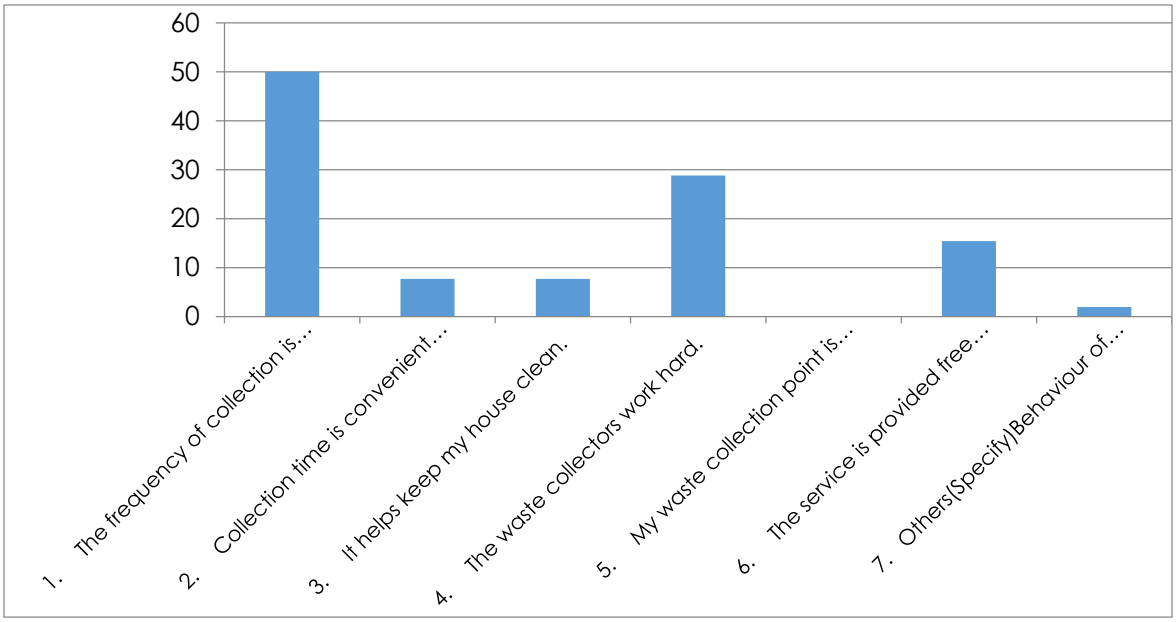
Graph 23: Perception regarding Present Level of Service

Another question investigated if they were satisfied with the service, to which their reply was also divided. 46% respondents were satisfied but 42% replied negatively.



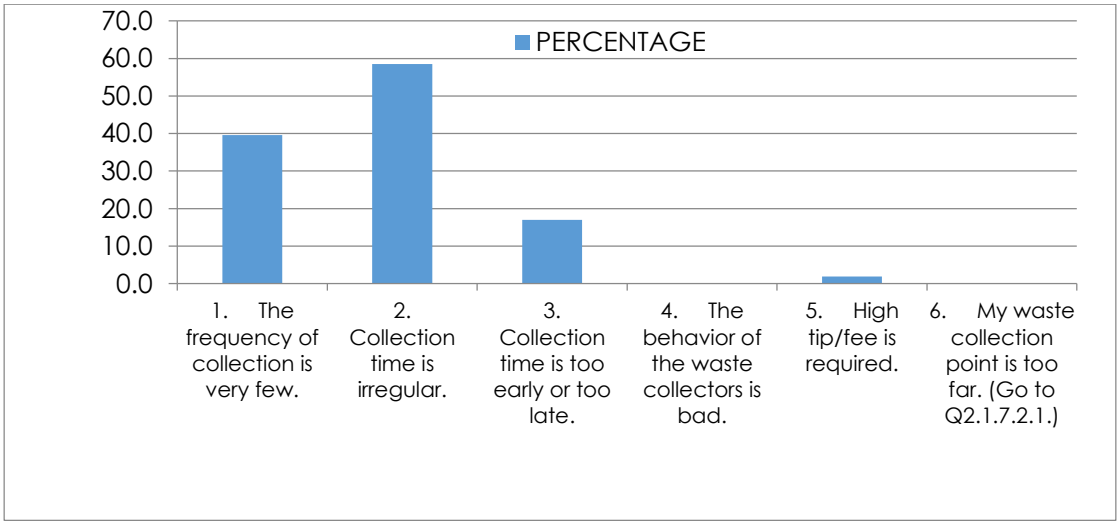
Graph 24: Waste Collection Service Satisfaction

Explanation on their reason for satisfaction is presented in Graph 25. Half the consumers are satisfied because of appropriate collection frequency, while approximately 30% are comfortable only because their waste collector is efficient.



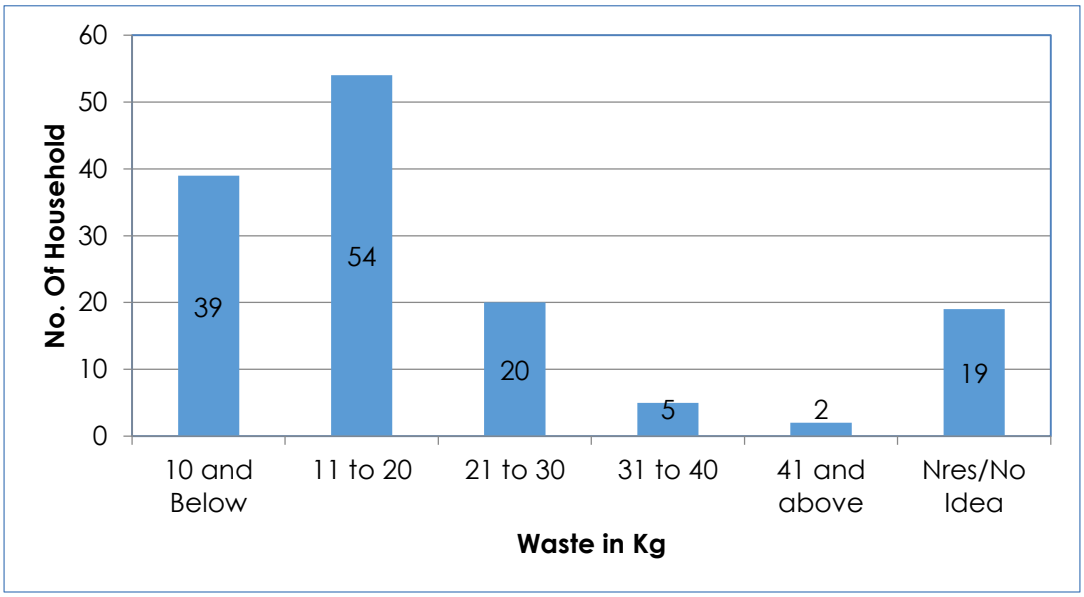
Graph 25: Reasons of Satisfaction for Waste Collection Service

When the reason for no satisfaction was discussed it appeared that the consumers, who were not satisfied, actually expected more frequent and timely service Graph 26.



Graph 26: Reasons of no Satisfaction for Waste Collection Service

How much waste is generated by the household is a crucial variable that has its implications for the implementation of better solid waste management system. Graph 27 shows that most of the households generate waste between 11 to 20 kg per week. 2 of the total households surveyed responded that they generate 41kg or above in a week. Though the figure seems on higher side but the proportion of households is too small that it can be ignored and does not mar the analysis in anyway.



Graph 27: Waste Discharge per Week (Middle Income Group)

Recycling is an important variable so the information about recyclable material is very much important. In this regard when households were asked *about their recycling activity,* 3 said (2%) they give them to the waste collector, 54 responded (39%) they give to somebody who visits time to time and 10 categorized as others that includes: give to maid, bring in personal use, children know etc. etc.

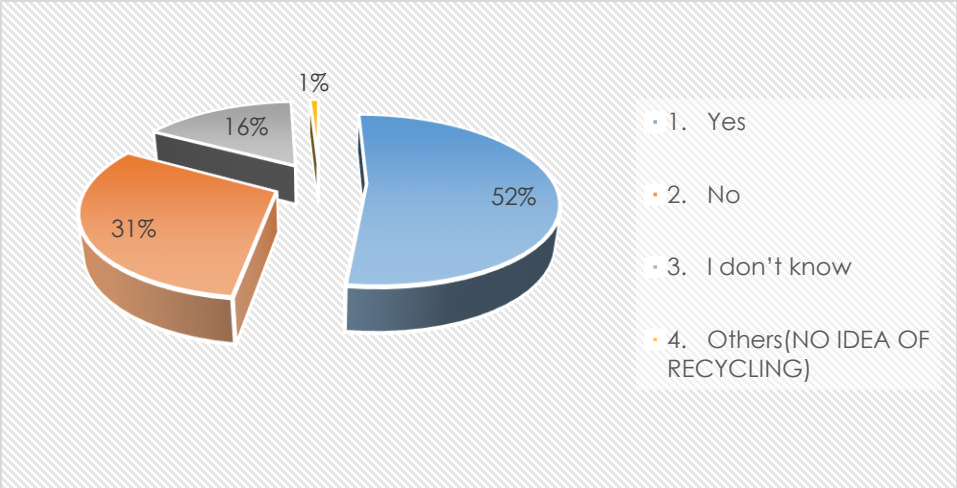
If any organization is interested in taking 'used bottles awareness campaign' along with a good incentive structure is a must. The first step in this regard is to know the current situation of segregation of recyclable material from the rest of the waste. Table 7 shows the current behavior of the households regarding segregation of used bottles. A major proportion of households in middle income group does not segregate them.

Table 7: Response of Households to question about used Bottle Recycling

Response	No of Responses in Yes	% proportion
1. I separate bottles from other wastes	66	48
2. I separate deposit bottles and disposable bottles from other wastes	1	1
3. I separate only deposit bottles and return them to shops	1	1
4. I don't separate them and discharge them together with other wastes	61	45
5. I don't know	0	0
6. Others(Specify) Give to Maid / sometime separate sometime not	8	6

Note: two households did not respond to this question

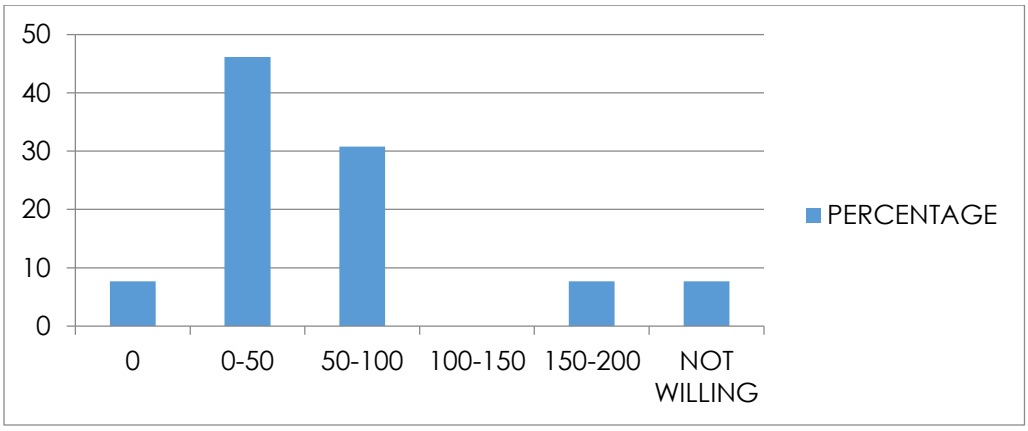
When asked if they were asked by the service provider to separate bottle so that they can be recycled efficiently would the household be willing to do so? 54 households (39%) out of 139 said no. The response is somewhat encouraging in comparison with high income group where the entire 40 households (100%) in the sample responded no. Likewise when asked if they support the idea of recycling, 52% agreed that it should be supported. 31% were not in agreement and 16% had no idea if recycling should be supported (Graph 28).



Graph 28: Recycling Support

When the households were asked what do usually they use to discharge waste? 90 households (65%) answered plastic shopping bags and 59 responded (42%) dustbins (total is greater than the sample because some households responded they use both). If there is any drive from the government to reduce the use of plastic bags dustbins could be distributed among the households to dispose off their waste.

Further they were asked if they were willing to pay some amount for the waste management services, only 16% were not inclined towards paid services. Remaining respondents agreed that they would pay for SWM services (Graph 29).



Graph 29: Willingness to Pay for SWM Services (Rs. per Month)

3.1.2.3. Financial Information

Regarding the payment for amenities the situation is as follows:

As expected water supply and waste collection services are not big burden on the middle income but the electricity charges definitely leave a heavy toll on their income. Does increase in electricity prices reduces the consumption at household level is a relevant question with wider policy implications that need to be investigated.

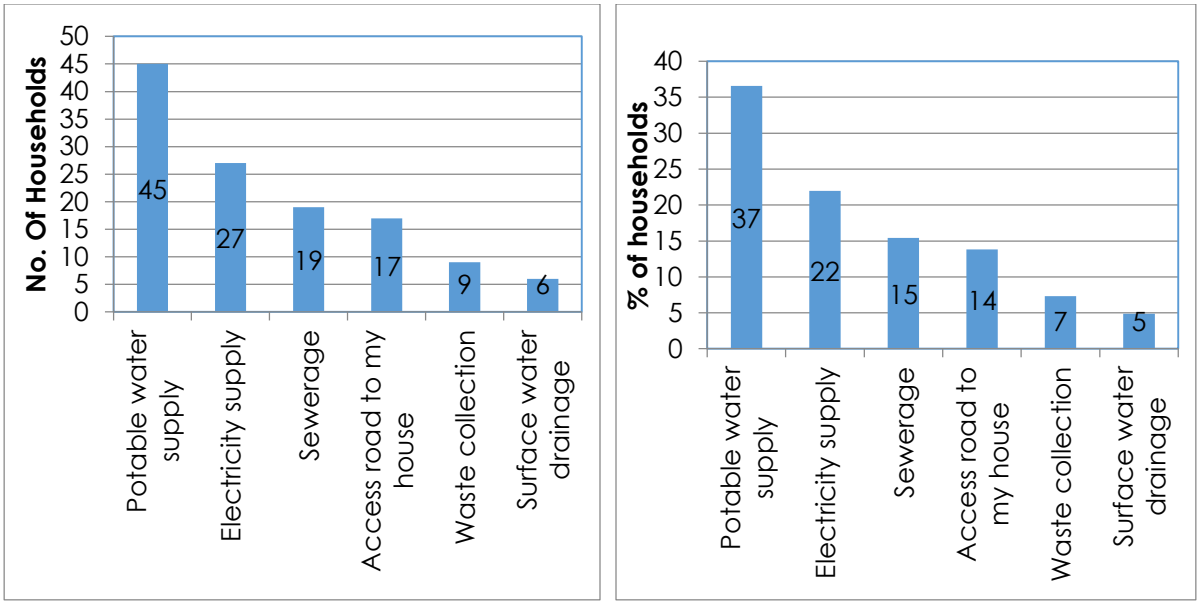
Table 8: Payment by Middle Income Households for Different Services

Payment for waste collection		**Payment for Water Supply**		**Electricity Payment**	
No. Of Households	**Fee/Tips**	**Response**	**No. Of Households**	**Response**	**No. Of Households**
23 (28%)	Not Shared	Not shared	23 (26%)	Not shared	19 (23%)
9 (11%)	Below 20	Borehole	42 (48%)	1500 and below	8 (10%)
28 (34%)	Rs. 30 - 50	Pay (50)	1 (1%)	1501 to 3000	12 (15%)
19 (23%)	51-100	Pay (100 to 300)	7 (8%)	3001-5000	14 (17%)
3 (4%)	200 and above	Others	14 (16%)	5001 to 8000	16 (20%)
-	-	-	-	8001 and above	13 (16%)

Note : Total does not match the sample surveyed as in the data many values were missing

A question was asked to the households regarding the order of priority of the services for their living conditions. The options given were potable water supply, surface water drainage, sewerage, waste collection, electricity supply and access road to my house. Potable water supply assumed the top priority as 45 households put in ranking and it was

followed by electricity supply with 27 households. Surface water drainage took the last position in ranking. Please see Graph 30 for the results in compact form.



Graph 30: Household Order of Priority for Services

Besides this regarding cleanliness problem, 54 households think that people litter the area, 26 households think that illegal dumping nearby cause offensive odor. 47 say that litter blocks the drainage. In response to the question "Who do you think should take initiative to keep the city clean?" 82 household responded National Government. One might infer that general awareness of people about the functions of different layers of the government is very weak. They should understand what national government has to do with the cleanliness of the city?

And who is responsible in local governance. Only 25 respondents replied that GWMC should initiate the process. It can also be inferred that in middle income area GWMC has not penetrated much or at least people are less aware about its functioning. When asked if they are willing to keep the city clean in some way, 83 households responded yes. It is quite natural; no one takes the risk of excluding oneself from god citizen for nothing. Such questions are generally responded yes. They are just there in the questionnaire to increase the level of comfort with the interviewee.

3.1.3. Low – Income Group

Lastly the social survey for low income is presented in the following section. Total number of questionnaires filled in the low income area was 217. Map of the surveyed location is presented below.

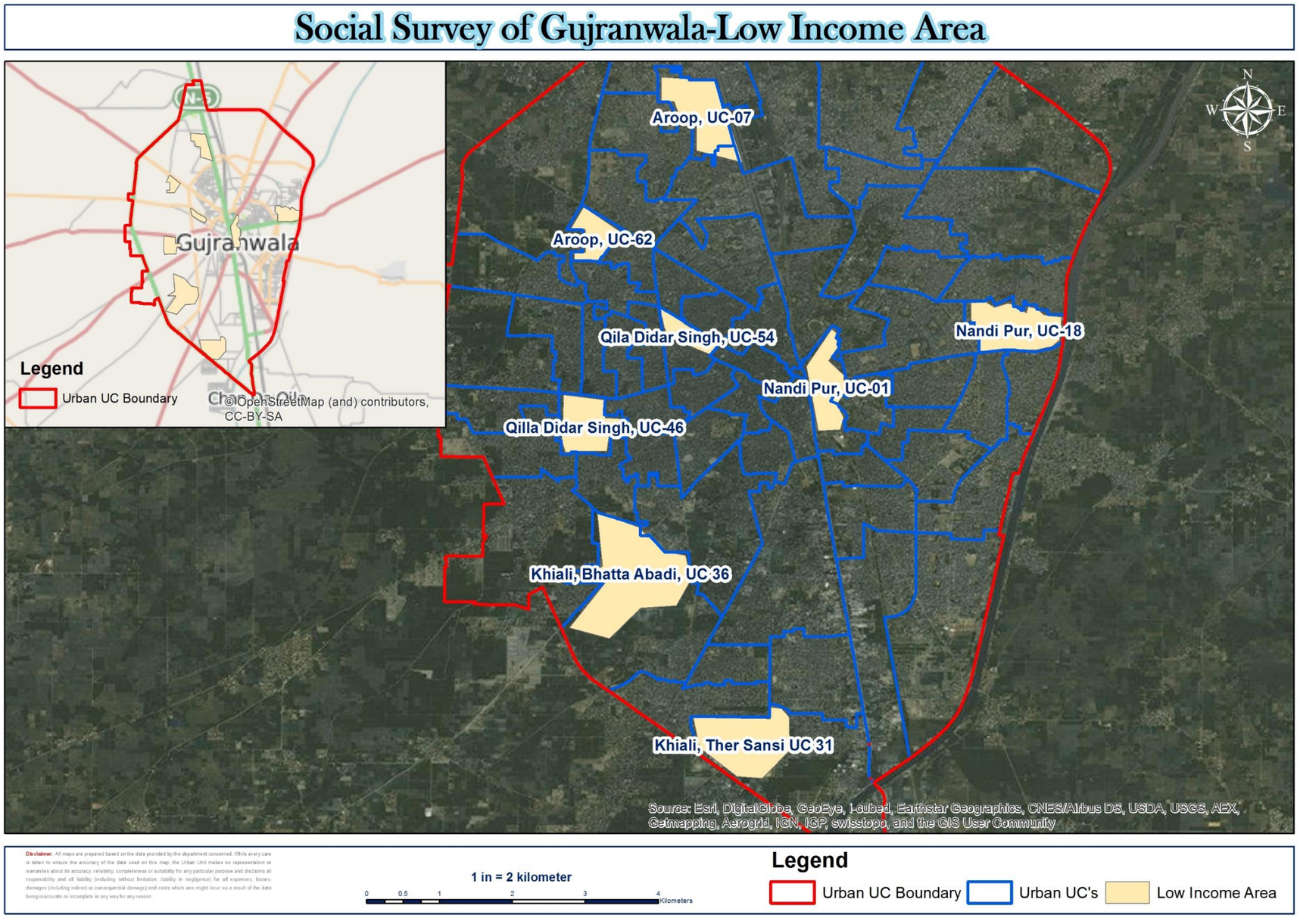


Figure 9: Location of Low - Income Survey Areas

3.1.3.1. General Information on Low – Income Group

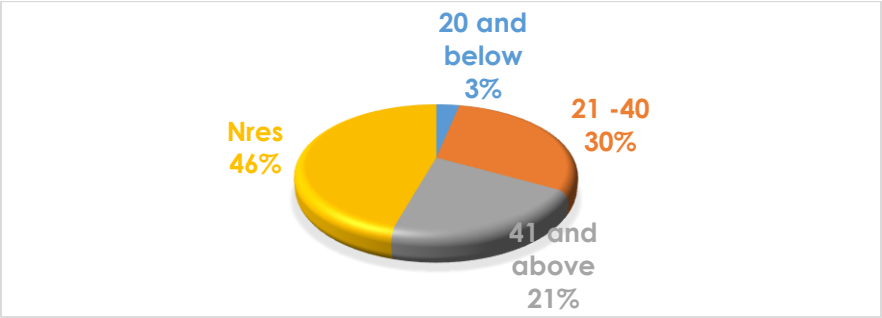
Like the earlier groups, in the low-income house-holds case too, the respondents are almost 50-50. The little difference may be attributed to the norm prevailing in the society where some male head of the household do not prefer their females to talk openly. So it can be assumed that here again the absence of gender biases in response is very much conspicuous. Moreover, 45 percent of the respondents were master of the households themselves. Only 1 percent of the respondents were others, this makes the data reliable.

Table 9: Distribution of Gender and Relation to the Master of the Household

Respondents	Male	Female	Relation with The Master			Other
			Master	Wife	Children	
217	115 (53%)	97 (45%)	98 (45%)	70 (32%)	41 (19%)	2 (1%)

Note: some cells were blank

To address the age issue of the respondents we present in the following chart. We give importance to the age issue as we proxy the seriousness of the respondents from his/her age. Secondly, it is also safe to assume that if the respondent is older, he knows more about the financial matters of the household.

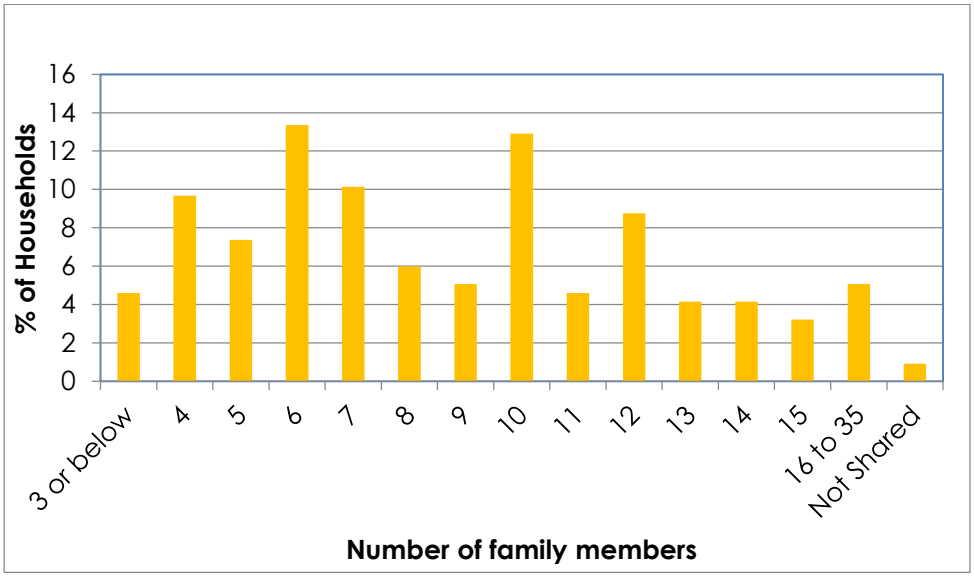


Graph 31: Age of Respondents in Percent Proportion of Total Sample

Graph 31 indicates that 51 percent of the respondents were 21 years old or above. Interestingly, 46 percent did not tell their age. One might argue that they were younger than 20, but generally speaking; a priori we think that not-to-reveal-age tendency is higher

in the middle age (21 years to 40 years) people. Keeping this argument in mind, we can say that a high percentage of respondents was mature one.

In Graph 32 below we show the frequency distribution of the household family size.



Graph 32: Family Size in Low Income Group

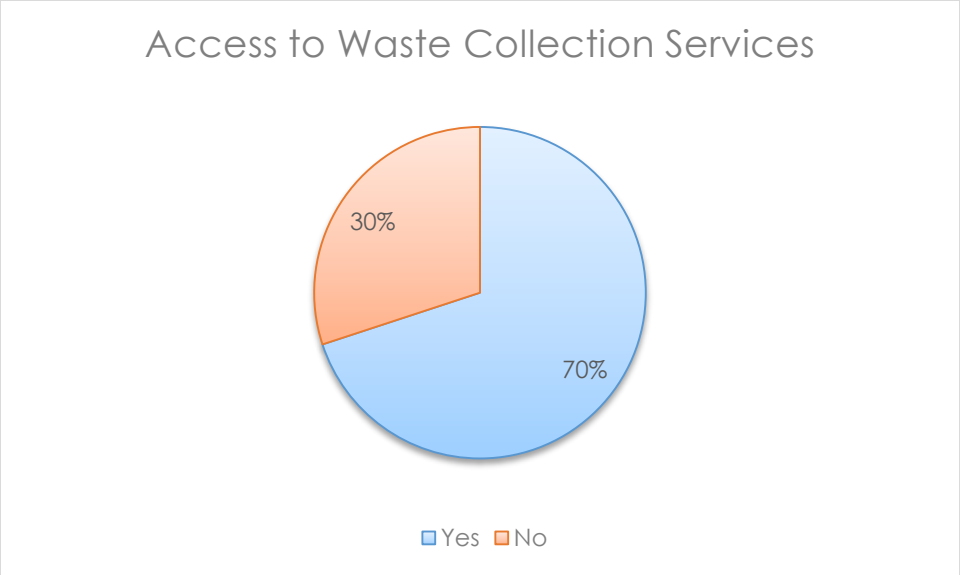
The average of family members per low income household turns out to be 8.92 which is again higher, but in comparison with 7.72 of high income and 8.72 of middle income, this makes sense. Generally speaking, higher income groups tend to have smaller family.

When questioned about family income only 18 households (8.30%) shared their income. The situation was better when it comes to expenditure side as 89 households (41%) shared their expenditures. The expenditures ranged from Rs. 2,800 per month to Rs. 42,000 per month. How accurately they reported their expenditures remains a question mark.

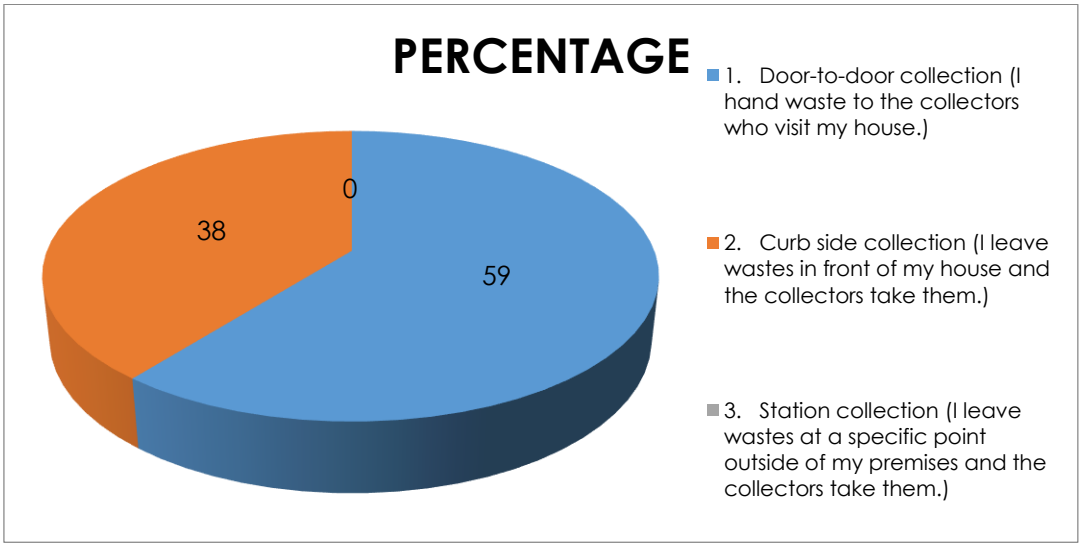
3.1.3.2. Information on Existing Solid Waste Management System

When question about waste collection service; "*do you have waste collections services*", was asked 149 households (69%) responded "Yes", 66 households (30%) said "No" and 2 households (that is less than 1%) did not respond. In our opinion it is a good percentage of

waste collection services. However, 30 percent of low-income group does not enjoy the services of waste collection, it should be a worrisome sign for the concerned authorities.

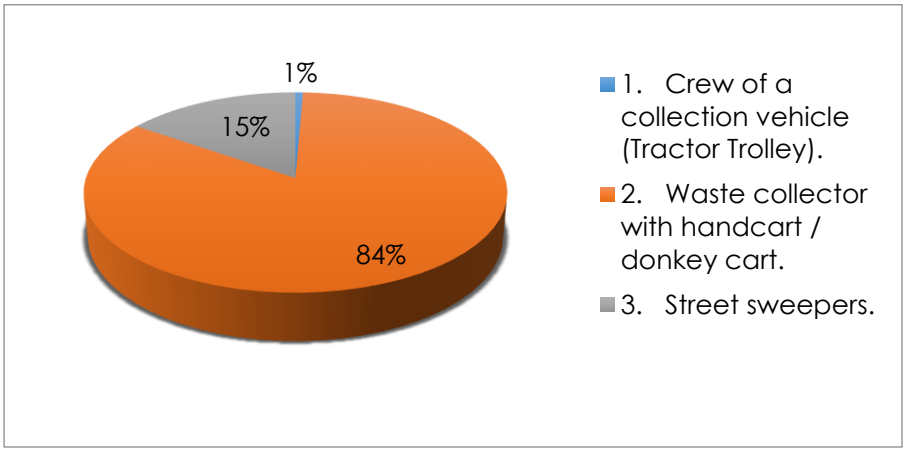


Graph 33: Waste Collection Service in Low - Income Areas



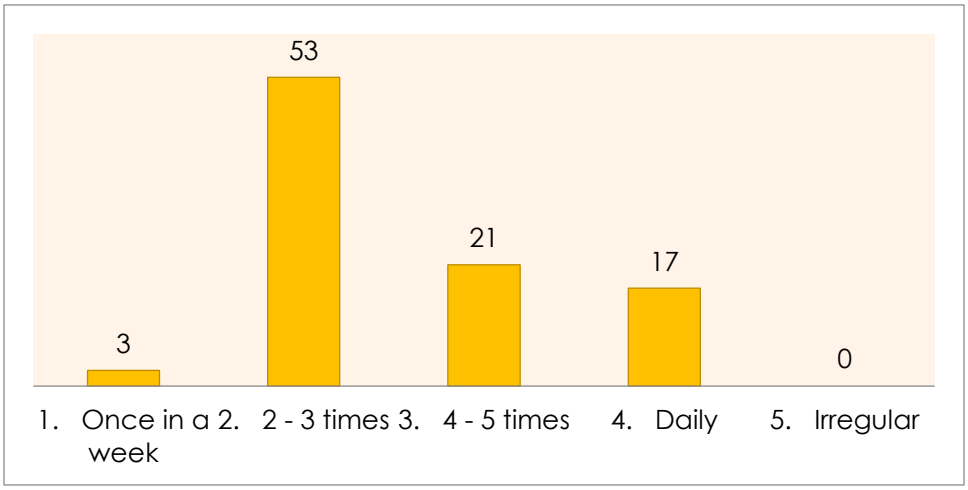
Graph 34: Waste collection Service in Low Income Group

The next question *who collects the waste* was asked to those 149 households (70% of the group from which waste is collected). 126 (84%) responded waste collector with handcart / donkey cart and the rest 23 households (15%) replied street sweepers. To another question 76 percent responded that waster collectors are from GWMC, 19 percent said that they are from individual CSO, CBO or NGO, the rest 6 percent said it is a private company or I don't know.



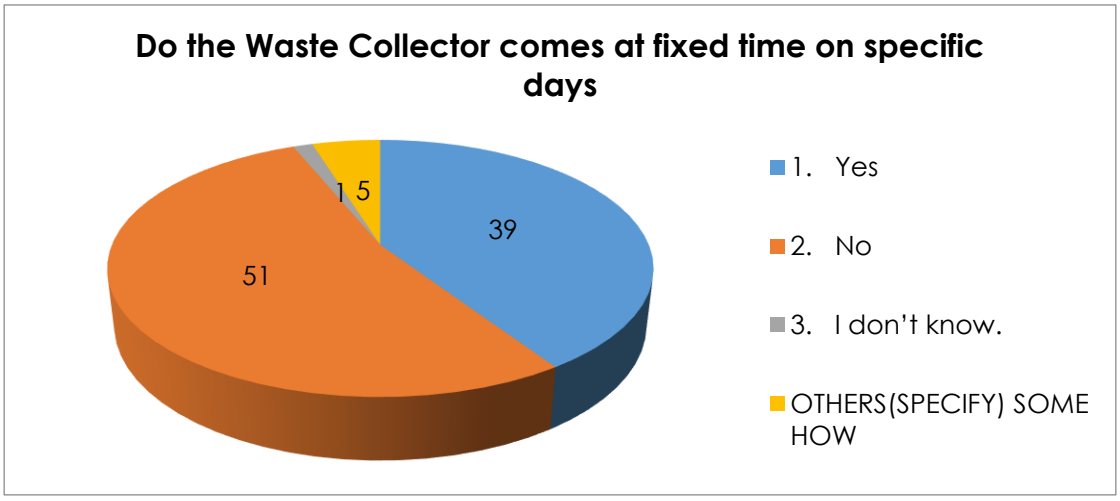
Graph 35: Waste Collection Activity

Once it is known that 70 percent low income households group has the services of waste collection the next natural question was about waste collection frequency per week. Graph 36 below shows this information.



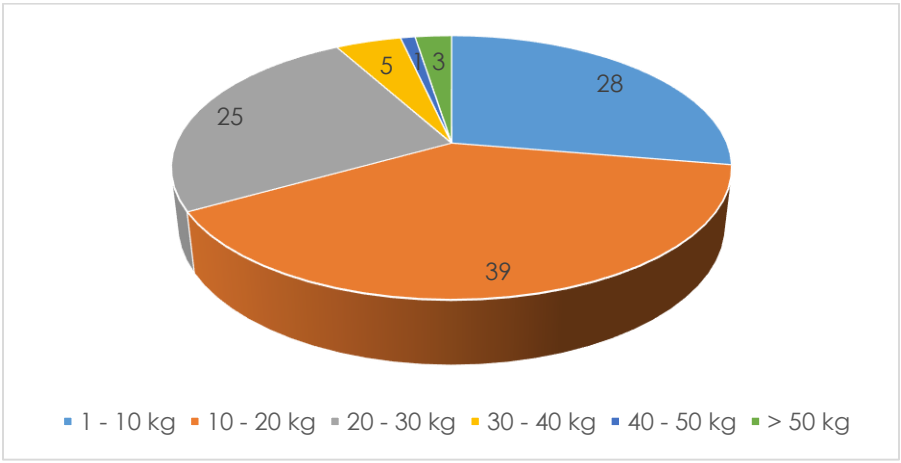
Graph 36: Frequency of Waste Collection in Percent Proportion (per week)

The graph shows that only 17 percent households receive daily waste collections services whereas from 53 percent households waste is collected 2 to 3 times per week or even less than that. Daily waste collection service may be introduced in all areas of the low income households if the objective is to have waste with large moisture contents for further utilization. However, one good thing is that none of the households reported that the waste collection is irregular. It implies that service is there though its frequency may not be appropriate. Similarly time schedule of waste collection is not reliable either as depicted in Graph 37. 50 percent of the low – income group stated that the collection activity was irregular.



Graph 37: Routine of Waste Collection

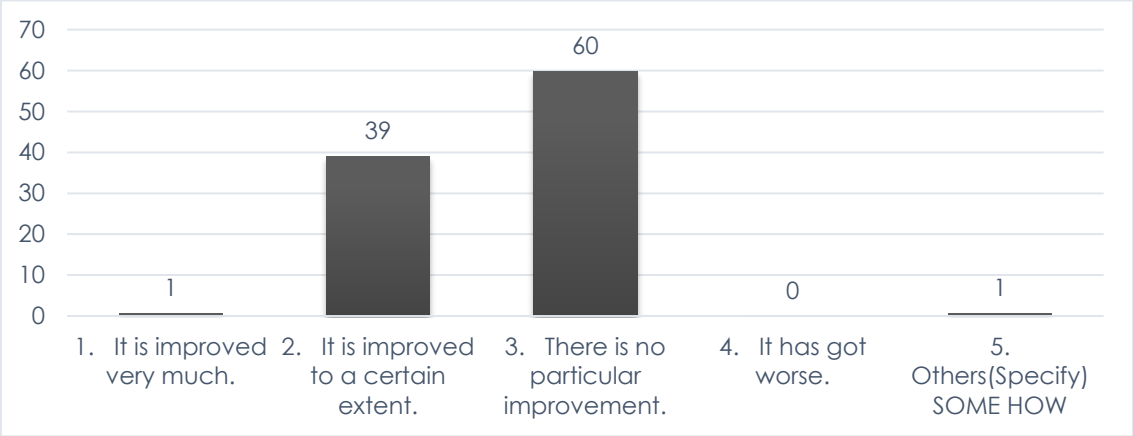
Regarding the amount of waste generating during a week, Graph 38 shows the range and amount in kilograms per household. Large proportion of household, that is, 82 households (39%) discharge waste between 10kg -20kg per week and followed by the second largest slot 57 households (27%) discharge 10 kg or lesser that this per week. So it is evident that more than 65% households discharge waste less than 20 kg per week. Interestingly, in the middle income group the highest number of household fall in the same category, i.e. between 11 to 20 kg per week.



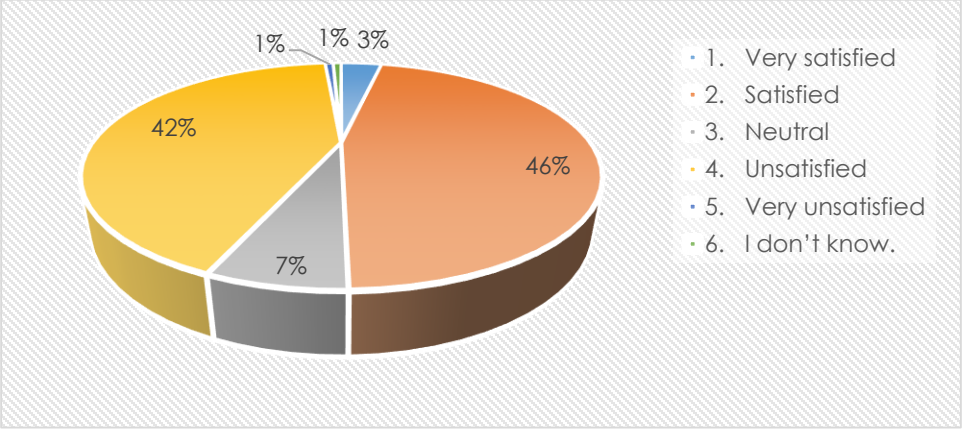
Graph 38: Waste generation Per Household per Week

Regarding the problems of the waste collection system 50% response was that it is too early or too late, 31% said collection time is irregular, and 17% said that frequency of collection is very few.

About the trend of collection services 60 % responded that there is no particular improvement in the trend of waste collection services, 39% told that there is an improvement to some extent and the one percent not very much improved (Graph 39). Furthermore, 46 % said that they are unsatisfied with the current waste collection system, 42% recorded satisfaction, 7% were neutral and 3% did say that they are very much satisfied with the current waste collection system.



