

Survey of Household Solid Waste Generation and Public Awareness on Waste Separation and Compositing Practices in Cebu City

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Compiled and Edited By

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This survey on household solid waste generation and composition in Cebu City was carried out as part of the Community-Based Solid Waste Management System Development Project in Cebu City.

1. Introduction

1.1 About this survey

This survey on household solid waste generation and composition in Cebu City was carried out as part of the Community-Based Solid Waste Management System Development Project (2010-2013) implemented by Cebu City with the technical cooperation of the Kitakyushu International Techno-Cooperative Association (KITA) and the Institute for Global Environmental Strategies (IGES) under the funding assistance from the Japan Fund for Global Environment (JFGE). The project aims to establish a model for community-based solid waste reduction system through a corporation among key stakeholders, including citizens, NGOs and local government, by introducing the practice of composting for organic waste management, the segregation of recyclable, and awareness building and environmental education for citizens at the Barangay level.

For these purposes, the survey focused on the following key aspects:

- To get an idea of the amount of waste produced by an average household
- To get an idea of the average composition of household waste, and
- In addition, members of these households were also asked a few questions, pertaining to their usual behaviour and their knowledge and attitudes towards solid waste management.

The report is structured as follows:

- Section 1 gives some background information about the current situation regarding solid waste management in Cebu City, and the basic laws and regulations governing the various aspects of the solid waste in the city.
- Section 2 presents the main results of the household survey carried out in the eight pilot Barangays.
- Section 3 summarizes the important points raised in the preceding sections and recommendations are made to consider in planning and implementation of the community-based solid waste management system development projects in Cebu City.

1.2 Methodology and Limitations

In order to obtain general information on organizational and practical aspects of solid waste management in Cebu city, interviews were conducted by the relevant government officials in both city office and Barangays. Interviews were both formal and informal using open-ended guide questions followed by relevant probing queries. Additional documents on solid waste management in Cebu City were also collected and reviewed for obtaining secondary data.

Waste production and composition at household level was measured by household survey carried out in eight pilot Barangays in Cebu City in September 2010. A sample of 118 households was randomly selected from these pilot Barangays after consultation with both city officials and Barangay officials. The Table 1 gives the basic information about the pilot Barangays.

Table 1: A List of Pilot Barangays

Name of Barangay	Land Area (ha)	Total Population in 2000	Number of Households	Sample Households randomly selected for the study
Capital Site	53.75	12,477	2,670	15
Ermita	20.42	7,995	1,677	20
Kamputhaw	135.63	17,867	3,621	13
Mabolo	153.18	27,498	5,754	10
Mambaling	61.76	26,417	5,377	10
Quiot	101.46	13,342	2,732	19
Sawang Calero	22.32	7,077	1,404	20
Tinago	24.40	8,190	1,724	11

Source: City Planning and Development Office, Cebu City, 2007. Compiled by Premakumara, 2011

A team of university students was hired to carry out the household survey and they were trained about the questionnaire, survey methodology and the measurement before dispatched to their respective Barangays. A senior staff of the Cebu City Environment and Natural Resources Office (CCENRO) was responsible for overall supervision of the field survey. (The Name of research team in Annex 1)

The selected households were educated about the survey, its main objectives and asked their cooperation before starting the field survey. Each household was then informed to separate their waste into organic and non-organic at source and collect them separately into two polythene bags.

The separated waste at household was collected in daily-basis for one week, making a total of seven collection trips. The contents of the bags of waste for each household were sorted again where needed and weighed per material type. The total amount of waste collected per household for each collection round was also measured, to determine the cumulative error in weighing the separate waste components. It was then recorded for calculation. (See Annex 2 and 3 for survey results). The material types were classified according to the following categories:

- Organic materials, including food remains, leaves, etc.
- Paper, including cardboard
- Plastics, including laminates and other compound products containing plastic
- Metals
- Others, including glass, bottles

There were some limitations to the survey. Though a larger sample would give more useful results, the study had to limit to the small household sample due to time and resource constraints. The variations in compression and the rather crude method used for volume measurements make the accuracy and degree of representation of this volume-figures somehow questionable. Note also that the weight of the garbage measured is the fresh weight. The dry weight or water content of the waste fractions was not considered. Further, the scales used for measuring the weight were also not really suited for this type of survey. Even though, they were calibrated trade scales, they were not guaranteed to be fully linear below 500 g.

2. Solid Waste Management in Cebu City

2.1. Introduction of Cebu City



Figure 1: Location of Cebu City in Cebu Province.
Source: www.google.co.uk (go-package.com)

Cebu city is one of the historical cities in the central part of the Philippines. It was a small fishing village and trading port in 1521. In 1575, Cebu City was developed as a first Spanish Colony called Villa del Santisimo Nombre de Jesus. In 1937, it was recognized as the first modern city in the Philippines and gradually grown into a highly urbanized metropolitan area where it still functions as the second largest growth centre in the country, next to Manila. [1]

The economic activities in the city are dominated by the trade and service sectors due to its strategic location in the Visayas region and the air and sea transport. According to the statistics, the service sector activities constitute 73 percent of the economy of the city, far greater than the industry (20

percent) and agriculture (7 percent) sectors. Direct foreign trade comprised 30 percent of the entire Visayas and is equivalent to 52 percent of the entire trade of Mindanao. Further, the city also controlled 70 percent foreign ship arrivals and 90 percent passenger movements in the province of Cebu. [2][3]

Table 2: Comparative Total Population and Annual Growth Rate Metro Cebu, Province and the Philippines

	Total Population in 2000	Population Density per Sq. Km in 2000	Annual Growth Rate, 1995-2000 (%)
Cebu City	718,821	2,204	1.77
Metro Cebu	1,693,881	1,990	2.26
Province	2,377,588	603	3.07
Philippines	76,498,735	229	2.36

Source: City Planning and Development Office, Cebu City, 2007

Cebu City is an island that has a total land area of 326.10 sq.km. Among them 20 percent is designated as urban areas, while the balance 80 percent is rural areas. As of the 2000 census, the total population of Cebu City was 718,821 people and 137,864 households, which was equivalent to 42 percent of the total population of the Metro Cebu and 30 percent of the entire

population of the province. The population density of the city was 2,204 persons per sq. km, which was also much higher than the average density of 1,990 persons per sq. km in the Metro Cebu and 603 persons per sq. km in the whole province. [1] However, it was evident that population growth rate in Cebu City is on a declining trend. The Table 2 shows that an annual growth rate of 1.77 percent from 1995 to 2000 is the lowest among the other cities and towns in Metro Cebu during this period.

The city is governed by the city council elected by the citizens and empowered within its jurisdiction to ensure the protection of public health and the environment through the adoption and formulation of best environmental practices in ecological waste management and the institutionalisation of the public and private partnership in the development and implementation of integrated and ecological solid waste management programmes. [4] The city council is headed by the City Mayor and under him, all other departments and offices as required to be established under the Local Government Code to implement its plans or priority programmes and projects. For the effective governance of the city services, the functions are decentralized into the Barangays, a lowest level of local government administration body. The Cebu City has divided into 80 Barangays and among them 50 Barangays is belonged to Urban Barangays and the balance 30 is Rural Barangays. [1]

2.2. Current State of Solid Waste in Cebu City

A highly urbanized Cebu City is faced with an increasing rate of waste generation. As of 2001, the total waste generated in the city was 511 tons per day with an estimated 0.71 kg per person per day. Based on an annual 2 percent growth rate for residential waste and 4 percent growth rate for non-residential waste, the city government estimated that by 2010, the total volume of garbage raised up to 755 tons per day. (See Table 3) However, there is no accurate data on the present waste generation in the city.

Table 3: Forecast of Solid Waste Generation in Cebu City, 2001-2010

Year	Total Waste Generated (ton/day)	Residential (ton/day)	Nonresidential (ton/day)
2001	511	292	219
2002	533	302	231
2003	557	313	244
2004	582	324	258
2005	608	336	272
2006	635	348	287
2007	663	360	303
2008	692	372	320
2009	723	385	338
2010	755	399	356

Source: Villarete, (no date), Cebu City

The total waste collection ratio in Cebu City is estimated at 80 percent and 57 percent of which are residential waste and the balance 33 percent is non-residential wastes. It was evident that urban Barangays are far more effective than the rural Barangays in the collection of waste from its residents. In many rural Barangays, common disposal practices still involve open dumping, burning, burying and feeding to animals. [5] The Table 4 shows the common waste disposal methods in Metro Cebu, before the enforcement of provisions in RA 9003 and local ordinances.

