



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
METRO CEBU DEVELOPMENT AND COORDINATION BOARD (MCDCCB)



THE ROADMAP STUDY FOR SUSTAINABLE URBAN DEVELOPMENT IN METRO CEBU

FINAL REPORT

SUPPORTING REPORT 1: DATABASE FORMATION

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ABBREVIATIONS

ADB	Asian Development Bank
BRT	Bus Rapid Transit
BSWM	Bureau of Soil and Water Management
CPA	Cebu Ports Authority
DENR	Department of Environment and Natural Resources
DOST	Department of Science and Technology
DP	Data Processing
DTM	Digital Terrain Model
GPS	Global Positioning System
GIS	Geographic Information Systems
GT	Garage-Terminal
HH	HouseHold
HIS	Household Interview Survey
HOV	High-Occupancy Vehicles
JICA	Japan International Cooperation Agency
JST	JICA Study Team
LGU	Local Government Unit
LiDAR	Light Detection And Ranging
LRT	Light-Rail Transit
LTRFB	Land Transportation Franchising & Regulatory Board
MARINA	Maritime Industry Authority
MCDCB	Metro Cebu Development and Coordinating Board
MCDP	Metro Cebu Development Project
MCIA	Mactan Cebu International Airport
MCIAA	Mactan Cebu International Airport Authority
MCWD	Metro Cebu Water District
MEPZ	Mactan Export Processing Zone
MGB	Mines Geosciences Bureau
NAMRIA	National Mapping and Resources Information Authority
NIPAS	National Integrated Protected Areas System
NSO	National Statistics Office
OD	Origin–Destination
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PEZA	Philippines Economic Zone Authority
PPDO	Province of Cebu Planning and Development Office
PUJ	Public Utility Jeepney
PhiGIS	Philippine GIS Data Clearinghouse
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PHP	Philippine Peso
QR	Quality Assurance
RO-RO	Roll-On Roll-Off
SL	Screen Line
SM	Shoe Mart
SRP	South Road Property
USC-WRC	University of San Carlos, Water Resource Center
VOT	Value Of Time
WTP	Willingness To Pay

1 HOUSEHOLD INTERVIEW SURVEY

1.1 Background and Objectives

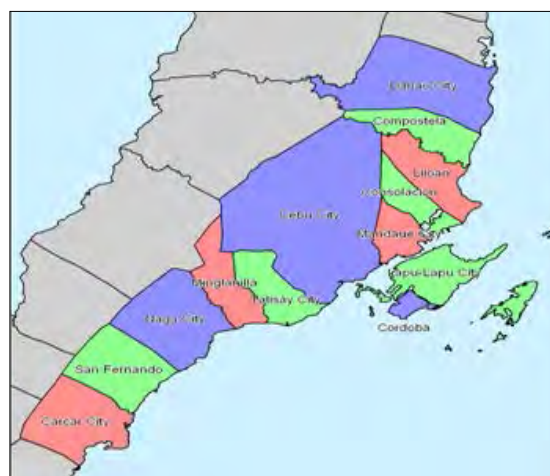
1.1 The Roadmap Study for Sustainable Urban Development in Metro Cebu (hereinafter referred to as the Roadmap Study) is a Metro Cebu Development Coordinating Board (MCDCB) undertaking with technical assistance from the Japan International Cooperation Agency (JICA). During the course of the study, huge databases from surveys were generated and compiled. One such database is the output of a large-scale Household Interview Survey (HIS) conducted for Metro Cebu from January 20 to April 9, 2014.

1.2 The objective of the HIS is mainly to collect information on the travel characteristics of the residents of Metro Cebu as well as related socio-economic data to gain a better understanding of the conditions and behavior of trip makers. The opinions of household members on development issues affecting the growth of the metropolis were also gathered as useful indicators and guide for planners and decision makers. Moreover, the HIS results provided important primary data which, together with other data gathered during the study, were analyzed to afford ample platform for the development of plans for attaining the vision of Mega Cebu 2050.

1.3 Unlike in past surveys, two survey methods were employed this time for collecting information from the Metro Cebu residents. One was the conventional direct interviews on field with target household samples normally done in many studies, while the other survey used the internet technology. The objective of the latter is to support the field survey but with an added intent of evaluating the effectiveness of this method for future similar research studies for the metropolis.