Graph 39: Trend of Waste Collection Service Improvement



Graph 40: Level of Satisfaction for Waste Collection Services

When ask *what do they use to discharge waste?* 128 households (86%) said plastic shopping bags, and 139 (93%) responded dustbins. These questions are not mutually exclusive and there are households in the data which use both simultaneous and thus they responded to both the items to discharge waste.

Table 10: Recycling Behavior for Used Bottles

Questions	Frequency	Percentage
1. I separate bottles from other wastes	151	70
2. I separate deposit bottles and disposable bottles from other wastes	3	1
3. I separate only deposit bottles and return them to shops	5	2
4. I don't separate them and discharge them together with other wastes	51	24
5. I don't know	3	1
6. Others(Specify) Give to Maid / sometime separate sometime not	5	2

The highest category is "I separate bottles from other wastes", that is, 151 households (70%) do the separation and what do they do then? The answer lies in the next question response where 133 households (86%) reveal that they sell then to somebody who visits their place time to time to collect such items. So the behavior of low income households is quite understandable as the selling of such bottles does bring some amount.

On other items like paper, can, cardboard the data indicate that these items are less applicable to this income group. When the question was asked "In general do you support the idea of recycling?", in the sample of 217 households 142 households (65%) said "Yes" they do support, 15 households (7%) replied "No" whereas 49 households (23%) responded "I don't know" and 11 (5%) fall in the category of "others".

Does the household separate kitchen waste for any purpose, when this question was asked 202 households (93%) responded no.

3.1.3.3. Information on Financial Matters

Regarding the cost of services in low income group we present a table below that summarizes payments made for these services.

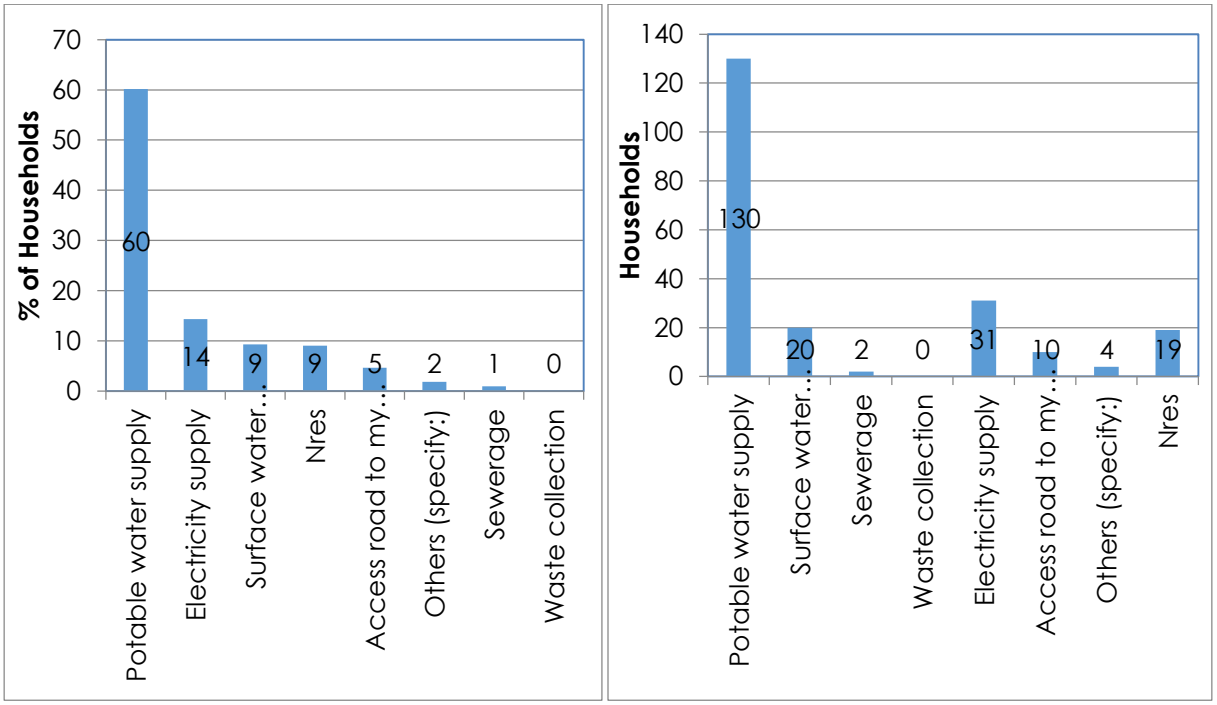
Table 11: Cost of Service in Low - Income Group

Payment for waste collection		**Payment for Water Supply**		**Electricity Payment**	
No. of Households	**Fee/Tips**	**Response**	**No. of Households**	**Response**	**No. of Households**
38 (26%)	50 or below	Not shared	76 (35%)	Not shared	28 (14%)
50 (34%)	51 to 100	No Supply	60 (28%)	200-999	7 (3%)
12 (8%)	101-200	No Connection	53 (25%)	1000-2000	66 (33%)
6 (4%)	201 and above	1-100	18 (8%)	2001-3000	33 (16%)
43 (29%)	Nres	101-200	3 (1%)	3001-5000	26 (13%)
-	-	201 and above	2 (1%)	5001-7000	30 (15%)
-	-	Nothing	3 (1%)	7001-11000	11 (5%)

As evident from the Table 11, for the waste collection services 88 households (60%) pay Rs. 100 per month or even lesser than that. Out of which 38 households (26%) pay just Rs. 50 per month or even lesser than that. 29% of households did not respond to this question. When it comes to the payment for water supply 189 households (88%) make the "not shared", "no supply", or "no connection" response. This response suggests that either they have boreholes or they are not served the monthly bills by WASA.

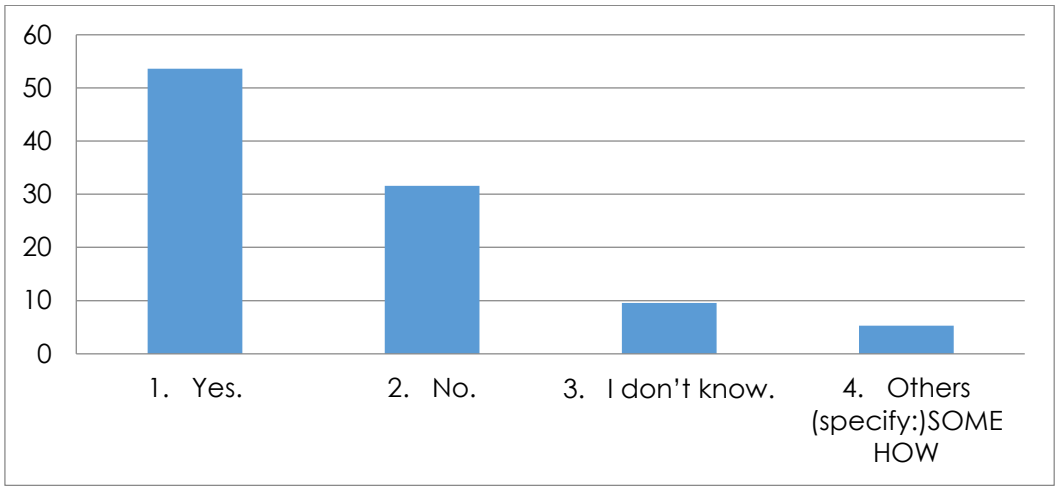
Electricity payment is the category where people do share their payments in greater proportion relative to the other categories. 20% of the sample pays more than Rs. 5000 per month. Keeping in mind the low-income-households, it seems a big toll on their income.

In response to the question, "which item is priority for your living condition?" *potable water supply* assumed the first place as 60% of the household cast vote for it. *Electricity supply* followed it though with a very wide gap since only 14% of the households showed their preference for it. More interestingly, none of the households said that *waste collection* is the first priority. It is reminded that in the sample of 217 low-income households only 149 households have the waste collection services (31% without this service) but in the priority ranking waste collection assumed the last position. One might argue that it might have assumed second priority by the majority of households, to answer this potential question, when we checked the data, it was known to us that only 2 households put it on the second priority, and 23 households (11%) put it on third priority.



Graph 41: Order of Priority for Services

In response to the question about cleanliness of the public areas – roads and parks – 54% of the respondents said "Yes", 32% opted "No", 10 % responded "don't know" and 5% replied "somehow".



Graph 42: Cleanliness of Roads and Parks

To another similar question that "*who does clean the road in front of your premises?*" 39% said GWMC, 35% responded that a family member does, and 6% said nobody does.

Regarding the design of collection services for the low – income group, it was investigated in the survey if they are willing to pay for door to door collection twice a week, only 13% respondents were not willing to pay. However, remaining agreed to pay small amount ranging between Rs. 50 to Rs. 300 per month. It is worth mentioning here that 14% respondents didn't share their opinion altogether.

3.2. Commercial Establishments' Survey

Moving to the other components of social survey, sample distribution for commercial and other activities were also finalized by the JICA project team as outlined in Table 12.

Table 12: Sample Distribution for Commercial Establishments

Category	Samples*	Establishment to be surveyed
Market	5	Major markets, sales
Schools and University	5	No. of enrolled students

		(1 university, govt. college & school, private college & school)
Commercial Establishment	7	Large Scale, Number of Employees, Floor size
Restaurants	5	No. of customers
Hotels	5	No. of rooms
Stores	10	Floor size
Factories	10	Large Scale, based on production
Hospitals	3	No. of beds
(Sub Total)	50	

*All the selected categories in the Waste Amount and Composition Survey (WACS) shall be included in this survey.

3.2.1. Markets

As described in Table 12, market survey was carried out in major markets of Gujranwala. Sample size was 5 markets, however, larger number of markets were surveyed and in this report 10 markets are presented for comparison rather than 5.

Details of survey analysis is discussed in the following sections.

3.2.1.1. General Information

Summary of basic information of markets surveyed is presented below;

Table 13: Information of Markets

Name	No of Employees	No of Shops in Market	Floor Area	Amount of Waste Generated in a Week (kg)	Amount of Waste Discharged in a week (kg)
Fruit and Vegetable Market	>100	200	5 Acres	48,000 to 54,000	36,000
Fazal Market	>100	45	8 Kanals	2800	350 to 400
Model Bazar Noshera Road	10 to 19	1	120 ft (Length)	350	300

Futto Mand Market	>100	170 to 200	3 to 4 Marlas	600 to 650	600
Sheikhupura Road Market	50 to 99	300	60 Marla	420	400
Sheranwala Market	>100	150	8 Kanals	1500	200
Dhulley Market	>100	65 to 70	60m (Length)	920	850
Gondlanwala Market	20 to 49	25	260 ft (Length)	210	200
Khiali Bypass Market	>100	70 to 80	436 ft (Length)	NRes	NRes
GAO Market	<10	20	40 m (Length)	400 to 450	400

Location of these markets is marked on the map below.

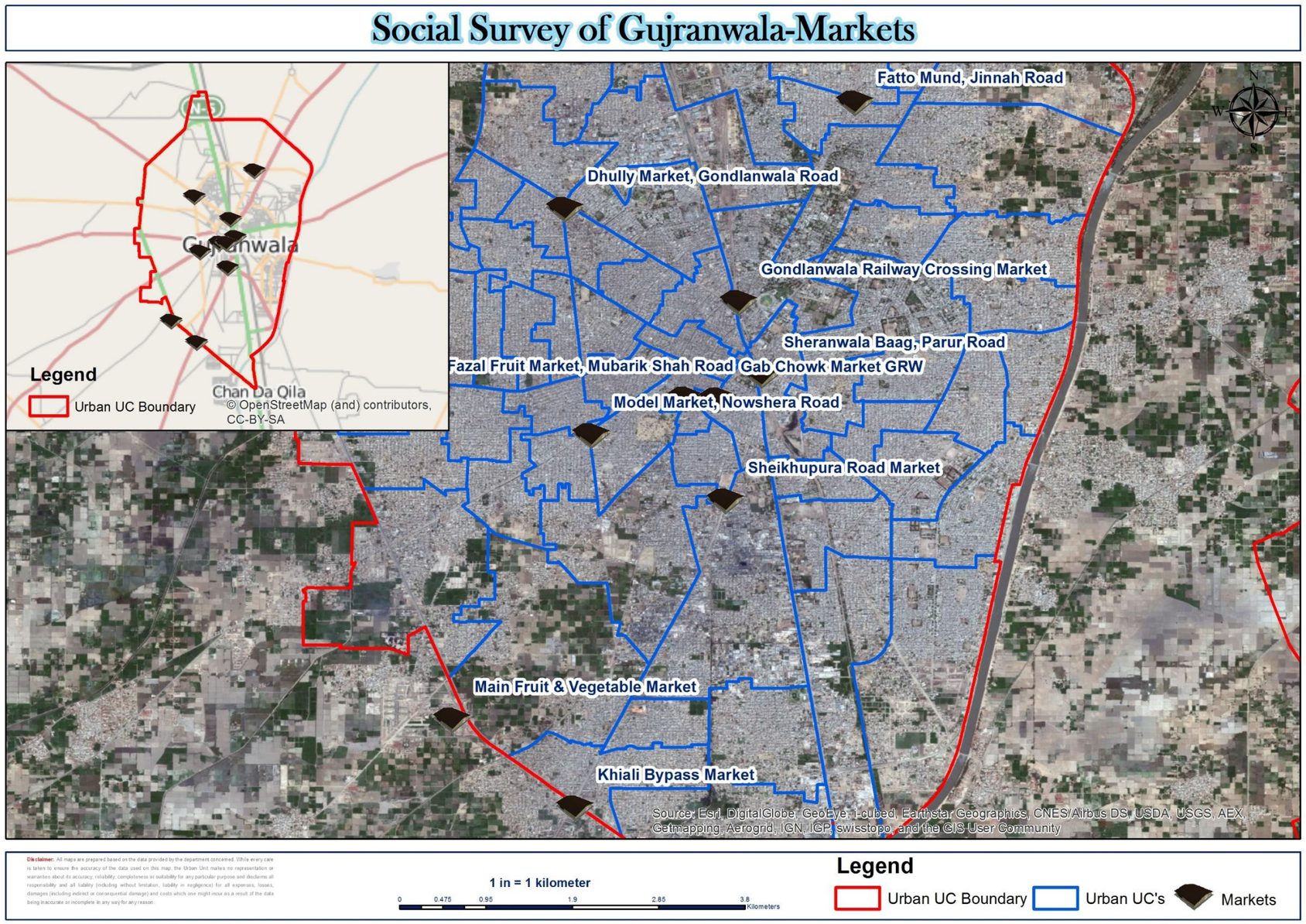


Figure 10: : Location of Markets visited for Social Survey

Some of the images of survey in these markets are presented below.

Figure 11: Pictures of Social Survey in Markets

Main Fruit & Vegetable Market, Malhi Chowk, Bypass Road, GRW/UC#124

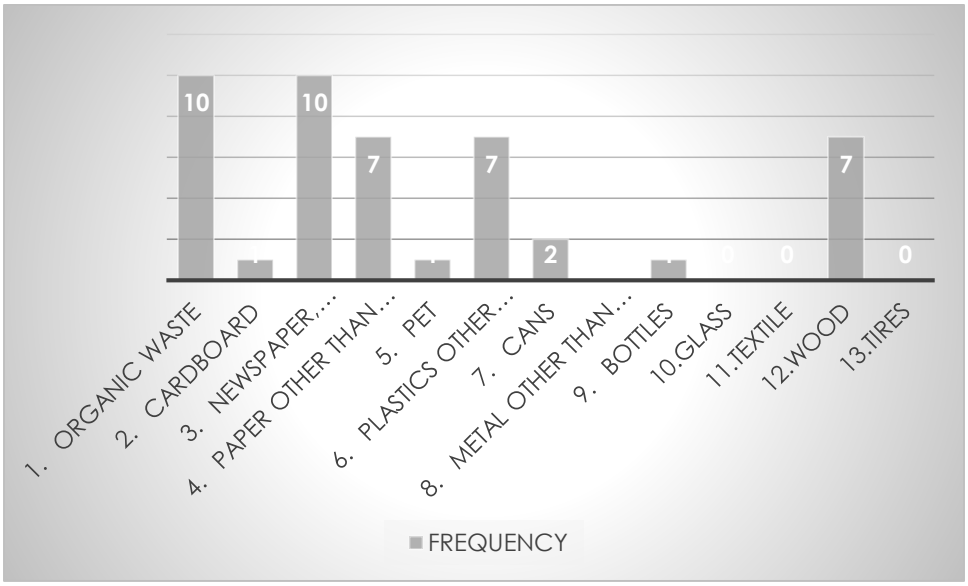
Model Market, Nowsehra Road, GRW/UC#80/44

Fazal Fruit Market, Mubarak Shah Road, GRW/UC#79/43

Sheran Wala Bagh Railway Crossing Market, Pasroor Road, GRW/UC#37/1

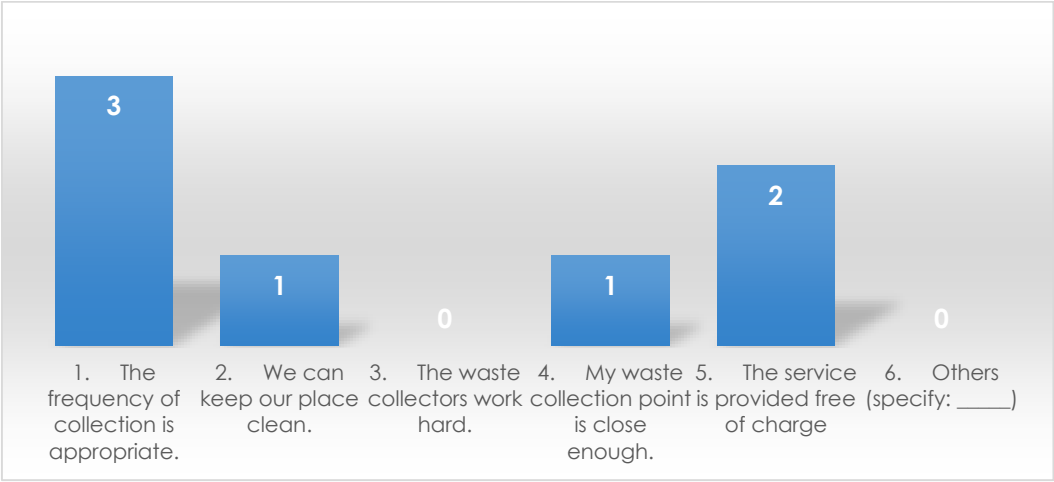
3.2.1.2. Waste Generation and Recycling Behavior

When the composition of waste discharged in their market was investigated, the respondents replied combination of components. Graph 43 below present the frequency distribution of their responses on percent scale.



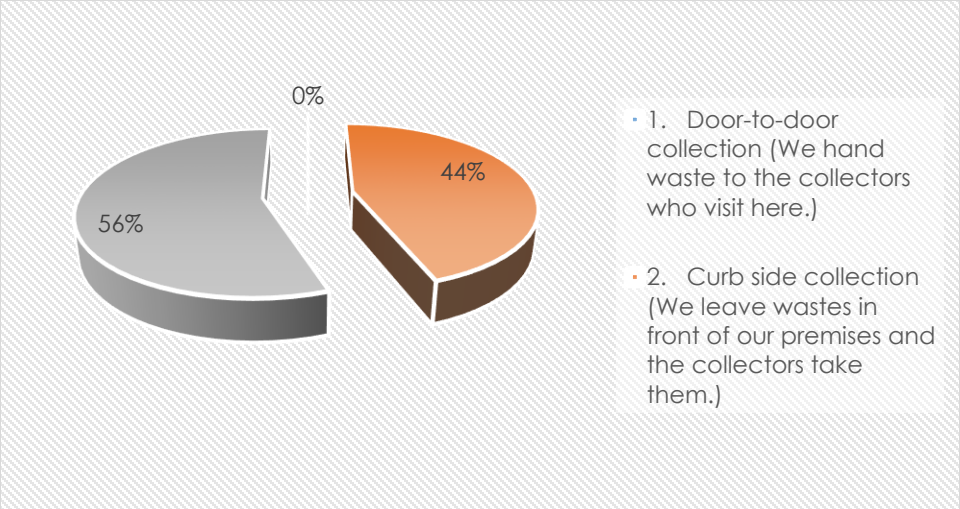
Graph 43: Waste Composition in Markets

When asked if they have waste collection service, 90% replied that they do while only 10% told that they don't have any service available. All those who have collection service told that the waste is collected by the department (GWMC). Moreover, 44% were satisfied with the service whereas, 56% were not. The reasons assigned to satisfaction of services are drawn on frequency chart below.



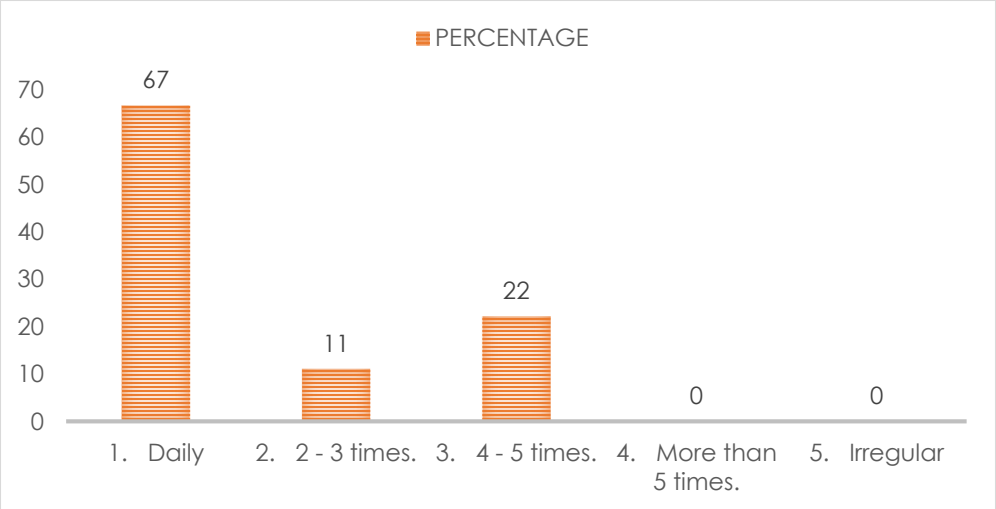
Graph 44: Reasons of Satisfaction for Present Waste Collection Services

Type of waste collection activity was defined either at their door step or curb side. The percent proportion is shown in graph below.



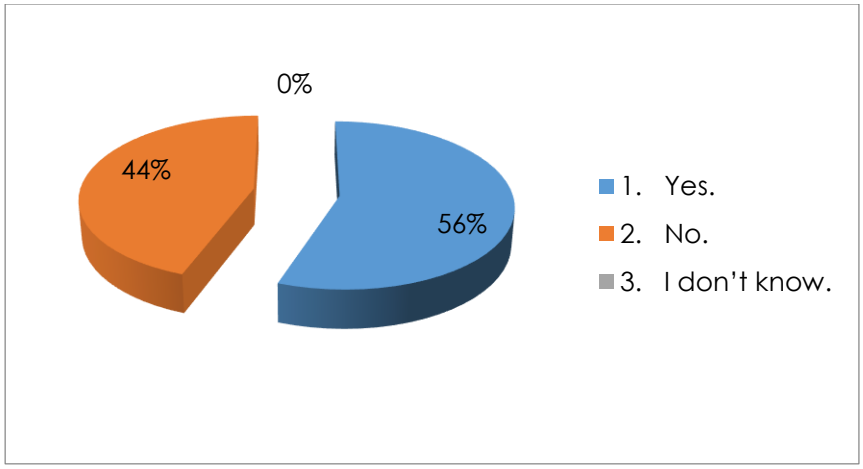
Graph 45: Type of Collection Activity

Regarding the frequency of waste collection, various responses recorded are presented below.



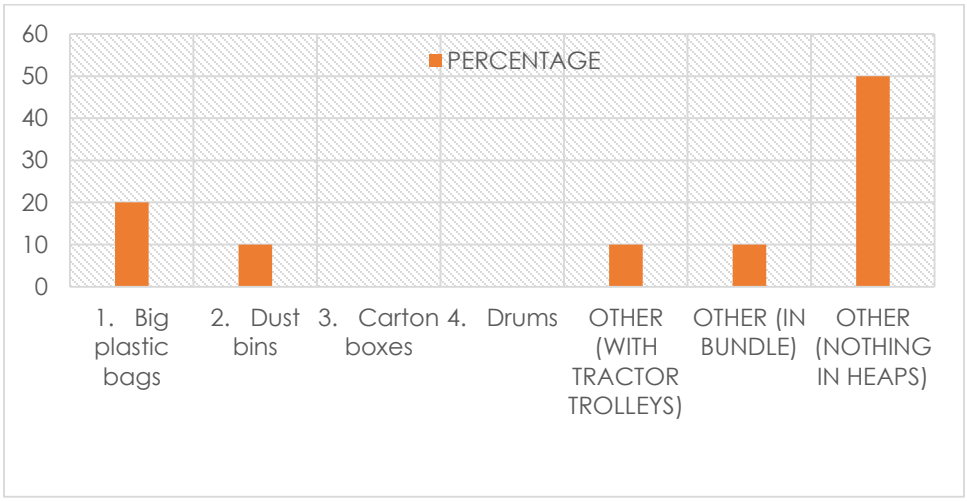
Graph 46: Frequency of Waste Collection

Punctuality was investigated separately, to which mixed response was received. 56 % were of the viewpoint that collection is regular but 44 % replied it was not regular.



Graph 47: Schedule of Waste Collection

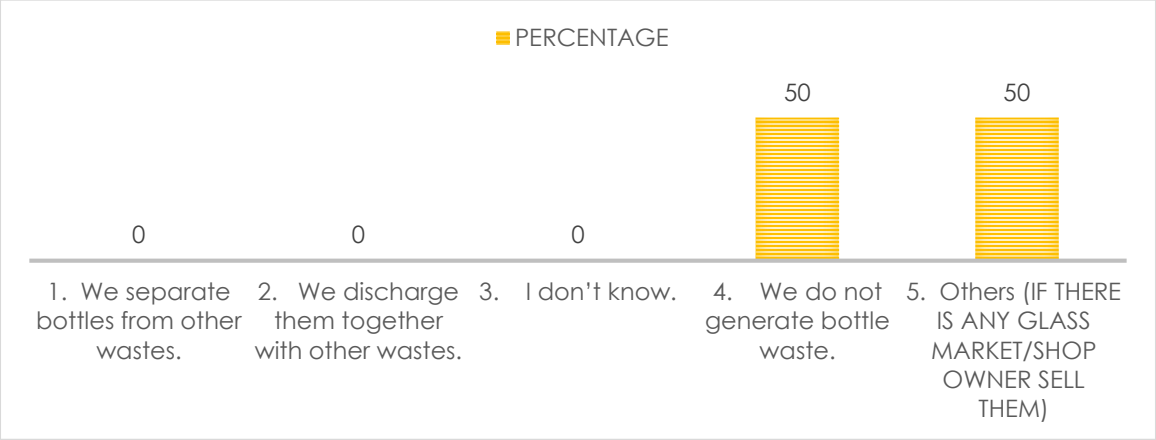
When asked if they treat their waste only one respondent told that they do. But the treatment that he was refereeing to was burning. Mode of storage at source is described in Graph 48.



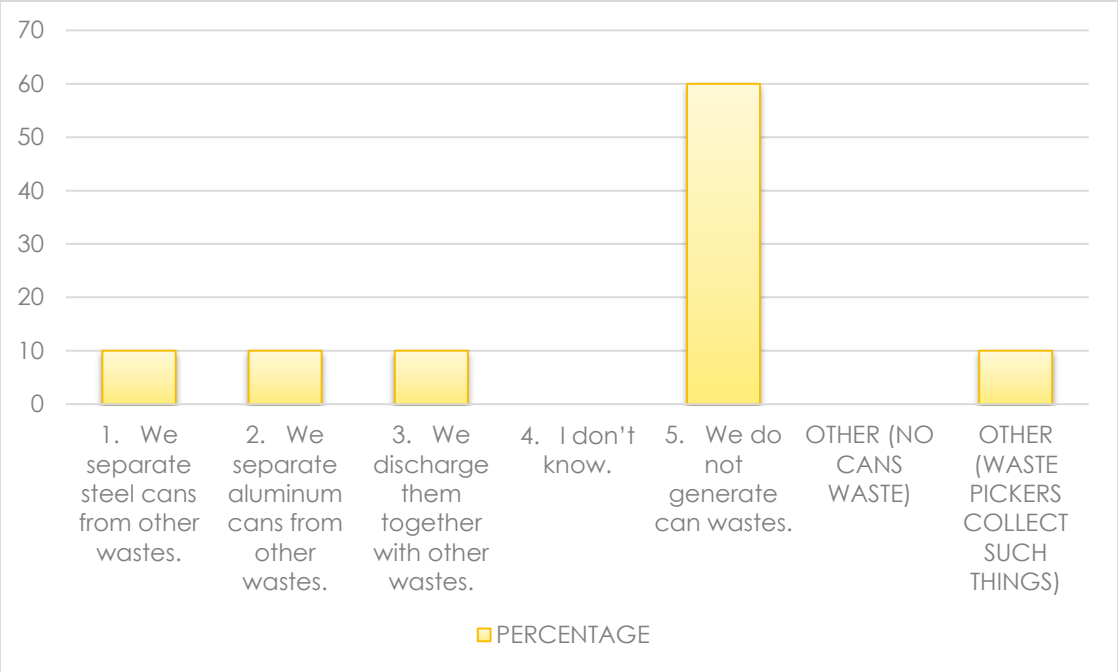
Graph 48: Storage at Source

Recycling trend of various materials is presented in the following graphs which is self-explanatory.

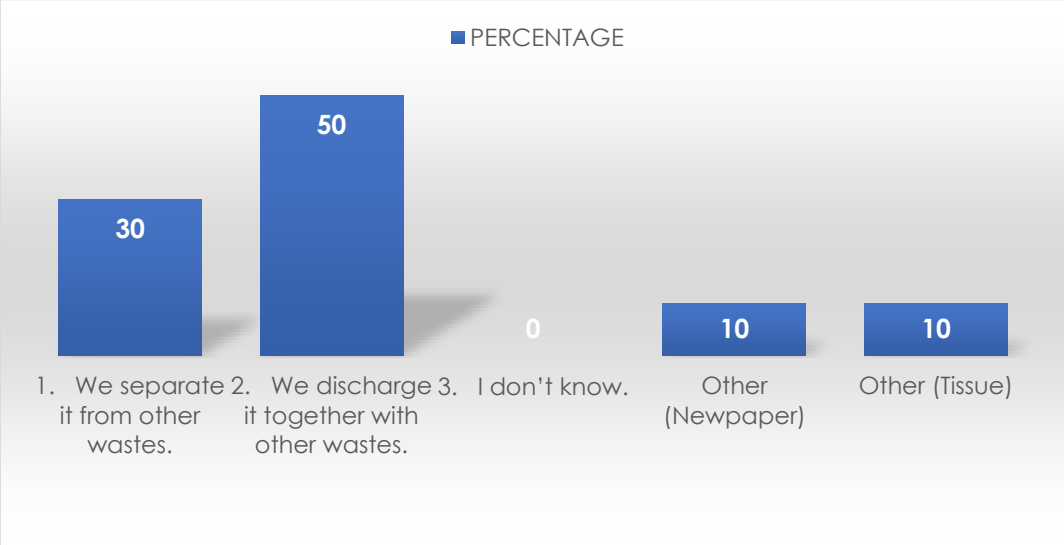
Graph 49: Plastic Bottles Discharge Behavior



Graph 50: Glass Bottles Discharge Behavior



Graph 51: Cans Segregation and Discharge Behavior

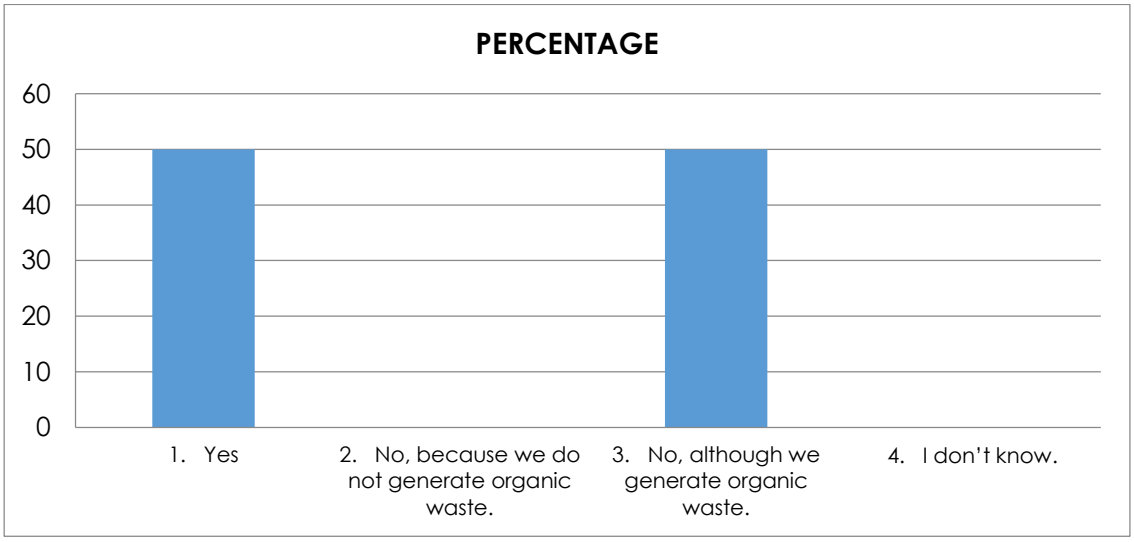


Graph 52: Sorting Behavior for Paper

For most of the recyclable materials, markets rely on sanitation staff who may segregate whatever component gives more profit. And large percentage of respondents who told they do not segregate, gave the reason that it's troublesome.

At the same time all the respondents who are not sorting recyclables said they would cooperate for efficient recycling.

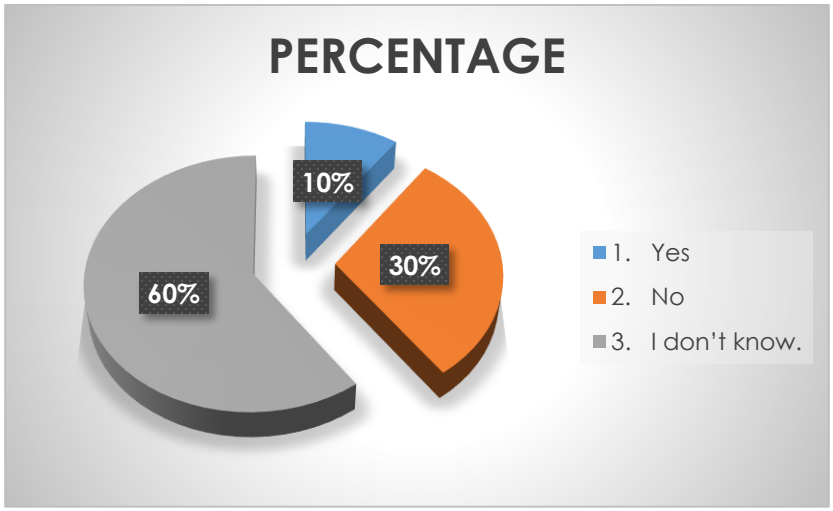
When the respondents were asked about sorting of organic waste 50% told they did while 50% said they didn't.



Graph 53: Sorting Behavior for Organic Waste

All markets where organic waste was sorted told that this waste is used to feed animals. Similarly among those markets where no sorting is practiced, 80% informed that they will cooperate to sort organic waste so that it may be converted into compost. Only 20% were in disagreement. According to them, sorting could be troublesome, so they would avoid sorting.

Overall trend of sorting in these markets was investigated. The responses are plotted in graph below on percent scale.



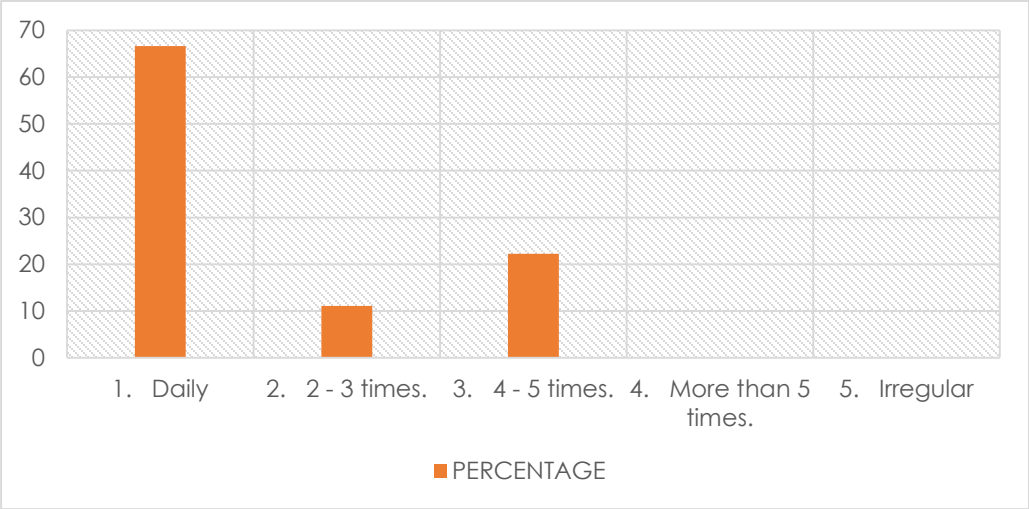
Graph 54: Willingness of Markets to Sort

One question was posed to see the treatment trend of waste components in markets. It is worth mentioning here that only 10% of respondents mentioned that they treat their waste. The type of waste they told they treat is organic and burning it is their way of treatment. They were asked how they dispose off the ash to which they responded that they throw it with other waste components.

3.2.1.3. Waste Collection Services

When the participants from markets were asked about waste collection services, 90% told that they have access to these services. All of these markets with waste collection services further informed that GWMC was providing them these services. Out of these markets 44% were availing curbside collection mechanism and 56% were provided with stationary container collection system.

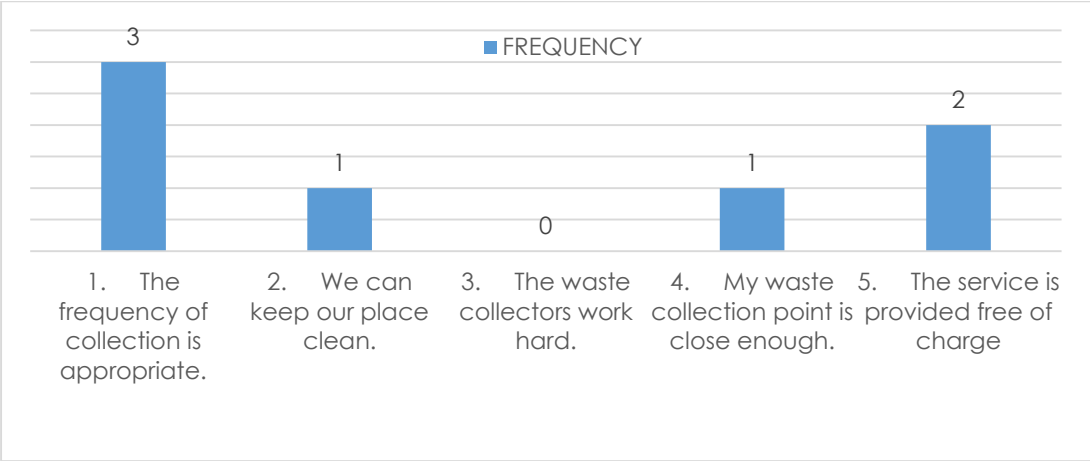
For collection service routine following graph separates the percent responses.