Table 4: Common Waste Disposal Methods in Metro Cebu, 2000

Method of Waste Disposal	Household	
	Total Number	Percentage (%)
All Methods	676,401	100
Pickup by garbage trucks	212,652	31.5
Dumping	71,192	10.5
Burning	331,762	49.1
Composting	16,891	2.5
Burying	16,891	2.5
Feeding to animals	11,929	1.8
Others	4,272	0.6

Source: UNEP, 2009

Table 5 estimated that the composition of municipal solid waste of Cebu City as follows: 50 percent of organic waste, 16 percent of plastic, 16 percent of paper, 4 percent of metal and 14 percent of others.

Table 5: Physical Composition of Waste in Cebu City, 2011

Physical Composition	Percentage
Organic waste	50%
Plastic	16%
Paper	16%
Metal	4%
Others	14%

Source: Rey, 2011

The city's waste collection system operates 24 hours in three shifts. Waste is collected mainly by city-owned garbage trucks complemented by Barangay-owned garbage trucks. Currently, the city government has 29 units of garbage compactor and open dump trucks consisting 8 brands from 3 different countries (Japan, Korea and Sweden). [6] However, it was identified that only 18 trucks are in the proper condition for operation, while the rest of the others are out of work. The city garbage truck fleet is complemented by those owned by the Barangays, which estimate about 87. [4]



Figure 2: Uncollected waste dumped in canal and open spaces.
Photo: Premakumara, 2010

The city government uses three types of collection methods to ensure efficient waste collection in the city. The bell collection method is used in areas that are inaccessible to trucks. The kerbside collection method is normally used in areas where commercial establishments are located. The communal container collection method issued for schools, public markets and public terminals. However, it was evident that there is heaps of

uncollected garbage in the roadsides.

The collected waste then transported to the City's landfill site in Barangay Inayawan. It was designed and financed by the Japanese International Cooperation Agency (JICA) and started to operate in 1998 as the only active sanitary landfill site in the Philippines for receiving 400 tons of waste daily for 6-7 years. [5] However, it is operating still as an open dump serving all 80 Barangays in Cebu City.

The landfill was built based on the semi-aerobic design. Landfill gas was vented through a series of horizontal and vertical pipes. However, the leachate treatment pond serves only as an impounding basin, which discharges partially treated leachate in the surrounding area,



Figure 3: The Cebu City's Landfill Site in Inayawan.
Photo: Premakumara, 2010



Figure 4: Abandoned Leachate Treatment Pond in the Landfill Site. Photo: Premakumara, 2010

causing the adjacent communities to complain. Also located inside the Inayawan landfill compound is the PhilBio biogas reactor for the sewage and leachate. Due to technical difficulties, the reactor project has been shelved. Further, a large scale incinerator built was not used when the Clean Air Act was enacted by the national government. [5]

2.3. Policy and Institutional Framework for Solid Waste Management in Cebu City

Since the enactment of the Republic Act (RA) 9003 or the Philippines Ecological Solid Waste Management Act of 2000, the Cebu city Government has taken some initiatives to implement it at Barangays level. Cebu City formed the City Solid Waste Management Board (CSWMB) in 2003 aiming to submit and implement a plan for the safe and sanitary management of solid waste generated in the city limit. It is headed by the Mayor and mandated to perform the following functions. [4]

- Prepare, submit and implement local ten-year SWM plans and develop specific mechanisms and guidelines for its implementation
- Review plan every 2 years and monitor its implementation
- Adopt revenue generating measures to promote support
- Provide necessary logistical and operational support
- Coordinate efforts of its component Barangays
- Manage the collection and disposal of residual and special wastes
- Encourage setting up of multi-purpose Environmental Cooperatives

The CSWMB has already drafted a Solid Waste Management Framework for Cebu City in 2005 with the technical assistance of Fort Collins, Colorado, USA, which is the resource city of Cebu under the Resource Cities Programme of the International City/County Management Association. The framework is comprised of the city's practical visions, strategies, and action plan for the next 10 years (2005-2015).

In the brief for the Kitakyushu Initiative Network, Cebu City identified the following actions in the Solid Waste Management Framework. [3]

- Institutional capability building through various training programmes
- Public information and awareness by involving NGOs
- Waste segregation at source
- Improvement in the practices of waste separation and recycling at disposal
- Management of medical waste by the private sector and industrial waste management with the involvement of Chambers of Commerce
- Promotion of composting and recycling with the help of agricultural department
- Energy conservation and construction of biogas digester
- Efficient garbage collection system by acquiring new equipment and vehicles

The Department of Public Services (DPS) is responsible for solid waste management and disposal, street cleaning, street lighting, potable water supply, and the repair and maintenance of garbage trucks in the city. Further, Cebu Environmental Sanitation Enforcement Team (CESET) was established recently for mobilizing the participation of communities in waste separation through enforcing environmental laws. Incorporated into this, the city government also used the mechanism of fees, penalties and fines to encourage the observance of RA 9003 and its enabling city ordinances.

Under the Section 7 of the RA 9003, each Barangay is required to establish the Barangay Solid Waste Management Committee (BSWMC) for the following functions and responsibilities. [5]

- Formulate of the solid waste management programme consistent with the city municipality plan
- Segregation and collection of biodegradable, compostable, reusable wastes
- Establish materials recovery facility
- Allocate Barangay funds and look for outside sources of funds
- Organizes core coordinators
- Submit monthly report to the city

However, a study conducted by the law students of the University of Cebu found that only Barangay Luz had fully complied with the provisions of RA 9003. [7] Most of other Barangays fell short in establishing Material Recovery Facility (MRF) and promotion of composting for organic waste reduction. This has forced the city authority to ban the un-segregated waste transporting to Inayawan landfill by the Barangays since 1 of April 2011. As Mayor Michael Rama said the idea is to have garbage sorted out into biodegradable matter that can be composted in the Barangays and non-biodegradable materials that can be recycled, with the remaining residual waste taken to the Inayawan landfill. [8]

3. Results of Household Survey

3.1 Waste production

Amounts

As Figure 5 shows the average household waste generation have significant variation between pilot Barangays and also within a single Barangay. This can be happened due to the following reasons, such as samples are quite small and the number of factors governing waste production among households can be enormous, the phenomenon of selective collection can also be a source of error and variation that is not accounted for, people may not always throw all of their waste into the provided bags, causing a lower production to be measured, and possibly also a shift in composition and a lack of understanding the purpose of the survey might cause them to sometime include waste from other sources as well, thereby increasing the amounts measured.