1.2 Survey Area

1.4 The survey area is composed of the seven cities (Cebu, Danao, Mandaue, Lapu-Lapu, Talisay, Naga, and Carcar) and six municipalities (Compostela, Liloan, Consolacion, Cordova, Minglanilla, and San Fernando) of the Metro Cebu area, as shown in Figure 1.2.1. Every barangay of these local government units (LGUs), including those at the different islands and highlands, were surveyed to capture the trip information from both the urban and rural areas including the far areas.



Source: JICA Study Team.

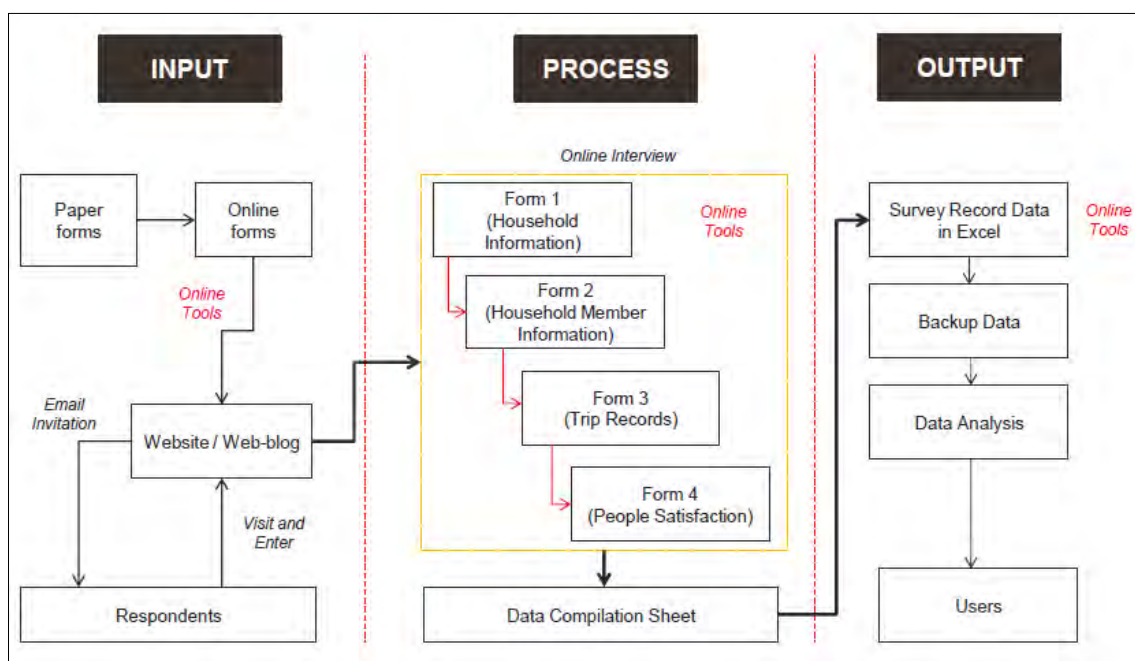
Figure 1.2.1 Survey Area

1.3 Survey Methodology

1) Online HIS

1.5 The online survey was prepared to capture data from certain circles or group of respondents who were either involved in the Roadmap Study or were already familiar with the study. This survey uses the internet link as a medium of communication between the surveyors and the respondents. Among the three popular online survey applications to choose from,¹ Google Drive was chosen for ease of use and suitability to the questionnaire format.

1.6 The framework for the survey is shown in Figure 1.3.1 below. Paper-based forms were transformed into online forms. Sending out of questionnaires was done via online invitations encouraging respondents to access the survey website.



Source: JICA Study Team.