Graph 55: Level of Waste Collection Service

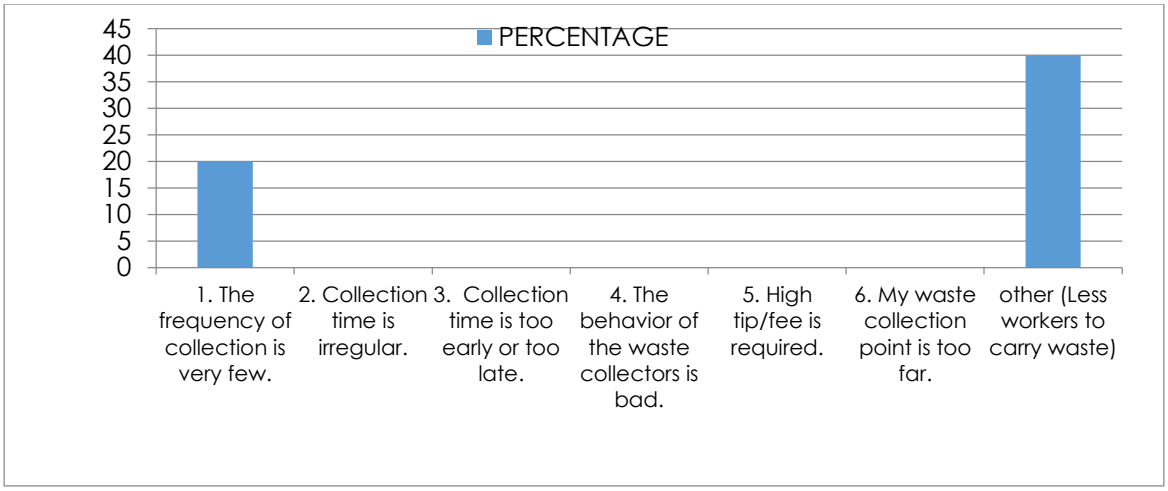
Further respondents were divided in opinion about schedule of collection. According to 44% of the respondents waste collectors were irregular, in contrast 56% said the collection schedule was regular. The perception varies when asked if they are satisfied with the present collection system. Because, 44% replied that they were satisfied and 56% said they weren't.

Reasons for satisfaction are presented below in graph.



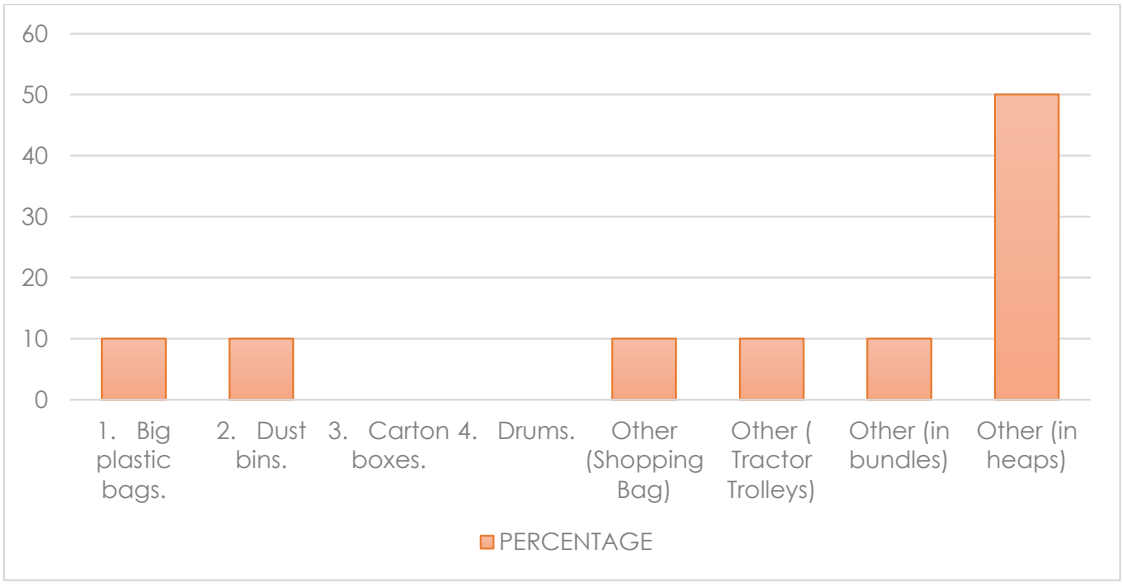
Graph 56: Reasons for Satisfaction from Waste Collection Service

Once these reasons have been observed, let's look at the reasons of no satisfaction in the following graph.



Graph 57: Reasons of no Satisfaction for Waste Collection Service

Methods used by the market respondents to dispose off their waste is presented below in graph.

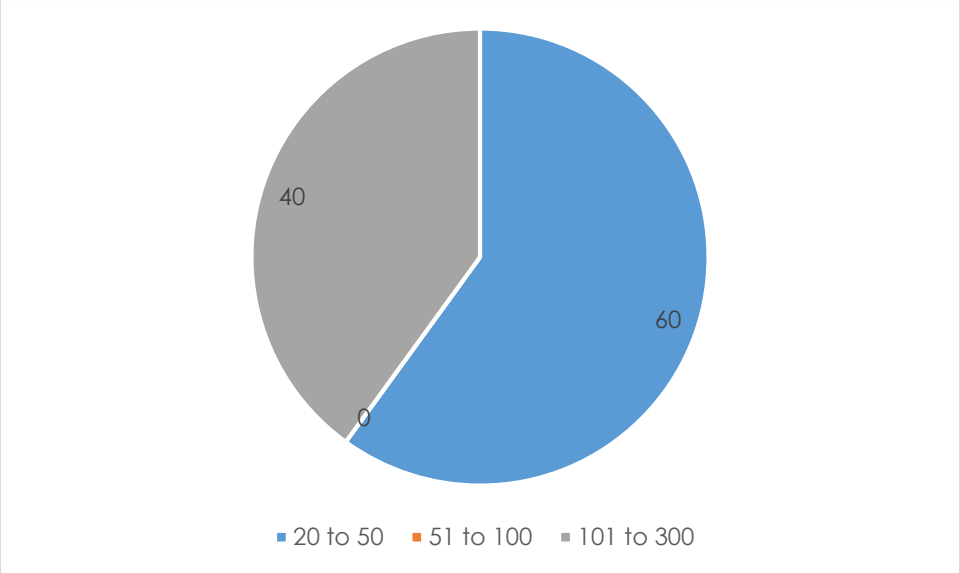


Graph 58: Method used to dispose off Waste

3.2.1.4. Financial Information

When asked if they par tip/fee to waste collectors, 56% replied that they do, 36% told that they do not only 11% said they don't know.

The range of payment is shown in graph below.

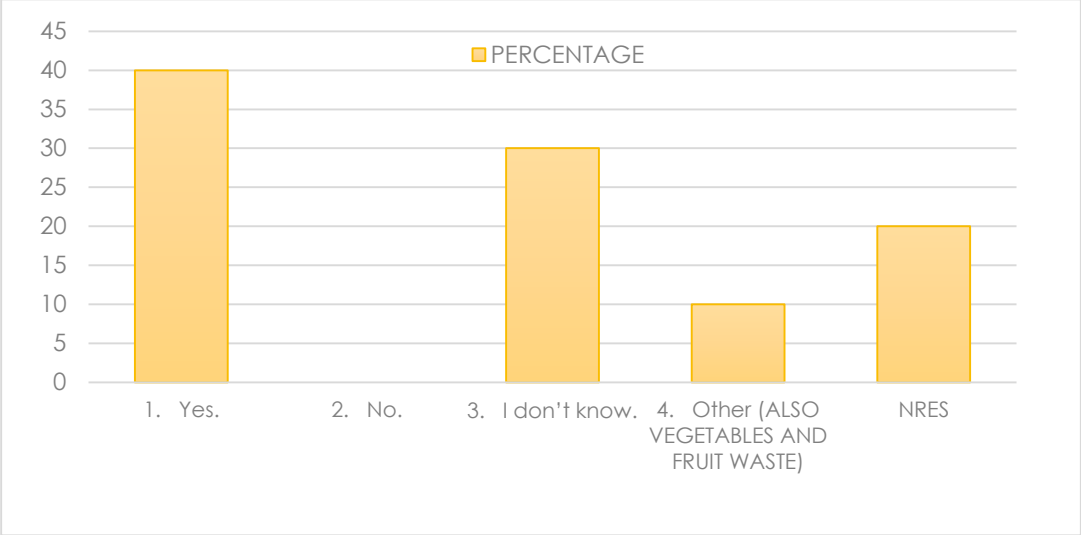


Graph 59: Payment of Tip/Fee in Rs. per Month

3.2.1.5. Cooperation for Waste Management System

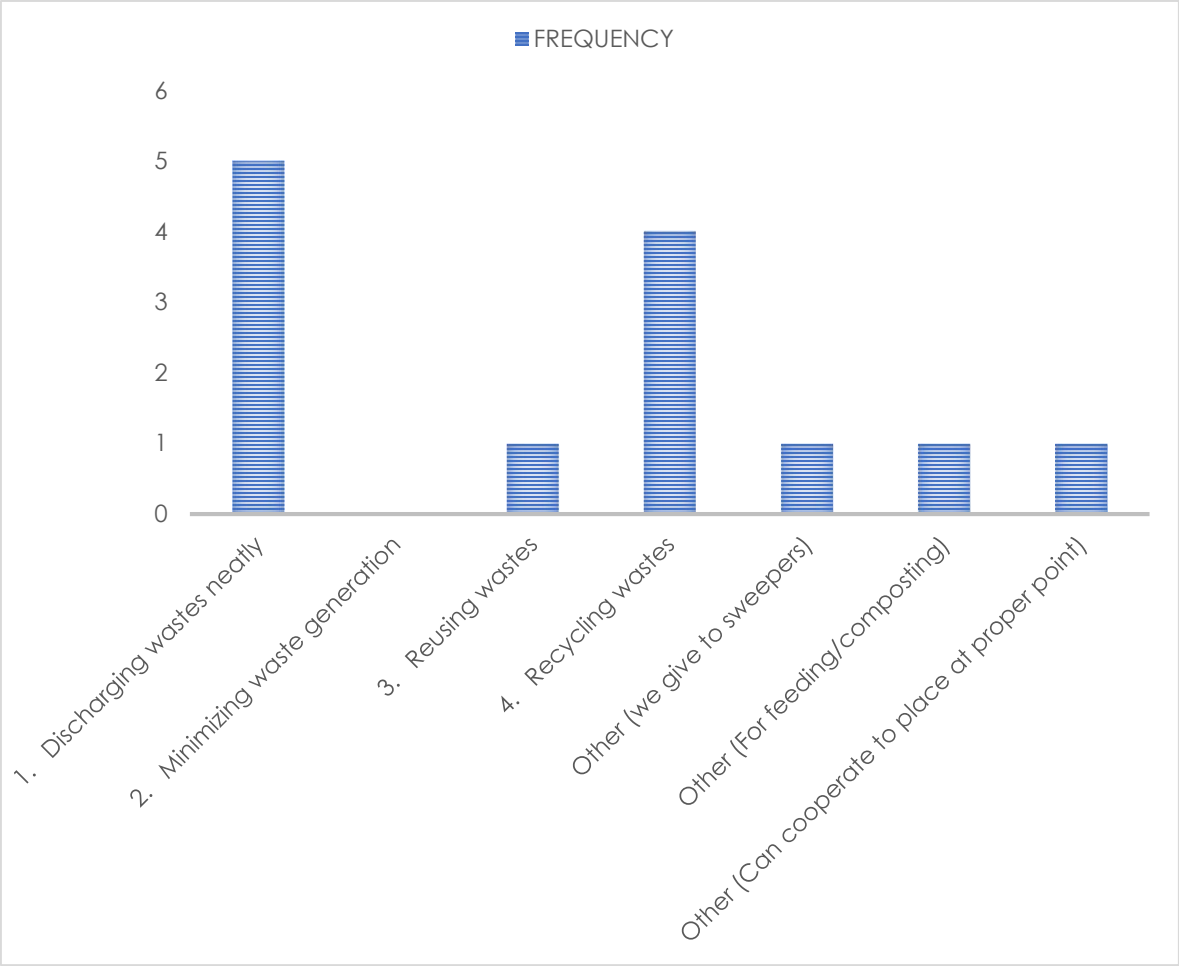
The survey participants from markets were told that in some other countries, there are cases where special boxes are equipped at such places as markets or shops to collect recyclable wastes efficiently from people in the community. Suppose that the GWMC wanted to introduce this scheme and you were supplied a box by the GWMC and asked to put the box at your market/shop. The communities were going to be encouraged to bring PETs to the box and the GWMC would come here to collect them once a week. Would you be interested in cooperating this scheme? Some of the respondents (30%) said they had no idea in this matter, others (60%) opined that it is not possible in our culture and communities.

When the participants were asked if they would cooperate to sensitize customers about reuse of shopping bags, 40% agreed. The responses of all the participants in percent proportion are presented below.



Graph 60: Cooperation for Reuse of Plastic Bags

It is even more heartening to view their response regarding cooperation when market respondents agreed to cooperate with GWMC for efficient waste management services. Among various options, those chose by respondents are presented below as frequency of responses.



Graph 61: Avenues of Cooperation

3.2.2. Schools and Colleges

5 institutions were to be surveyed including government and private school, government and private college and one university. As most of the schools in Gujranwala are public sector and very few colleges are private ones, it was felt that more of government institutions may be surveyed. Below the data from six institutions are analyzed.

3.2.2.1. General Information

In table below information related to institutions is summarized.

Table 14: General Information of Schools and Colleges

Name of Institution	No of People	Education Description	Total Area	Total Floor Area
GOVT IQBAL HIGH SCHOOL	500 to 999	Secondary School	11 kanal	4 kanal
GOVT. HIGH SCHOOL DHULLY	500 to 999	Secondary School	Nres	17 kanal
SCHOOL OF SCHOLARS	500 to 999	Secondary School	Nres	Nres
GOVT. ISLAMIA COLLEGE JINNAH ROAD	500 to 999	Sciences, Computer Sciences and Art	95 kanal	25 to 30 kanal
GOVT. COLLEGE FOR BOYS SATELLITE TOWN	500 to 999	Sciences, Computer Sciences and Art	140 kanal	140 kanal
GIFT UNIVERSITY, GUJRANWALA	1000 to 1999	Science, Engineering and Social Sciences	8 kanal	3 kanal

Locations of these schools are marked on the map below.

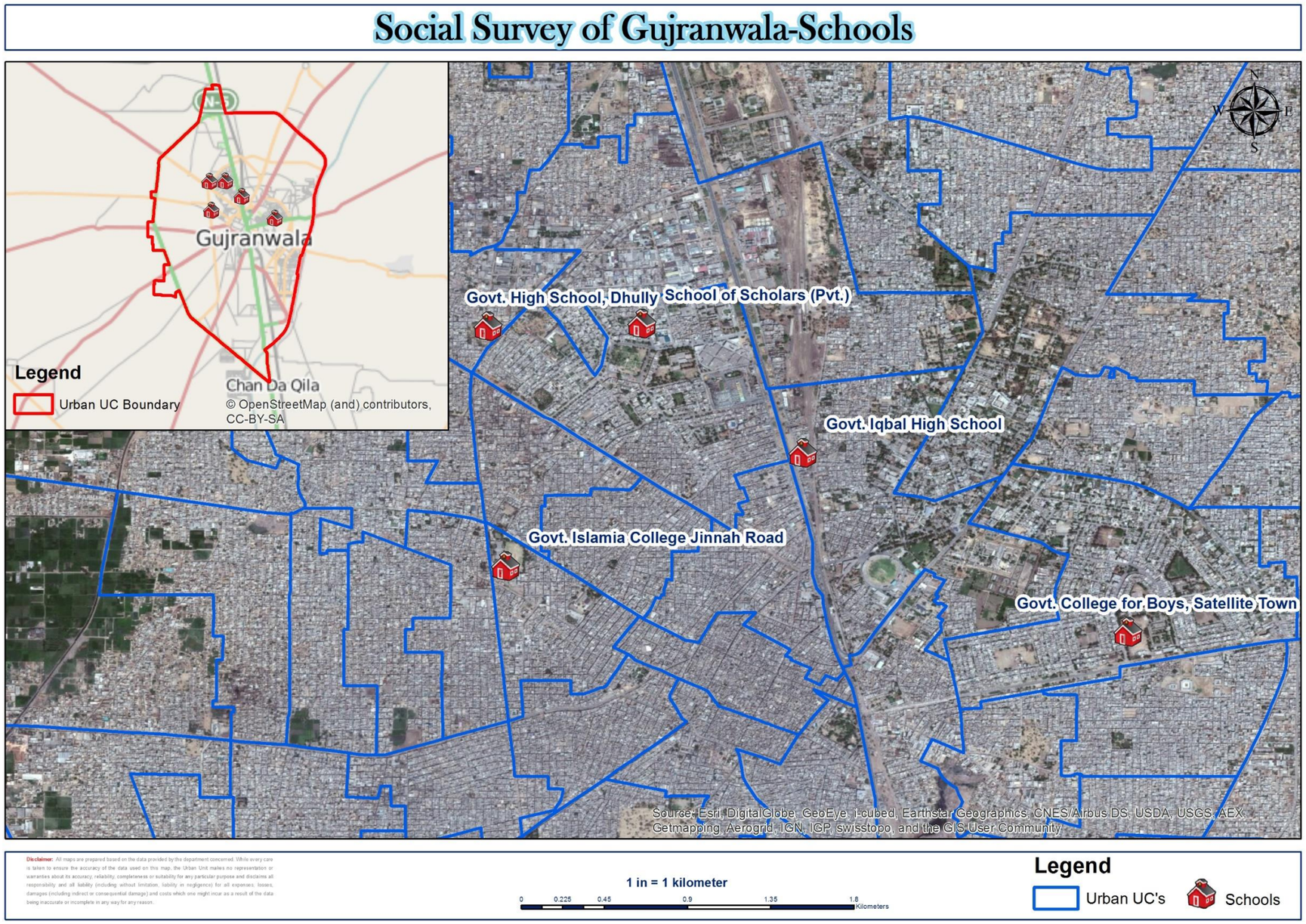
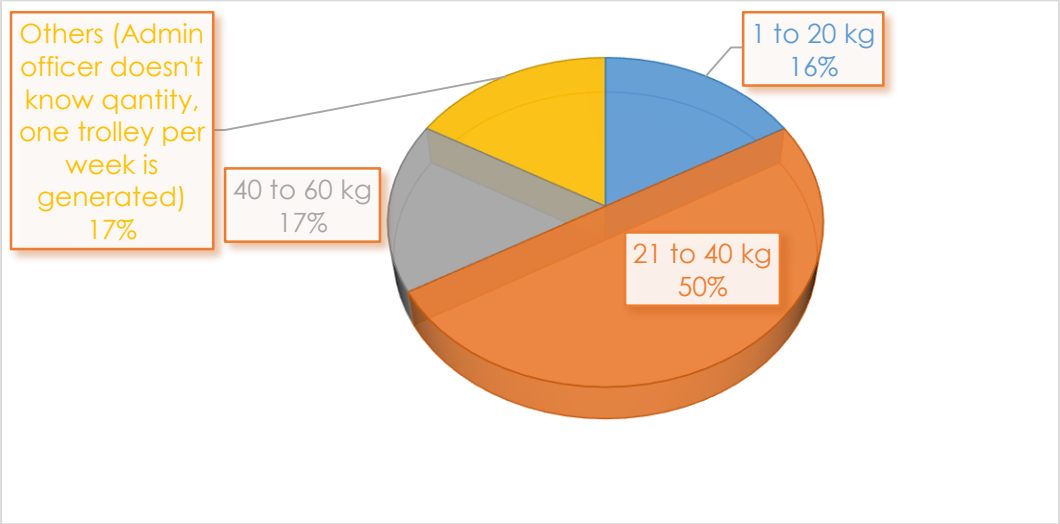


Figure 12: Location of Schools contacted for Social Survey

3.2.2.2. *Waste Generation and Recycling*

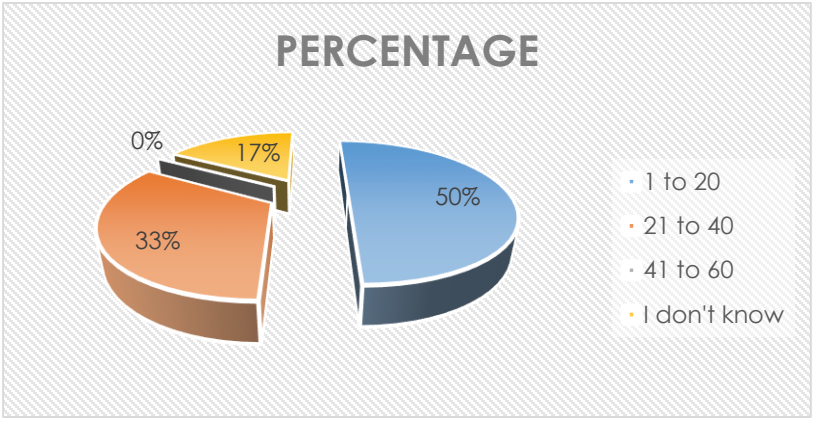
Waste generation in kilograms per week for all the institutions is presented in graph below.



Graph 62: Waste Generation in Educational Organizations

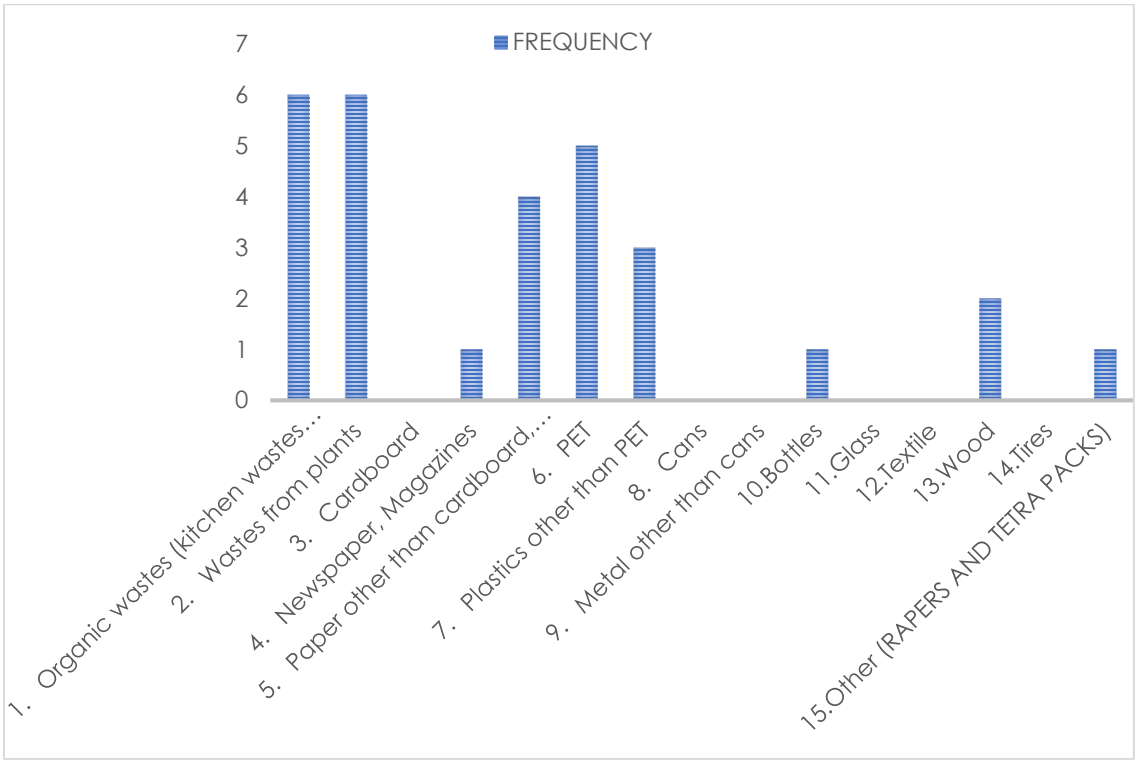
It may further be noted that schools have quoted lesser waste quantities as compared to colleges. But the respondent belonging to university was unaware of waste quantity generated there.

Regarding waste discharged per week, lesser amounts were quoted by each respondent. The percent proportion of waste discharged is presented below.



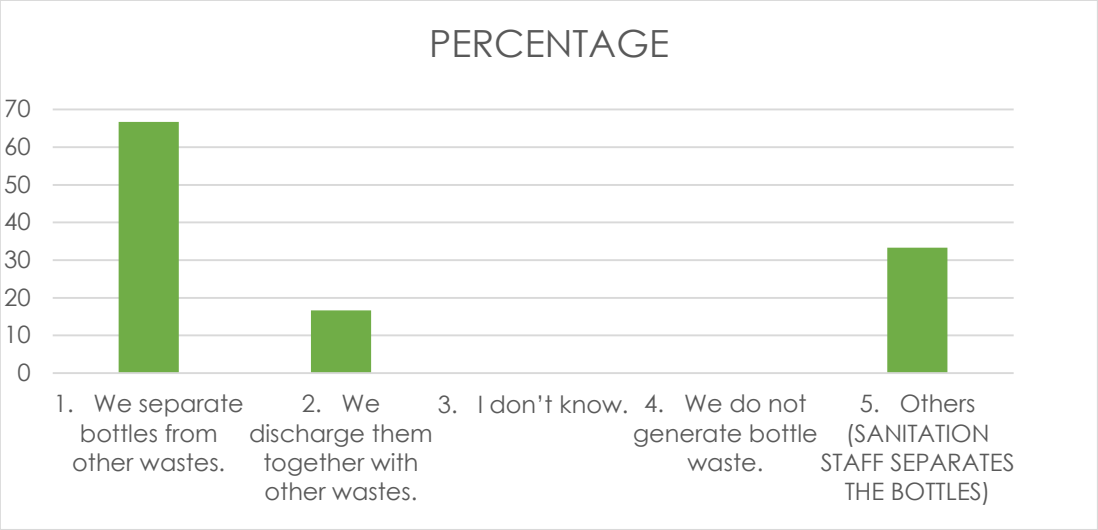
Graph 63: Amount of Waste Discharged per Week

When details of components of waste discharged was asked following responses are recorded.



Graph 64: Waste Components Discharged in Educational Institutions

One by one, it was asked if their institution segregated some waste materials. Initially some questions were posed about bottle sorting.



Graph 65: Bottle Recycling in Educational Institutions

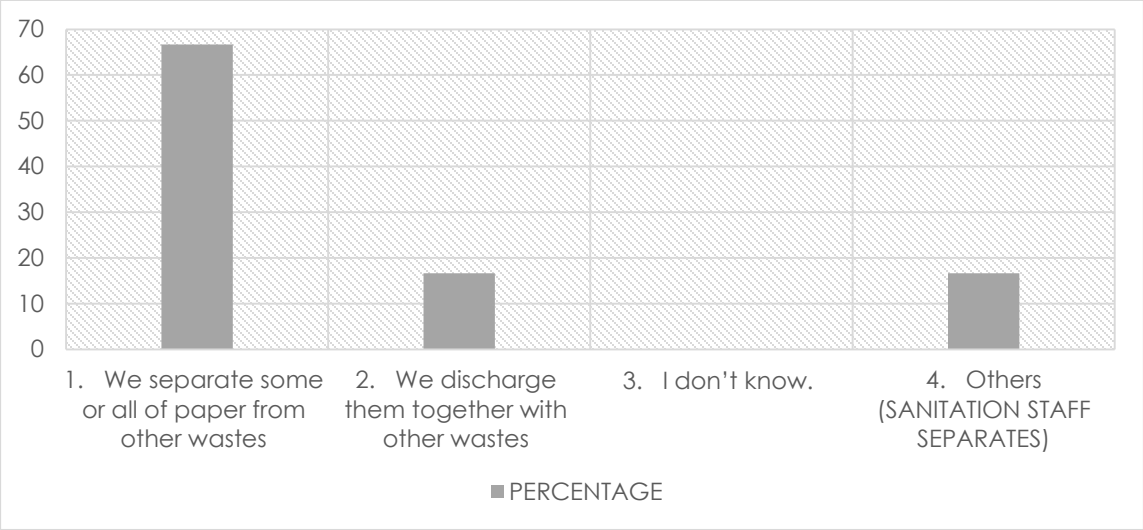
All those institutions where bottles are separated, told it was their cleaning staff who does that. However, when it comes to quantify the amount of waste generated, only one respondent said it was approximately 5 kg while others were unable to give any definite number. All the institutions agreed that the sorted bottles were sold at recycler shops, or someone came to buy it from them.

The institution who told they dispose it off with other wastes, also further clarified that they are not separating because they know their sanitation staff does that. Lastly, when asked if they were willing to segregate, they replied positively.

After bottles, the participants were asked about sorting activity of cans. Two of the respondents told that they separate both steel and aluminum cans, while four told that they do not generate can wastes.

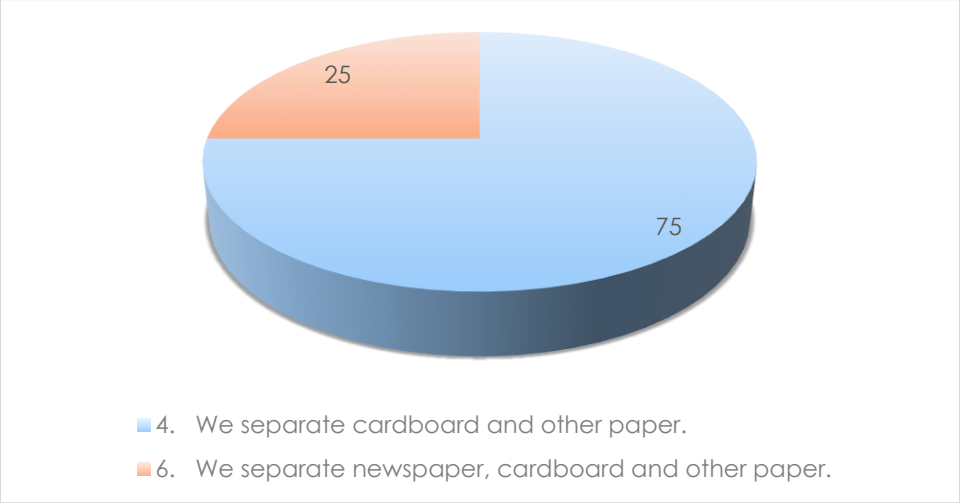
The institutions where cans are separated, it is their cleaning staff who does that. One of the respondents was able to tell that they generate around 1 kg of cans but the other couldn't reply. Lastly both the respondents were unable to answer any price of resale.

After cans, the respondents were asked to tell us about their sorting behavior regarding paper. Their responses are plotted below.



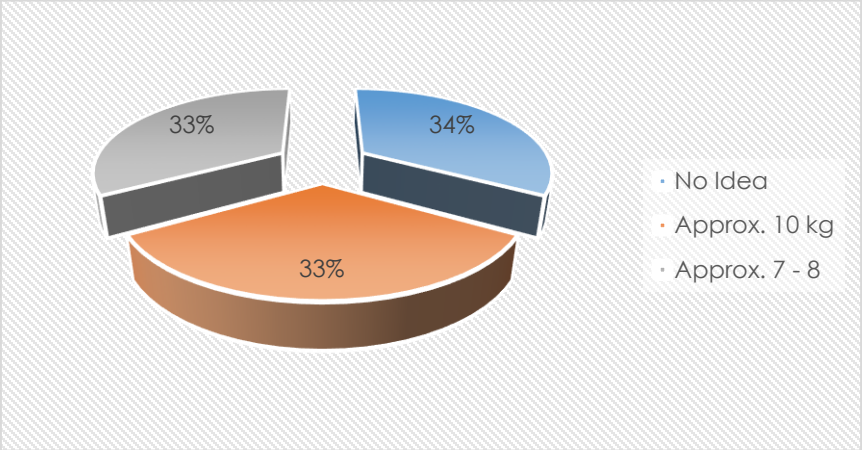
Graph 66: Sorting Behavior for Papers

Though there is large proportion of institutions practicing paper sorting, but it comes to who does it; it is always the responsibility of sanitation staff.



Graph 67: Paper related Sorting Activity

Amount of paper waste sorted is estimated in Graph 68.



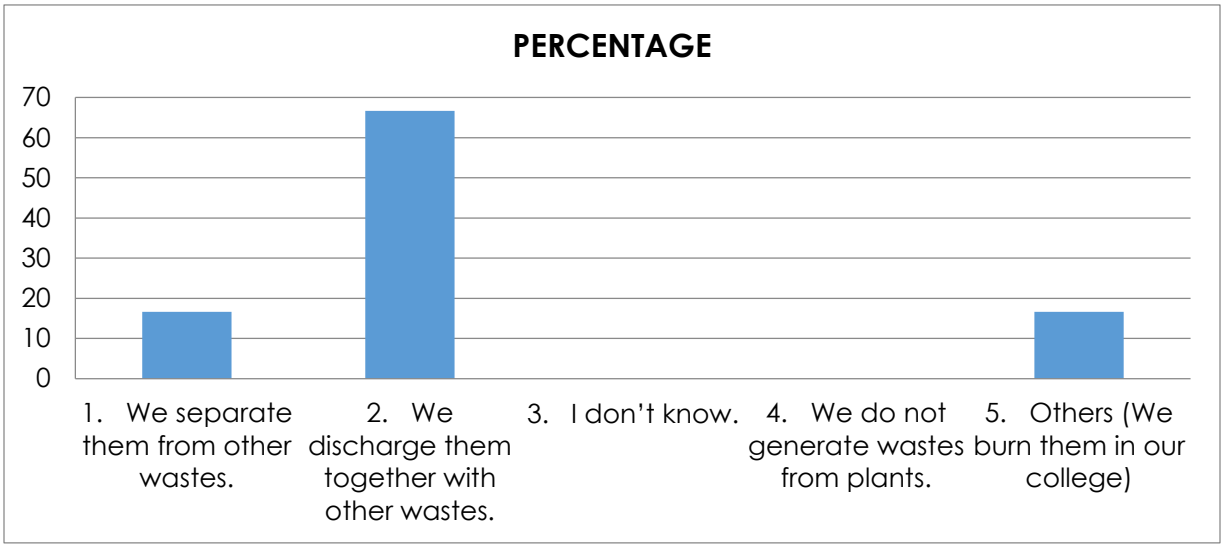
Graph 68: Amount of Sorted Paper per Week

In continuation, they were asked what they do with the sorted paper and cardboards. Two among three respondents told that they take sorted paper and cardboard to recycler's shop and the third one did not reply to this question.

Other than that they were unable to tell what price is prevalent for resale of paper and cardboard waste. The respondent who told they separate cardboard was neither able to assign any amount generated or price of resale.

At the same time participant who told they don't sort paper in their institution said it was because troublesome but still was willing to cooperate if asked.

Regarding green waste or garden waste the participants were posed the question if they sorted it or not. Only 17 % replied that they sorted green waste, 67% participants did not sort and 17% said they burnt it within their premises (Graph 69).



Graph 69: Sorting Behavior for Green Waste

It is interesting to note that the institution where it is sorted, they also give it to waste collectors. Though it is imaginable that this green waste gets used in some way, but our questionnaire could not get any further information out of it. At the same time 100 % of the respondents were willing to cooperate if they were asked to sort garden waste for producing compost from it.

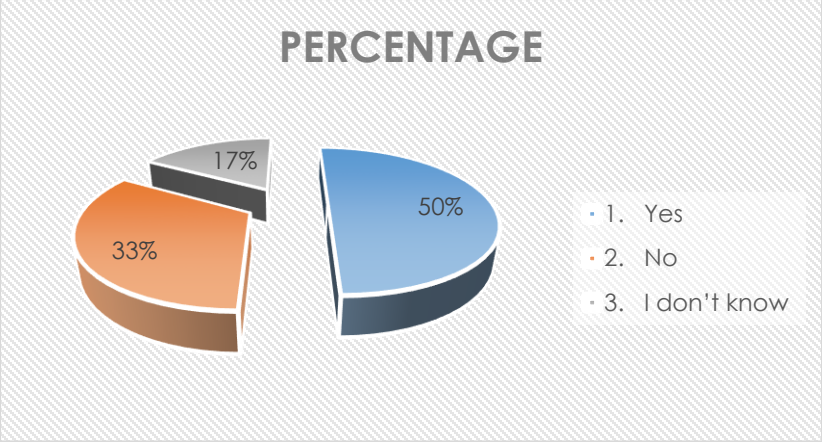
Those respondents who told about no sorting of garden waste were asked about the reasons. One said that it is difficult to pick and collect and put in container while the other one said nothing about it.

For kitchen waste all the respondents told that they do not sort any of the kitchen waste in their institutions. 75% said they would sort if asked for it only 25 % said they would not as it is well less in amount.

For any other material that is sorted in their institution, one participant told they segregates PET, plastics wood and leaves, one other respondent said PET only and three others told that whichever is sellable is sorted by their sanitation staff.

3.2.2.3. *Waste Collection Services*

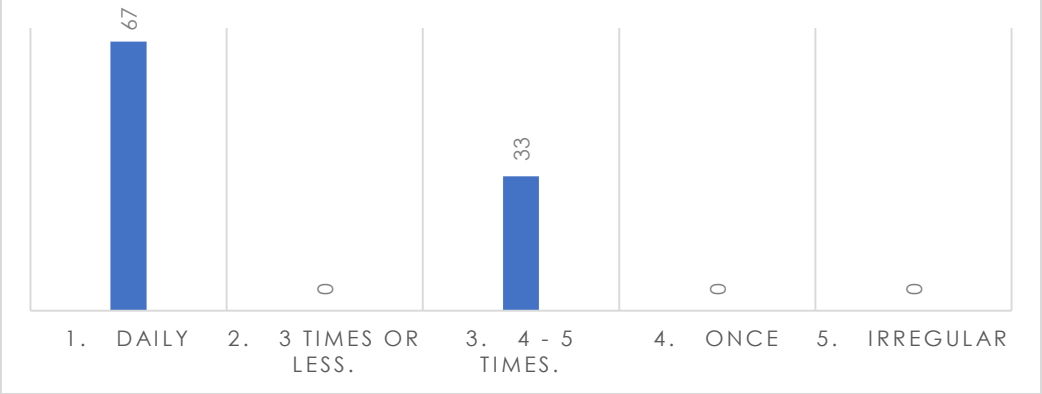
To start the information gathering on waste collection services, it was asked if the institution has access to waste collection service. Half of the respondents told that they avail this service. All responses in percent proportion are presented below.



Graph 70: Access to Waste Collection Service

100 of the respondents who were provided these services; told that GWMC is working in their area and the collection service is stationary container collection.

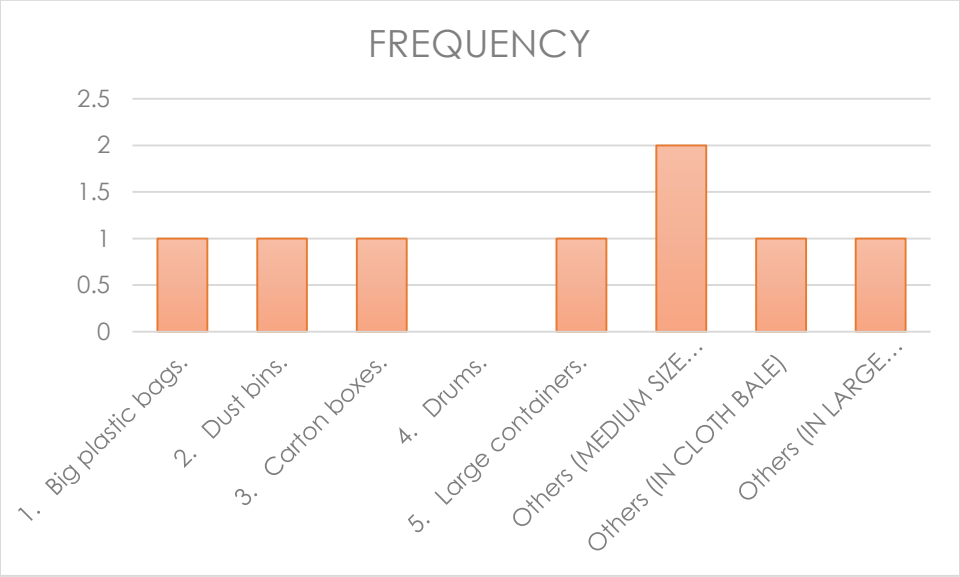
The variation in collection frequency is plotted in graph below.



Graph 71: Frequency of Waste Collection Service (percent proportion)

Further 67% told that the collection schedule was regular while 33% replied that they have no information on that. In same proportion, 67% were satisfied with the level of service, remaining 33% said it's their sanitation staff who transports it to container so they could not tell how the service level was. For the participants who are not availing the collection service, it was asked whether they would like to have the collection service. 33% said they would like to have these services and are also willing to par Rs. 50 per month, however, 67% told they would rather not have these services. The respondents didn't want to have services because either they have their own cleaning staff or they are comfortable throwing their waste in available containers.