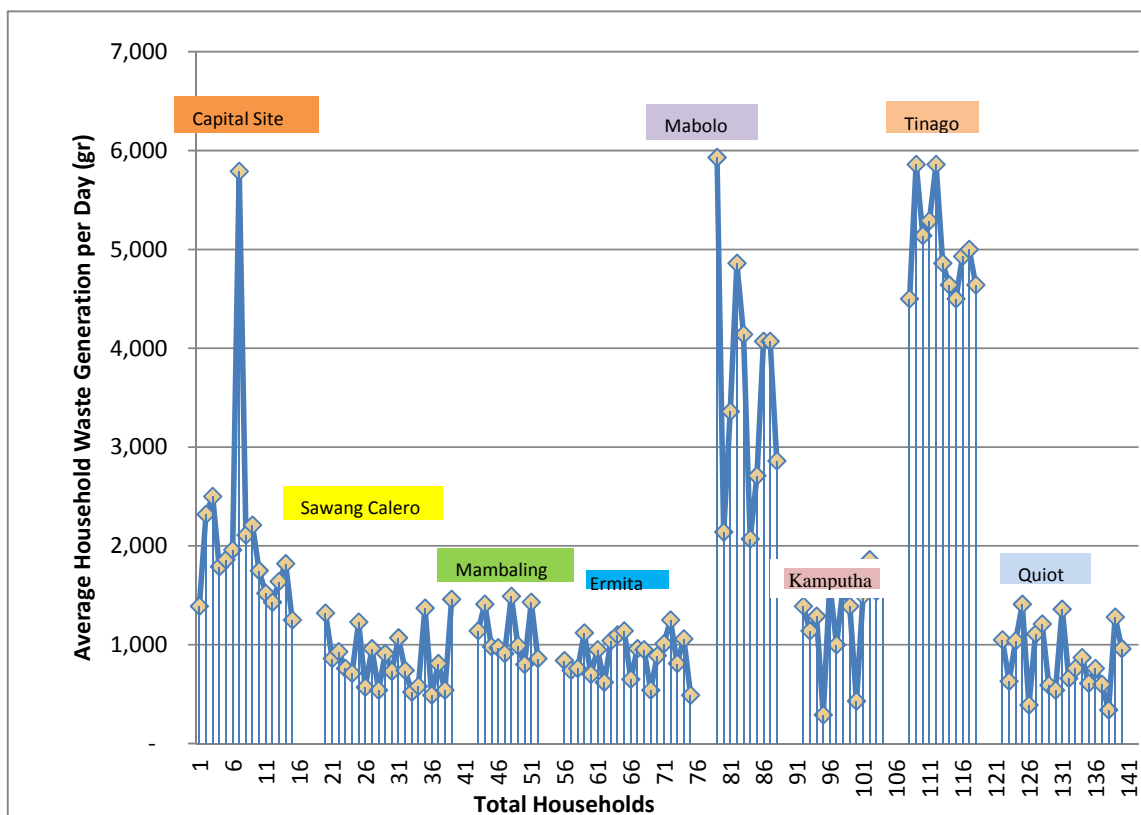


Figure 2: Average Household Waste Generation per Day per gr. Source: Compiled by Premakumara, 2011

Though the variation makes it difficult to generalize the average amount of garbage produced by the households in pilot Barangays, it shows some order of magnitude of solid waste production by these households. The findings reveal that household waste generation about 750–1500 grams per household per day, depending on the sort of area in which the households are located and a number of other factors, such as income and family size. Further,

it was identified that the average waste generated by person per day is about 300-500 grams per person per day. (See Figure 6)

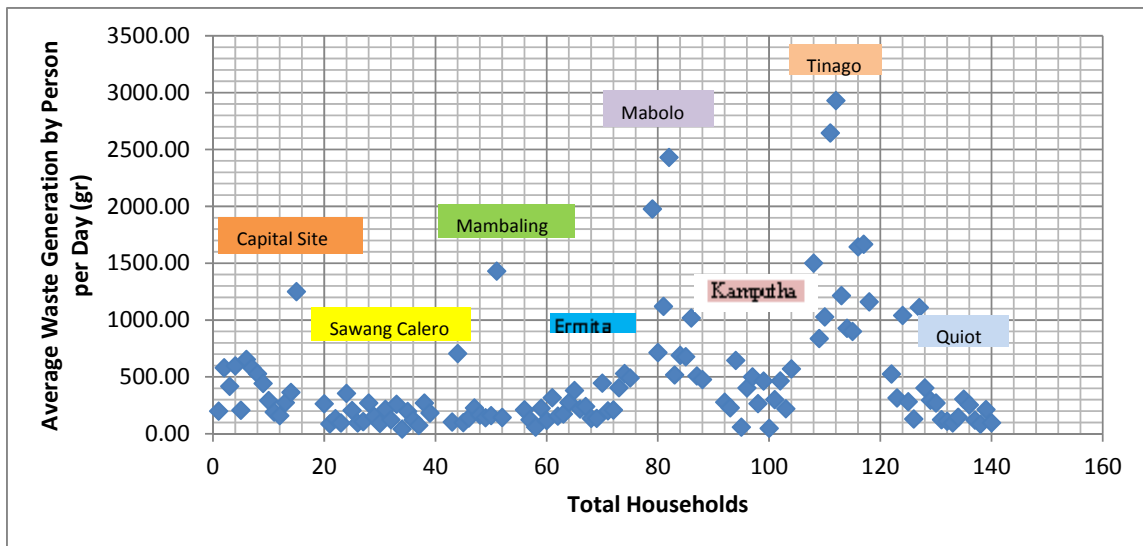


Figure 3: Average Waste Generation by Person per Day (gr). Source: Compiled by Premakumara, 2011

Composition

The Figure 7 shows that the average waste composition also came upon the same problem of high variation between the Barangays as well as the households within the Barngay, this variation seemed to be somehow less, when compared to the total waste generation amounts.

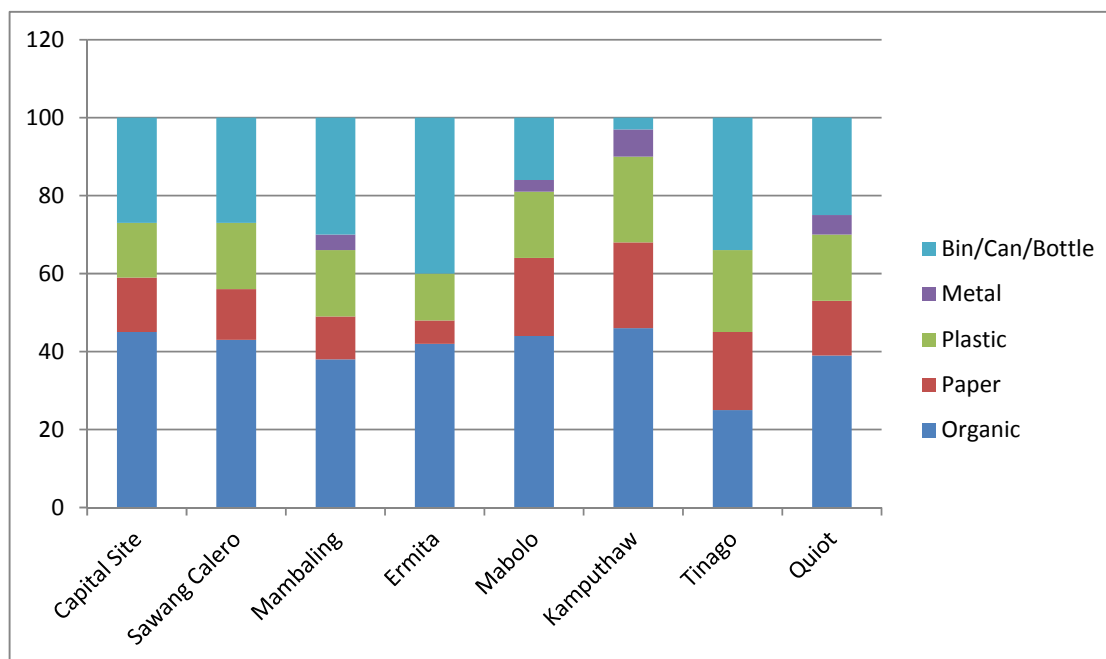


Figure 4: Average Household Composition of Waste in Pilot Barangays. Source: Compiled by Premakumara, 2011

According to the Table 6, the organic waste fraction is varied from 25 percent – 46 percent, an average of 40 percent. It consists mostly out of food remains and kitchen waste. It is often mixed with some plastic and paper, mostly wrapping materials and other types of packaging. Sometimes the organic fraction contains gardening-waste like leaves and small portion of soil.

The paper fraction is around 6 percent – 22 percent among the household waste, an average of 15 percent. It can be separated into packaging materials, newspapers and others (including other small-fractions, such as notes, documents, tissues and school books etc.).

The plastic fraction of the household is around 12 percent – 22 percent, an average of 17 percent. It consists mostly of packaging materials, which can be separated into plastic bags in one hand and factory-added packaging materials from consumer items on the other hand. It can be separated further into easily recyclable materials, such as PE, PET, PP, which seems to make up roughly half of the plastic packaging. However, it was noted that a larger portion of the easily recyclable materials is polluted with food remains and other substances, and is not always easily cleaned that make it very hard to recycle.

The metal fraction is usually made up of small items and represents an average of 3 percent of total waste generation. The other fractions are around 3 percent – 40 percent, an average of 25 percent, which mostly consists of bins, cans and mostly broken household items.