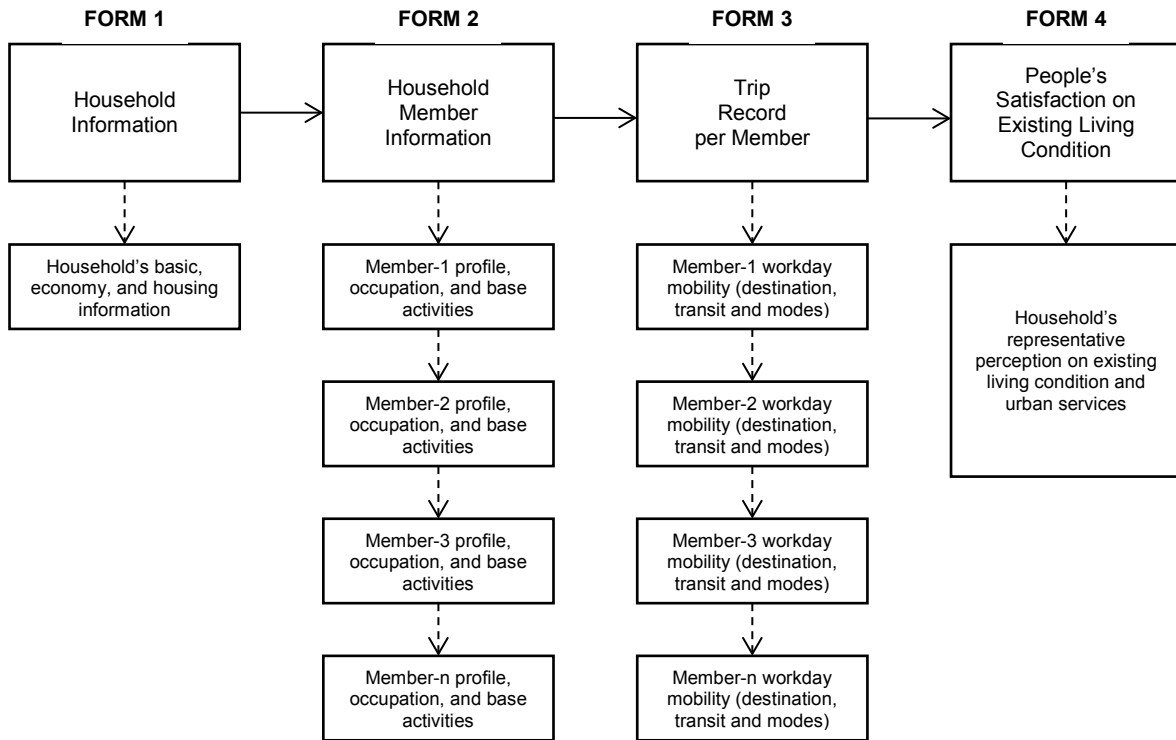
Figure 1.3.1 Online Survey Framework

1.7 There were three important activities in the preparation stage, namely: (i) preparing a master email template that connected to all survey work files, and used by surveyors for correspondences with respondents, (ii) online questionnaire forms containing questions, instructions, and other information related to survey materials (see Figure 1.3.2), and (iii) respondents sheet (summary of survey result) containing information about respondents' answers.

(1) Selection of Samples (Criteria and Number)

1.8 The online survey respondents were limited to those who were familiar and actively involved in the study. As such, their answers were considered as major stakeholders' opinions and were compared to results from the community at large. The comparison illustrated the similarities and differences of government, private, and community entities in terms of their preferences and priorities regarding Metro Cebu urban development.

¹ The three popular online survey applications considered were Google Drive, Survey Monkey and Survey Gizmo.



Source: JICA Study Team.

Figure 1.3.2 Online Survey Questionnaire Forms

1.9 Apart from study familiarity and stakeholder involvement, the other general criteria for respondent selection were as follows:

- (i) Familiar with internet operation;
- (ii) Have personal emails;
- (iii) Easy to call and communicate with;
- (iv) At least with a knowledge or general understanding about the survey activity; and
- (v) More appropriate categories: students, office workers, aged between 17–70 years old.

1.10 The total number of target respondents was 200 but the number of email invitations sent was 255 unique email addresses.

(2) Survey Implementation (Survey Trial, Sending, Interview, Monitoring, Data Receiving, Data Compilation)

1.11 The implementation stage started with a trial activity. This trial involved a small number of samples especially those with similarities to the main respondent criteria. Trial results were evaluated and all useful feedbacks were used to improve the actual online survey implementation.