As for the treatment, one respondent told that they burn their garden waste within their premises. Lastly regarding the way these institutions dispose off their waste, a chart is drawn with responses on regular routine of disposing the waste.



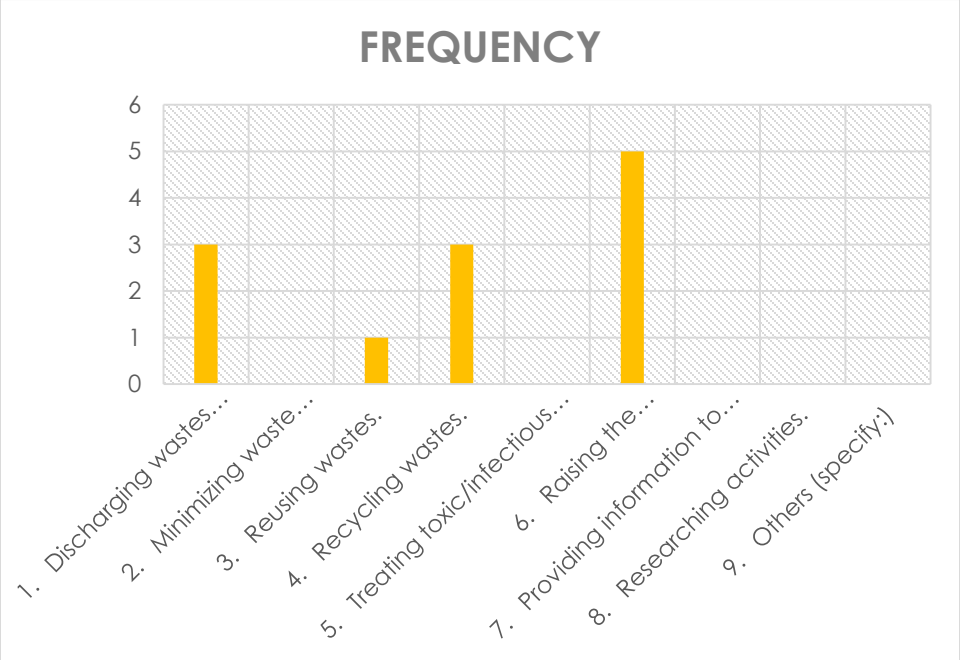
Graph 72: Waste Disposal Methods

3.2.2.4. Financial Information

Regarding fees or charges, not a single participant told that their institution pays for waste collection service. They also told that they do not pay any tips or fee to waste collectors.

3.2.2.5. Cooperation for Waste Management

In last series of questions, the willingness of educational institutions was checked. They were asked if they can do something to help environment. The responses on keeping the environment clean are presented below.



Graph 73: Avenues of Cooperation

Similarly it was investigated if recycling in schools, colleges or universities can improve environmental awareness. 83% of the respondents were in favor of such initiative in educational institutions, only 17% were unable to solidly form an opinion.

The encouraging response was related to cooperating with government departments and GWMC to promote recycling in the community. 100% of the respondents agreed that educational institutions must play their role in recycling.

3.2.3. Commercial Establishments

7 large scale commercial setups were to be surveyed during the social survey activity. The analysis of various components investigated in the social survey are presented in the following sections.

3.2.3.1. General Information

Following organizations were surveyed to fill out social survey forms.

Table 15: Information of Offices included in Social Survey

Name of office	No. Of employees	Annual sales	Total floor area
GWMC	50-99	Nres	585m^2
Departent of agriculture(field wing), Gujranwala	50-99	Nres	4 kanal
TMA Aroop Town	50-99	Nres	1 kanal
Public Health Engineering Department	20-49	Nres	10 marla
DO Health	50-99	Nres	Approx 1 kanal
Zilla Council	50-99	Nres	150m^2
Bank of Punjab Trust Plaza	20-49	Nres	752m^2

It may be seen in the information that most of the organization are medium size organizations with number of employee ranging between twenty and hundred. Now we will look in detail their behavior and awareness regarding waste management.

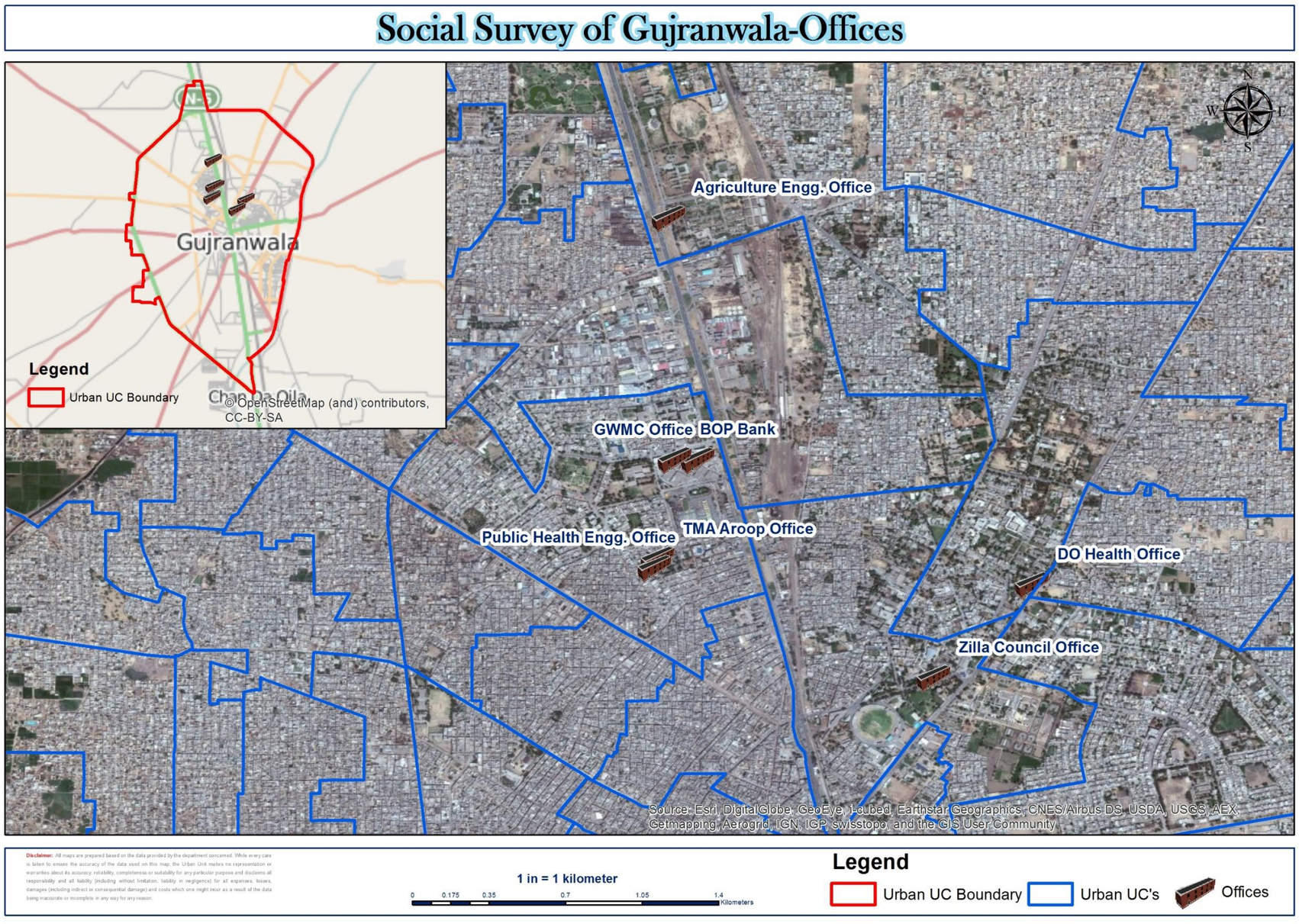
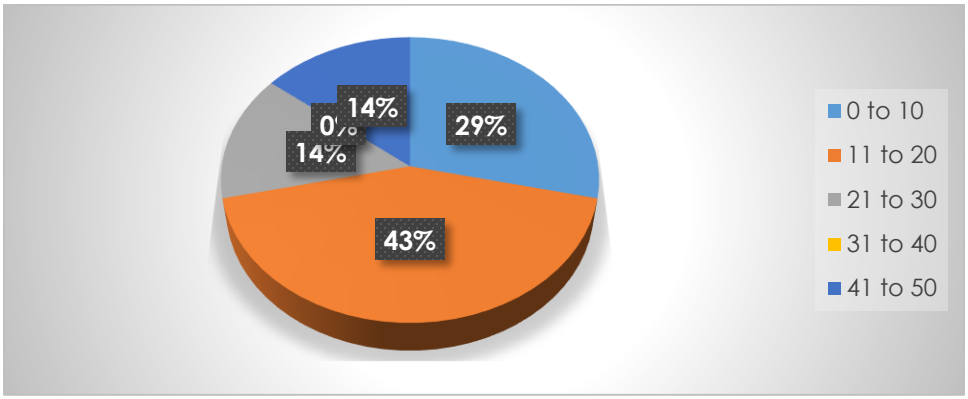


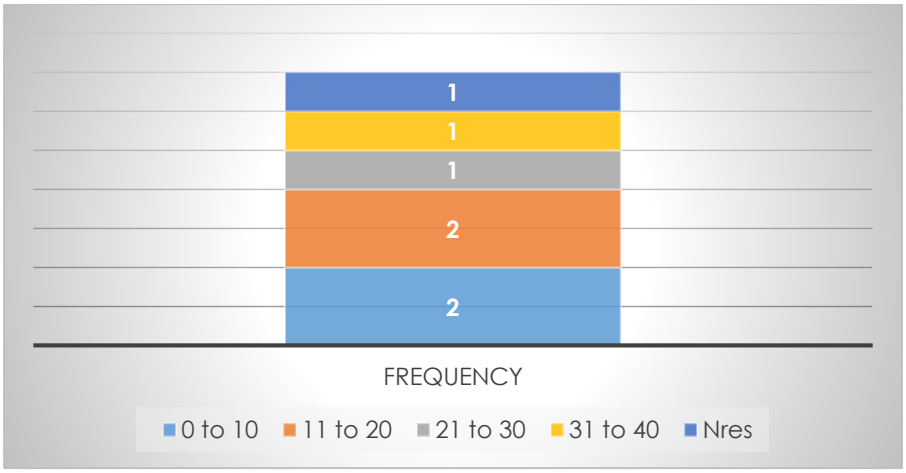
Figure 13: Location of Offices

3.2.3.2. *Waste Generation and Recycling Behavior*

The survey participants from offices were asked how much waste is generated in their organization on weekly basis.

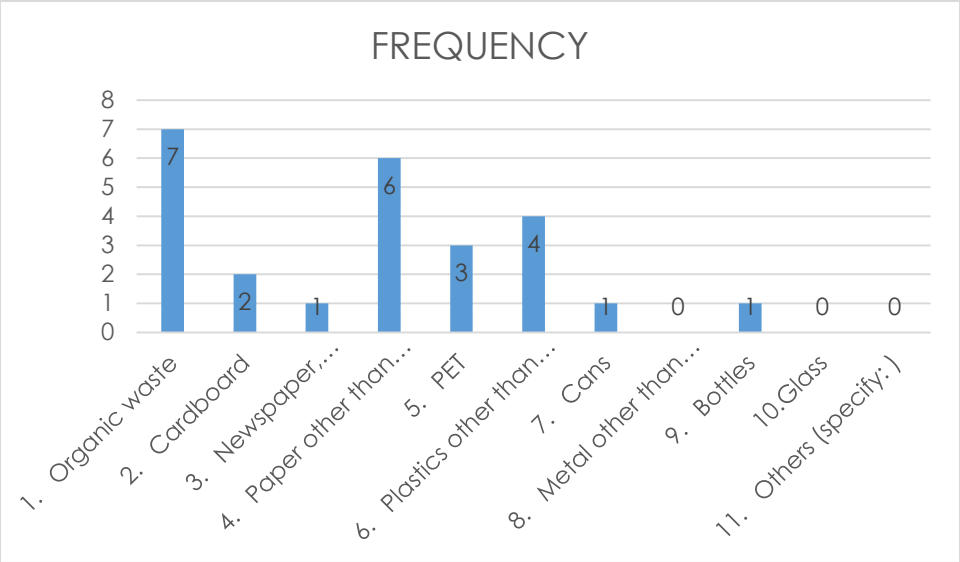


Graph 74: Waste Generation in Offices (kg per week)



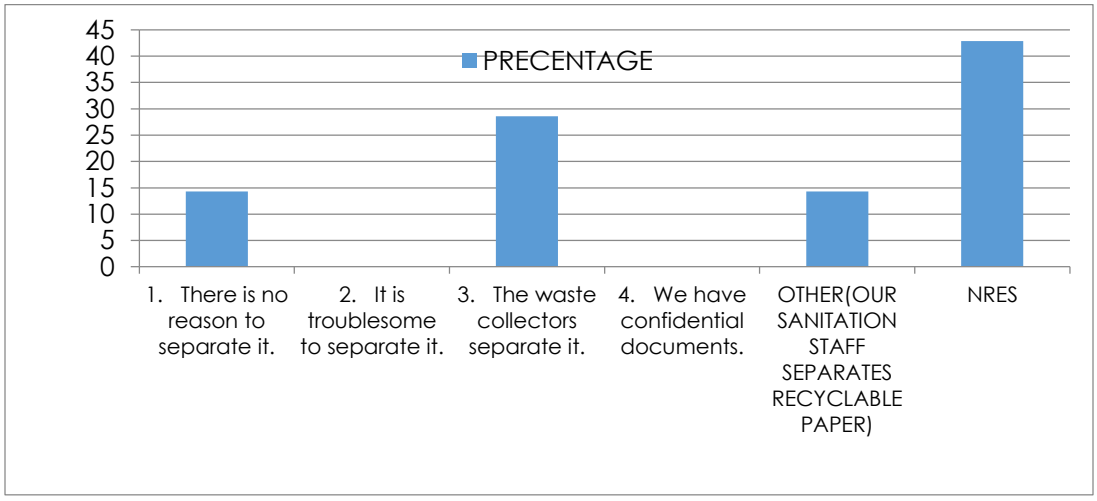
Graph 75: Amount of Waste Discharged (kg per week)

Afterwards, the respondents were asked to choose among the list of components of waste to guide the survey team on what they generate in their office as waste. Graph below is plotted on frequency distribution of responses which is self-explanatory.



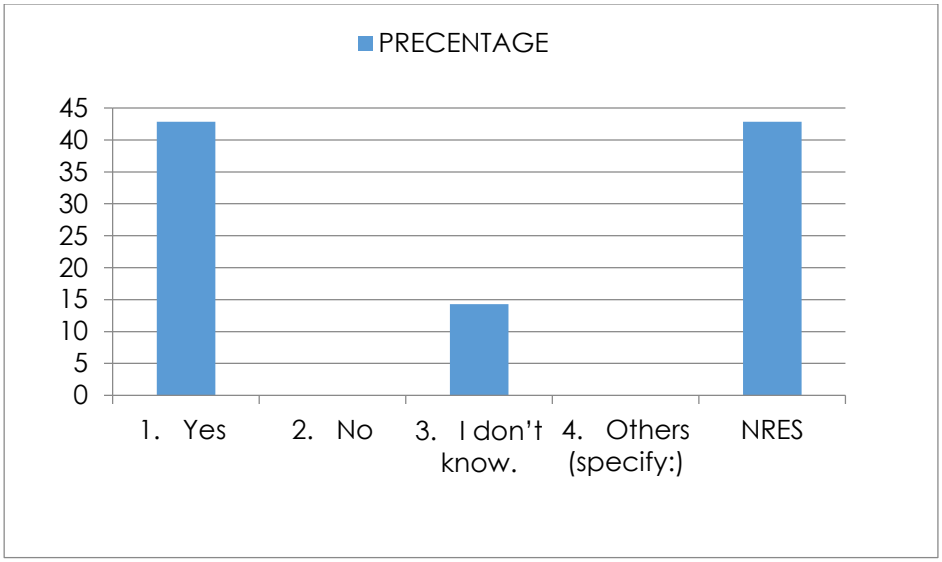
Graph 76: Waste Components generated in Offices

It was also demanded if any of the offices treated any component of waste before discharging it. Only one respondent told that they do. Next series of questions were related to segregation of recyclable materials. Starting from paper sorting, all the respondents told that they don't practice sorting for papers. Reasons assigned to no sorting are presented below in terms of percent proportion.



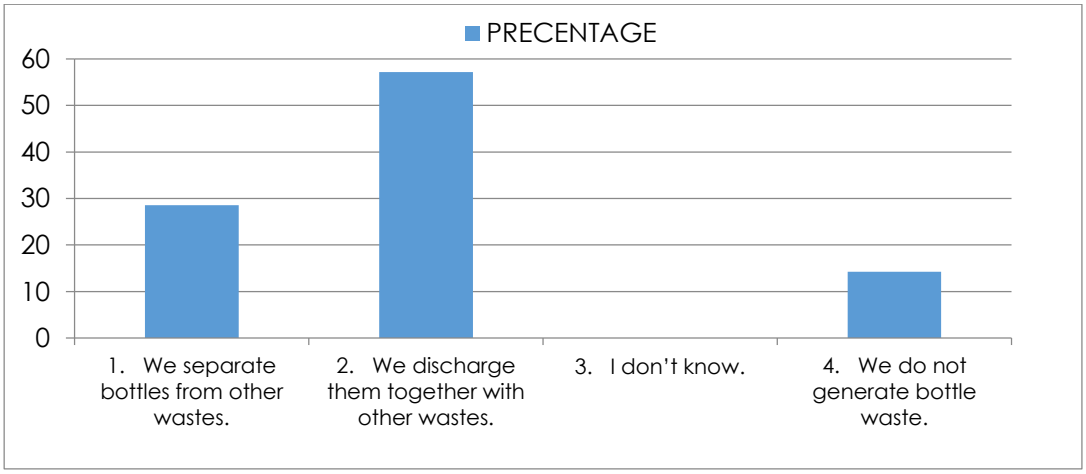
Graph 77: Reasons of no Sorting for Paper

At the same time some of the respondents agreed to separate paper if it was required of them for efficient recycling. All responses on percent scale are shown below in the graph.



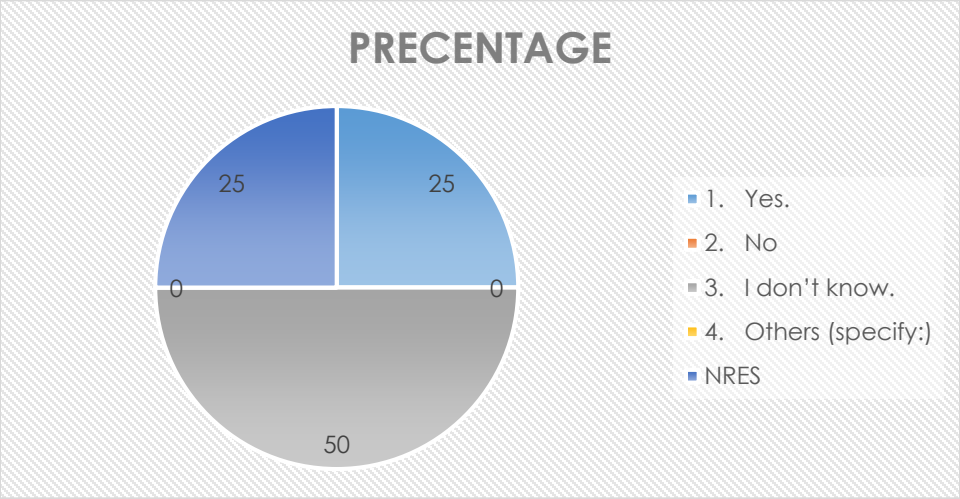
Graph 78: Willingness to Cooperate for Recycling

Regarding the sorting activity of bottles, different replies were collected which are presented below.



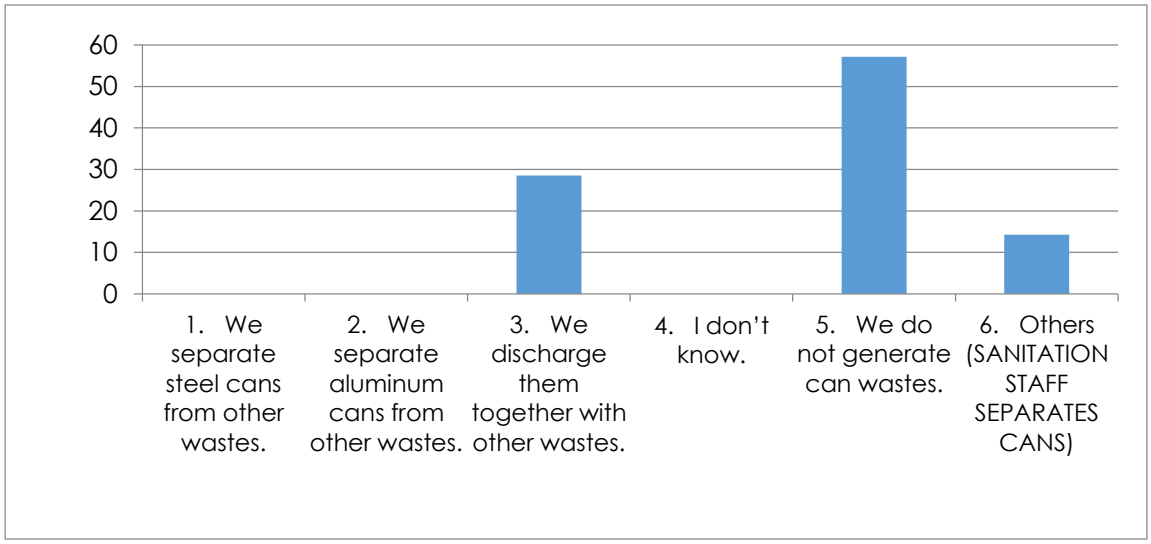
Graph 79: Sorting Behavior for Bottles

For those respondents who were not involved in sorting activity, it was asked to suggest most appropriate reason to not segregate. 75 % of respondents told that waste collectors separate it when they collect, remaining 25% weren't able to answer anything. They were then asked if they would cooperate if recycling can become efficient, their replies are plotted below.



Graph 80: Willingness to Cooperate

Next in line was the analysis of sorting behavior towards cans. The respondents were asked what they did with their can wastes. Their replies are presented in percent proportion below.

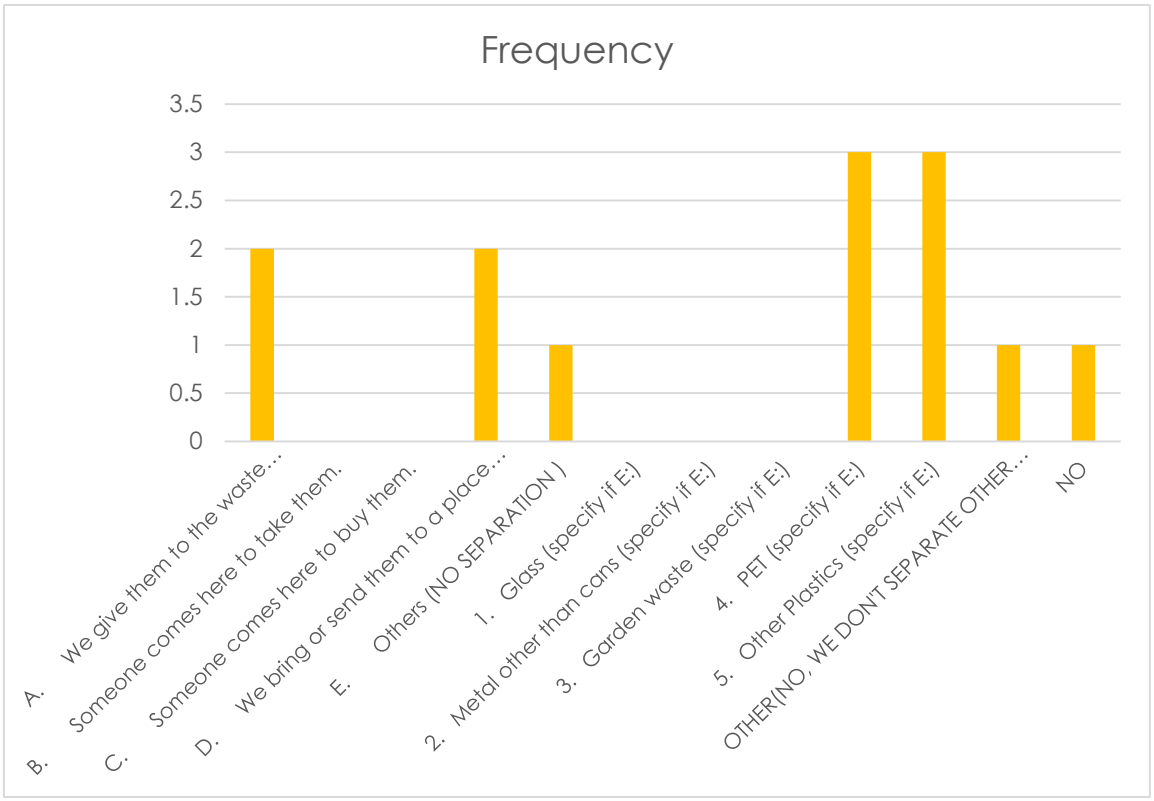


Graph 81: Sorting Behavior for Cans

Only one respondent had told that sanitation staff separates can from other wastes but he couldn't reply about the quantity of waste cans. He was also unable to tell what happens to the sorted waste.

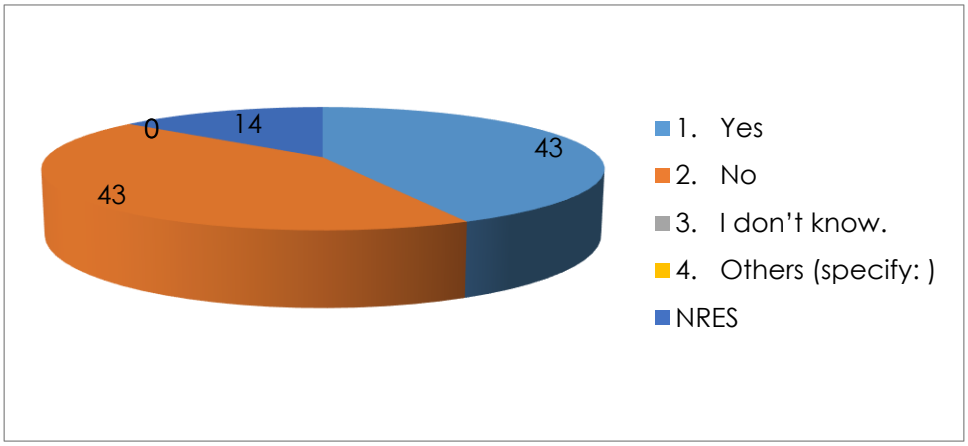
Those who were not involved in this activity told that they do not do it because waste collector does it, however if they were required to segregate for efficient recycling they would definitely do it.

In the end they were asked if they segregated other types of waste. They were given several options, in response to which they selected few of them as presented below.



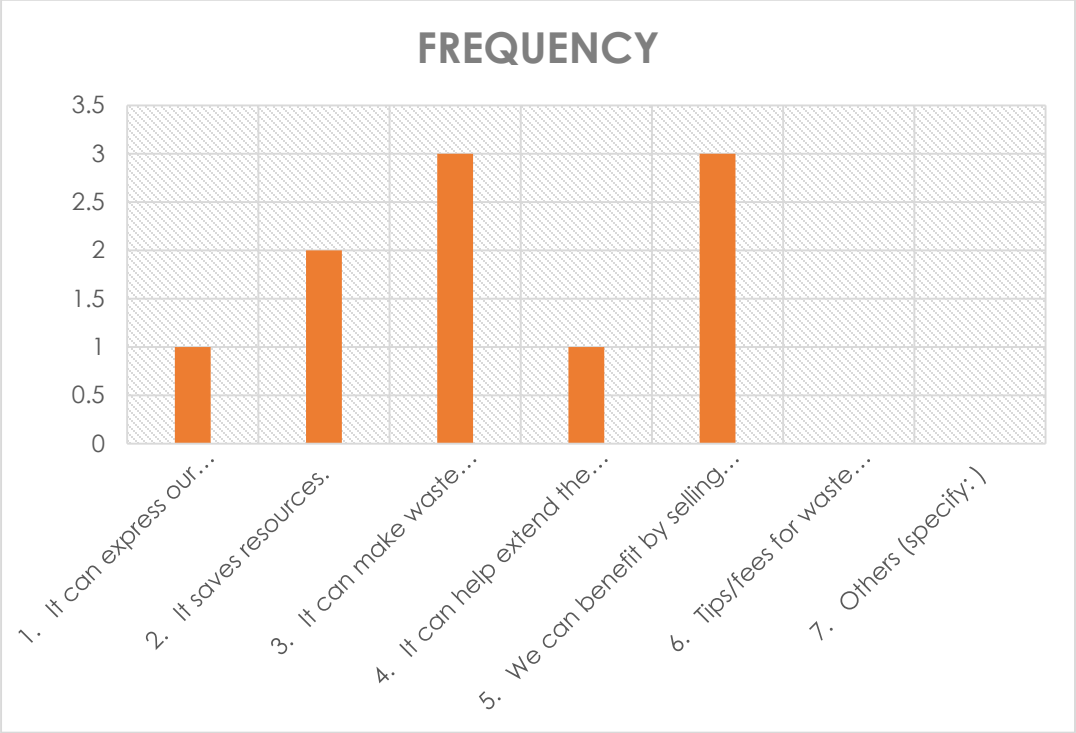
Graph 82: Types of Wastes Separated in Offices

Further it was asked whether their office was interested in recycling or not. The replies are presented on percent scale in the following graph.



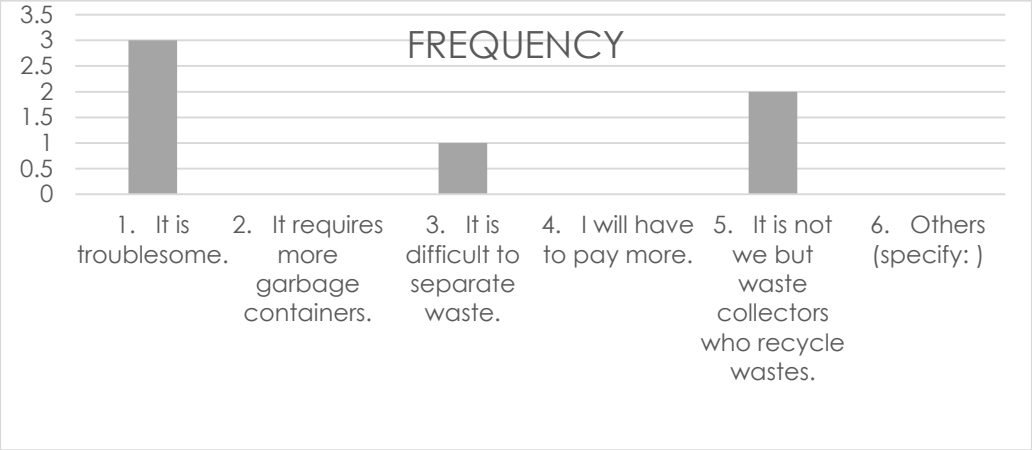
Graph 83: Interest in Segregation

The possible reasons their office would opt for recycling are presented below.



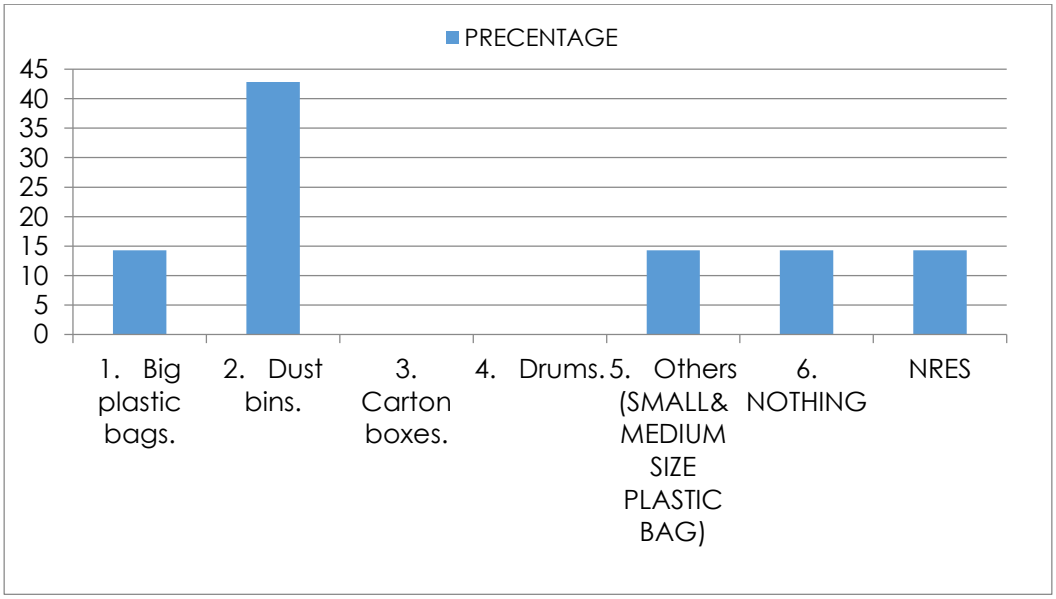
Graph 84: Reasons of Interest in Recycling

On the other hand those who were not in favor of recycling gave the following reasons.



Graph 85: Reasons for not Segregating

One question was specifically asked to the respondents to judge their waste discharge behavior. It was asked how they dispose off their waste. The replies are plotted on percent scale and presented below.

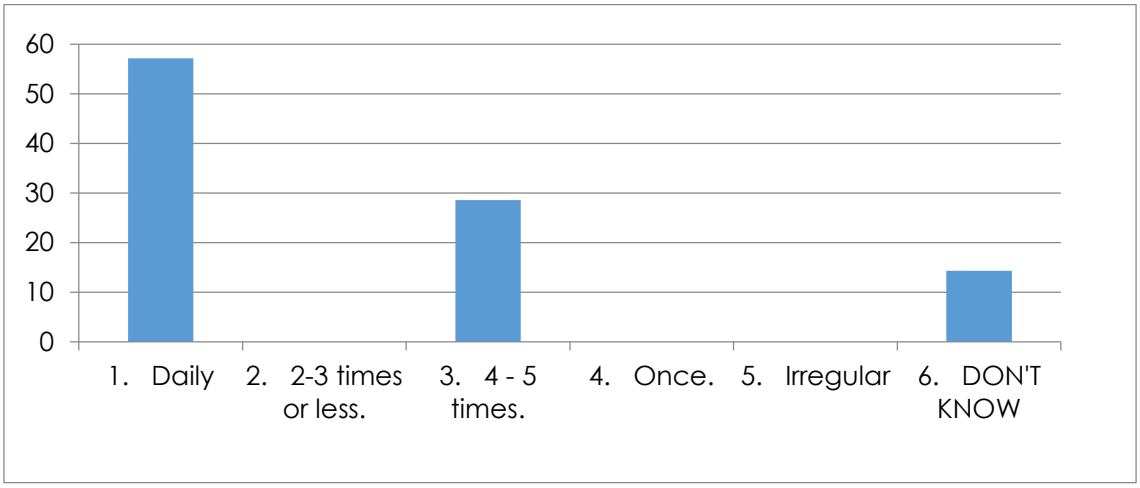


Graph 86: Waste Discharge Behavior

3.2.3.3. *Waste Collection Services*

In a series of questions, the access to waste collection service was assessed. First of all, 100 % of the respondents told that they avail the waste collection service. All of them then confirmed that GWMC was providing them the service and the service was available at the level of stationary container. It means that they have to transport waste to the container from where GWMC staff collects and transports it.

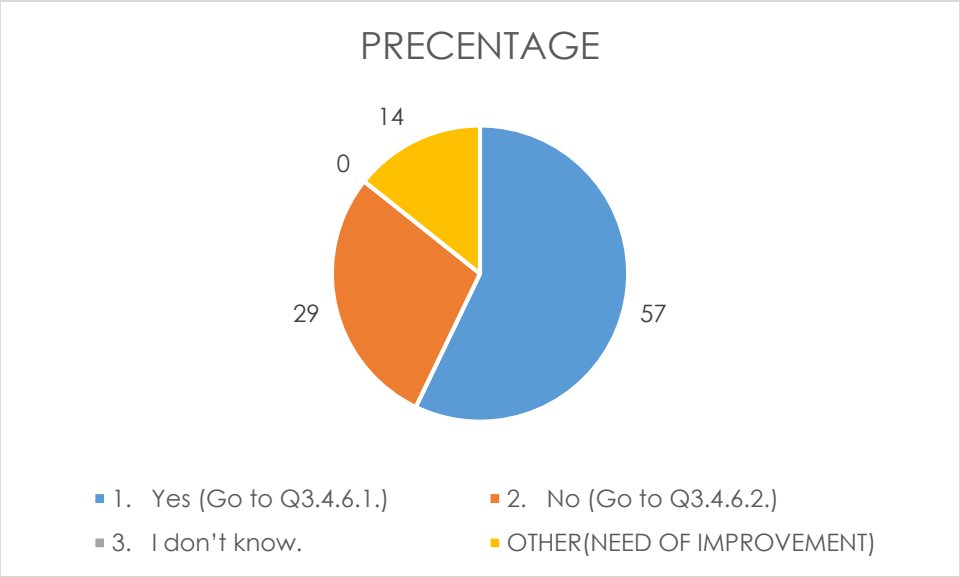
Regarding the frequency of waste collection service, most of the offices confirmed that it was on daily basis, other replied less frequent collection service. The replies are presented on percent scale below.



Graph 87: Frequency of Waste Collection in Percent Proportion

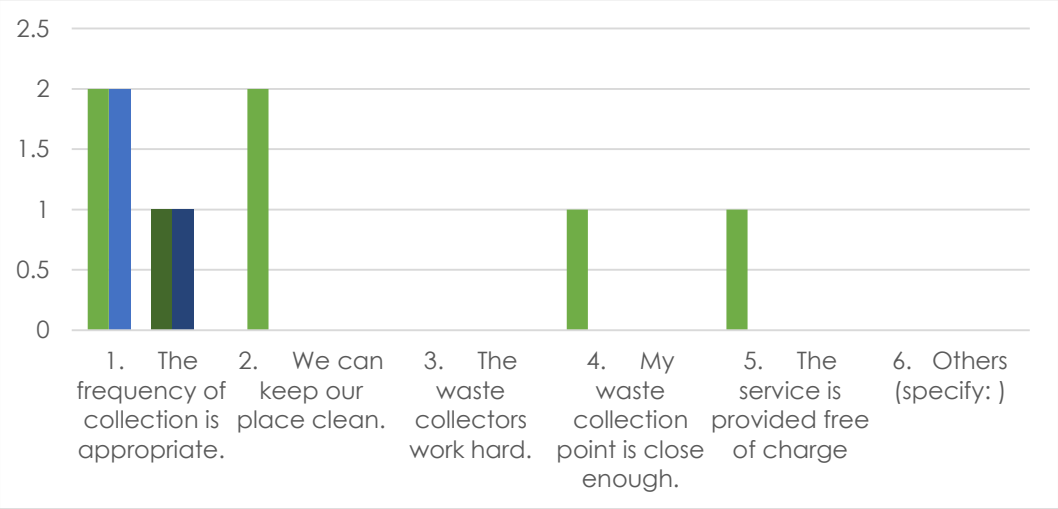
Unfortunately 71% of the respondents were unable to comment on punctuality of collection service but remaining 29% agreed that service was regular in terms of specified time or day.

Likewise they were asked if they were satisfied with the current service. Their replies are presented below.