Table 6: Average household Waste Composition in Pilot Barangays

Pilot Barangay	Organic	Paper	Plastic	Metal	Others
Capital Site	45	14	14	0	27
Sawang Calero	43	13	17	0	27
Mambaling	38	11	17	4	30
Ermita	42	6	12	0	40

Mabolo	44	20	17	3	16
Kamputhaw	46	22	22	7	3
Tinago	25	20	21	0	34
Quiot	39	14	17	5	25
Average	40	15	17	3	25

Source: Compiled by Premakumara, 2011

3.2. Public Awareness and Attitude

As this study was only able to complete the questionnaires for a small number of households from a selected Barangays, the results were few and might not say very much in detailed. In order to establish the main subjects and angles for a good awareness campaign, more study would be required in the future. However, even in the little and often superficial answers we did get, some important trends can be identified.

Awareness

Table 7: Do you know what happened to your garbage after disposed?

Response	Capital Site		Sawang Calero		Mambaling		Ermita		Mabolo		Kamputhaw		Timago		Quito		Total	
Yes	11	55%	16	80%	5	50%	13	65%	3	15%	6	45%	1	9%	12	63%	67	56%
No	4	45%	4	20%	5	50%	7	35%	7	85%	7	55%	10	91%	7	37%	51	44%

Source: Compiled by Premakumara, 2011

It was common that people do not seem much aware of the possible environmental problems caused by the irregular disposal of household waste. As Table 7 shows, about 44 percent of households have never thought about what happens to their garbage after disposed.

However, it was found that many people have an idea (84 percent) about the interrelation between waste and the public health problems. Many of them are also aware about mosquitoes are involved for these illnesses through media (mostly TV) and school education. But, it is difficult to predict only from this data that how widespread and detailed this knowledge is and whether people know how to treat waste properly, so that health problems are prevented.

Table 8: Are you aware of any health issues relating to garbage?

Response	Capital Site		Sawang Calero		Mambaling		Ermita		Mabolo		Kamputhaw		Timago		Quito		Total	
Yes	13	86%	17	85%	9	90%	18	90%	6	60%	12	92%	10	90%	15	78%	10	84%
No	2	14%	3	15%	1	10%	2	10%	4	40%	1	8%	1	10%	4	22%	18	16%

Source: Compiled by Premakumara, 2011

Further, a number of questions were asked to know the awareness of households on waste recycling, composting and backyard gardening. As Table 9 summarises, about 59 percent of households are involved in selling recyclable materials to house-to-house collectors. According to them, the waste materials are not seen as garbage. These recyclable materials are seen as something that still has a good value. However, it is very common that these recyclable materials are also thrown away when it is not collected. Most people don't want to

take any trouble to store much of the material for collection or extra time to deliver it in a junk shop by themselves.

Table 9: Do you recycle things yourself?

Response	Capital Site		Sawang Calero		Mambaling		Ermita		Mabolo		Kamputhaw		Timago		Quito		Total	
Yes	10	66%	13	65%	5	50%	10	50%	4	40%	7	53%	7	63%	14	73%	70	59%
No	5	34%	7	35%	5	50%	10	50%	6	60%	6	47%	4	37%	5	27%	48	41%

Source: Compiled by Premakumara, 2011

Table 10 shows that people have very little knowledge about the composting. Even though, 24 percent of households are ensured that they have some idea about composting, this knowledge is only limited to general understanding on composting.

Table 10: Do you have any idea about composting?

Response	Capital Site		Sawang Calero		Mambaling		Ermita		Mabolo		Kamputhaw		Timago		Quito		Total	
Yes	4	26%	6	30%	3	30%	3	15%	1	10%	2	15%	3	27%	6	31%	28	24%
No	11	74%	14	70%	7	70%	17	85%	9	90%	11	85%	8	73%	13	69%	90	76%

Source: Compiled by Premakumara, 2011

It was further identified that 30 percent of households involved in backyard gardening, specially planting flowers and some fruits and vegetables for private use. Many people however, argued that the main problem in doing composting as well as gardening is lack of enough space within their household.

Table 11: Do you have involved in doing gardening?

Response	Capital Site		Sawang Calero		Mambaling		Ermita		Mabolo		Kamputhaw		Timago		Quito		Total	
Yes	5	33%	8	40%	6	60%	2	10%	2	20%	2	15%	3	27%	8	42%	36	30%
No	10	67%	12	60%	4	40%	18	90%	8	80%	11	85%	8	73%	11	58%	82	70%

Source: Compiled by Premakumara, 2011

Attitudes

According to Table 12, 59 percent of households identified that garbage is a problem for them, while for balance 41 percent garbage was not a problem. It was evident that people are only seen garbage as a problem when the regular waste collection service is not available and some practical problems are happening due to lack of space for dump or burn their waste. In the areas where people have a regular waste collection service and enough space (outside) for dumping do not see garbage as a problem.

Table 12: Do you think that garbage is a problem

Response	Capital Site		Sawang Calero		Mambaling		Ermita		Mabolo		Kamputhaw		Timago		Quito		Total	
Yes	8	53%	12	60%	9	90%	12	60%	7	70%	10	76%	5	45%	7	36%	70	59%
No	7	47%	8	40%	1	10%	8	40%	3	30%	3	24%	6	55%	12	64%	48	41%

Source: Compiled by Premakumara, 2011

Many people’s idea was that regular waste collection as the solution to solid waste management problems in their Barangays. As Table 13 shows about 52 percent of households argued that the Barangays should responsible in providing regular waste collection services to its residents. A final disposal is not really considered a problem by most people. They don’t much concern about what happens to the garbage once it is removed from their premises, which is the evidence of the NIMBY (Not In My Backyard) phenomenon in the pilot Barangays.

Table 13: Who do you think needs to make the changes for improving the solid waste management in your Barangay?

Response	Capital Site	Sawang Calero	Mambaling	Ermita	Mabolo	Kamputhaw	Timago	Quito	Total
Barangay	9 60 %	3 15%	5 50%	11 55 %	8 80%	9 69 %	11 100 %	6 31 %	62 52 %
Households	3 20 %	5 25%	3 30%	3 15 %	0 0%	4 31 %	0 0%	8 42 %	26 22 %
City Office	1 7 %	1 5%	0 0%	1 5 %	0 0%	0 0 %	0 0%	0 0 %	3 2%
All together	0	9 45%	2 20%	5 25 %	1 10%	0 0 %	0 0%	5 27 %	22 18 %
N/A	2 13 %	2 10%	0 0%	0 0 %	1 10%	0 0 %	0 0%	0 0 %	5 6%

Source: Compiled by Premakumara, 2011

Table 13 further indicates that about 22 percent of households are seen the possible role of households in improving the solid waste management services in their Barangays. However, most people see their possible role is to give the garbage to collection trucks, or put into a central garbage bin no too far from their houses, making ease the task of waste collection. Some people think however that not everyone in the Barangay would participate in such an activity and this will disappoint them too to participate. When asked household’s willingness to pay for regular waste collection services, about 92 percent said they don’t want to pay. Their argument was that waste collection is a responsibility of Barangays.

Table 14: Do you willing to pay for waste collection service?

Response	Capital Site	Sawang Calero	Mambaling	Ermita	Mabolo	Kamputhaw	Timago	Quito	Total
Yes	1 6 %	3 15 %	1 10 %	1 5 %	0 0%	1 7 %	1 9 %	5 26 %	13 11 %
No	14 94 %	17 85 %	9 90 %	19 95 %	10 100 %	12 93 %	10 91 %	14 74 %	105 89 %

Source: Compiled by Premakumara, 2011

4. Conclusions and Recommendations

4.1 Main Conclusions

Solid Waste Management in Cebu City

- Solid Waste Management is one of the serious environmental issues in Cebu City. A highly urbanized Cebu City is faced with an increasing rate of waste generation. As of 2001, the total waste generated in the city was 511 tons per day with an estimated 0.71 kg

per person per day. It was estimated that by 2010, the total volume of garbage raised up to 755 tons per day. However, there are no accurate data on the present waste generation in the city. The city has estimated that the composition of municipal solid waste as follows: 50 percent organic waste, 16 percent paper, 16 percent plastic, 4 percent metal and 14 percent others.