1.12 The actual online survey started on March 10, 2014 and lasted till March 31, 2014 (total of 21 days). There were two ways to reach the respondents. One was by directly emailing the questionnaire forms to the respondents using a master email template, and the other by sending email to them containing some information and instructions with an automatic invitation link to the online questionnaires.

1.13 The characteristics of the questionnaire forms² are as follows:

- (a) **Form 1:** 47 questions on household information;
- (b) **Form 2:** 25 questions for each household member (maximum of 6 members);
- (c) **Form 3:** 23 questions per trip (maximum of 10 trips); and
- (d) **Form 4:** 149 questions on opinions and assessments on living conditions.

1.14 Sending out questionnaire forms can be very simple. In reality, however, sending out a large number of email destinations needs extra work. Some providers cannot send emails more than a certain amount per day (for example: google email can send 50 emails to random respondents automatically per day). To deal with this, it was suggested for the surveyors to each provide more than one email account if the target respondents were more than 50 samples.

1.15 As often happen with the online survey approach, some of the major obstacles in the survey were: (i) respondents did not understand about the survey implementation or how to fill in the questionnaire forms, (ii) respondents did not understand the questions or instructions written on the online website/email, and (iii) respondents had internet connection problems. Meanwhile, surveyors could not have a chance to meet and explain to respondents about the survey and/or any missing information.

1.16 A specific period and deadline were given to respondents for their replies. Surveyors monitored the progress and were allowed to contact respondents if they did not complete questionnaire forms within the given time. If they still did not provide answers, respondents were excluded or considered as "no answer" in the interview process.

(3) Data Compilation (Data Transfer and Checking)

1.17 When all respondents were finished accomplishing the forms and sent their answers, all data results were compiled. Data were presented in table format and then transferred into a digitized format in accordance with data results from paper forms. It was important to have similar data answer codes so the data collected from the online survey could be easily compared or even combined with the results from the direct field interview survey. In particular, final data checking was also done to ensure that the incoming data were in accordance with the questionnaire forms.

2) Field HIS

1.18 A sampling size of 1% of households based on the 2010 NSO Population Census was calculated for all barangays in Metro Cebu.

1.19 Field enumerators were assigned to randomly interview selected households in their assigned areas. All household members above 5 years old were interviewed although for those between 5 to 11 years old, the parent or guardian were allowed to answer for the younger household members.

1.20 In terms of population, the survey area had 2.5 million people (2010 NSO Census). However, taking into account the annual population increase of each LGU for years 2007 to 2010, a growth rate was applied for the years 2011 to 2014 to arrive at the 2.9 million population for 2014 (see Table 1.3.1). It is from this population base that the number of

² There were several mandatory questions that needed to be answered by respondents before they could submit their answers.

target households for sampling was determined.

Table 1.3.1 Population and Target Sampling by LGU

City / Municipality	Population			Projected Population* (2014)	Number of Households* (2014)	Target Sample Households
	2000	2007	2010			
City of Carcar	89,199	100,632	107,323	116,805	22,995	232
Cebu City (Capital)	718,821	798,809	866,171	964,313	227,348	2,280
Compostela	31,446	39,167	42,574	47,557	9,362	95
Consolacion	62,298	87,544	106,649	139,212	27,406	274
Cordova	34,032	45,066	50,353	58,402	11,497	115
Danao City	98,781	109,354	119,252	133,800	26,341	284
Lapu-Lapu City	217,019	292,530	350,467	447,151	108,013	1,083
Liloan	64,970	92,181	100,500	112,723	22,191	223
Mandaue City	259,728	318,575	331,320	348,413	86,055	860
Minglanilla	77,268	101,585	113,178	130,756	25,741	258
City of Naga	80,189	95,163	101,571	110,665	21,786	222
San Fernando	48,235	54,932	60,970	70,077	13,796	141
City of Talisay	148,110	179,359	200,772	233,454	45,959	460
Metro Cebu	1,930,096	2,314,897	2,551,100	2,913,328	648,490	6,527

Source: Population Census of 2000, 2007 and 2010 from National Statistics Office of the Philippines.

* Note: The projected population is intended solely for estimating target samples and is not recommended for planning purposes.