Graph 88: Satisfaction for Current Service

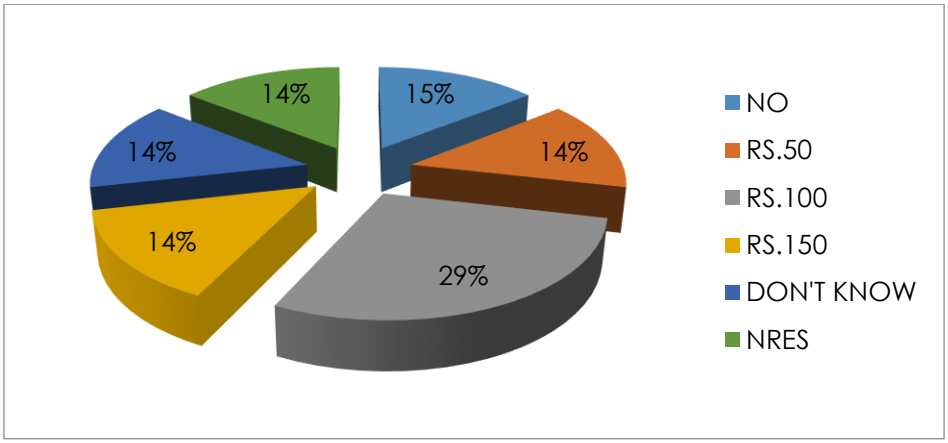
Reason of satisfaction are presented below in graph, on the other hand respondents only gave one reason of dissatisfaction that staff strength is not sufficient.



Graph 89: Reasons for Satisfaction regarding Collection Service

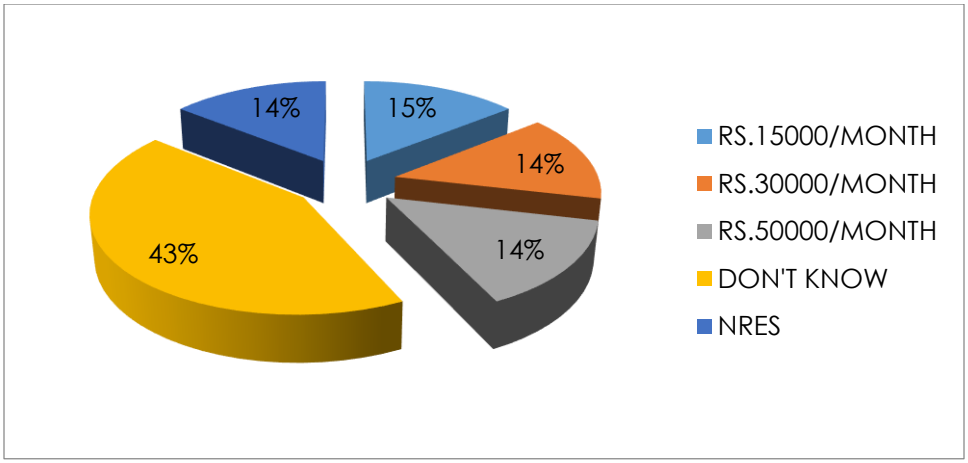
3.2.3.4. *Financial Information*

The respondents were asked about the cost of service but nobody was able to reply. Even they had not had any idea of payment but the all told that they didn't pay tips/fees to waste collectors. Moreover most of them responded positively when asked if they are willing to pay for waste collection service. The range of payment in Rs. per month is presented below in percent proportion.



Graph 90: Willingness to Pay for Waste Collection Services

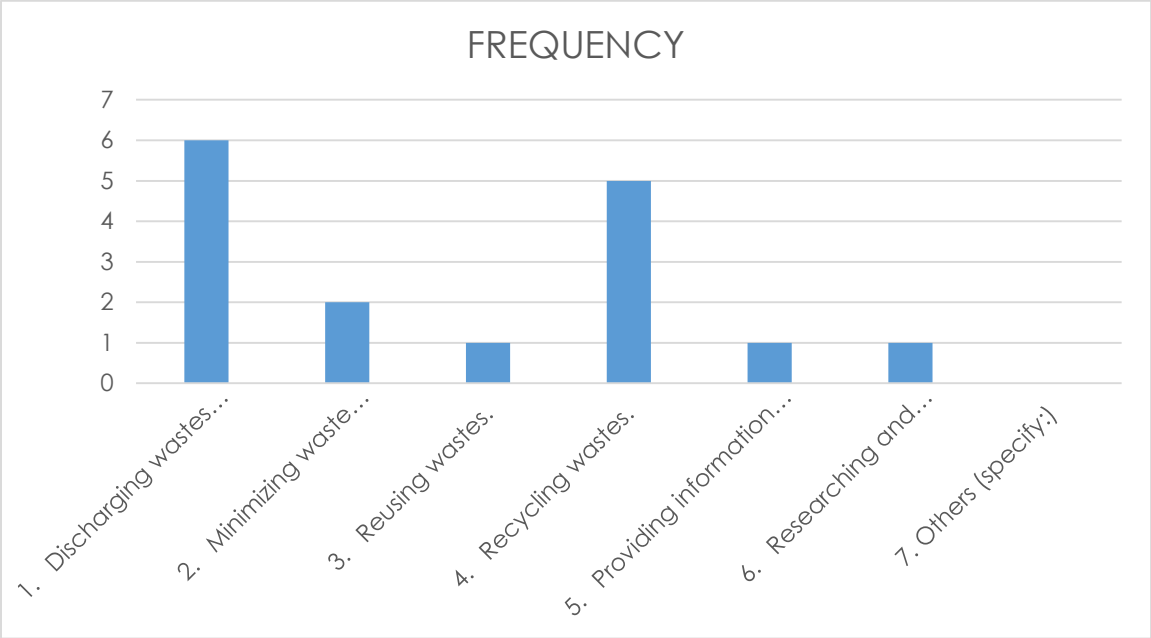
Most of the participants also informed about their monthly electricity bills as outlined below.



Graph 91: Range of Monthly Electricity Bill

3.2.3.5. Cooperation for Waste Management

It was asked that coping with wastes requires efforts of not only the city and the GWMC but also the general public. If they thought there is something which your office can do for good waste management, all of them replied yes. From plural options given to them, some of the selected ones are presented below.



Graph 92: Avenues of Cooperation

3.2.4. Restaurants

For the purpose of social survey 5 restaurants were selected for the purpose. Locations of these restaurants are shown in map below.

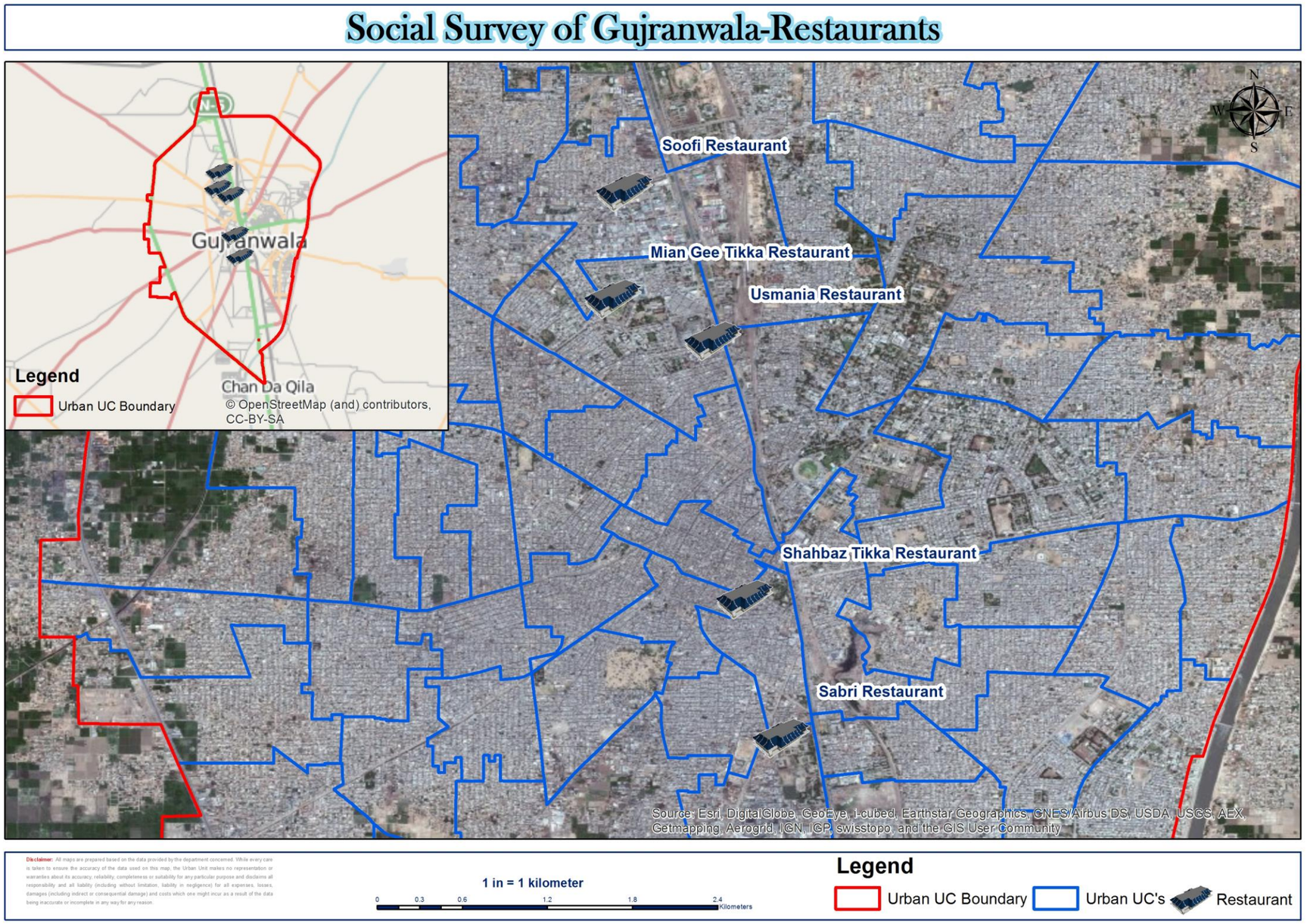


Figure 14: Location of Restaurants

3.2.4.1. General Information

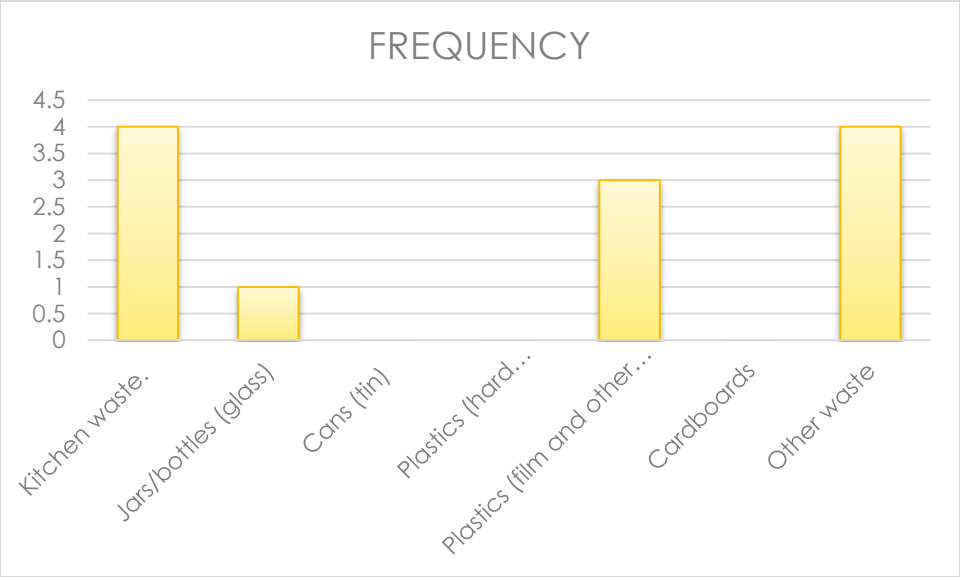
Following table summarizes the basic information about the restaurants surveyed in the social survey field activity.

Table 16: General Information regarding Restaurants visited in Social Survey

Name of Restaurant	Type of Restaurant	No of employees	Annual sales	Total floor area
Soofi Restaurant	Pakistani food	10-19.	No idea	12 marla
Sabri Restaurant	Pakistani food	Less than 10	Nres	5 marla
Mian Jee Tikka	Pakistani food	10-19.	Nres	5 marla
Usmaniya & Rehmaniya Hotel	Pakistani food	Less than 10	Nres	4 marla
Shehbaz Tikka	Pakistani food	20-49	18,250,000	120 marla

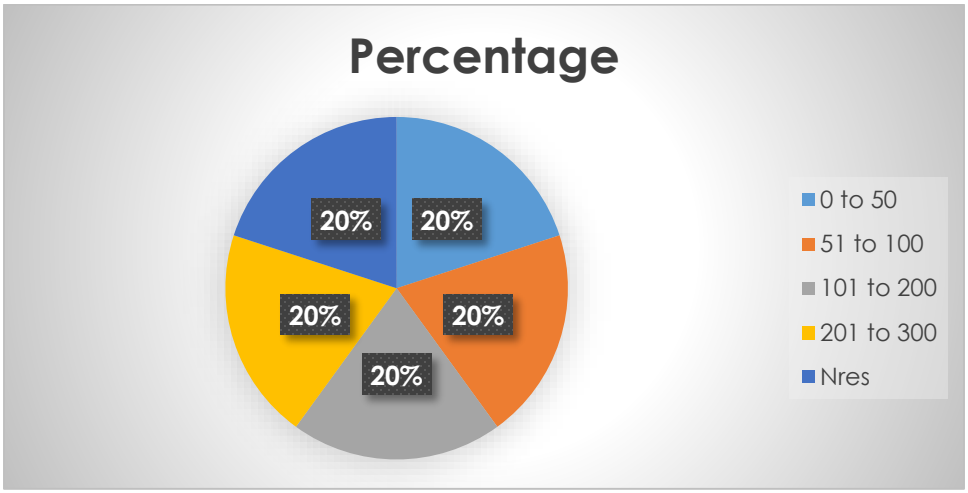
3.2.4.2. Waste Generation and Recycling Behavior

All the restaurants were asked to tell about various components generated in their restaurants. The frequency distribution of their waste composition is shown in graph below.



Graph 93: Types of Wastes Generated in Restaurants

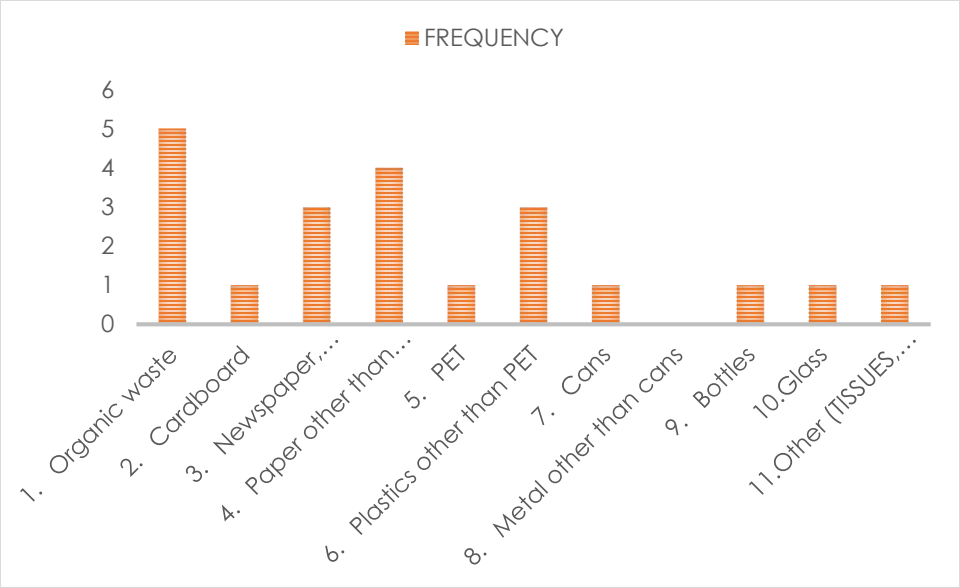
The amount of kitchen waste when plotted separately show the following range.



Graph 94: Range of Waste Generation in kg per Week

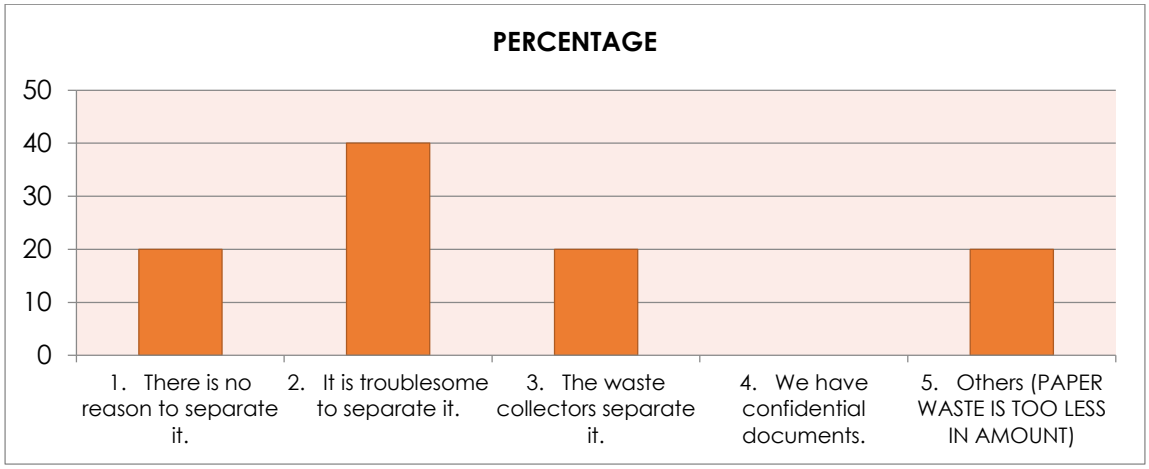
Though huge quantities of kitchen waste are being generated but all the respondents told that they are discharging it indiscriminately; with other wastes. Upon the next question on

discharge behavior of the restaurants, components of waste discharged by these restaurants are shown in graph below in terms of frequency of responses.



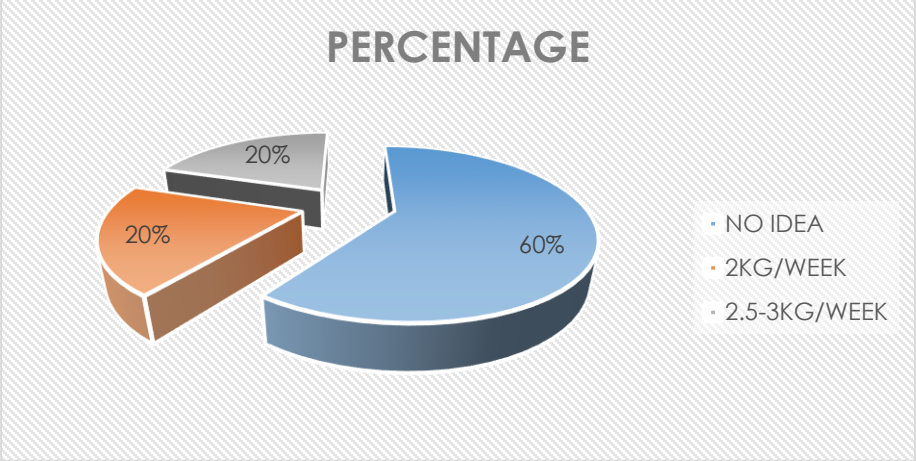
Graph 95: Types of Waste Discharged by the Restaurants

All the respondents also told they are not segregating paper or cardboard. They assigned the following reason to this behavior.



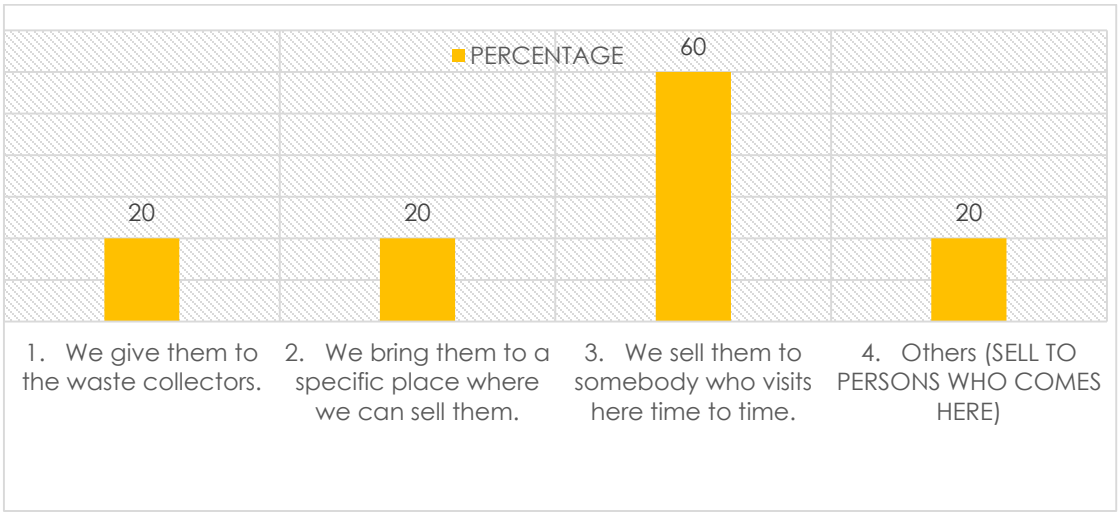
Graph 96: Reasons of no Sorting

In comparison with the paper, recovering bottles had completely different approach in surveyed restaurants. 100 % of the respondents told that they recover bottles from their waste stream. 40 % of the respondents were even able to quantify their separated bottle waste. The range is presented below with percent responses.



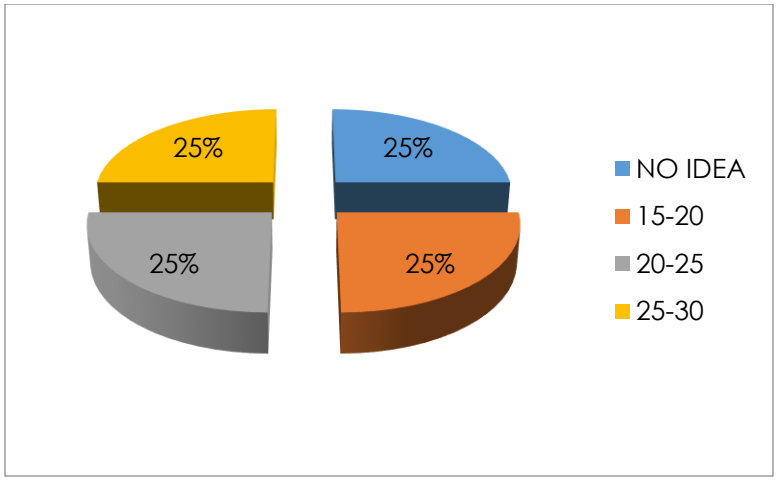
Graph 97: Quantity of Bottle Waste

Use of these bottles is presented below.



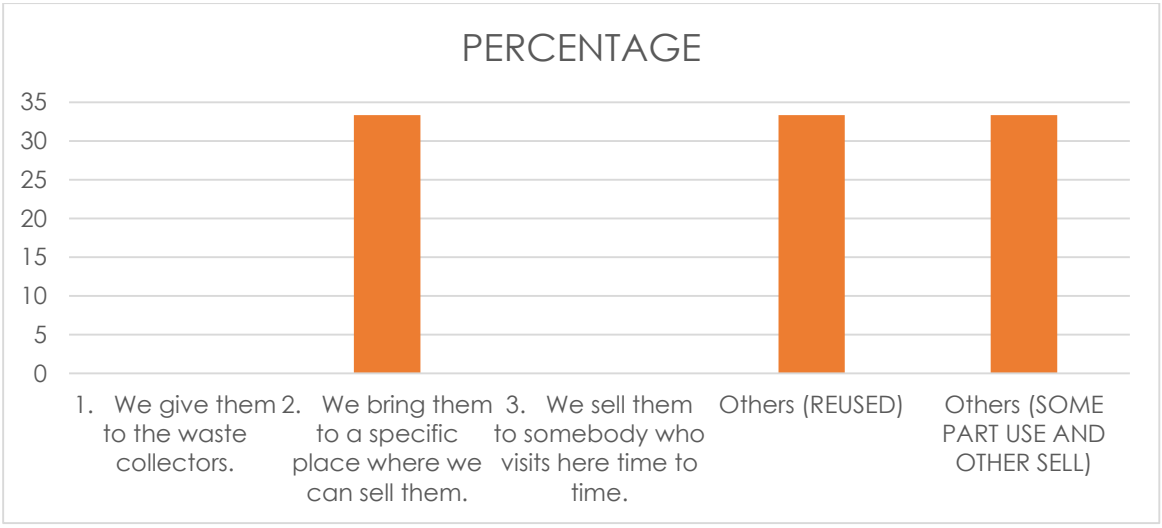
Graph 98: Use of Separated Bottles

The approximate sale rate was also given by 75% of the respondents as shown in graph below.



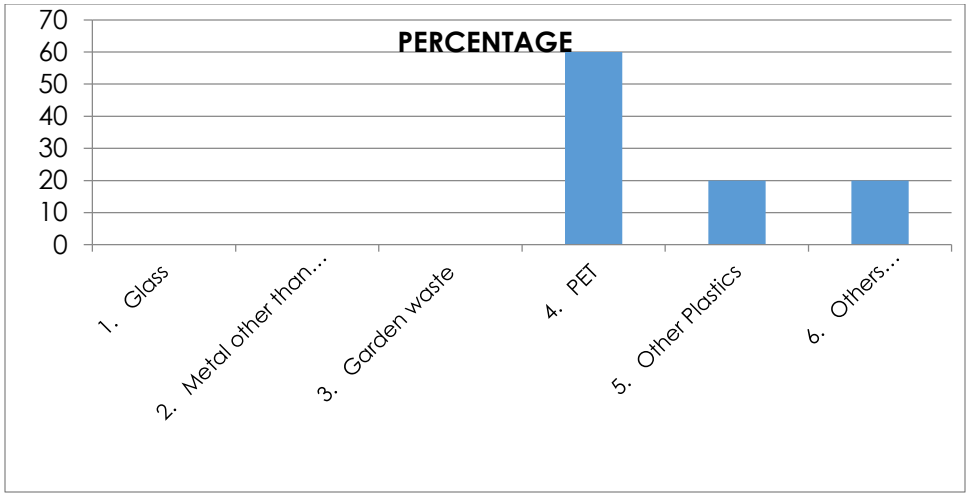
Graph 99: Sale Rate for Used Bottles in Rs. per kg

Regarding the sorting activity for cans, 60% restaurants separate both steel and aluminum cans. Remaining 40% informed that they do not generate can wastes. Those who separated the cans were not able to quantify them, however, they informed about what they do with these sorted cans. Their responses are presented below in graph.



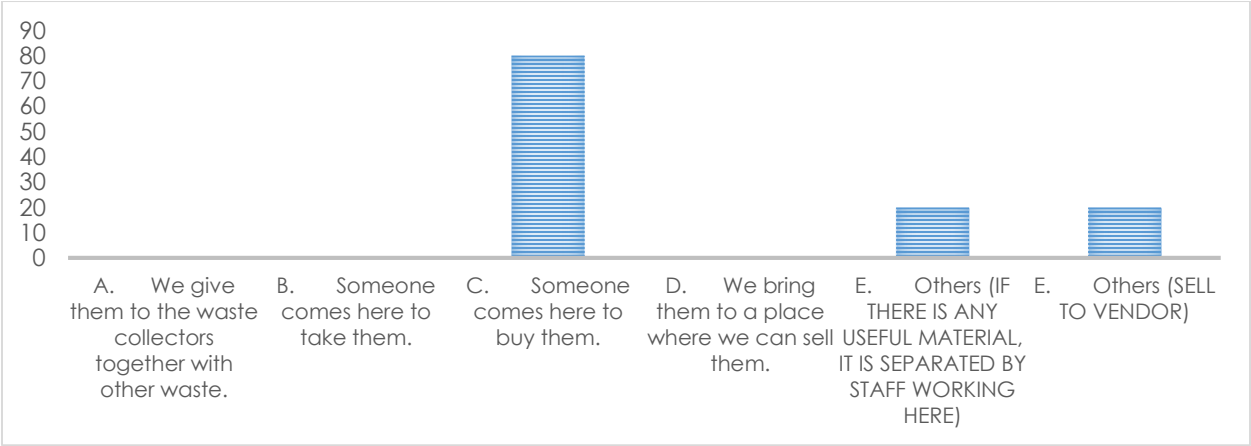
Graph 100: Use of Segregated Cans

Resultantly they were asked if there were other waste types that they sorted. Their replies are plotted in the bar chart below.



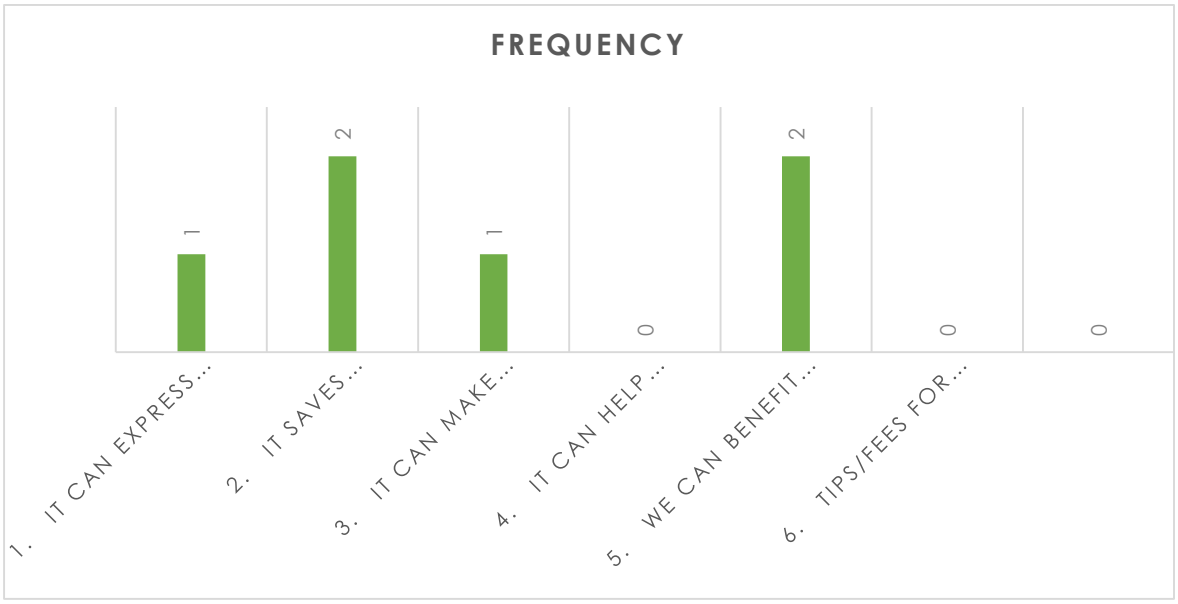
Graph 101: Sorted Waste Components

These sorting materials have different fate according to their possible use in the same place or otherwise. The responses chosen by the respondents are presented below.



Graph 102: What the Restaurant Owners do with Sorted Wastes

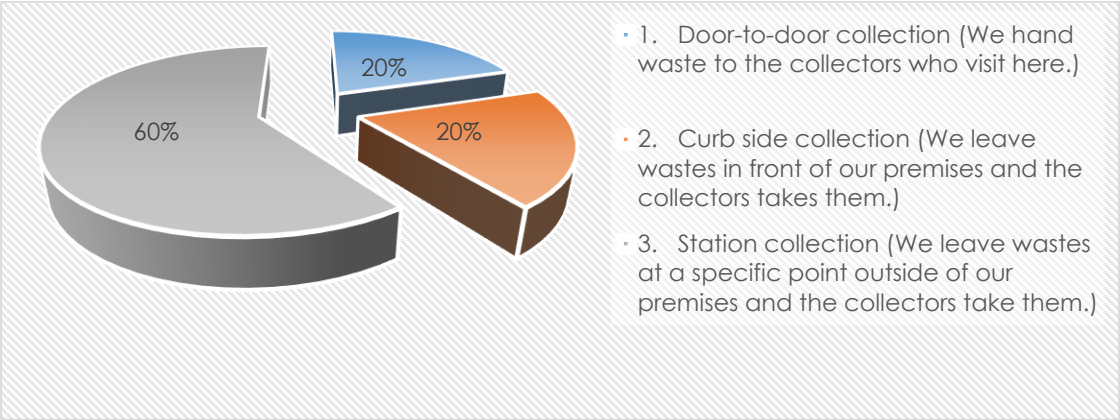
For recycling initiatives, 60% agreed that it should be done while 40% were not in favor. They further provided reasons for segregation as presented below.



Graph 103: Why Recycling should be done

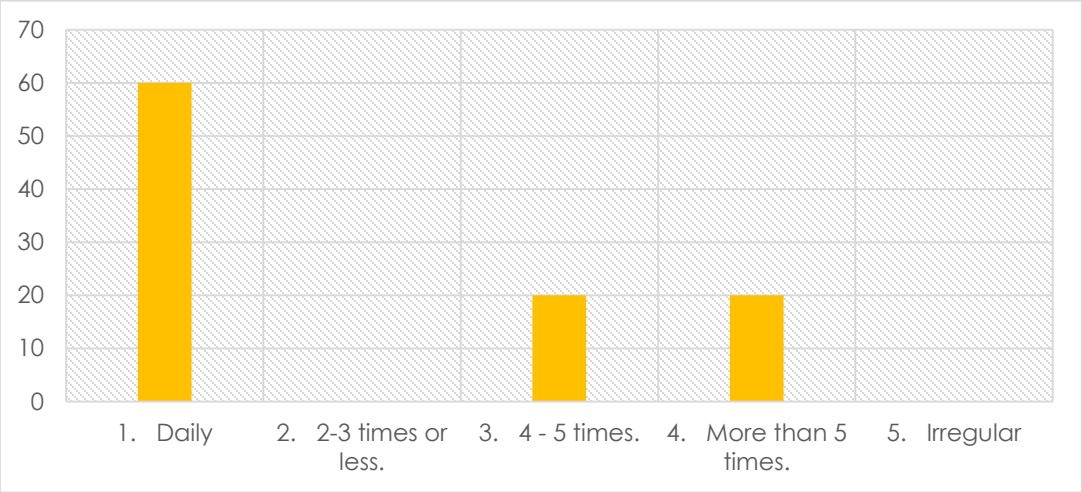
3.2.4.3. *Waste Collection Services*

All the respondents confirmed that they are being provided the waste collection services, and that too by the GWMC. Level of service varied between different restaurants as presented in graph below.



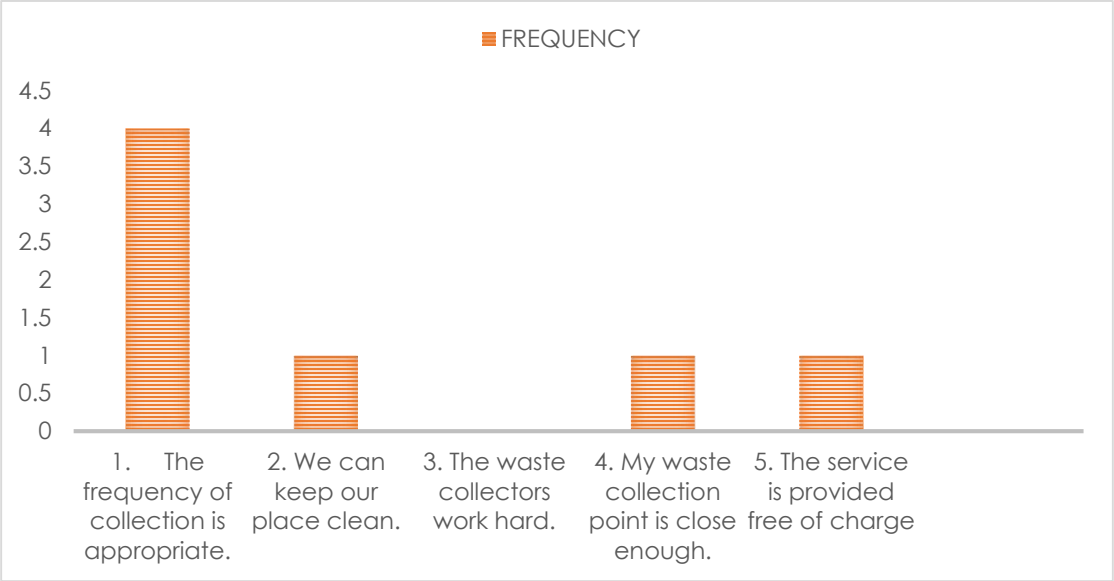
Graph 104: Level of Waste Collection Service

The frequency of waste collection in a week is presented below.



Graph 105: Frequency of Waste Collection in Percent Responses

Almost everyone confirmed that the waste collection schedule is regular, only one respondent told that he did not know about it. Similarly 80% were satisfied with the present service level only 20% opined that it needs improvement. Various reasons of satisfaction are presented below.



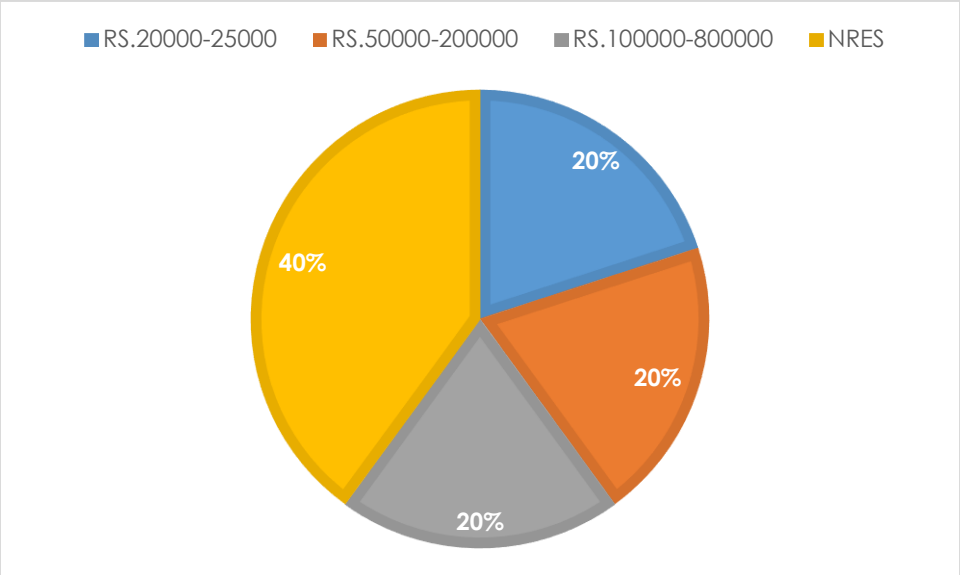
Graph 106: Reasons of Satisfaction regarding Waste Collection Service

The respondents were asked what they used to discharge waste out of their premises, 60% replied that they use large plastic bags while 20% told that they use dust bins and open heaps each.

3.2.4.4. Financial Information

All the respondents were asked about the payment of charges or fees for waste collection or disposal services. 60% of the respondents informed that they pay fees/tips but 40% told that they don't pay anything. Those respondents who told that they pay further informed about the range of payment. One respondent told their restaurant pay Rs. 100 per month, two informed they pay Rs. 1000 per month. But when asked if they were willing to pay for improved services, two of them quoted the same fee that they are presently paying and remaining one respondent chose not to reply.

At the same time it is worth noting that in terms of their capacity to pay for services one of the respondents pay Rs. 100,000 to 800,000 per month as their electricity charges. The range for electricity bills is presented below for all the respondents.