- The city's waste collection system operates 24 hours in three shifts using three types of waste collection methods, including bell collection, kerbside collection and communal collection. However, urban areas are often littered with garbage due to absent of sufficient waste collection services due to lack of collection vehicles, budget and manpower.
- The collected waste is transported to the central landfill site in Barangay Inayawan. Though it was designed and constructed by the JICA as a sanitary landfill site in 1998, currently operates as an open dump without any measures to control leachate, dust, odour, landfill gas or vermin resulting health and environmental problems. It can be seen that the PhilBio biogas reactor was constructed inside the Inayawan landfill compound for the sewage and leachate. However, the reactor project has been shelved, Due to technical difficulties. Further, a large scale incinerator built was not used when the Clean Air Act was enacted by the national government.
- Since the enactment of the RA 9003 or the Philippine Ecological Solid Waste Management Act of 2000, Cebu City has been spearheading its implementation in all the Barangays in the city. Cebu City established the CSWMB in 2003 aiming to submit and implement a plan for the safe and sanitary management of solid waste generated in the city limit. It has already prepared the Ten Years Solid Waste Management Framework for Cebu City in 2005 with the technical assistance of Fort Collins, Colorado, USA.
- The DPS is responsible for carrying out the solid waste management activities in the city. Further, CESET was established recently for mobilizing the participation of communities in waste separation through enforcing environmental laws. Under the Section 7 of the RA 9003, each Barangay is required to establish the BSWMC for formulating a solid waste management programme within its limit.
- The section 20 of RA 9003 mandates the local governments to divert at least 25 percent of all solid waste from final waste disposal facilities through promoting re-use, recycling, composting and other resource recovery activities by 2006 and this target had to be increased every three years thereafter. Further, it was mandated to establish a Materials Recovery Facility (MRF) in every Barangays for final sorting, segregation, composting and recycling. Only residual waste should be transferred to a sanitary landfill or a controlled dumpsite. It is also mandated to apply the user pay principle for solid waste management services.
- However, it was identified that only Barangay Luz had fully complied with the provisions of RA 9003. All the other Barangays fell short in establishing Material Recovery Facility (MRF) and promotion of composting for organic waste reduction. This has forced the city authority to ban the un-segregated waste transporting to Inayawan landfill by the Barangays since 1 of April 2011.

Waste Generation and Composition at Household Level

- Though the reliability of the figures is shown some limitations due to small sample-size, large variations and selective collection of households leading to biased results, the household survey gave some order of magnitude of solid waste production by the households.
- Waste production of the households was in the range of 750-1500 grams per household per day, depending on the sort of area in which the households are located and a number of other factors, such as income and family size. Further, it was identified that the average waste generation by person per day was roughly 300-500 grams per person per day.
- The average composition of the household waste that was measured by weight are as follows: Organic waste (40 percent), Paper (15 percent), Plastic (17 percent), Metal (3 percent), and Others (25 percent).
- The organic waste fraction makes a relatively large contribution to the total weight and it consists mostly out of food remains, kitchen waste, and some gardening-waste like leaves and small portion of soil. The paper fraction is included packaging materials, newspapers and others (including other small-fractions, such as notes, documents, tissues and school books etc.). The plastic fraction consists mostly of packaging materials, which can be separated into plastic bags and factory-added packaging materials from consumer items. A significant part of the paper and plastic fractions can be easily separated for recycling and organic fraction can be used for composting.

Public Awareness and Attitudes on Solid Waste Management

- It was common that many people do not seem aware of the potential environmental problems caused by disposal of solid waste. Waste is often seen as a problem because of practical reasons. They don't much concern about what happens to the garbage once it is removed from their premises, which is the evidence of the NIMBY (Not In My Backyard) phenomenon.
- Most people seem to know about health problems (especially mosquitoes) relating to garbage from school education and mass media.
- Some households are involved in selling recyclable materials to house-to-house collectors. The waste materials that can still be sold are not really seen as garbage. These recyclable materials are seen as something that still has some value. However, it is usually thrown away when not collected.
- Very few have an idea about composting and practice in gardening. Many people argued that the main problem for doing composting and backyard gardening is lack of enough space within their households.
- Regular waste collection by Barangays is seen by many households as a solution to the garbage problem. However, some people argued about the possible role of households, which was limited to giving the garbage to collection trucks, or put into a central garbage

bin no too far from their houses, making ease the task of waste collection. Almost all households don't want to pay extra fees for waste collection service and argued that it is a responsibility of Barangay.

4.2 Some Recommendations for Designing Local Action for Solid Waste Management in Pilot Barangays

- As mandated by the Section 32 of RA 9003, each Barangay needs to establish its own Solid Waste Management Programme, including both holistic vision with achievable targets and practical actions to setup MRF. Major operational components need to be considered in making this plan is; waste reduction and segregation at source, effective waste collection and transport, resource recovery and processing at the MRF (promotion of recycling, composting, and marketing) and information, education and communication campaign. Further, it needs to be generated through active participation of all stakeholders, including Barangay officials, residents, civil society organizations and both, formal and informal business sector.
- For the effective planning and implementation of community-based solid waste management system, it is essential to have the support of the local community. The households are the ones that have to initially sort out their waste at source, store the waste materials that are to be collected for recycling and participate in household composting activities. Therefore to ensure strong co-operation, the local people must be involved from the very beginning in setting up the system and their concerns need to be considered.
- According to the survey results, many people in the pilot Barangays do not aware of the environmental problems caused by dumping waste without proper treatment as well as about what happened to their waste after it collected by the Barangay staff. Moreover, a very few have involved in recycling activities and their basic knowledge in composting is also limited. Therefore it is very important that involving local community in the very beginning of the project planning and correctly informed them on proper sorting of waste materials, composting techniques and management of household waste in general as well as motivating them to realize that they are responsible for making society more liveable by responding to the pressing issues and concerns in their own community.
- The process of making local community aware of the solid waste management issues in their Barangay and making them responsible for taking initiatives can be done through the properly designed awareness programmes and internalization of the cleanliness precepts into the vision making. For example, Barangay Luz carried out a series of seminars and training programmes for its residents before starting its widely-acknowledged community-based solid waste management programme. [9] These seminars and training programmes were part of the larger information, education, and communication campaign (IEC) that aimed to highlight the waste problem as an urgent and serious issue in the Barangay. Further, the people are reminded of their household and community responsibilities as well as how to sort waste and make compost, and also on what not to do. This is very important but often forgotten. The instruction briefings on many projects only focus on what to do, but not on what to avoid.
- The implementation of the IEC campaign was carried out under the Sitio's of the Barangay. (Sitio is a community) A Bayanihan Center (Community Centre) was established in each 15 Sitios and elected its own set of officers, including the Chairperson,

Vice-Chairperson, Treasurer, Secretary and Bookkeeper for carrying out its tasks. During the IEC campaign, people were also informed to obey the community rules, such as segregate waste at source, cleaning individual surroundings and immediate premises, and give their garbage at the specific time of the waste collection and the penalties and fines as defined in City ordinance 1361, if not. The main enforcers of the implementation are the members of the Bayanihan Centre and volunteers of the local solid waste management board in the Brangay Luz. They are visiting the area regularly and penalize those that have been remiss in their responsibilities. This can be a fine of 300-1,000 Pesos or a render of community service for one day to one week.

- The survey findings identified that people are used to throw recyclable materials, when it is not collected regularly. They don't want to take any trouble to store much of the material for collection. Therefore, it was recommended to establish the proper waste sorting, collection and processing system, before starting the awareness rising of the new waste management system. A separated recyclable material needs to be collected in specific schedule and send back to recycling factories or junk shops or utilize for promotion of community production.
- A separated organic material can be utilized for making compost. This can be done at the household (household composting) or community level (community composting centre). However, it needs to be carefully considered some elements of composting, such as technical, financial, socio-cultural and institutional aspects prior to select a suitable approach. For example, household composting could be a very simple, easy to manage, less costly and less institutional barriers when compared to the community composting centres that required small capital cost, suitable space for shelter, management system, staff and resources. But, household composting has required a high level of interest and commitment among the members in the household, awareness of composting, space for gardening when compared to community composting centre approach. The survey findings however suggested that very few have basic knowledge of composting as well as involved in backyard gardening. Further, many people feel that composting did not fit in their living condition in closely spaced neighbourhoods.
- The people in pilot Barangays are seen waste as a practical problem rather than as an environmental problem. Most people feel that waste management is a responsibility of the Barangays and would only be willing to take action themselves if it gives sufficient benefit. This issue can be overcome by encouraging people to recycle their garbage or making compost in exchange for money. For example, Barangay Luz established the Kwarta Sa Basura Programme (KSBP) to buy the recyclable materials from the households. It was implemented by the Bayanihan Center and the Barangay Luz Homeowners Multipurpose Cooperative. The households are advised to bring their recyclable materials to the Barangay hall or any other designated centres in the Barangay every Saturday for collection. The materials that residents are brought measured and gave a price based on the market value. The total amount generated from the recyclables will be deposited as savings in the cooperative under the name of the person. Each member has a passbook and saving will be given an annual interest of 7 percent. Members can withdraw the savings anytime whenever they need it.
- The experience of Barangay Luz shows its success in generating livelihood out of trash and reducing the volume of garbage at the source. However, the low benefits of selling waste materials are mostly caused by the fact that one household does not produce much

recyclable waste, and does therefore not get much income from selling it. This problem can be avoided by incorporating the informal collection and recycling routes that already exist in the Barangay. This existing system of "informal waste collection" can then be extended to include the waste materials that are currently not (sufficiently) collected and/or recycled. When implemented correctly, this could result in benefits for everyone involved (households, collectors, resellers, recyclers).