(1) Survey Forms

1.21 The survey forms used in the HIS are listed below and attached in the Appendix.

- (a) **Form 1 Household Information:** This questionnaire covers the socio-economic characteristics of the households, their structure, income levels, location of residence, number of years in said residence, etc.
- (b) **Form 2 Household Member Information:** This questionnaire covers the socio-economic characteristics of each household member regardless of his/her age. These include age, gender, education level, type of driver's license, occupation, work or school address, income, and vehicle ownership, if any.
- (c) **Form 3 Trip Records:** This questionnaire covers the characteristics of weekday trips focusing on Tuesday, Wednesday and Thursday trips made by each household member 5 years old and above. These include trip origin and destination, trip purpose, travel mode, transfer points as well as departure and arrival times.
- (d) **Form 4 People's Satisfaction / Perception on Existing Living Conditions and Urban Services:** This questionnaire covers public opinion on preparation for natural disasters, water supply, sewage and drainage system, electricity supply, solid waste collection, traffic congestion and public transport, and governance. Throughout this perception survey, the surveyor also explained the Mega Cebu Vision 2050 initiative (i.e., utilizing a promotional leaflet). The respondents were also asked to note their overall assessment relating to their living environment and quality of public services, as well as how they felt about the future of the Mega Cebu project and what they can do to help.

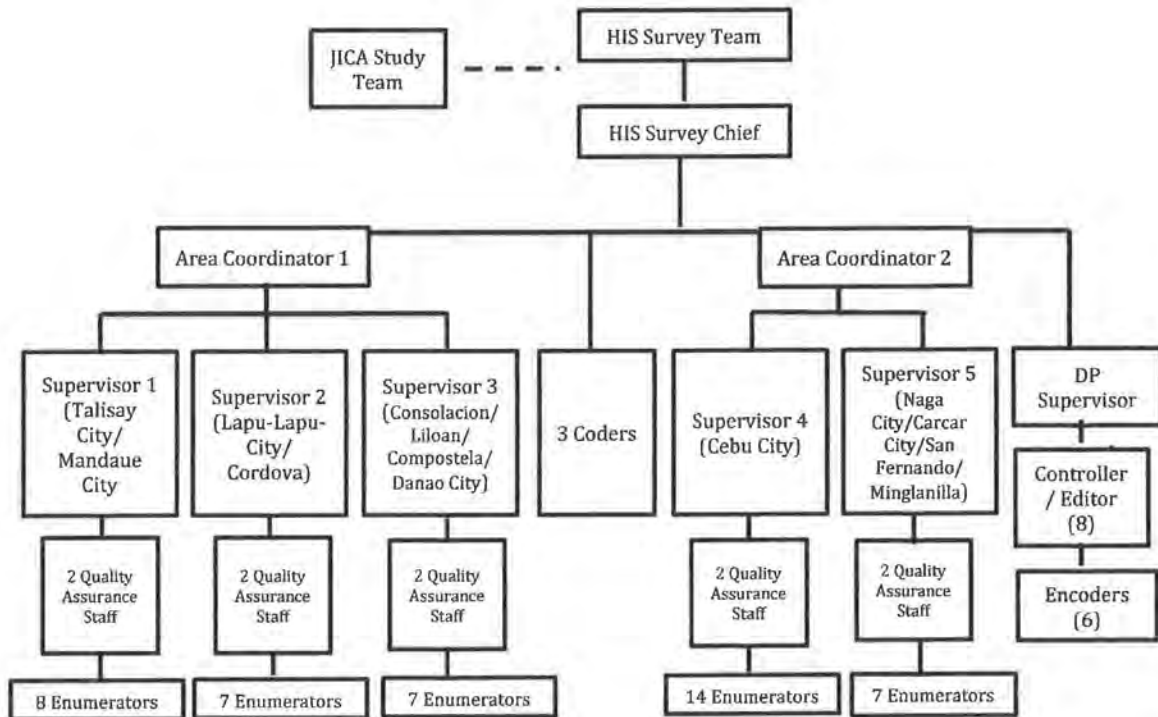
(2) Survey Staff Organization and Work Flow

1.22 A survey organization and management system was formed to ensure efficient survey activities and good outputs. The survey team consisted of the following (see Figure 1.3.3 and Figure 1.3.4):