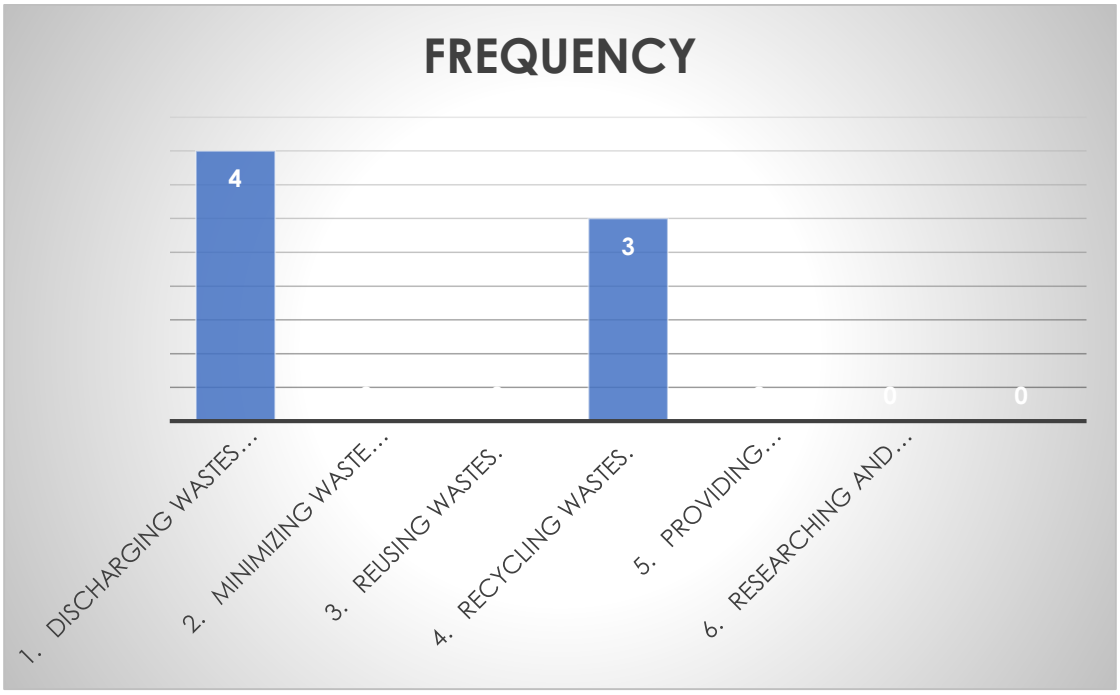


Graph 107: Range of Electricity Bills

3.2.4.5. Cooperation for Waste Management

The respondents were informed that Coping with wastes requires efforts of not only the city and the delegations but also the general public. They were asked if they think there is something their office can do for good waste management. 80% were of the opinion that they could definitely do something, only 20% thought there might not be something of that sort.

When asked what sort of cooperation their restaurants offer, their replies were either related to disposing off properly or recycling more.



Graph 108: Avenues of Cooperation

The cooperation intent was further explored while sensitizing the respondents about collaboration with other entities. They were told that a campaign to raise people's awareness of wastes is one of the ideas in order to involve the general public into waste management. It was asked if they thought your office would be interested in cooperating with the country, city or delegation for such campaign. It is heartening to mention that all the respondents replied positively.

3.2.5. Hotels

Like the restaurants, 5 hotels were decided to be surveyed.

3.2.5.1. General Information

Basic information regarding the surveyed hotels in summarized in table below.

Table 17: Summary of Basic Information of Hotels

Name of hotel	Annual Sales	Floor Area	No of Rooms	No of Guests/ Day
Lahori Hotel	No Response	4m^2/marla/kanal	16	6
Hotel City	No Response	1 kanal	30	10
Pindi Hotel	No Response	1 Marla	4	16
City Top Hotel	No Response	5 kanal	14	12
Shelton	Finance Deptt Knows	4 kanal	No Response	No Response

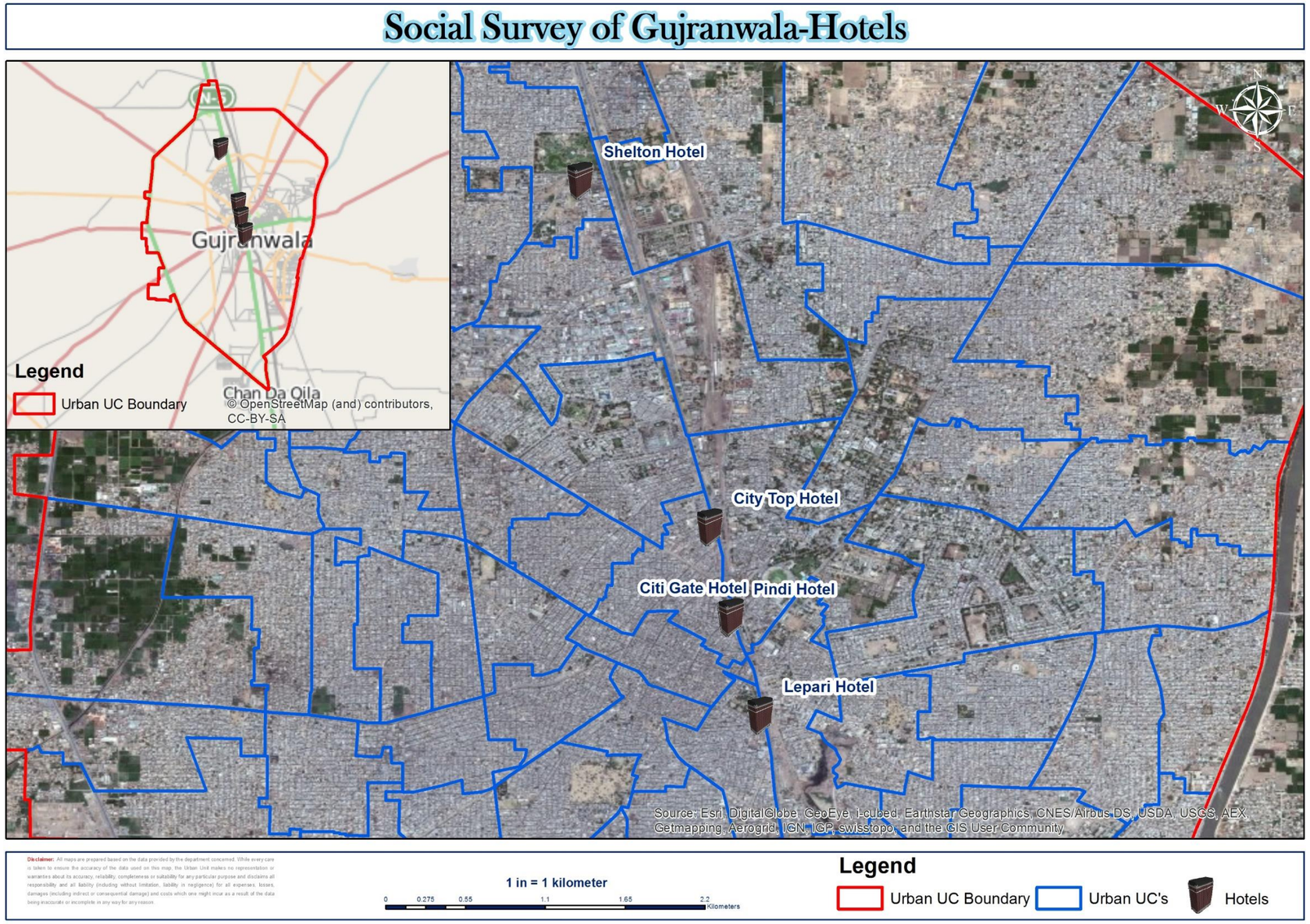
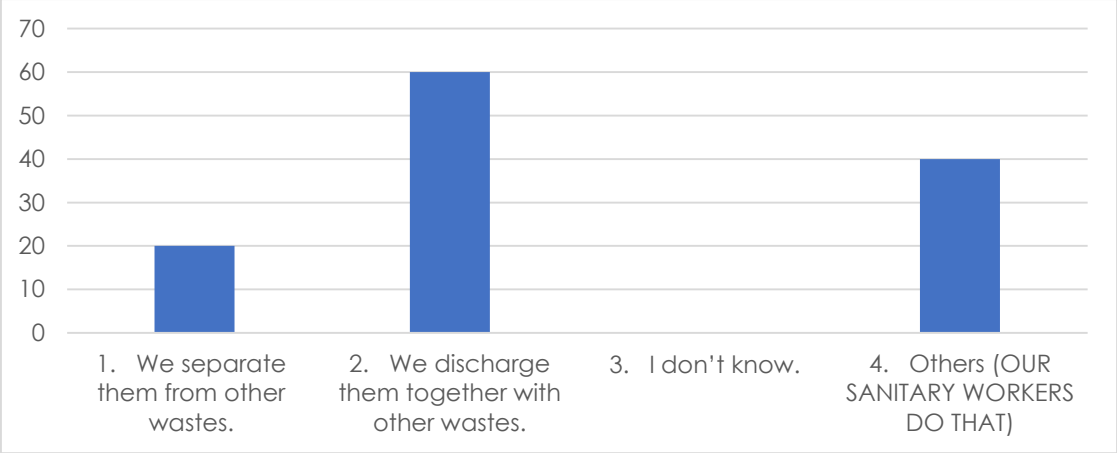


Figure 15: Location of Hotels

3.2.5.2. Information on Recycling

To collect the information on the recycling behavior respondents were asked if they separated paper from their waste stream. Only 20% informed that there were separation of paper in their hotel.

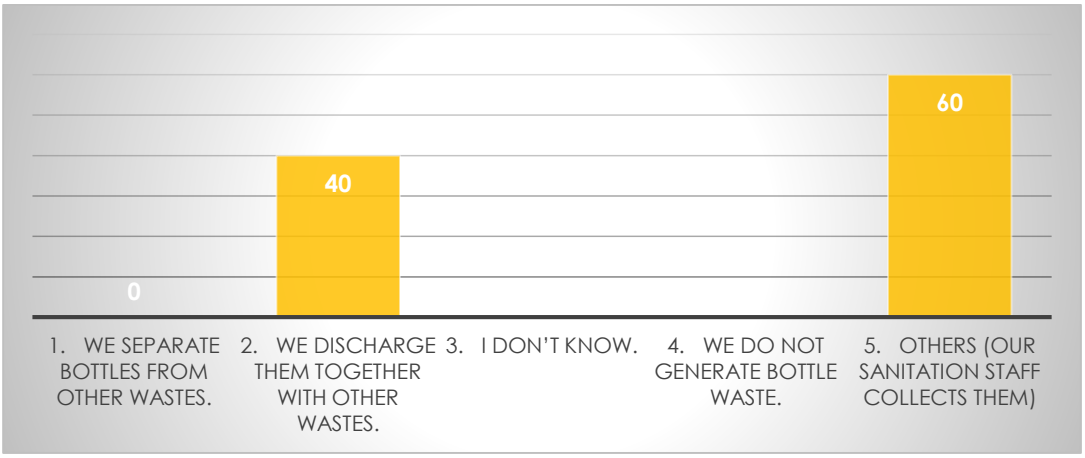


Graph 109: Paper Separation in Hotels

In terms of frequency only one respondent replied positively, who was further asked next set of questions as to who separates paper waste and what sort of paper waste is separated? The respondent informed that their cleaning staff separated paper and in fact different types of paper and cardboard were separated at their hotel premises. The same respondent was unable to estimate the quantity of paper waste generated from his hotel. He also informed that the waste is brought to market where it is sold but he showed his ignorance on price of recyclable paper.

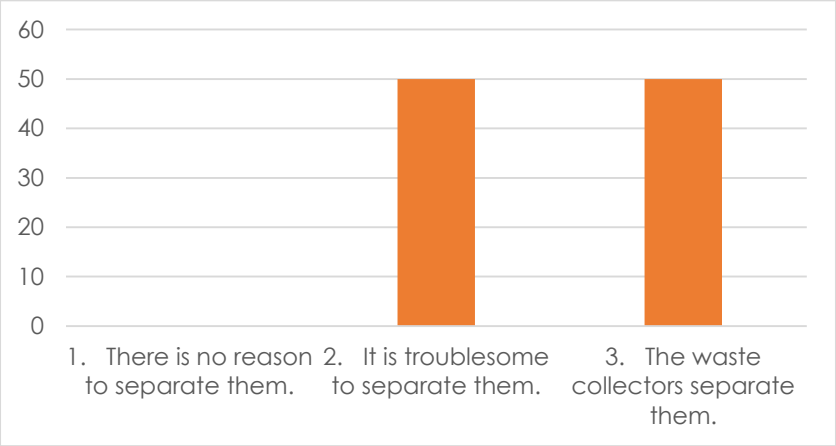
From the participants who were not segregating recycling paper, the reason was asked. They replied that they don't see a reason to separate paper.

Recycling pattern for bottles was also investigated which is summarized below.



Graph 110: Bottle Segregation in Hotels

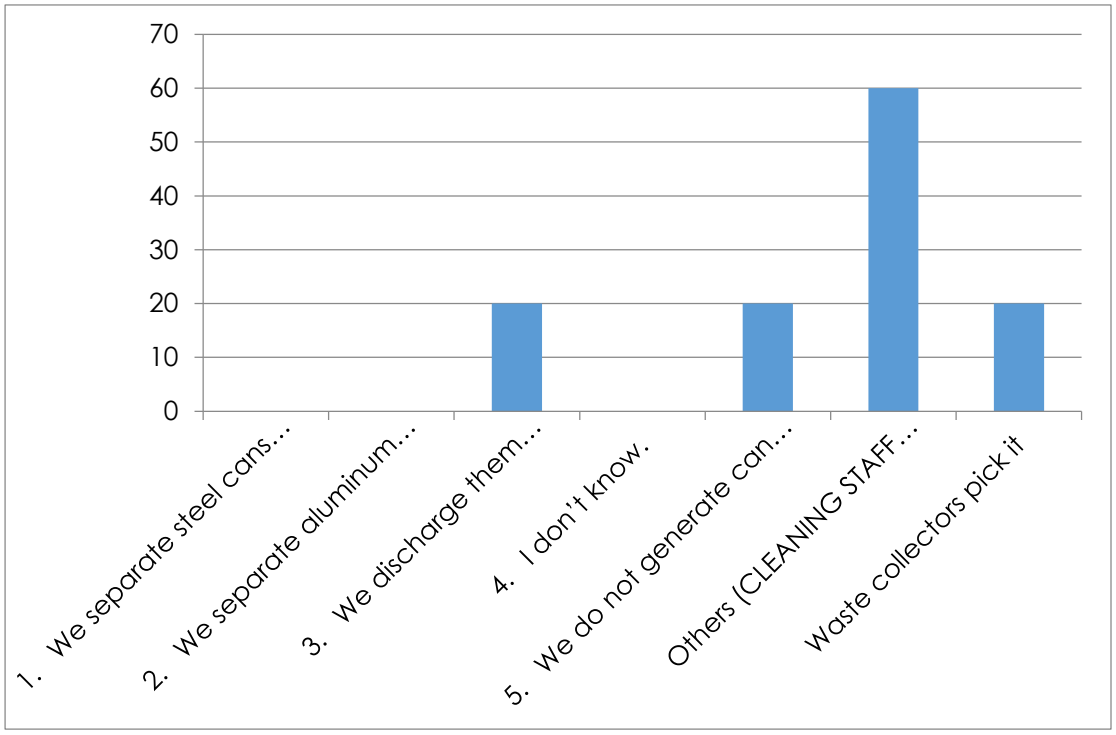
For those factories who do not separate glass bottles were asked the reasons. Their responses are depicted in graph below.



Graph 111: Reason of no Segregation Activity

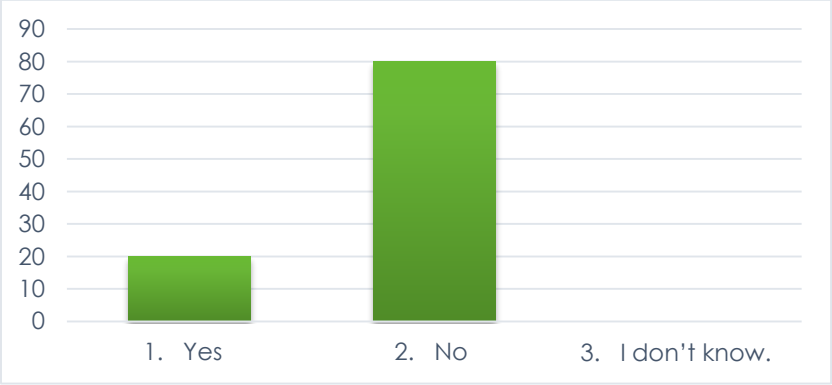
However, the heartening response is related to change in behavior. It was investigated that if they were asked to segregate for recycling would they cooperate. Both the factories who are not practicing segregation, replied positively.

The recycling behavior for cans in percent proportion is presented in the graph below



Graph 112: Recycling Behavior for Cans

Lastly the overall perception of waste recycling was gauged by asking them if their facility was altogether interested in segregating resourceful materials. Only one of the respondents (20%) agreed remaining (80%) were not in favor.

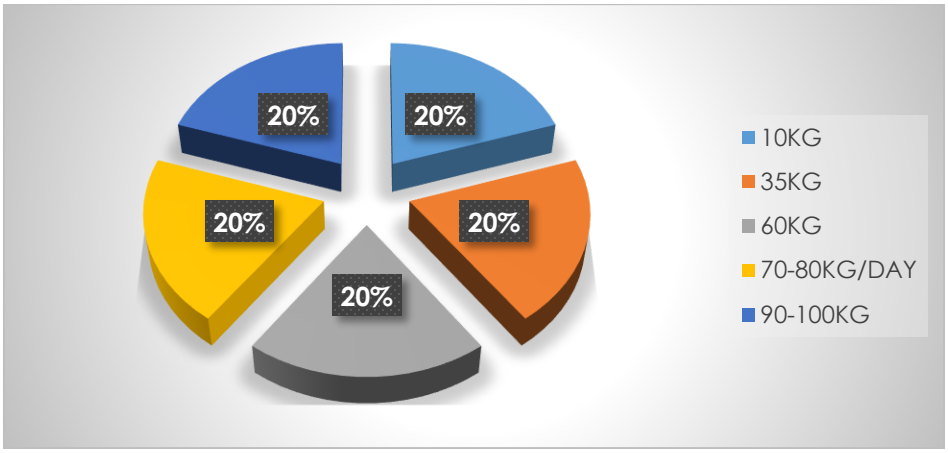


Graph 113: Perception of Waste Segregation

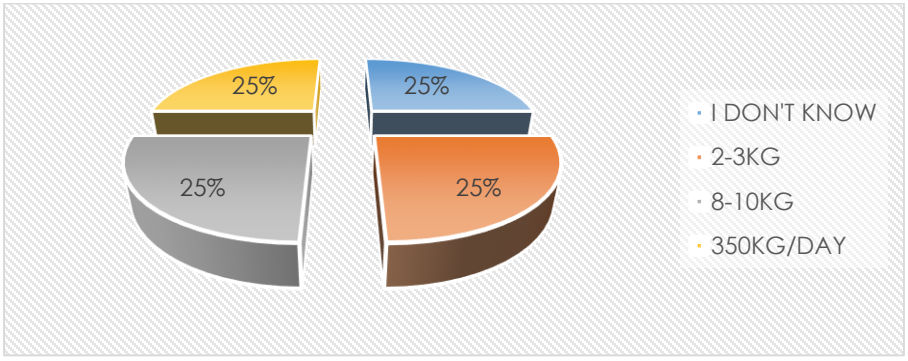
The only respondent who was interested in recycling further informed that it's beneficial as it saves resources and revenues can be earned by selling the recyclable components. Similarly those not in favor told that they don't want to recycle as it is difficult and it's not their job but waste collectors' responsibility.

3.2.5.3. *Waste Collection and Discharge Behavior*

Regarding their waste generation and discharge behavior, questions on amount of waste generated and disposed of were asked separately. The answers are presented in pie charts below.

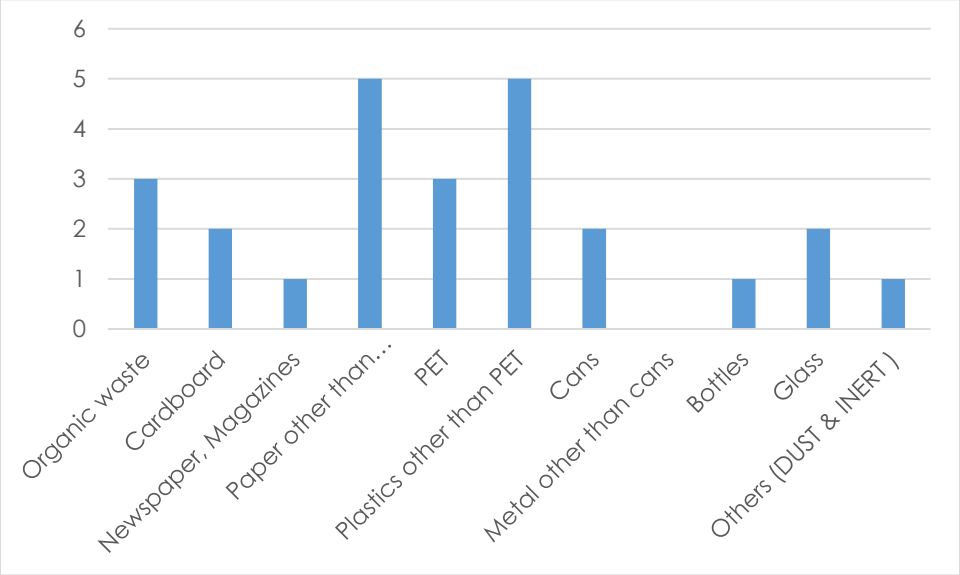


Graph 114: Waste Generation in kg



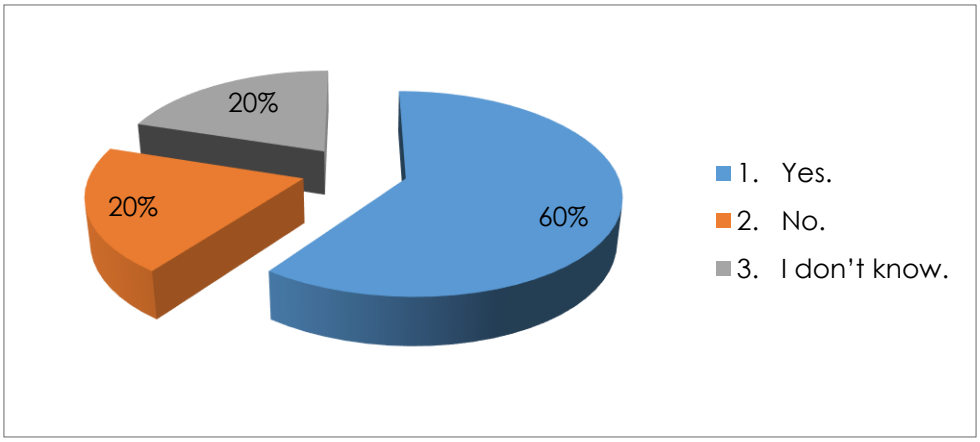
Graph 115: Waste Discharge (kg)

Further waste subcategories were asked from all the hotels to describe which components their facility is generating as waste. These waste components are presented below in terms of frequency distribution.



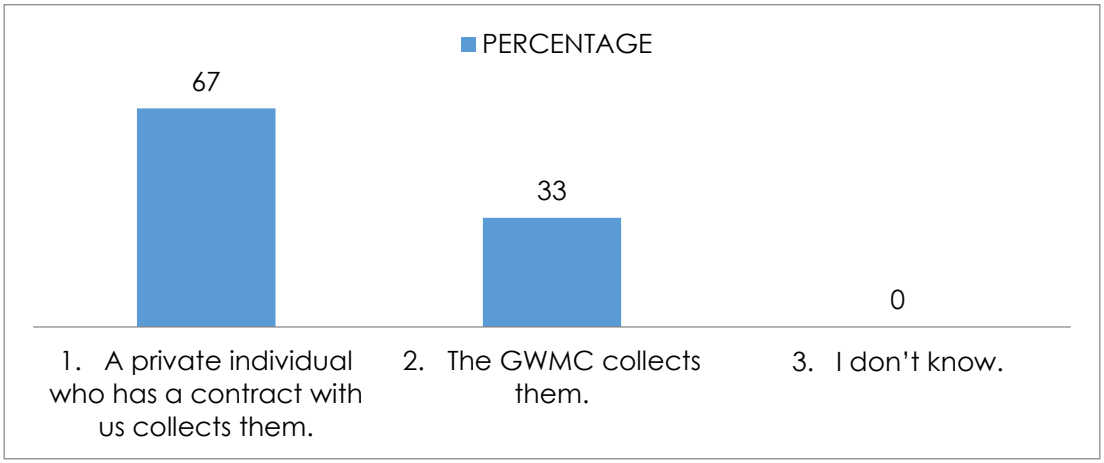
Graph 116: Subcategories of Waste as Generated in Hotels

When asked if they have waste collection services, 60% replied that they have whereas, 20% replied no or I don't know each (Graph 117: Waste Collection Services for HotelsGraph 117).



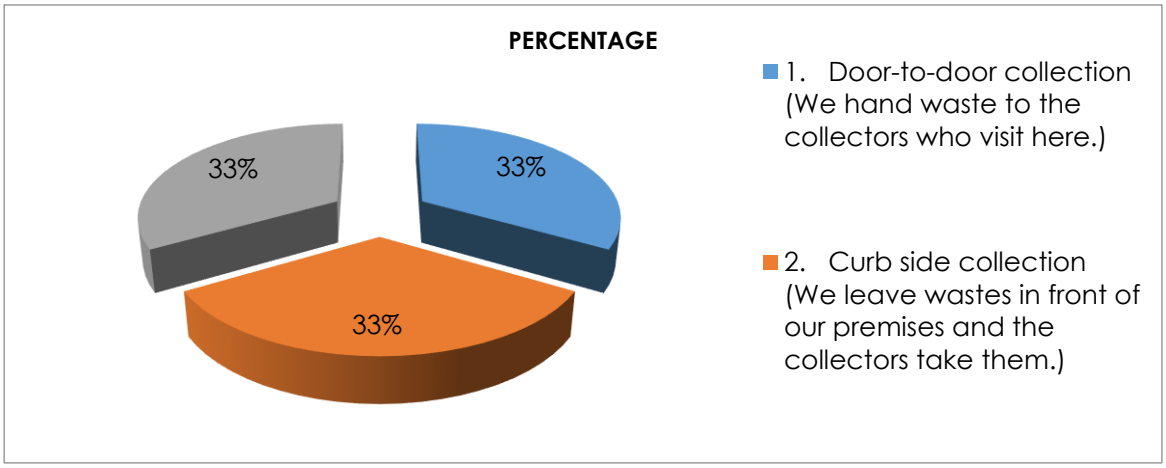
Graph 117: Waste Collection Services for Hotels

The next series of questions were posed to the entities who are availing the waste collection services. Regarding the service provider, 67% replied that it's privately arranged, while 33% replied it is done by GWMC.



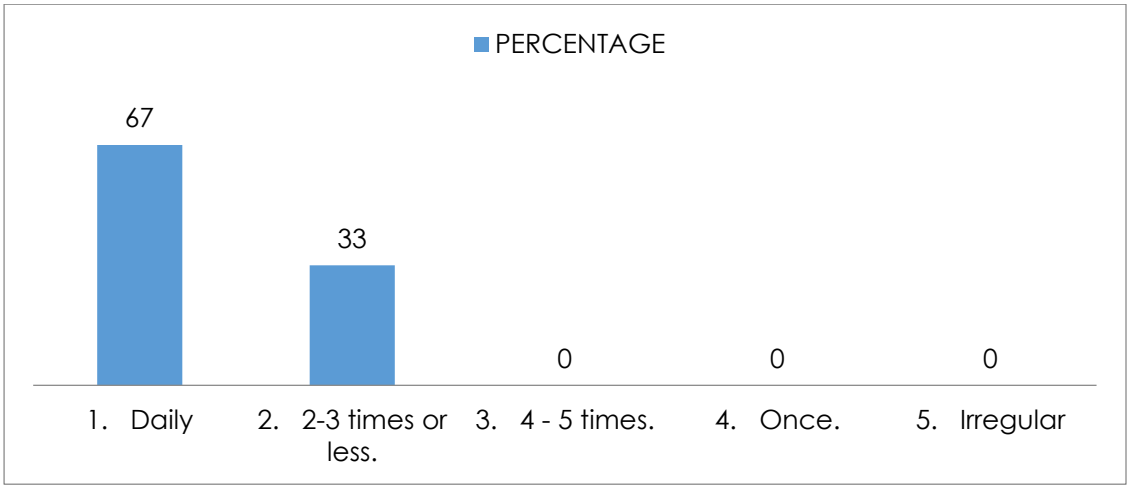
Graph 118: Waste Collection Service Provider

On the mode of waste collection, the service level was equally distributed from door to door collection, curb side to station collection (Graph 119).



Graph 119: Level of Service for Hotels

Similarly the collection frequency was described by 67% to be daily activity while 33% replied that waste was collected two to three times during the week (Graph below).



Graph 120: Frequency of Waste Collection Service

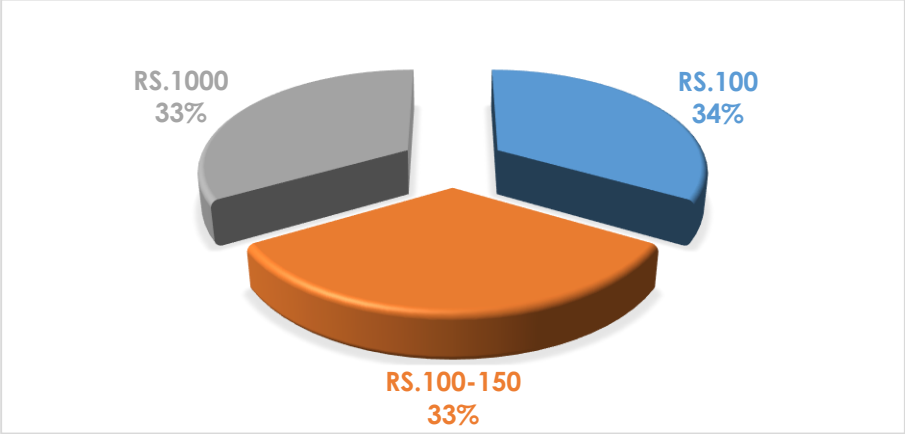
About the punctuality of waste collection, it is disappointing to see that nobody replied positively. 33% respondents said they were not punctual and 67% replied they were unaware of collection timing. None of the respondents mentioned that the waste collection was timely executed.

For waste treatment, 100% of the respondents told the survey team that they don't treat any sort of waste that they are presently generating.

3.2.5.4. Financial Information

It was inquired that what amount they pay for waste collection services. One of the two respondents told that he doesn't know and his general manager would have the information. The other one informed that they pay Rs. 15,000 per month. For change in fees respondents avoided their opinion on how much their hotels can pay and they hadn't had any information on how much tip is paid to the waste collectors.

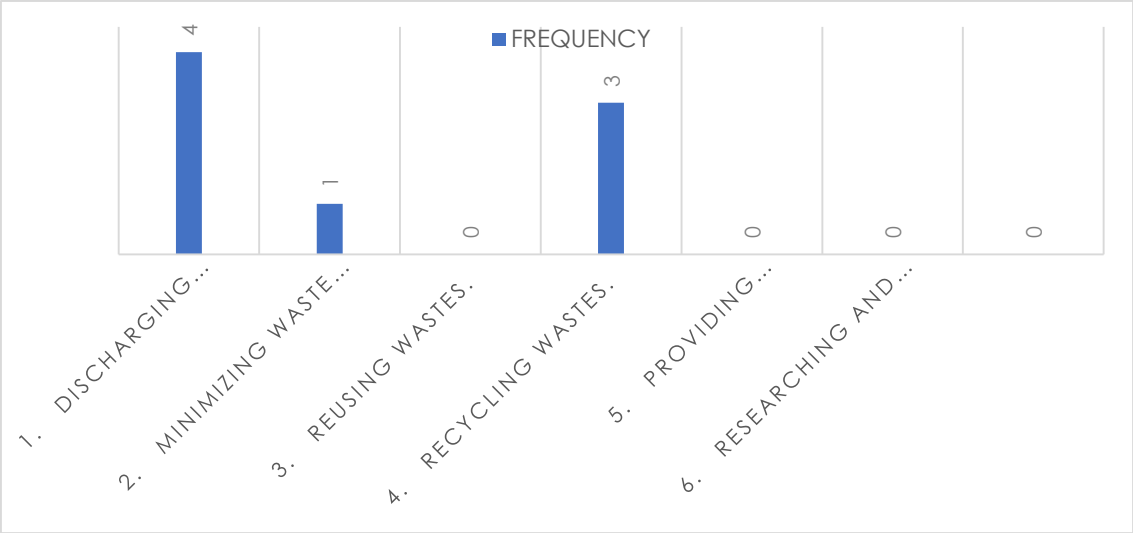
But as an employee, they was positive on paying for waste collection services, one replied they can pay Rs. 100/month, second told they can pay Rs. 100 – 150/month, while the third replied they can pay up to Rs. 1000/month.



Graph 121: Willingness to Pay for Service

3.2.5.5. Cooperation with Waste Management Organization

As for their willingness to cooperate with organizations working for waste management, it is worth noting that 80% of respondents agreed to cooperate. They were asked if they can tell what sort of help they would be and they chose minimizing waste, recycling and discharging neatly. The responses are presented on frequency chart below. While analyzing these responses it should be kept in mind that multiple answers are possible.



Graph 122: Possible Avenues of Cooperation

Similarly the respondents replied very positively for awareness campaigns, they agreed on helping the waste management entities in such activities.

3.2.6. Stores

Across the city, 10 store were decided to be surveyed.

3.2.6.1. Basic Information

The stores and shops surveyed during the field activity are delineated in table below.

Table 18: Basic Information of Surveyed Stores

Name of shop/store	No of Employees	No of shops	Total annual sales	Items mainly sold	Total floor area
Al-sidra store	Less than 10	Nres	Nres	Canned/bottled foods and beverages	2 marla

				Daily consumable goods	
Babar general store	Less than 10	Nres	Nres	Canned/bottled foods and beverages Daily consumable goods	1.5 marka
Dar book center	Less than 10	Nres	Nres	Stationary magazines and books	29m^2
Murtaza store	Less than 10	Nres	Nres	Grains including, wheat rice lentils, etc. Canned/bottled foods and beverages Daily consumable goods	13 marla
Rizwan general store	Less than 10	Nres	Nres	Grains including, wheat rice lentils, etc. Canned/bottled foods and beverages Daily consumable goods	0.5 marla
Gourmet baker(shop)	20-49	Nres	2400000	Foods which are cooked here	7 marla

				Canned/bottled foods and beverages	
				Bakers	
M noor colony	20-49	Nres	Nres	Grains including, wheat rice lentils, etc.	1 kanal
				Canned/bottled foods and beverages	
				Daily consumable goods	
Shop & save	10-19.	Nres	Nres	Daily consumable goods	2-3 marla
				Stationary magazines and books	
Metro shoes	Less than 10	Nres	Nres	Only shoes	3 marla

It is noted that almost no one shared their information on size of business in terms of revenues, however, the floor area and number of employees can help us gauge their scale of business.

The map below shows the location of shops and stores visited during the social survey.

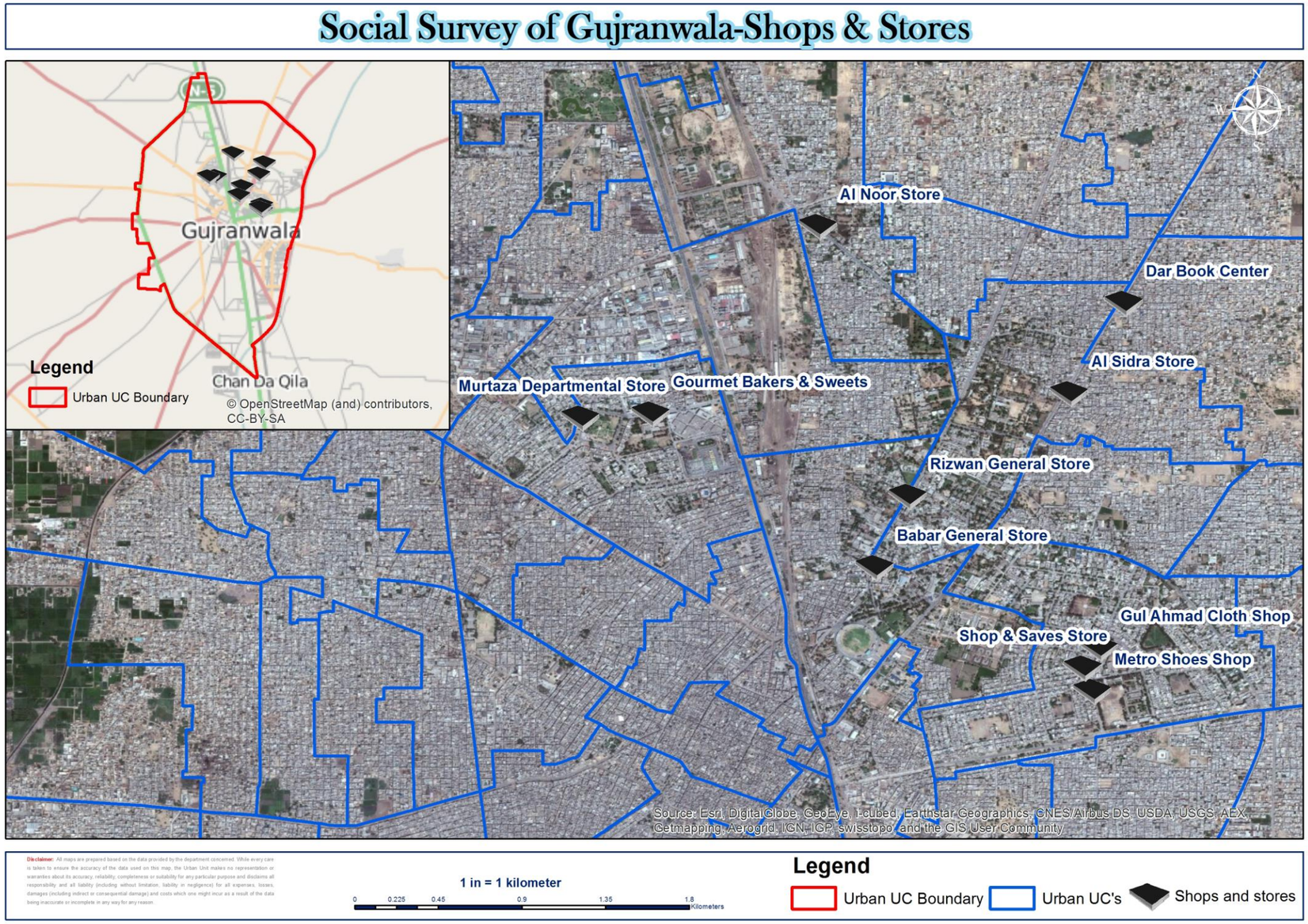


Figure 16: Location of Shops and Stores

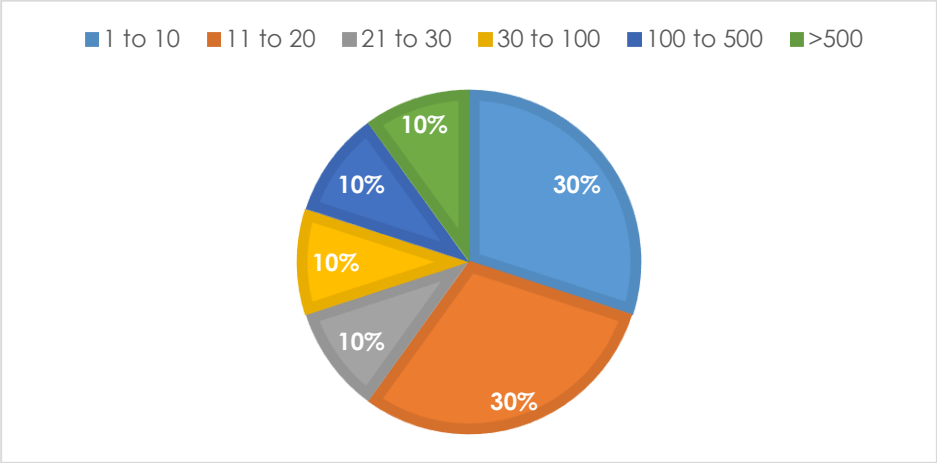
Below some pictures are presented showing the stores visited for the survey.