- Similar to recyclable materials, the use of the final compost products also needs to be considered. The final products of household composting can be used for backyard gardening if enough space is available within the household. Otherwise, a system can be established as similar to the KSBP to exchange household compost for money. The final products of the community composting centre can also find a market. But, it depends on the quality, cost and other market related factors, such as awareness on organic farming and subsidies for commercial fertilizer etc. Further, compost products can be utilized for greening park and streets in the Barangay.
- The experience of Barangay Luz shows that a creating space for collective actions among community members and giving some incentives recognizing their active participation in community activities can be motivated community members, Bayanihan centres and Sitio for taking new initiatives to achieve environmentally sustainable communities. Some of these programmes are; clean and green contest for the cleanest Sitio, best recycling products from waste contest, a contest for the highest number of kilos segregated in the Sitio, Christmas décor contest using recyclable material and contest of sustainable composting centres.
- Finally, it can be concluded that a strong political will, clear strategies and commitment of staff in the Barangay are essential for the success of community-based solid waste management system. The Cebu City Government can be provided legal framework, subsidies for the establishment of MRF, technical support and awarding system for recognizing the local initiatives taken by the Barangays. NGOs or any other Civil Society Organizations can play a significant role in initiating awareness building programmes, technical and methodological advice, and assist in creating market mechanisms. While international institutions can play a number of vital roles, such as building networks among partners, providing technical and logistical advice, know-how and capacity building opportunities, and providing of development assistance mechanisms in cooperation with other programme and development agencies.

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Annex 1: Research Team

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Annex 2: Total Household Waste Collection by Types

Capital Site	H/H/members	Organic	Paper	Plastic	Metal	Others	Total (Kg)	Av.Kg/per Day	Av.g/per Day
H/H /1	7	5.25	2.25	2.25	0	0	9.75	1.39	1,390
H/H/2	4	6.5	2.5	2.25	0	5	16.25	2.32	2,320
H/H/3	6	6.5	2	2	0	7	17.5	2.5	2,500
H/H/4	3	8.25	2	2.25	0	0	12.5	1.79	1,790
H/H/5	9	9	2	2	0	0	13	1.86	1,860
H/H/6	3	5.75	1	2	0	5	13.75	1.96	1,960
H/H/7	10	10	2	2	0	26.5	40.5	5.79	5,790
H/H/8	4	6.75	2	2	0	4	14.75	2.11	2,110
H/H/9	5	7.5	2	2	0	4	15.5	2.21	2,210
H/H/10	6	6	1.25	2	0	3	12.25	1.75	1,750
H/H/11	8	5.5	3.15	2	0	0	10.65	1.52	1,520
H/H/12	9	5	2.5	2.5	0	0	10	1.43	1,430
H/H/13	6	7	2.25	2.25	0	0	11.5	1.64	1,640
H/H/14	5	5.5	2.25	2	0	3	12.75	1.82	1,820
H/H/15	1	4.25	2.25	2.25	0	0	8.75	1.25	1,250
Total, Kg		98.75	31.4	31.75	0	57.5	219.4		
%		45%	14%	14%	0%	26%	100%		
Sawang Calero									
H/H/1	5	2	3.25	2	0	2	9.25	1.32	1,320
H/H/2	10	2	0.75	1.75	0	1.5	6	0.86	860
H/H/3	7	2.25	1.75	1.25	0	1.25	6.5	0.93	930
H/H/4	8	1	0.75	0.85	0	2.75	5.35	0.76	760
H/H/5	2	2.5	0.5	1.25	0	0.75	5	0.71	710
H/H/6	6	2.85	0.75	0.5	0	4.5	8.6	1.23	1,230
H/H/7	6	1.45	0.15	1.25	0	1.15	4	0.57	570
H/H/8	9	1.85	0.5	1.25	0	3.15	6.75	0.96	960
H/H/9	2	1.25	0.75	0.5	0	1.25	3.75	0.54	540
H/H/10	6	4	0.6	0.25	0	1.5	6.35	0.91	910
H/H/11	8	3.25	0.1	0.6	0	1.15	5.1	0.73	730

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H/H/12	5	2	1.5	1.25	0	2.75	7.5	1.07	1,070
H/H/13	6	1.9	0.5	2	0	0.75	5.15	0.74	740
H/H/14	2	2.35	0.15	1.15	0	0	3.65	0.52	520
H/H/15	14	1.75	0.65	0.65	0.25	0.75	4.05	0.58	580
H/H/16	7	7.75	0.25	0.8	0	0.8	9.6	1.37	1,370
H/H/17	4	1.25	0.85	0.5	0	0.85	3.45	0.49	490
H/H/18	11	1.75	0	1.15	0	2.75	5.65	0.81	810
H/H/19	2	1.5	0.75	1.25	0	0.25	3.75	0.54	540
H/H/20	8	6.25	0.75	0.5	0	2.75	10.25	1.46	1,460
Total, Kg		50.9	15.25	20.7	0.25	32.6	119.7		
%		43%	13%	17%	0%	27%	100%		
Mambaling									
H/H/1	11	2.5	0.25	0.25	0.75	4.25	8	1.14	1,140
H/H/2	2	3.5	0.75	0.9	0	4.75	9.9	1.41	1,410
H/H/3	10	3.35	0.25	1.75	0.25	1.25	6.85	0.98	980
H/H/4	7	2.65	0.25	1.65	0	2.25	6.8	0.97	970
H/H/5	4	2.35	1	1.35	0.25	1.45	6.4	0.91	910
H/H/6	9	3.75	0.65	3.5	0.5	2	10.4	1.49	1,490
H/H/7	7	1.5	0.25	2.15	0.25	2.75	6.9	0.99	990
H/H/8	5	3	1.25	0.25	0.25	0.85	5.6	0.8	800
H/H/9	1	2.85	3	0.25	0.75	3.15	10	1.43	1,430
H/H/10	6	3.85	0.45	0.65	0.25	0.85	6.05	0.86	860
Total, Kg		29.3	8.1	12.7	3.25	23.55	76.9		
%		38%	11%	17%	4%	31%	100%		
Ermita									
H/H/1	4	2.15	0.65	0.65	0	2.45	5.9	0.84	840
H/H/2	6	1.75	0.45	0.75	0	2.25	5.2	0.74	740
H/H/3	13	1.85	0.75	0.45	0	2.25	5.3	0.76	760
H/H/4	5	4	0.25	0.35	0	3.25	7.85	1.12	1,120
H/H/5	6	1.65	0.25	1	0	2	4.9	0.7	700
H/H/6	3	4.15	0.25	1	0	1.25	6.65	0.95	950
H/H/7	4	1.65	0.5	0.45	0	1.75	4.35	0.62	620
H/H/8	6	4.15	0.25	1.15	0	1.75	7.3	1.04	1,040
H/H/9	4	1.75	0.75	0.85	0	4.35	7.7	1.1	1,100
H/H/10	3	3.65	0	0.65	0	3.65	7.95	1.14	1,140
H/H/11	3	2	0.25	0.8	0	1.5	4.55	0.65	650
H/H/12	4	2.15	0.65	0.15	0	3.75	6.7	0.96	960
H/H/13	7	1.65	0	1	0	4	6.65	0.95	950
H/H/14	4	2.65	0.25	0.65	0	0.25	3.8	0.54	540
H/H/15	2	1.5	0.15	0.85	0	3.75	6.25	0.89	890
H/H/16	5	3.25	0.5	1.35	0	2	7.1	1.01	1,010
H/H/17	6	4	0.5	0.5	0	3.75	8.75	1.25	1,250
H/H/18	2	2.75	0.85	0.85	0	1.25	5.7	0.81	810
H/H/19	2	3	0.15	0.75	0	3.5	7.4	1.06	1,060
H/H/20	1	1.75	0.1	0.8	0	0.75	3.4	0.49	490
Total, Kg		51.45	7.5	15	0	49.45	123.4		
%		42%	6%	12%	0%	40%	100%		
Mabolo									
H/H/1	3	16	7.5	9	0	9	41.5	5.93	5,930
H/H/2	3	10	2	1	2	0	15	2.14	2,140
H/H/3	3	10	4	3.5	0	6	23.5	3.36	3,360
H/H/4	2	11	6	6	1	10	34	4.86	4,860
H/H/5	8	13	6	6	0	4	29	4.14	4,140
H/H/6	3	9.5	3.5	1.5	0	0	14.5	2.07	2,070
H/H/7	4	8	3	4	4	0	19	2.71	2,710
H/H/8	4	14	7	4.5	0	3	28.5	4.07	4,070
H/H/9	8	9	8	5.5	1	5	28.5	4.07	4,070
H/H/10	6	11	3.5	1	0.5	4	20	2.86	2,860
Total, Kg		111.5	50.5	42	8.5	41	253.5		