- (a) **Survey Chief:** Prepared reports on survey activities and supervised the activities of the entire survey team in close coordination with the study team.
- (b) **Area Coordinators:** Planned and managed the entire survey schedule and coordinated survey permissions with every municipality/city mayor and every barangay captain. They directly supervised the survey teams under their responsibility, which includes performance monitoring and reporting. Coordinators also did 20% random checking of all completed sheets.
- (c) **Field Supervisors:** Prepared comprehensive survey plans and work assignment schedules for the survey teams and did coaching/mentoring to quality assurance staff and enumerators. Each supervisor was assigned at least one municipality to handle. Supervisors also did 50% random checking of all completed sheets.
- (d) **Quality Assurance (QA) Staff:** Reviewed all interviews conducted by the enumerators. Also, conducted back checking and spot-checking of enumeration and completed questionnaires to ensure validity and correctness.
- (e) **Coders:** Assigned all codes to barangays where the respondents reside, work, as well as where they start, transfer and end their trips (trip origins / trip destinations / transfer points) based on a zone code list.
- (f) **Enumerators:** Carried out actual household interviews in their assigned areas and ensured completeness and accuracy of every answer given by respondents.
- (g) **Encoders:** Inputted all completed questionnaires into an electronic database system following specific encoding process and daily quota.
- (h) **Data Processing (DP) Supervisor:** Provided technical consulting and responded to error reports, problems or queries raised by encoders. Monitored the performance of controllers/ editors and encoders to guarantee and adhere to the agreed schedule and checked the accuracy and correctness of data before passing them on to the Study Team.
- (i) **Controller/ Editor:** Conducted quality check on completeness of the transmitted sheets. Edited and checked for accuracy of information provided. Coordinated the transmittal of erroneous questionnaires to supervisors for appropriate corrections, re-asking or re-fielding. Interfaced with the survey chief to organize responsibilities and deliverables.

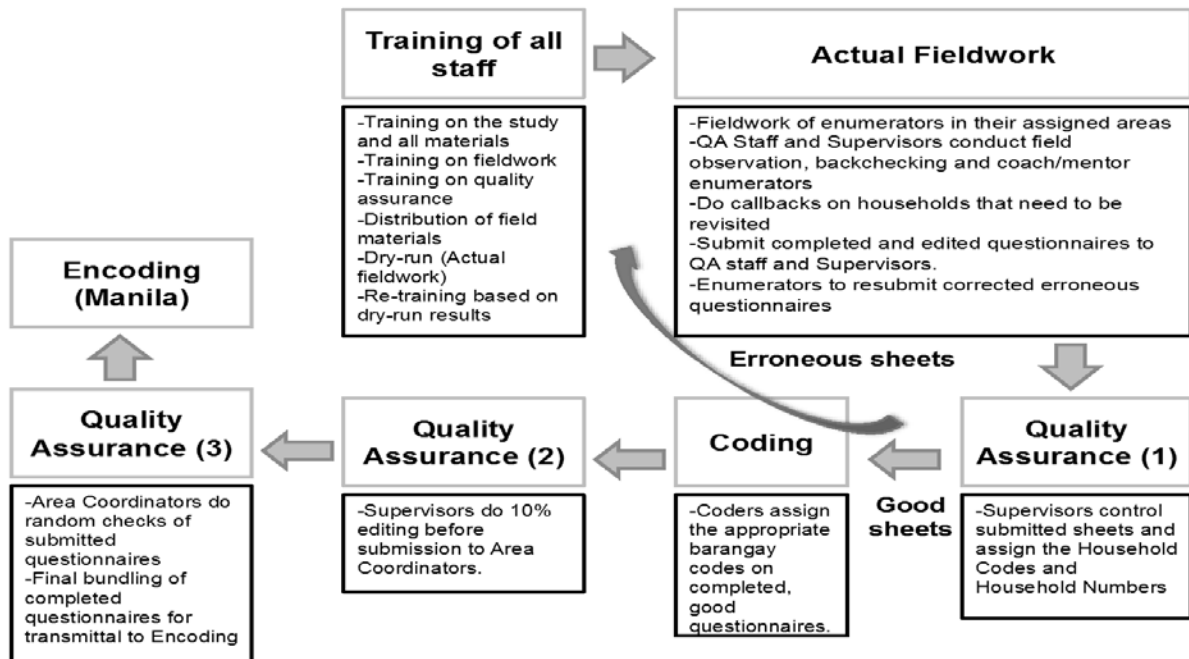
1.23 Area coordinators, supervisors, quality assurance staff, coders, and enumerators fall under the Fieldwork Group (Cebu-based) while encoders, data processing supervisors and controller/editor are under the Data Processing Group (Manila-based).