Figure 17: Pictures of Stores and Shops surveyed in Gujranwala

Babar General Store;UC#50/14	Dar Book Center;UC#49/13
	
Murtaza Departmental Store;UC#42/06	Al Sidra Store; UC#50/14
	

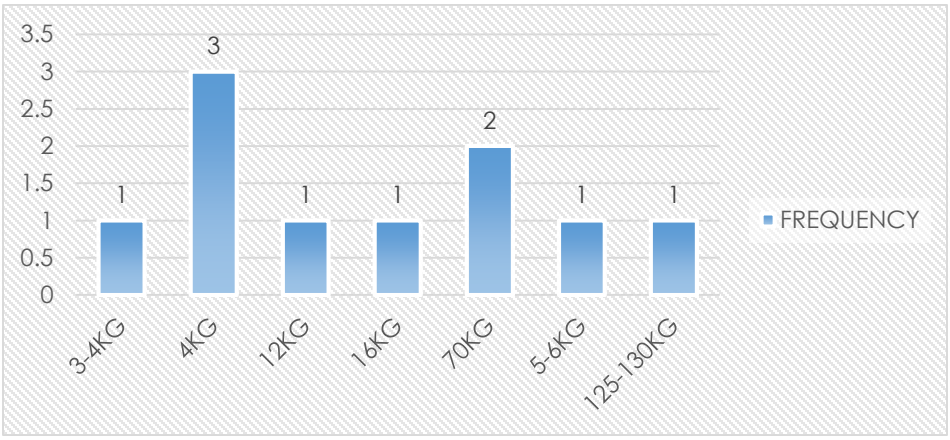
3.2.6.2. *Waste Generation and Recycling Behavior*

The waste generation in terms of quantity was asked. Due to large variation in waste generation range; 6 ranges were defined and are presented in the form of pie chart below.



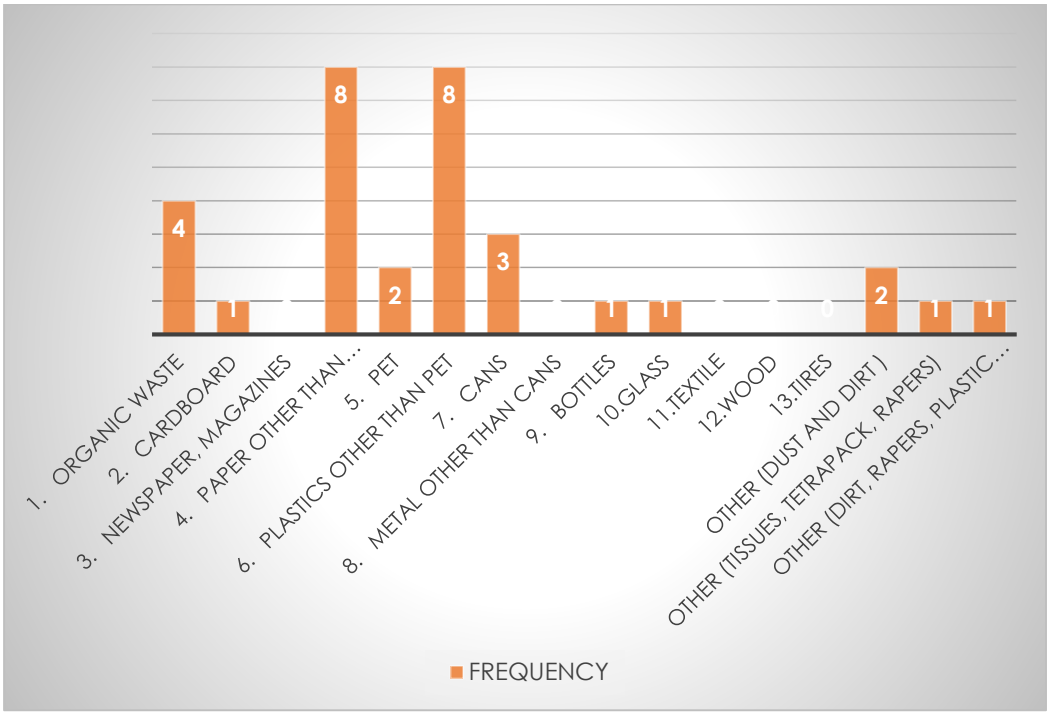
Graph 123: Waste Generation per Week (kg)

On the other hand when they were asked to give any numbers for the waste discharged, their answers highlight reduction in quantity that is discharged in comparison with that generated.



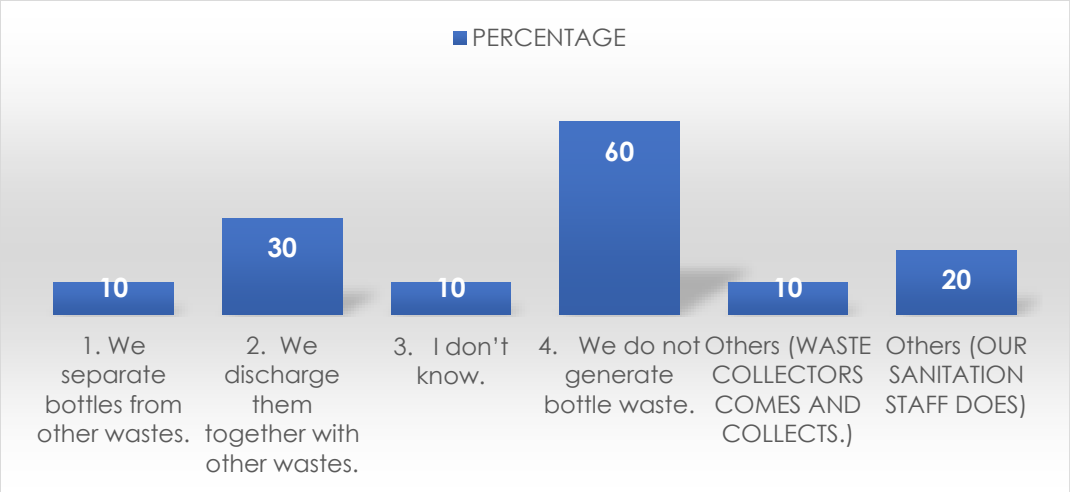
Graph 124: Frequency Distribution of Waste Discharge in Kilograms

Regarding the type of waste the stores and shops are generating, following graph is self-explanatory.



Graph 125: Waste Composition in Shops and Stores

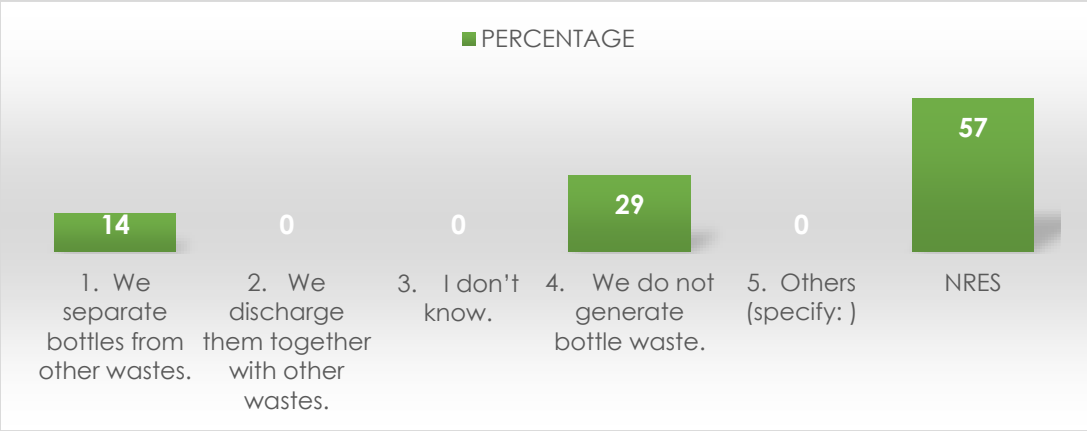
After knowing their waste characteristics, let us now focus on the recycling and segregation behavior of the shops. First of all the plastic bottle separation is analyzed below.



Graph 126: Separation Behavior for Plastic Bottles

Only 10% of respondents separate plastic bottles, but when asked how much that would be; he replied that he has no idea. However, he informed that they sell it to individual who comes to their shop occasionally. He also was unable to quote any figure for plastic bottle sale. Other respondents who told there was no effort at any level to separate plastic bottle, when asked the reason behind it told that they don't do the effort as they know that waste collection staff does it on its own. Similarly when they were further asked if they were interested to separate for recycling efficiency, none responded positively. It is important to mention here that two of the three same respondents agreed to cooperate if the community was provided with separate bins.

Second series of questions were related to segregation of glass bottles.

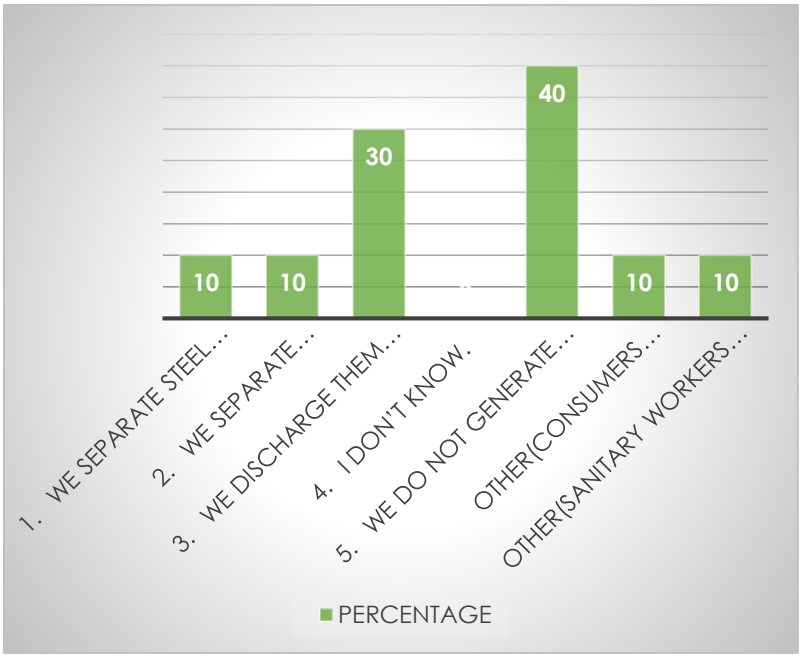


Graph 127: Separation of Glass Bottles

14 % of the respondents told that they generate and segregate glass bottles, but 29% replied that they don't generate bottle waste. Higher number of respondents (57%) didn't reply.

For the respondent who told that glass bottles are separated, he was asked to inform of any quantity or cost of resale to which he was unable to respond. He was only able to tell that these bottles are sold to a person who comes to their shop from time to time to buy recyclables.

Next in series were questions related to metal cans. Starting form the question on what the respondents or their facility do with the cans. Among the respondents, 10 % replied that they separate steel cans whereas 10 % told they separate aluminum cans. The responses in percent proportion are presented in graphs below.

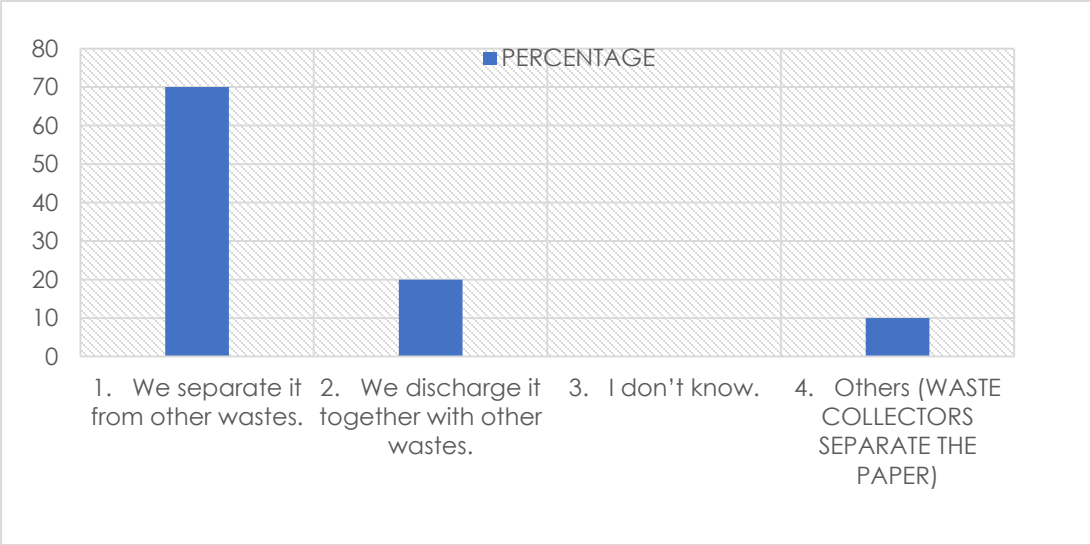


Graph 128: Separation Activity for Cans

When the two respondents who told about segregation where asked to give quantitative figures of cans, one said it's not possible to give any number. The other preferred not to respond altogether.

These respondents were not able to tell proportion of cans in total waste either. For those shops where no separation of cans is practiced, they were asked to assign a reason. All the respondents replied that since waste collectors separate the cans, they chose not to do it on their own. However, when asked their willingness to segregate for efficient recycling, 67% agreed to segregate, 33% still insisted that they would rather not as waste collectors are already doing the job. It is interesting to note here that the ratio reversed when they were asked to cooperate for the benefit of society.

Moving forward in the recycling activities for various components, several questions were asked regarding paper segregation and recycling. The initial question was posed to know what proportion of shops and stores separate paper waste. Graph below shows the responses in percent proportion.

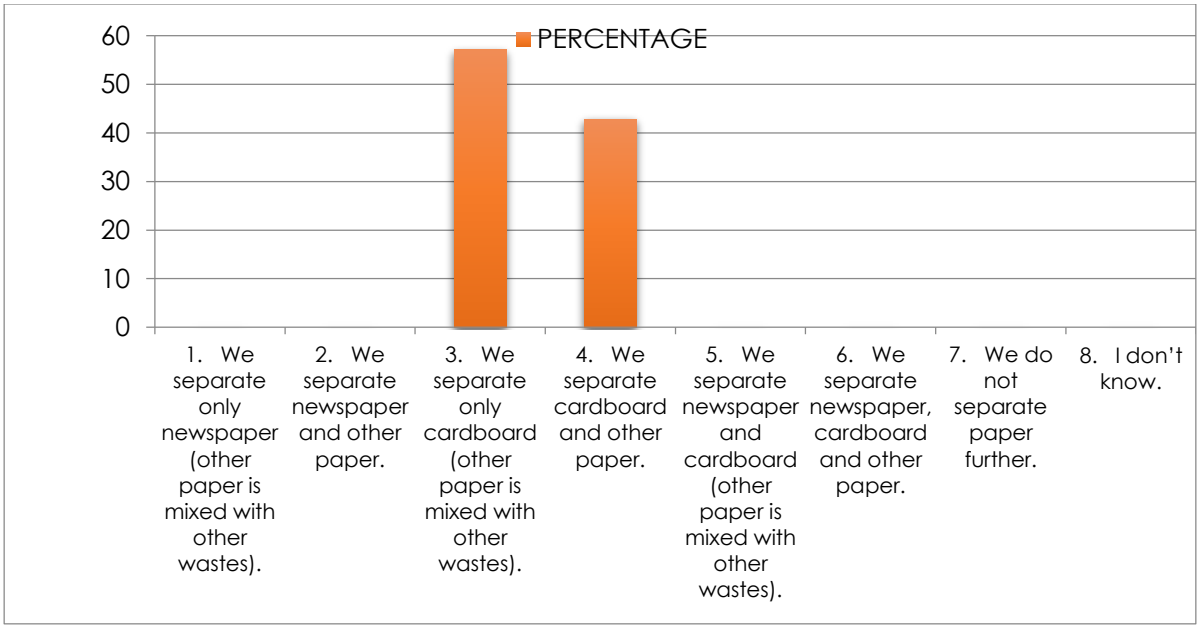


Graph 129: Sorting Behavior for Paper

Second question was related to how the separation is practiced, half of the respondents agreed that it is actually their cleaning staff who does that, 30% stated that they had designated person (Graph 130).

Graph 130: Paper Separation Responsibility in Shops and Stores

Next question lead to understand that only cardboard and cardboard with other papers was segregated. The proportion is shown in graph below.



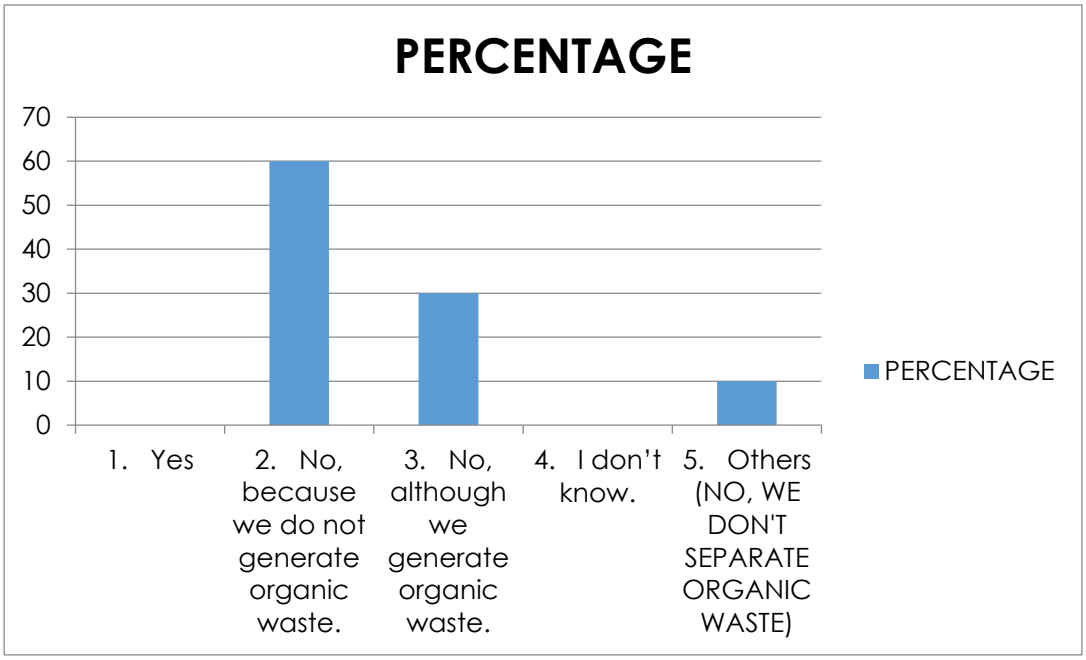
Graph 131: Separation Proportion of Various Types of Papers

But similar to their replies to amount of separated materials, they couldn't give a number to segregated cardboard and paper neither.

Those segregating only cardboard told couple of options on what they do with it to which they replied that either it is given to waste collector or to an individual who comes to purchase it. Couple of respondents were even able to quote the average price of Rs. 15 to 20 per kg.

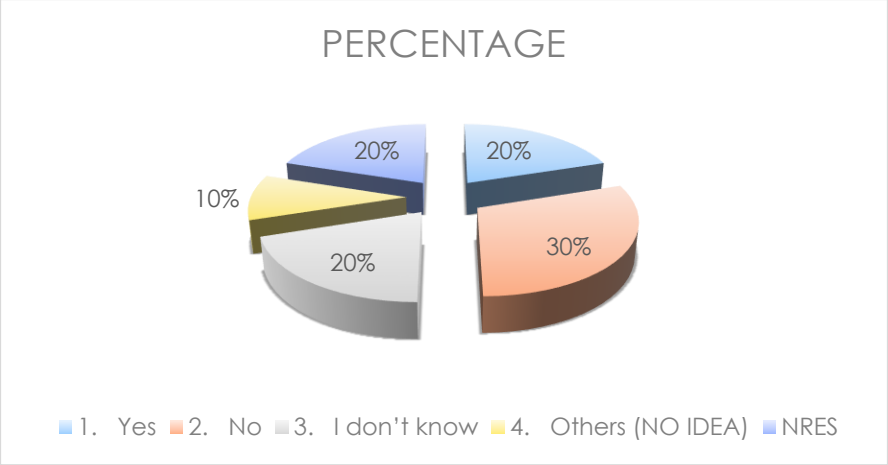
For those who do not separate papers, were asked the reason to which one respondent said it's troublesome while the other replied the quantity is too small to be segregated. Therefore, the same respondent said they will rather not segregate even when asked to because of small quantity. On the other hand the respondent who found segregation troublesome agreed to segregate if asked.

Lastly they were asked about the organic waste. The results are presented in graph below.



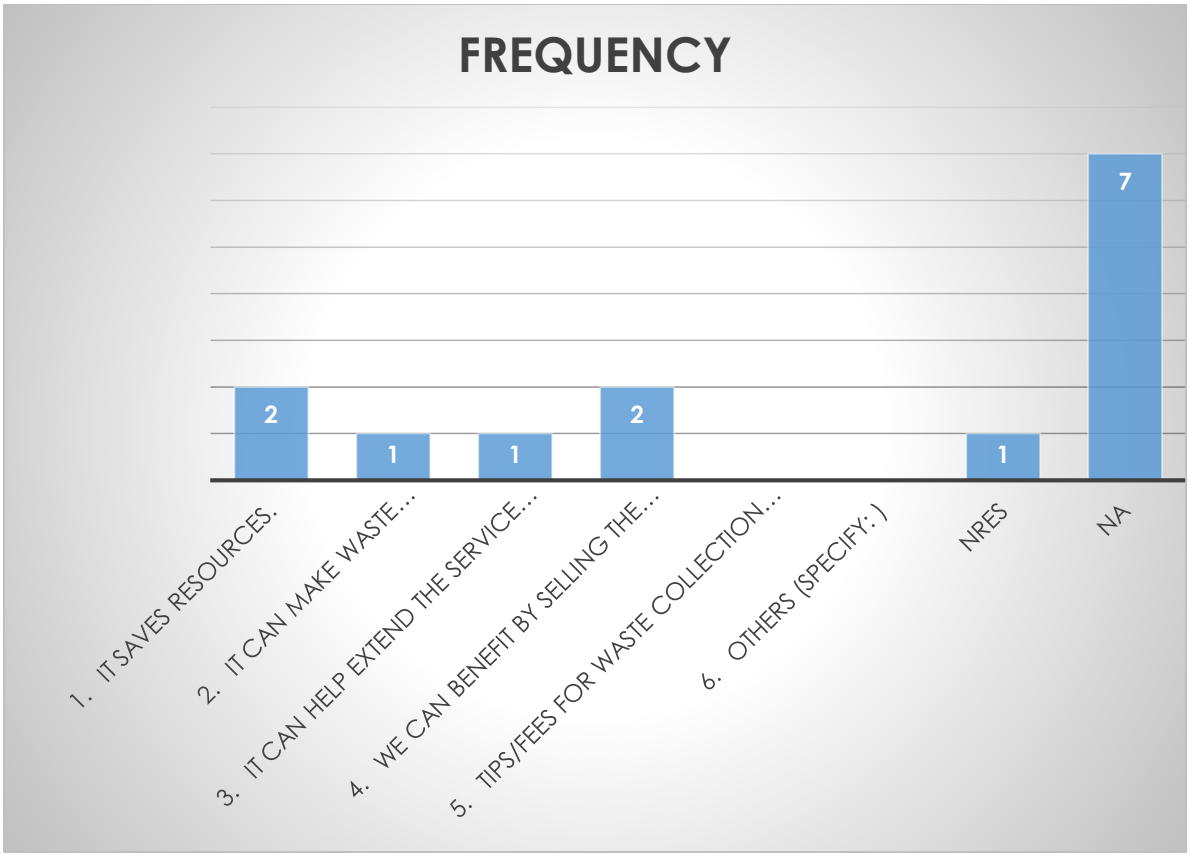
Graph 132: Percent proportion on Organic Waste Separation

After individual separation of components, it was investigated if the market was interested in segregation at all. The responses are presented below.



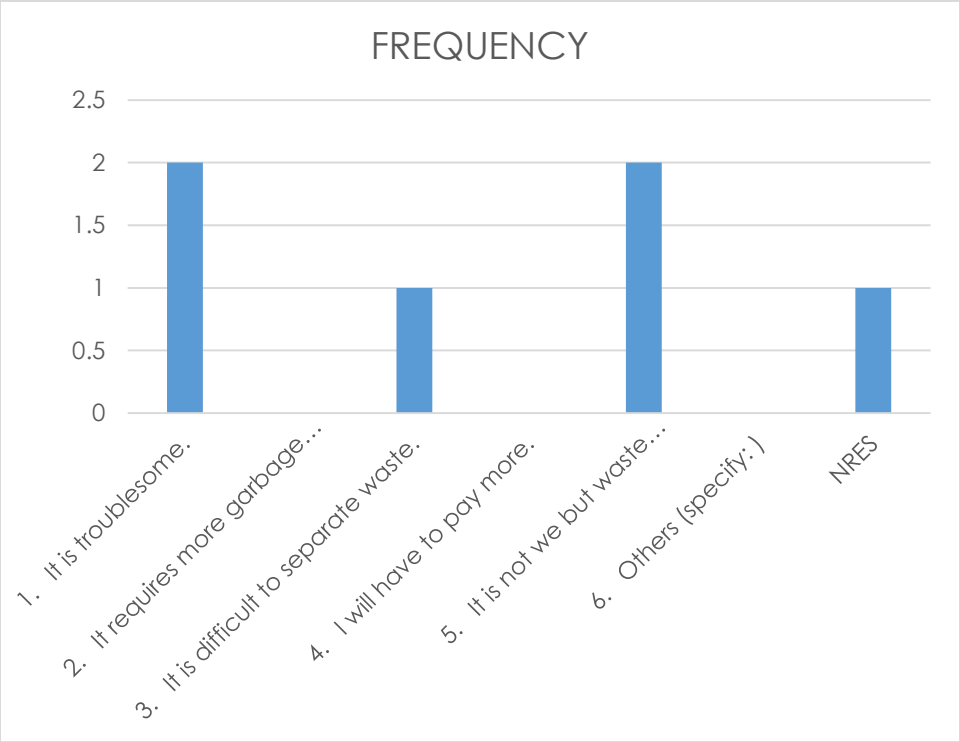
Graph 133: Interest in Sorting of Various Components

Reasons for interest in sorting is plotted below, while reviewing the replies it should be kept in mind that multiple answers were provided.



Graph 134: Reasons to Sort

Those who did not show interest in sorting, reasons were investigated, which are plotted on frequency chart below.

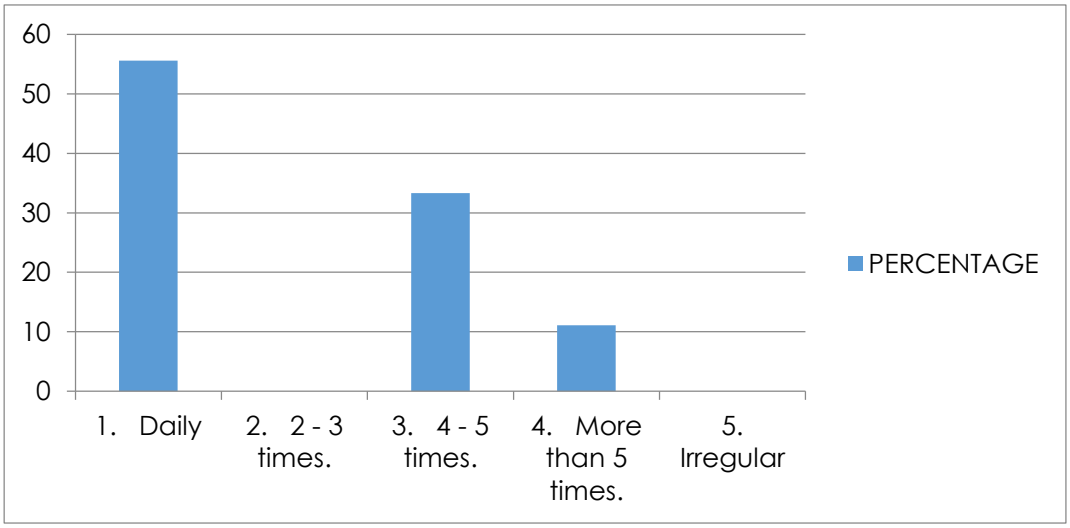


Graph 135: Reasons for no Sorting

3.2.6.3. Waste Collection Services

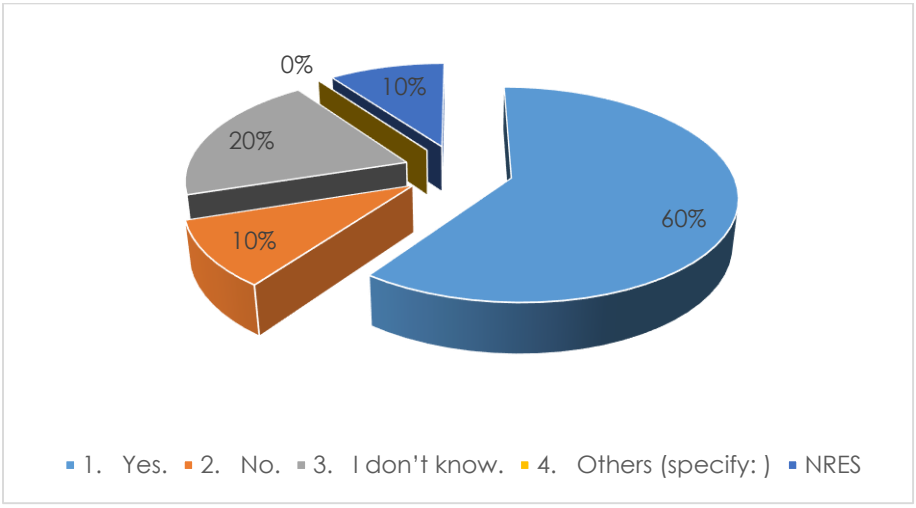
The respondents were asked if there is waste collection service available to their shop or store. 90% replied that the do have the service whereas only 10% told they don't have such service. All the respondents told that GWMC is providing the waste collection service in their area. It was also told that they do not have door to door collection, telling that 67% have curbside collection and 33% have stationary container collection system.

The frequency of collection varies from daily to lesser number of days in a week. The proportion is presented in graph below.



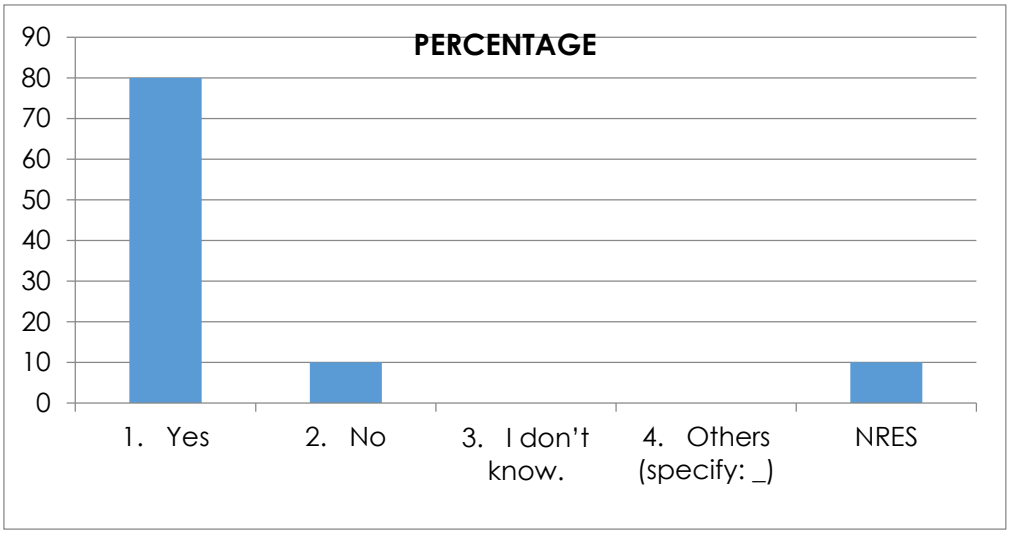
Graph 136: Frequency of Waste Collection per Week

It can be seen that more than 50% have daily collection. Likewise punctuality was also praised when 60% mentioned that the workers come on time.



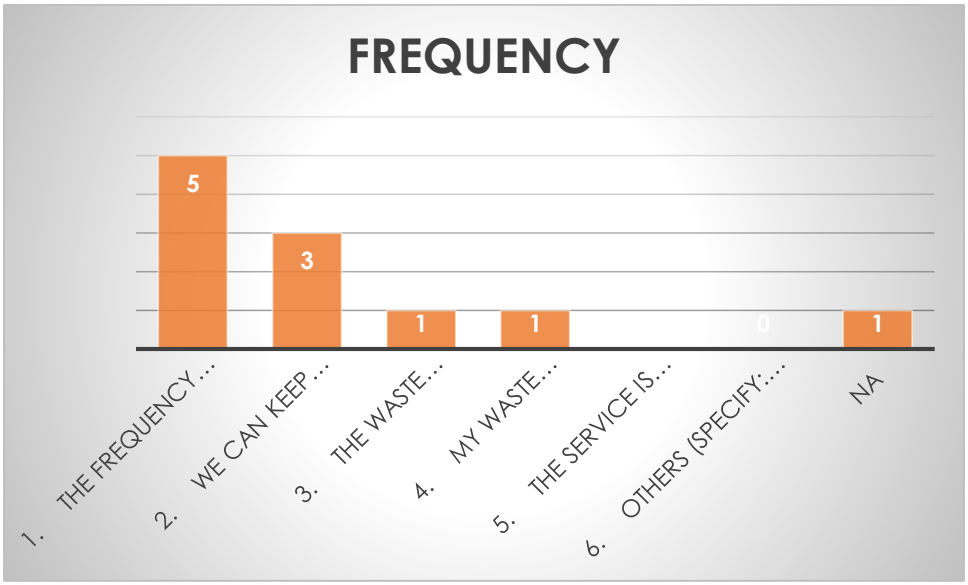
Graph 137: Waste Collection Schedule

The respondents also showed satisfaction for the waste collection service.



Graph 138: Satisfaction for Waste Collection Service

Those who were satisfied assigned the following reasons to their satisfaction.



Graph 139: Reasons of Satisfaction

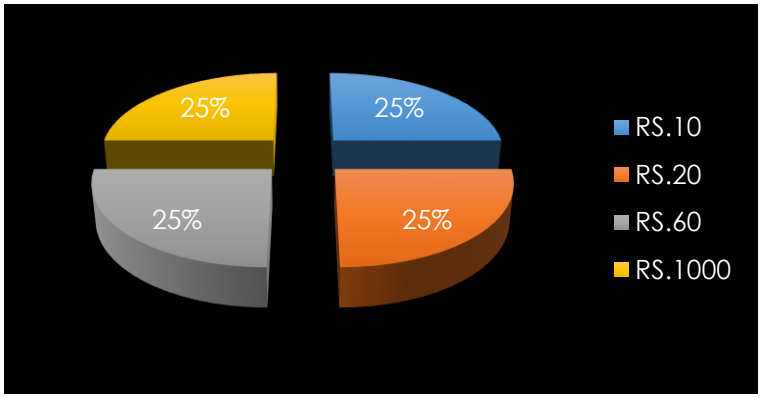
While reviewing these answers it should be kept in mind that plural answers were possible to this questions. The only respondent who was not satisfied linked it to high tip/fee of waste collection service.

80 % respondents told that they store waste in dust bins before it is picked, 10 % told they store in drum, while remaining 10 % informed that they make heaps outside their shop from where it is picked.

However, waste treatment of any sort is not practiced as mentioned by 90% of the respondents. The remaining 10% also didn't give positive response, rather no reply was given.

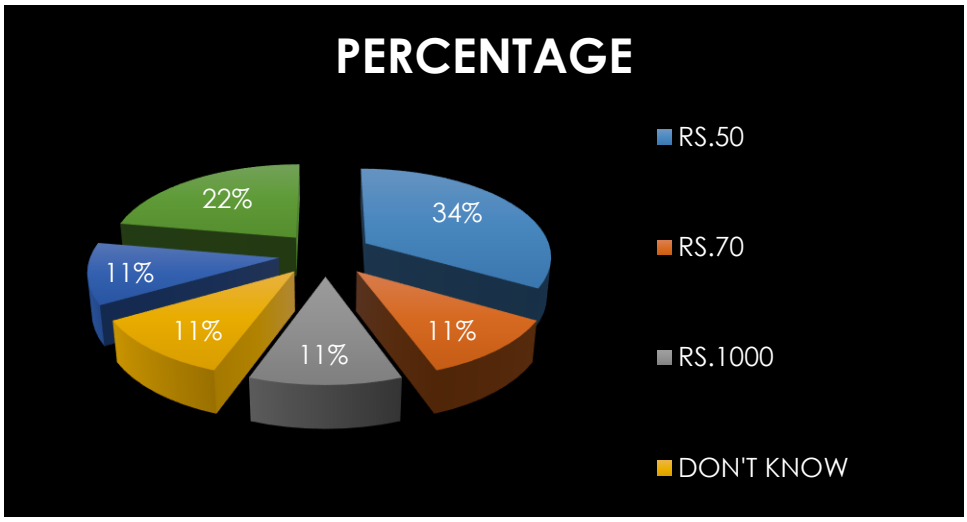
3.2.6.4. Financial Information

Regarding the service cost, 60% respondents told that they do not pay any collection charges/fee but 40% told that they pay monthly charges. The proportion of payment range is presented below.



Graph 140: Monthly Charges

It was asked if they were willing to pay more, and their responses are plotted below.

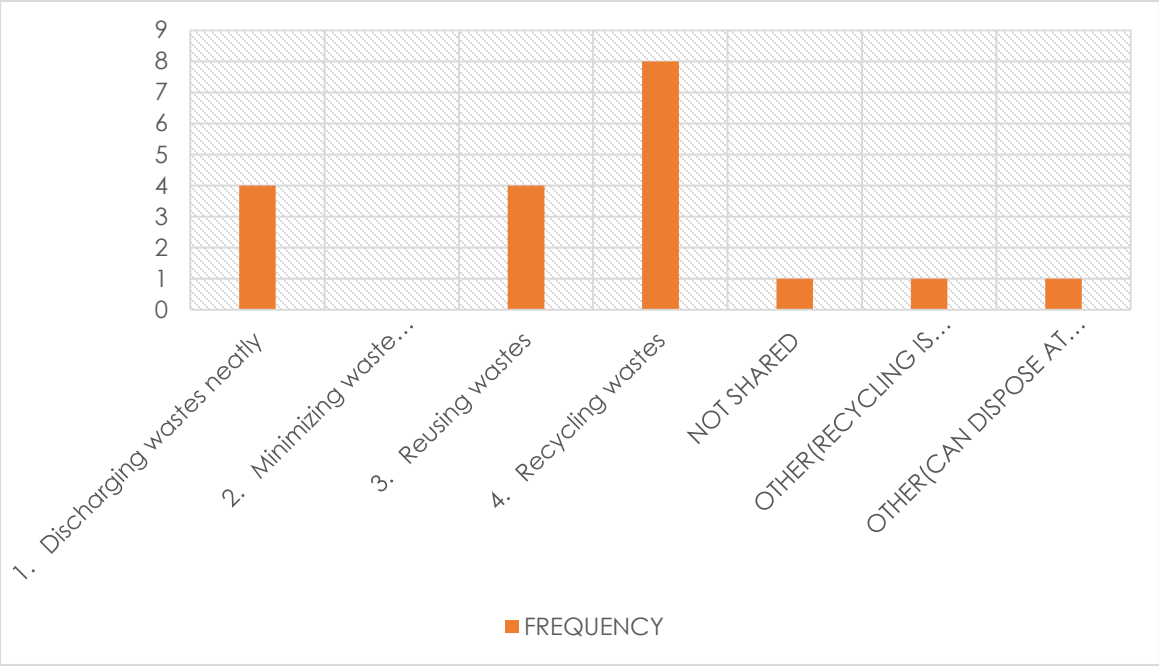


Graph 141: Willingness to Pay

3.2.6.5. Cooperation for Waste Management

Lastly their willingness to cooperate for recycling campaign was examined. They were asked if they would cooperate in storage of recyclable materials in separate boxes. Only 10% responded positively, while 50% replied negatively and remaining 40% chose not to respond. But on the other hand promoting reuse of shopping bags was widely accepted as 70% agreed to cooperate.

Moreover, 90% agreed that their market can play positively for improvement of solid waste management system. Most of them gave various proposal on how the market can cooperate. These responses are plotted on frequency chart to highlight their cooperation perception.



Graph 142: Possible Cooperation Avenues

3.2.7. Factories

Though many factories are present in Gujranwala, however, 10 were selected for the survey spread across the city.

3.2.7.1. General information

To understand about their present condition, some basic information is captured in Table below along with their production, and year of establishment. Their line of production in terms of three top products is also delineated in Table.