**SURVEY OF HOUSEHOLD SOLID WASTE GENERATION AND PUBLIC AWARENESS ON
WASTE SEPARATION AND COMPOSITING PRACTICES IN CEBU CITY**

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%		44%	20%	17%	3%	16%	100%		
Kamputhaw									
H/H/1	5	6.5	1.25	2	0	0	9.75	1.39	1,390
H/H/2	5	3	2.5	2.5	0	0	8	1.14	1,140
H/H/3	2	6	1.75	1.25	0	0	9	1.29	1,290
H/H/4	5	2	0	0	0	0	2	0.29	290
H/H/5	4	6.25	2.5	2.5	0	0	11.25	1.61	1,610
H/H/6	2	2	2.5	2.5	0	0	7	1	1,000
H/H/7	6	6	2.5	2.6	0	0	11.1	1.59	1,590
H/H/8	3	2.75	2.5	2.5	2	0	9.75	1.39	1,390
H/H/9	9	0	0	0	0	3	3	0.43	430
H/H/10	5	5.5	2.5	2.5	0	0	10.5	1.5	1,500
H/H/11	4	5	2.5	2.5	3	0	13	1.86	1,860
H/H/12	7	5.75	2.5	2.5	0	0	10.75	1.54	1,540
H/H/13	3	3	2.5	2.5	4	0	12	1.71	1,710
Total, Kg		53.75	25.5	25.85	9	3	117.1		
%		46%	22%	22%	8%	3%	100%		
Tinago									
H/H/1	3	8.5	5.5	5.5	0	12	31.5	4.5	4,500
H/H/2	7	12	9	8	0	12	41	5.86	5,860
H/H/3	5	9	6.5	7.5	0	13	36	5.14	5,140
H/H/4	2	9.5	7	8.5	0	12	37	5.29	5,290
H/H/5	2	8	9	9	0	15	41	5.86	5,860
H/H/6	4	7.5	6	8.5	0	12	34	4.86	4,860
H/H/7	5	9	5	7.5	0	11	32.5	4.64	4,640
H/H/8	5	7.5	7.5	6.5	0	10	31.5	4.5	4,500
H/H/9	3	9.5	6	7	0	12	34.5	4.93	4,930
H/H/10	3	9	7	7	0	12	35	5	5,000
H/H/11	4	7.5	8	6	0	11	32.5	4.64	4,640
Total, Kg		97	76.5	81	0	132	386.5		
%		25%	20%	21%	0%	34%	100%		
Quiot									
H/H/1	2	1.15	0.8	1	0.15	4.25	7.35	1.05	1,050
H/H/2	2	1.65	0.5	1.5	0	0.75	4.4	0.63	630
H/H/3	1	2	1.5	2.5	0	1.25	7.25	1.04	1,040
H/H/4	5	6	0.75	3	0	0.15	9.9	1.41	1,410
H/H/5	3	1	1.25	0.25	0.1	0.1	2.7	0.39	390
H/H/6	1	1.3	0.6	2.3	2	1.6	7.8	1.11	1,110
H/H/7	3	4.25	1.5	0.6	0.15	2	8.5	1.21	1,210
H/H/8	2	1.8	0.3	0.2	1.1	0.75	4.15	0.59	590
H/H/9	2	1.5	0.75	0.3	0	1.25	3.8	0.54	540
H/H/10	11	6.8	0.5	1.35	0.15	0.75	9.55	1.36	1,360
H/H/11	6	0.8	0.3	0.8	0	2.75	4.65	0.66	660
H/H/12	8	3.75	1.25	0.35	0	0	5.35	0.76	760
H/H/13	6	3.5	1	0.15	0.15	1.3	6.1	0.87	870
H/H/14	2	0.5	0.75	0.5	0	2.5	4.25	0.61	610
H/H/15	3	1	1.3	0.5	0.75	1.75	5.3	0.76	760
H/H/16	5	1.5	0.15	1.3	0	1.25	4.2	0.6	600
H/H/17	4	0.75	0.5	0.15	0.15	0.8	2.35	0.34	340
H/H/18	6	3.3	0.6	1.3	0.75	3	8.95	1.28	1,280
H/H/19	10	1.6	1	1.3	0.3	2.5	6.7	0.96	960
Total, Kg		44.15	15.3	19.35	5.75	28.7	113.25		
%		39%	14%	17%	5%	25%	100%		

Annex 3: Public Awareness and Attitudes on Solid Waste Management

Q1 What do you do with your garbage? 1. Collect by Barangay, 2. Throw to open space, 3. Burn, 4. Others

Q2 Do you know what happened to your garbage after disposed? 1. Yes, 2. No

Q3 Do you recycle things yourself? 1. Yes, 2. No

Q4 Do any other people collect waste for recycling? 1. Yes, 2. No

Q5 Do you think garbage is a problem? 1. Yes, 2. No

Q6 Are you aware of any health issues relating to garbage? 1. Yes, 2. No

Q7 Do you think that there is a need to change the existing system? 1. Yes, 2. No

Q8 Who do you think needs to make these changes? 1. City office, 2. Barangay, 3. Households, 4. N/A, 5. All

Q9 Do you have any idea about composting? 1. Yes, 2. No

Q10 Do you think that you can separate waste? 1. Yes, 2. No

Q11 Do you like to start a household composting? 1. Yes, 2. No

Q12 Do you practice any gardening? 1. Yes, 2. No

Q13 Do you willing to pay for waste collection? 1. Yes, 2. No

Capital Site	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
H/H /1	1	1	1	2	2	1	1	2	2	2	1	1	2
H/H/2	1	1	1	1	2	1	1	2	1	2	1	1	2
H/H/3	2	2	2	2	1	1	1	2	2	1	2	1	2
H/H/4	1	1	2	2	1	1	1	2	1	1	1	2	2
H/H/5	2	1	2	1	2	2	2	3	2	1	1	1	2
H/H/6	2	1	1	1	1	1	1	1	2	1	2	2	1
H/H/7	1	2	1	1	1	1	2	3	1	2	2	2	2
H/H/8	1	2	1	1	2	1	2	3	2	2	2	2	2

H/H/9	1	2	2	1	2	1	1	2	2	1	2	2	2
H/H/10	2	1	1	1	2	1	2	2	1	1	1	1	2
H/H/11	2	1	1	1	1	1	1	4	2	2	2	2	2
H/H/12	1	1	1	1	1	1	1	2	2	1	2	2	2
H/H/13	2	1	1	1	1	1	1	4	2	1	2	2	2
H/H/14	1	1	1	1	2	1	1	2	2	1	2	2	2
H/H/15	1	1	2	1	1	2	1	2	2	1	2	2	2
Sawang Calero													
H/H/1	1	1	1	1	1	1	1	5	2	1	1	2	2
H/H/2	1	2	1	1	1	2	2	3	1	1	1	2	2
H/H/3	1	2	2	2	2	2	2	3	2	2	2	2	1
H/H/4	1	1	1	1	1	1	1	5	2	1	1	1	2
H/H/5	1	1	2	1	1	1	1	5	2	2	2	2	1
H/H/6	1	1	2	2	2	1	2	3	2	2	2	2	2
H/H/7	1	1	1	1	2	1	2	5	2	1	2	2	2
H/H/8	1	2	1	1	1	1	1	5	2	2	2	1	2
H/H/9	1	1	1	1	1	1	1	5	1	1	1	2	2
H/H/10	1	1	2	1	2	1	2	1	1	1	1	1	2
H/H/11	1	1	1	1	2	1	2	5	2	2	1	1	1
H/H/12	1	1	2	1	1	2	1	5	2	1	1	2	2
H/H/13	1	1	2	1	1	1	1	5	2	1	1	2	2
H/H/14	1	1	1	1	2	1	2	3	2	1	2	1	2
H/H/15	1	2	1	1	2	1	2	3	2	1	1	1	2
H/H/16	1	1	1	1	1	1	2	2	2	1	1	2	2
H/H/17	1	1	2	2	1	1	1	2	2	1	1	1	2
H/H/18	1	1	1	1	1	1	2	2	1	1	1	2	2
H/H/19	1	1	1	1	1	1	1	4	1	1	1	2	2
H/H/20	1	1	1	1	2	1	1	4	1	1	1	1	2
Mambaling													
H/H/1	1	1	1	1	1	1	2	3	2	1	1	1	2
H/H/2	1	2	1	1	1	1	1	2	2	1	2	1	2
H/H/3	1	2	1	1	1	1	1	5	1	1	1	2	1
H/H/4	1	2	2	2	1	1	1	2	1	1	1	1	2
H/H/5	1	2	2	1	1	1	1	5	2	2	1	2	2
H/H/6	1	1	2	1	1	2	1	2	2	2	2	1	2
H/H/7	1	1	2	2	2	1	2	3	1	1	2	1	2
H/H/8	1	1	1	1	1	1	1	2	2	2	2	2	2
H/H/9	1	2	1	1	1	1	1	2	2	1	2	1	2
H/H/10	1	1	2	2	1	1	2	3	2	1	2	2	2
Ermita													
H/H/1	1	1	2	1	2	1	2	5	2	1	2	2	2
H/H/2	1	2	2	1	1	1	1	2	2	1	2	2	2
H/H/3	1	1	1	1	1	1	2	5	2	1	2	2	2

H/H/4	1	1	1	1	1	1	2	2	2	1	2	2	2
H/H/5	1	1	1	1	1	1	1	5	1	1	2	2	1
H/H/6	1	1	2	2	1	1	1	2	2	2	2	2	2
H/H/7	1	1	2	2	1	1	2	2	2	2	2	2	2
H/H/8	1	1	2	1	2	1	1	5	2	1	2	1	2
H/H/9	1	1	1	1	2	1	1	5	2	1	1	2	2
H/H/10	1	1	1	1	2	1	1	2	2	1	2	2	2
H/H/11	1	2	2	2	1	1	2	3	2	2	2	2	2
H/H/12	1	2	2	2	1	1	2	3	2	2	2	2	2
H/H/13	1	2	2	1	1	1	1	3	2	1	2	2	2
H/H/14	1	2	1	1	1	1	1	2	2	1	2	2	2
H/H/15	1	2	2	1	2	2	2	2	2	1	2	2	2
H/H/16	1	1	1	1	1	1	2	2	2	1	2	2	2
H/H/17	1	1	1	1	2	2	2	2	1	1	2	2	2
H/H/18	1	2	1	1	2	1	1	2	2	1	2	2	2
H/H/19	1	1	2	1	2	1	1	2	2	1	2	2	2
H/H/20	1	1	1	1	1	1	1	1	1	1	1	1	2
Mabolo													
H/H/1	1	2	1	2	2	1	2	2	2	1	2	2	2
H/H/2	1	1	2	1	1	1	1	5	2	1	2	2	2
H/H/3	1	2	2	2	1	1	2	4	2	1	1	2	2
H/H/4	1	2	1	1	1	1	1	2	2	1	2	2	2
H/H/5	1	2	2	1	2	2	2	2	2	2	2	2	2
H/H/6	1	2	2	2	2	2	2	2	2	1	2	2	2
H/H/7	1	1	2	2	1	2	1	2	2	2	2	2	2
H/H/8	1	2	2	2	1	1	2	2	2	1	2	1	2
H/H/9	1	2	1	1	1	1	1	2	1	1	2	1	2
H/H/10	1	1	1	1	1	2	1	2	2	1	2	2	2
Kamputhaw													
H/H/1	1	2	2	1	1	1	2	3	2	1	1	2	2
H/H/2	1	1	2	2	2	2	2	3	2	1	2	2	2
H/H/3	3	2	1	1	1	1	1	3	2	1	2	2	1
H/H/4	3	1	2	1	1	1	1	2	2	1	2	2	2
H/H/5	1	2	1	1	1	1	1	2	2	1	2	2	2
H/H/6	1	2	1	2	2	1	1	2	2	1	1	2	2
H/H/7	1	2	2	1	1	1	1	3	2	1	2	2	2
H/H/8	1	2	1	1	1	1	1	2	2	1	2	2	2
H/H/9	1	1	1	1	2	1	1	2	1	1	1	1	3
H/H/10	1	2	2	2	1	1	1	2	1	1	1	1	2
H/H/11	3	1	2	1	1	1	1	2	2	1	2	2	2
H/H/12	1	1	1	1	1	1	1	2	2	1	2	2	2
H/H/13	1	1	1	1	1	1	1	2	2	1	2	2	2
Tinago													

H/H/1	1	2	2	1	1	1	2	2	2	1	2	2	2
H/H/2	1	2	1	1	2	1	2	2	2	2	2	1	2
H/H/3	1	2	1	1	2	1	2	2	2	1	2	1	2
H/H/4	1	2	1	1	2	1	2	2	2	2	2	2	2
H/H/5	1	2	1	1	1	1	1	2	1	1	2	2	2
H/H/6	1	1	1	1	1	1	2	2	2	1	1	2	2
H/H/7	1	2	2	1	2	1	2	2	2	1	2	2	2
H/H/8	1	2	2	1	1	1	2	2	1	2	1	2	1
H/H/9	1	2	2	2	2	2	2	2	2	1	2	2	2
H/H/10	1	2	1	1	1	1	1	2	1	1	2	1	2
H/H/11	1	2	1	1	2	1	2	2	2	1	2	2	2
Quiot													
H/H/1	1	2	1	1	1	1	1	5	1	1	1	1	1
H/H/2	1	1	2	1	2	1	1	2	2	2	2	1	2
H/H/3	1	1	1	1	2	1	1	3	2	1	2	2	2
H/H/4	1	1	1	1	2	1	2	2	1	1	2	2	2
H/H/5	1	1	1	1	2	1	2	2	2	1	2	2	1
H/H/6	1	1	2	1	1	2	2	2	2	1	2	2	2
H/H/7	1	2	2	1	2	1	2	2	2	1	2	2	2
H/H/8	1	2	1	1	2	2	2	2	1	1	2	2	2
H/H/9	1	2	1	1	1	1	2	3	2	1	2	1	2
H/H/10	1	1	1	1	1	1	2	3	2	1	1	2	2
H/H/11	1	1	1	1	2	1	2	3	2	1	1	2	1
H/H/12	1	2	1	1	2	1	2	3	2	1	2	1	1
H/H/13	1	1	1	1	1	1	2	3	2	1	1	1	2
H/H/14	1	2	1	1	1	1	1	5	1	1	1	2	2
H/H/15	1	1	2	1	2	1	1	5	2	1	2	1	1
H/H/16	1	1	1	1	1	2	2	3	1	1	1	1	2
H/H/17	1	2	2	2	2	2	2	3	2	2	2	1	2
H/H/18	1	1	1	1	2	1	1	5	1	1	1	2	2
H/H/19	1	1	1	1	2	1	2	5	2	1	1	2	2