Table 19: Summary of Information of Factories visited for Social Survey

Name of Industry	Types of Business	No of Employees	Year of Establishment
Minhas industry	PPRC Pipes	200	2001

	Sanitary Fittings		
	-		
Anas Melamine Industry	Dinner Sets	25	1990
	-		
	-		
Mushtaq Foundry	Spare Parts of Fans	12	1987
	Motor Parts		
	-		
Popular Engineering Industries	Paper and Sugar Mill	35	1979
	Kitchen Ware		
	Hydo and Thermal Power Plant Spare Parts		
Sonex Cooking Ware	Non-Stick Utensils	500	1952
	Metal Finish		
	Anodized Utensils		
Itehad Industry	Spare Parts of fans	20	1992
	Mould Manufacturing		
	Surgical Tools		
Welcome industry	Cooking Range	60	1989
	Geysers		
	Heaters		

Indus Industry	Plastic Furniture	45	1980
	-		
	-		
Sonex Sanitary Fittings	Sanitary Fittings	700	1993
	Washroom Accessories		
	Toilet Tanks		
Prime Soaps and Chemicals Ltd.	Soaps	35	2009
	-		
	-		

Some of the pictures of surveyed industries are presented below.

Figure 18: Pictures of surveyed Factories

<table>
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Lean & Green
Private Limited Company

JICA

Location of these factories is marked in map below.

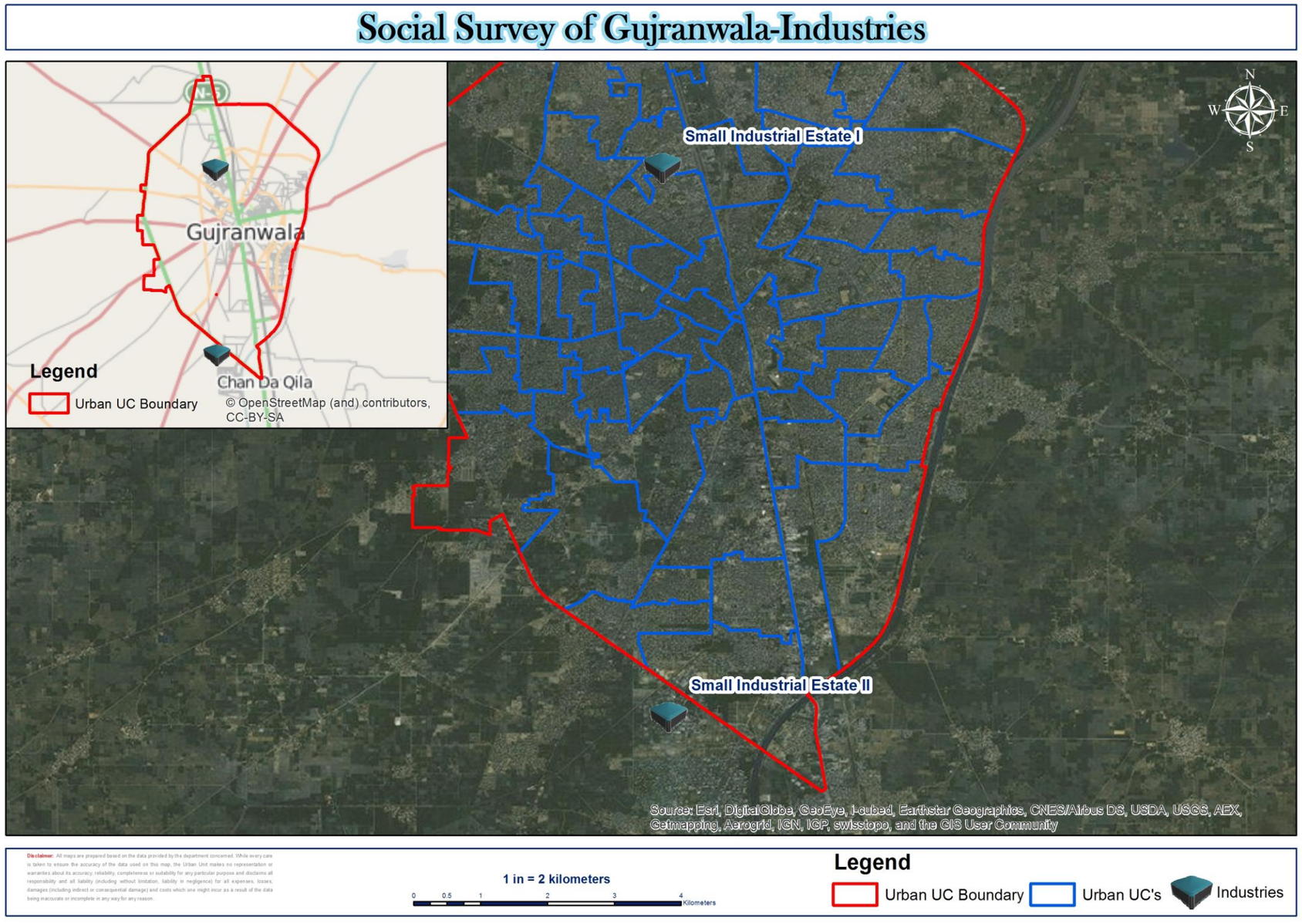
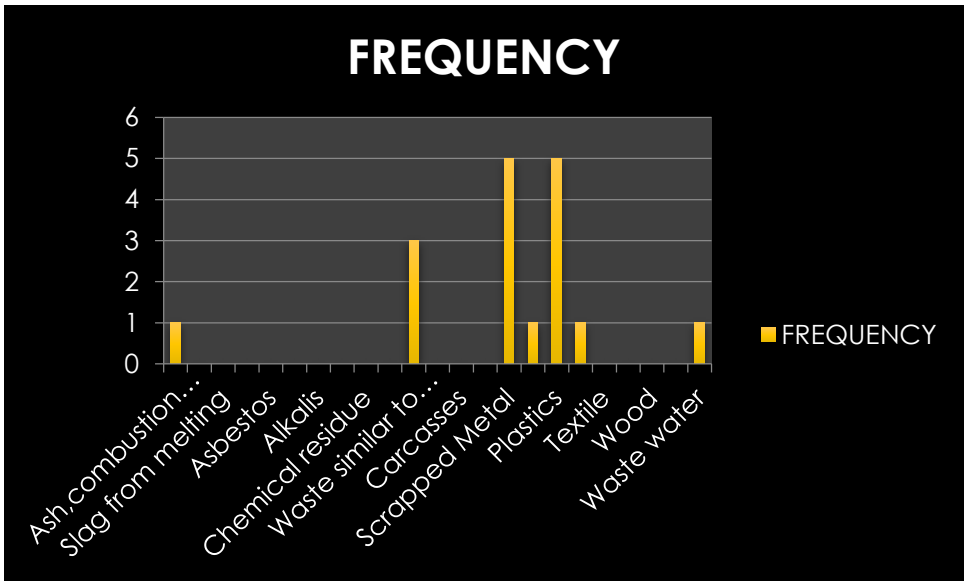


Figure 19: Location of surveyed Industries

3.2.7.2. Waste Generation and Discharge

First of all it was investigated if they could characterize the waste generated in their industrial set-up. Graph below shows their responses in percent proportion of their replies to the type of waste generated in their factories.



Graph 143: Type of Waste generated in Factories (Frequency of Responses)

Summary Table for the types of waste generated in surveyed factories is presented below.

Table 20: Type of Waste Generated in Factories

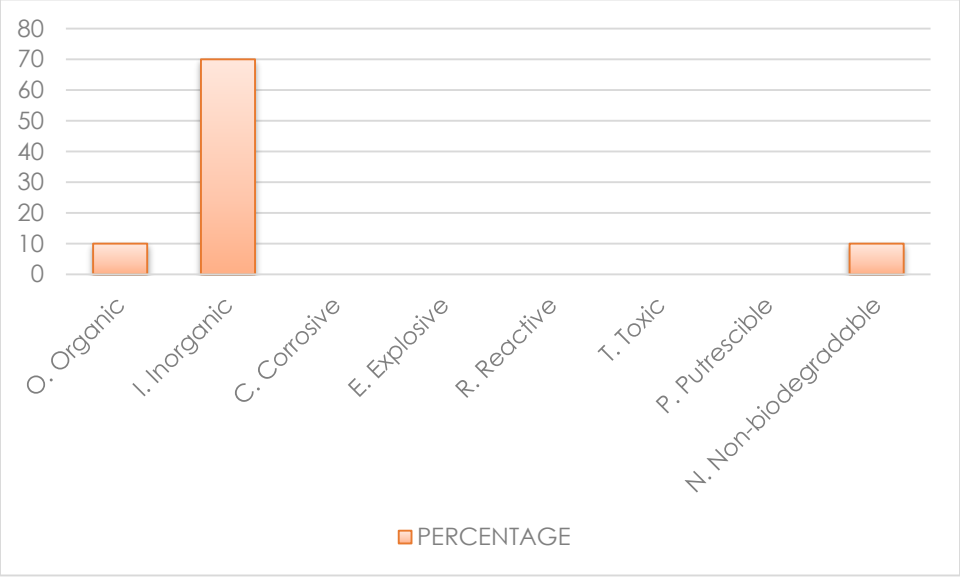
TYPE OF WASTE	FREQUENCY	PERCENTAGE
Ash, combustion residue	1	10
Waste similar to domestic waste	5	50
Metal and scrap	5	50
Paper and cardboard	2	20
Plastics	5	50

When questioned on physical state of waste generated at their factories, all of them replied that it was solid in nature. Only one industry mentioned that their production line generates both; liquid and solid waste. The nature of waste is presented in table below

Table 21: Nature of Waste produced in Factories

	NATURE			
TYPE OF WASTE	**Solid**	**Liquid**	**Semi-dry**	**Gas**
Ash, combustion residue	1	0	0	0
Waste similar to domestic waste	5	0	0	0
Metal and scrap	5	0	0	0
Paper and cardboard	2	0	0	0
Plastics	5	0	0	0
PERCENTAGE	100	0	0	0

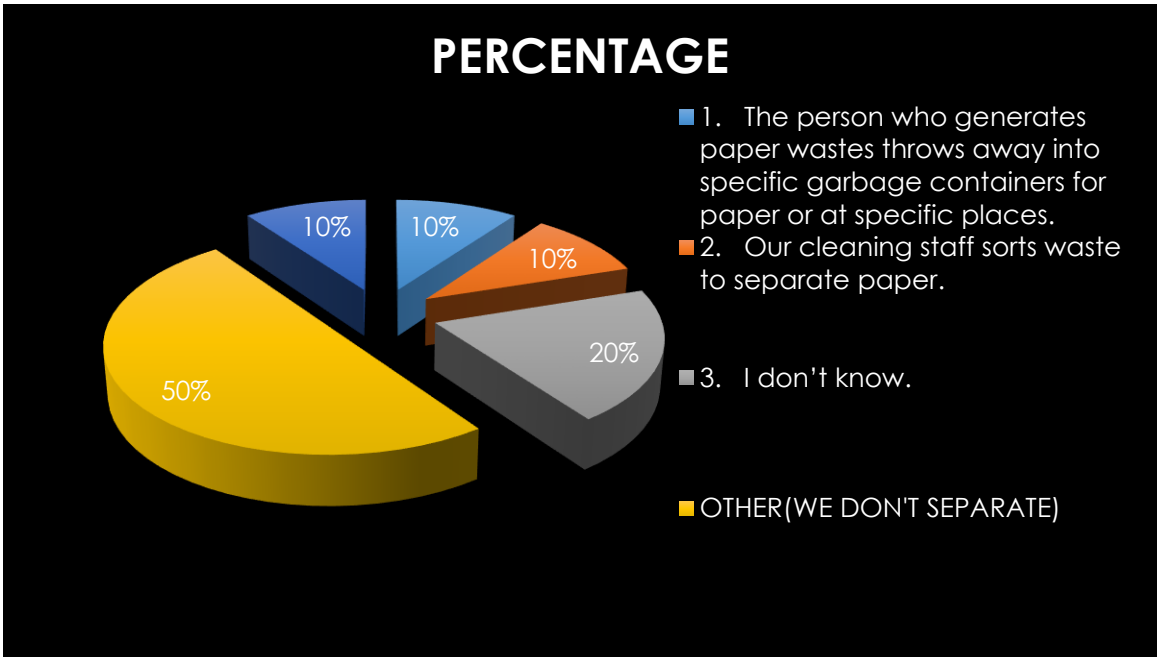
When further explored if they could define the type of solid waste being generated at their facility, 70% replied that it was inorganic in nature. Only 10 percent said it was organic while 10 percent chose not to respond.



3.2.7.3. *Waste Separation and Recycling*

The factories have supplies of paper for office and administration purpose and for any other production line requirement. It was asked if the paper was separated or not and if it was who had the responsibility within their organization. Among the surveyed factories 5 replied that they don't separate the paper. Among the remaining 5; one replied that they don't have paper waste while two respondents showed their ignorance on how it is done in their facility. One respondent said it was the responsibility of sweeping staff to take care of paper. Only one replied that it was the responsibility of the person generating the waste to throw it in specific container.

On the question related to type of paper separated, seven out of ten replied that they don't know but two respondents said that they separate cardboards only. One respondent who had mentioned earlier that there is no separation mechanism, replied the same that there is no such activity in their facility. On the question of amount of separated cardboard, one estimated that it is around 3 to 4 kg in one week while the other was unable to make any guess.



Graph 144: Paper Sorting in Factories

When they were asked about the use of separated paper, both the employees who had separation mechanism in place replied that it is sold to someone who frequently visits for the same purpose. Further it was also shared that present market rate of cardboard is Rs. 15/kg.

The same set of questions were then repeated for other recyclable components like cans, plastic bottles and others, but all were responded in negative. The series of questions were posed until two of them replied that metal other than cans were actually separated in their factories. One respondent also mentioned that they separate the garden waste.

Over all sorting activity of these factories is presented in table below.

Table 22: Material Sorting in Factories

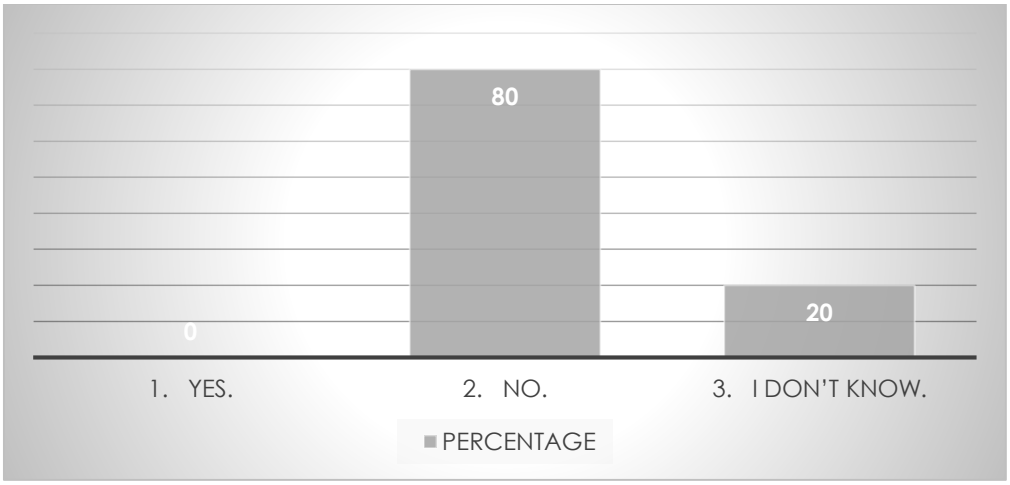
	(Partly) Separated (WHAT SPERATE?)				
TYPE OF WASTE	**COMBUSTION RESIDUE**	**METAL**	**SCRAP**	**PLASTIC**	**CARDBOARD**
Ash, combustion residue	1	0	0	0	0
Waste similar to domestic waste	0	0	0	0	0
Metal and scrap	0	3	2	1	0
Paper and cardboard	0	0	1	0	1
Plastics	0	0	0	2	0

Regarding the support for recycling, 90% of the respondents said that they supported the idea. Only 10% were not in favor of recycling. When asked why they would support recycling, among the nine who were in favor 8 replied because it had financial benefits. However, one mentioned that it saves resource. The one respondent who was not in favor of recycling, when asked about his reason of disagreement responded that it was not needed.

3.2.7.4. Waste Collection Service and Discharge Behavior

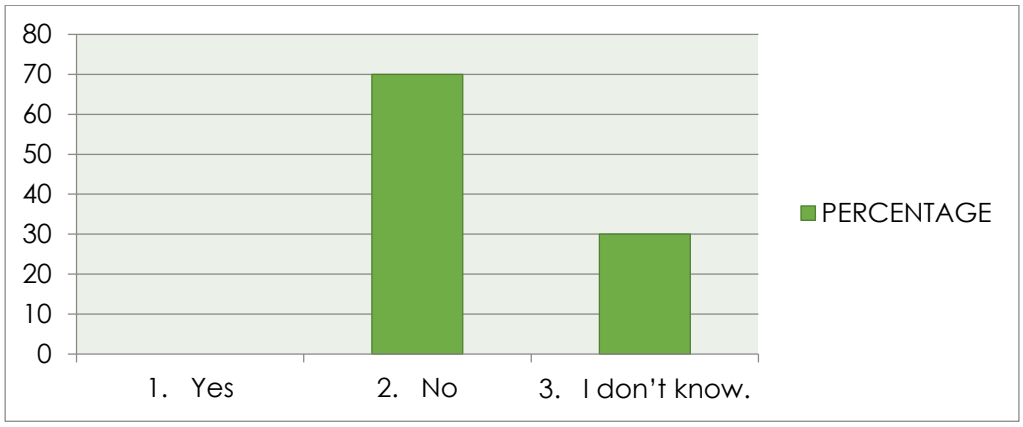
Next series of questions were related to waste collection services. 60% replied that they leave it in front of their facility and it is collected from there. Remaining 40% said that they have to bring their solid waste to a specific point from where it gets collected.

Regarding the punctuality of waste collection service, 80% were of the viewpoint that they don't come on time while 20% said they don't know about the collection schedule. It is not an encouraging pattern of service provider that industries personnel highlighted absence of service (Graph below).



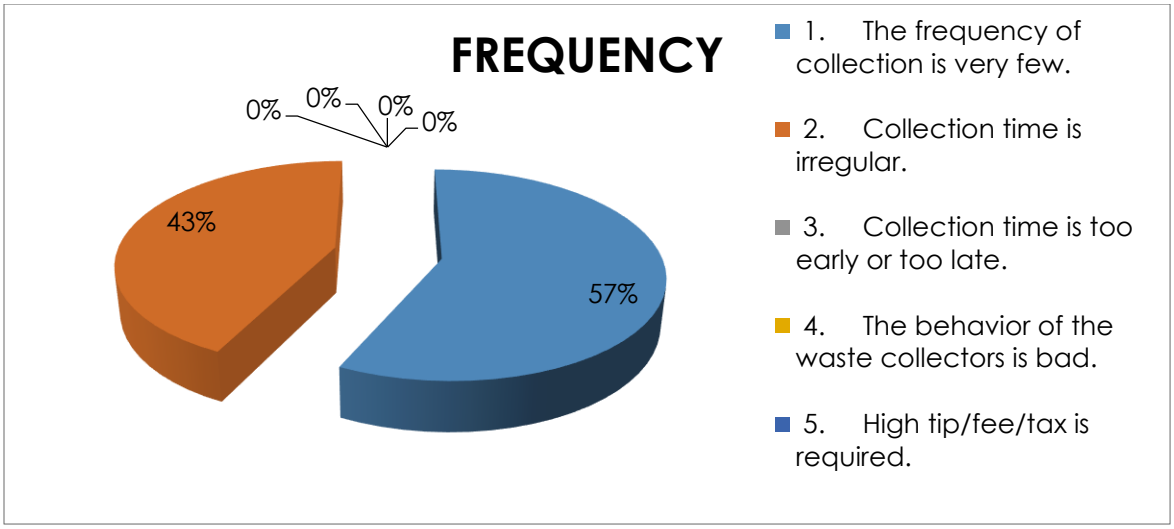
Graph 145: Regularity of Waste Collection Service

This the same reason that 70% showed no satisfaction of the waste collection services and 30% rather reported they don't know instead of giving any positive response(Graph below).



Graph 146: Satisfaction for Waste Collection Service

Reasons attributed to no satisfaction are presented in percent proportion in graph below, which shows that there are only two reasons of displeasure of the consumers belonging to industrial activity. One low frequency of collection and the other is lack of schedule on the service provider's end (Graph below).



Graph 147: Reasons of No Satisfaction

When it was asked who was collecting waste, answer to industrial waste was that 60% percent replied it was done by private company while 40% said it is not collected by any type of service provider. Likewise regarding domestic waste 60% informed that it was collected by government department (GWMC), however, 40% again said they have no such service.

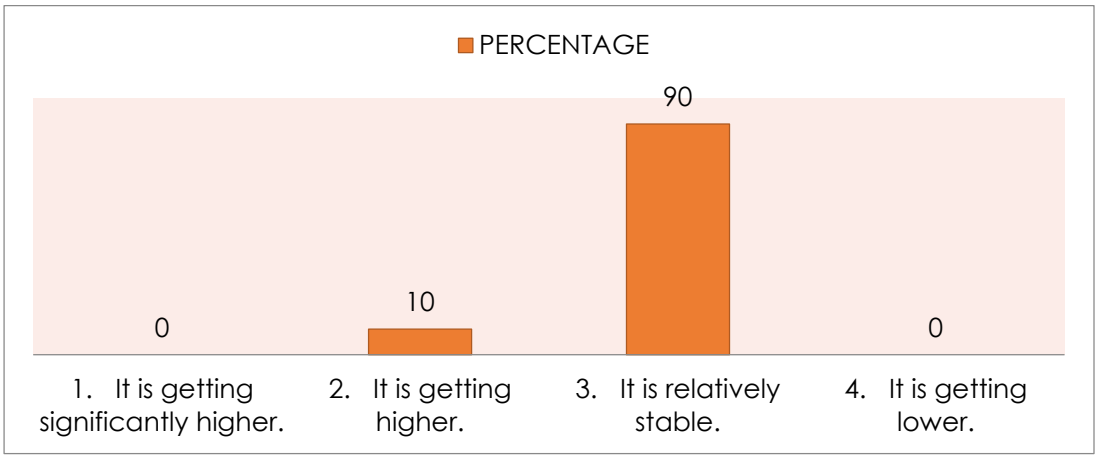
3.2.7.5. Financial Information

Industries who are provided with the waste collection service, were then asked how much they pay for these services. 67% informed that they don't pay anything. 17% said they pay on weight basis (Rs. 40/kg) and 17% told that they pay monthly fee of Rs. 400. Further their willingness to pay was investigated. It was asked if market price of waste collection was increased how much they are willing to pay. 17% of those already availing the service replied that they are not willing to pay. 17% agreed to pay Rs. 200/month and Rs. 400/month. It is interesting to note that almost 505 were willing to pay Rs. 500/month if the

service charges were increased. 100% of the responded told that currently they are not giving any tip to the waste collection crew.

The respondents who were not availing the waste collection service, when asked if they needed the service for industrial waste; 67% replied they did not need the service as no service gives them the liberty of throwing the waste on their own choice. 33% said they don't generate enough quantity of waste to be included in the waste collection served facilities. The same group respondents was asked if they would like to have waste collection service for the domestic waste. 25% replied they would like to have the service but 75% did not want these services for their domestic waste either. In continuation of service provision, their willingness to pay was also investigated. The only respondent was asked if he would pay for these services, to which he stated their facility can pay up to Rs. 200/ month.

On question related to cost of waste management, in general, respondents were asked could they explain the trend of cost in waste management service. 90% replied that the cost of service was relatively stable but 10% were of the opinion that it is increasing (Graph).

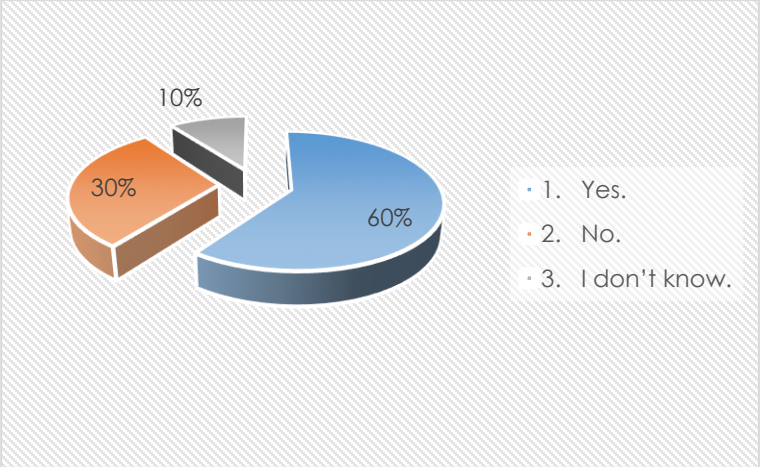


Graph 148: Trend of Cost for Waste Collection Service

3.2.7.6. Cooperation for Waste Management

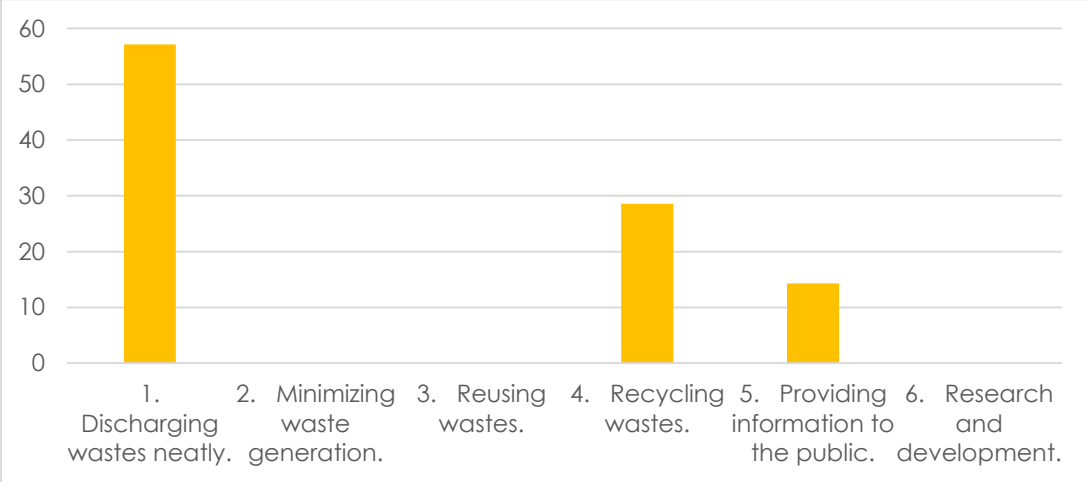
In a series of questions, the willingness of the respondents to cooperate for better waste management services was judged. All the respondents from each industrial set was asked if their factory would cooperate in efforts taken by GWMC. 60% agreed that they can make

efforts, 30% replied they cannot while 10% said they don't know if their factory can take the initiative or not.



Graph 149: Willingness to Cooperate

Among the 60% who were willing to cooperate, next question was explored to gauge what sort of activity they can undertake. The graph shows that 57% agreed they can through away their waste in a more proper manner, whereas 29% agreed that they could recycle waste. 14 percent stated that they could be part of the communication campaign.

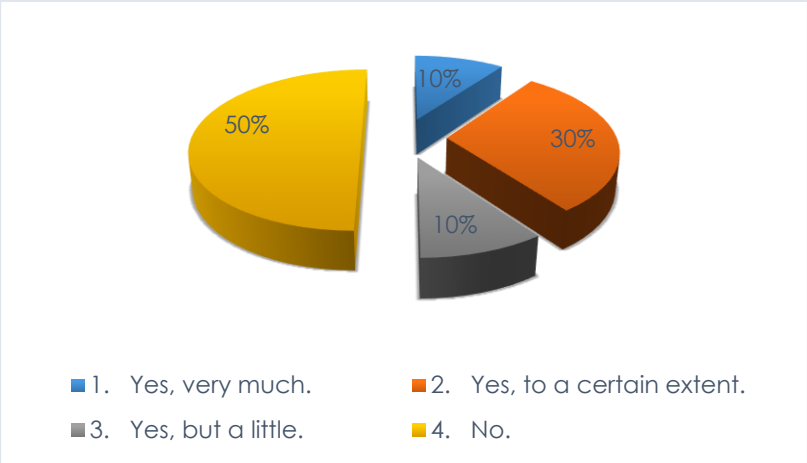


Graph 150: Avenues of Cooperation

The overall priority setting of the factories was also analyses in the questionnaire. The respondents were asked how much they give priority to the waste management. 30% replied that they give it high priority, 50% opined on medium scale priority but 20% accepted that waste management issue was a low priority for their factory (Graph).

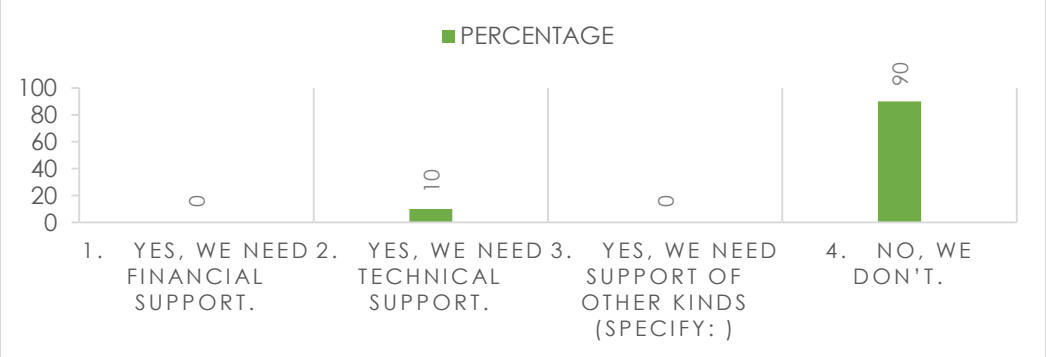
Graph 151: Priority of Waste Management Services

Their perception of any benefits associated with better waste management system was examined through asked them a simple question that did they think better system can bring them some benefit. The replies were mix of positive and negative responses. 50% altogether negated if a better system can bring them benefit, however, respondent in percent proportion of 10 stated yes a little bit. At the same time it is encouraging that 10% strongly believed in better system bringing them good and 30% thought it would be beneficial to some extent at least (graph below).



Graph 152: Responses to "Is Solid Waste Management System Beneficial?"

Lastly they were asked if they felt the need of support from government departments of GWMC, 90% replied that they don't need any kind of support. Only 10% agreed that they would require technical support from the organization dealing in solid waste management system (graph below).



Graph 153: Need Assessment for Waste Management

3.2.8. Hospitals

3 hospitals were agreed in the terms of reference for the social survey of Gujranwala. Spread across the city wider range of medical facilities were surveyed and larger number of patients visiting the hospitals was tried to be covered. Basic information on solid waste management in these hospitals in described in following sections.

3.2.8.1. General Information

Table below summarizes general information related to the hospitals surveyed.

Table 23: General Information of Surveyed Hospital

Name	No. of Employees	Type of Institution	No of Beds	Occupancy (per day)
Jinnah Memorial Hospital	105	Private	120	25 – 30
Siddique Sadiq hospital	145	Private	200	10
DHQ Hospital	1200	Public	455	300

Location of surveyed hospitals is shown in map below.

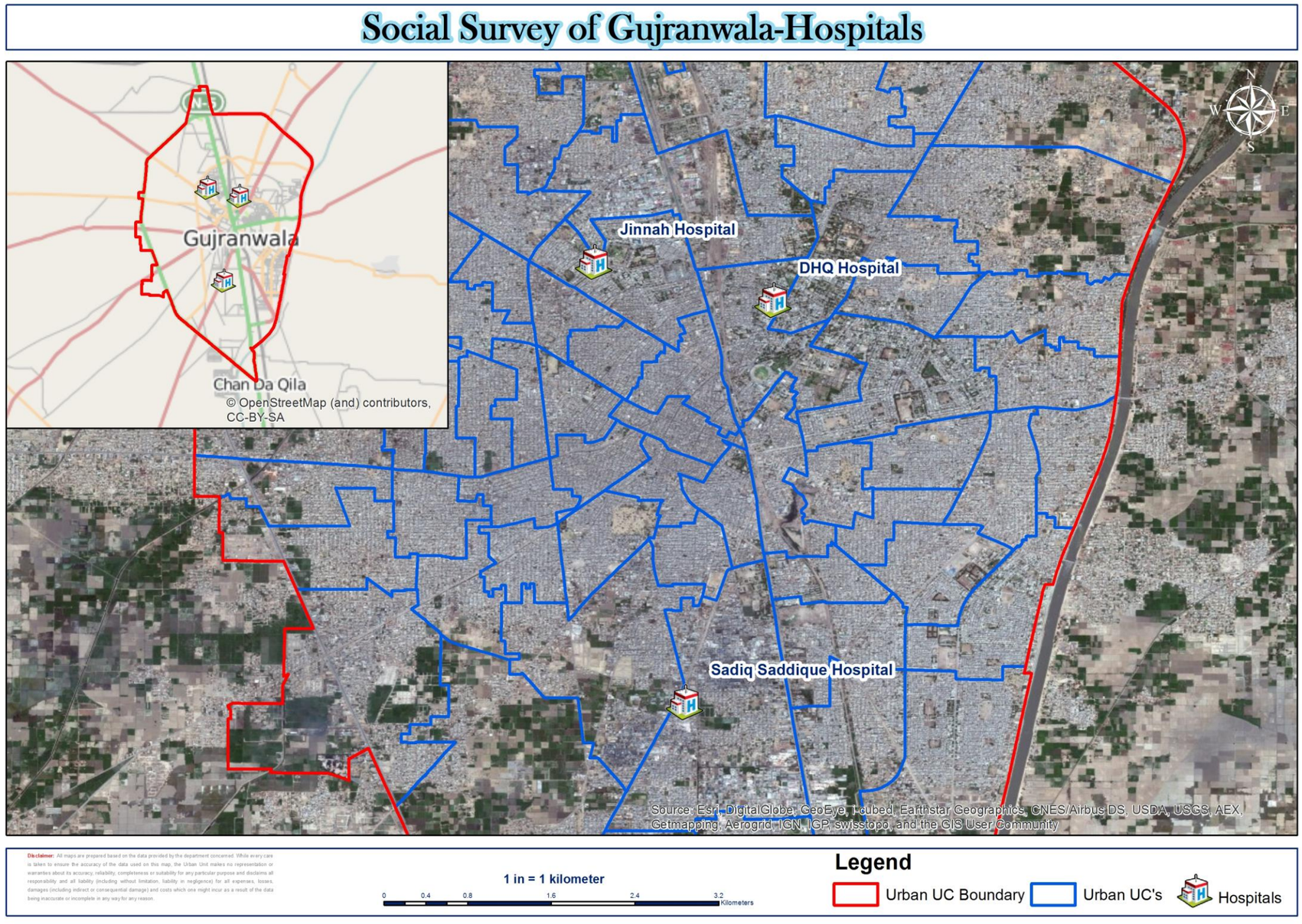


Figure 20: Location of surveyed Hospitals

Figure 21: Pictures of Hospitals Surveyed in Gujranwala

First of all they were inquired about storage of medical and general waste. All the three entities told that they store both waste types separately.

However, when asked what sorts they separate, only one respondent agreed to storing blood and infectious waste separately. All three hospitals, though store sharps and needles separately but not hazardous waste or radioactive waste.

3.2.8.2. Waste Collection System and Recycling

For the in-house collection all hospital respondents told that they have separate color coded bins for storage of wastes. And they all told that they use plastic bags for storage of medical waste and containers for sharps and needles. But only one hospital uses containers for pathological waste, or even have a cold storage. One of the hospitals informed that they had separate collection of pathological waste while the other two had none.

For the collection of hazardous waste, one respondent told they have a collection mechanism but the other two stated that they keep them in their original packing.

The encouraging activity regarding the collection stream is that all the hospitals have one or more central points within the hospitals for waste collection. The collection points are actually store rooms but the point to worry is that it is never disinfected. Only DHQ Hospital

has an access to store room for vehicles from where waste is loaded, for the other two waste is carried and loaded manually.

One of the hospitals do not have separate storage of hazardous waste. The other two where separate storage is available also have drainage linked to the area. Moreover, they told that their hospital does not generate radioactive waste.

One thing that all the respondents agreed to was that though their hospital is performing satisfactorily as for internal functioning, however, it poses risks for the external environment.

On question related to glass bottles; all respondents said that they do not generate bottle waste. For cans two of the three said they do not generate can waste, one told that what they generate is thrown with other wastes. He further responded that they don't separate as there is no need to do so but he agreed to engage in separation activity if required.

For paper two of the institution were reported to throw it with other waste and third showed his ignorance on what happens to it. Similarly no other separation activity was replied positively for cardboard, newspaper or other sorts. When asked why they do not separate papers, two of the respondents replied there was no need for it. But like separation of bottles, they agreed to separate paper if required.

For green waste segregation, one of the respondents told they throw it with other wastes, one replied they do not generate it while the last informed that it is stored with other wastes.

For recycling all three respondents mentioned that PET is segregated and sold to waste collectors separately. However, kitchen waste or not none of the institution treats its wastes.

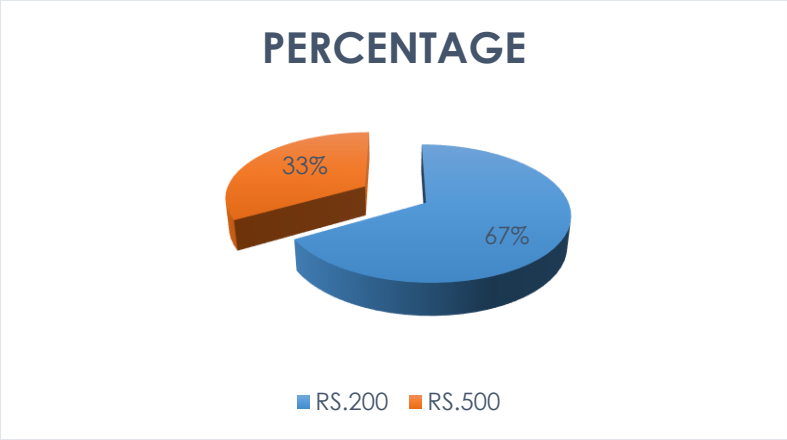
For general waste, all respondents told they generate organic waste and garden waste.

All were satisfied with waste collection services. They further told that hospital waste was collected by private companies and general waste was collected by none.

3.2.8.3. Waste Collection and Discharge

The series of questions started from access to waste collection service. All the respondent told that they have private company who collects hospital waste but they don't have any service when it comes to general waste.

So it was asked if they would like to have service for general waste, to which 100% of the respondent replied positively. Their acceptable limit for fees is presented below.



Graph 154: Willingness to Pay (Rs. per month)

3.2.8.4. Financial Information

When asked about the fees hospitals are paying for various components of waste generated in their entity, they were not able to give numbers for each component. However, they were able to quote lump sum amount of Rs. 79,200, Rs. 20,000 and Rs. 75,000 for 120 beds, 200 beds and 455 bed hospital respectively.

When asked if waste collection charges are increased, how much they could afford to pay, two respondents did not reply. The only one respondent who already is paying Rs. 20,000 mentioned that they could raise to Rs. 25,000.

3.2.8.5. Cooperation for Waste Management

When the respondents from hospitals were asked if they could cooperate with GWMC, all of them responded positively.

They were also asked how much priority they give to waste collection, their response was high priority. When asked if they thought they needed support in waste management, they all replied they need both, financial and technical support.

One last point which is worth mentioning here is that when they were told that coping with wastes requires efforts of not only the city and GWMC but also the general public. Did they think there is something their institution could do for good waste management; they simply said no. This must be highlighted in design of awareness campaigns that the hospitals should be sensitized on what they can do for better waste management.

4. Conclusion of Survey

This survey, may be first of its kind in the city, has provided some very important set of information which may help the solid waste management team design a plan while keeping in mind the expectations of the populace.

Based on the social survey, some of the conclusions can be reached as summarized below;

I. Waste collection services are generally available in all parts of Gujranwala, however, collection efficiency needs improvement.
II. Awareness about solid waste management is increasing, however, this awareness is quite partial in nature. There is a dire need to start and continue awareness programs for people of all age groups and from all walks of life.
III. Recycling, though not generally done directly either by households or other stakeholders, does exist partially. Servants/maids in household, particularly in the high- and middle income groups, employees in the lower cadre of organizations and/or cleaning staff of commercial establishments sort out most of the resalable items from other waste. The rest of easily recyclable waste, whose market exists, is generally collected by informal sector of scavengers.
IV. People are generally reluctant to share their revenues and/or expenses.
V. Responses to willingness to pay were mixed. Some are ready to pay against better door-to-door waste collection services. Others are somewhat reluctant.