1.24 The Fieldwork Group and Data Processing Group worked together to ensure that data gathered were correct, validated, and corrected (if need be).



Source: JICA Study Team.

Figure 1.3.3 Field HIS Organization and Staffing



Source: JICA Study Team.

Figure 1.3.4 Field Process Flow

(3) Survey Schedule

1.25 Prior to training, the Survey Subcontractor established an office in Cebu City to serve as headquarters for the HIS activities.

1.26 Training was conducted for the Fieldwork Group for three days, which was followed by two days of dry runs to ensure better understanding of the survey forms

and conditions in the survey areas (see Table 1.3.2). Both days of the dry run were done in actual fieldwork, with randomly selected households: one in an urban barangay and the other in a rural type of community. The results of the dry run as well as the discussions during the three-day training were used to finalize the survey questionnaires.

Table 1.3.2 Field HIS Survey Schedule

Activity	Duration
Preparation for Training	January 20–22, 2014
Training of Fieldwork Group	January 23–25, 2014
Dry-Run/Pilot Interviews	January 26–27, 2014
Re-Training of Fieldwork Group based on results of dry run/pilot interviews	January 29, 2014
Preparation of Final Fieldwork Materials (questionnaires, Mega Cebu Vision 2050 leaflets)	January 30–February 6, 2014
Actual Fieldwork	February 7–March 24, 2014
Re-fielding and Editing	March 25–April 4, 2014
Encoding and Data Processing of Completed Questionnaires	February 18–April 9, 2014

Source: JICA Study Team.

1.4 Online Survey Results

1) Number of Respondents

1.27 The response rate for the online survey was low at 13%, with 29 respondents out of 225 mails sent. Noticeably, the response rate decreased with the subsequent questionnaire sections indicative of the waning interest of respondents to progress to the next level of questions. The number of respondents per questionnaire form is as follows:

- (a) **Form 1 Household Information:** 29 respondents
- (b) **Form 2 Household Member Information:** 27 respondents
- (c) **Form 3 Trip Information:** 24 respondents
- (d) **Form 4 Opinions and Perceptions:** 22 respondents

2) Household Information

1.28 Housing types show a fair distribution from small lots and floor areas to those staying in grand scale lots and houses (see Table 1.4.1). A high percentage of respondents (86%) own their houses and land. About 49% of the houses are below 20 years in age and 28% are older than 30 years (see Table 1.4.2). Other information pertinent to housing are given in the Appendix.

1.29 Basic services are well-provided for this group of respondents as shown in Table 1.4.3. All of the households are provided with electricity and most (97%) have piped water and their solid waste collected. Sewage service seems to be a concern, with only 66% of households connected. The same is true for fixed telephone lines but this is not alarming since country statistics on mobile phone ownership is at 100%.

1.30 These groups of respondents are naturally e-communicators with good access to computers and internet connection since it is a requirement for this survey. Reported household incomes reveal most respondents in the middle to high income strata with 24% of respondents earning PHP60,000 to 79,000 a month and 38% earning above PHP80,000.

Table 1.4.1 House and Lot Area

Area (sq.m.)	Lot		House	
	No.	%	No.	%
100-below	8	27.6	13	44.8
101-200	9	31.0	6	20.7
201-500	5	17.2	3	10.3
501-1000	4	13.8	3	10.3
above 1000	2	6.9	2	6.9
No Answer	1	3.4	2	6.9
Total	29	100.0	29	100.0

Source: JICA Study Team -- Online Survey.

Table 1.4.2 Age of Structure and Length of Stay

No. of Years	Age of House		Years of Stay	
	No.	%	No.	%
10 below	6	20.7	8	27.6
11-20	8	27.6	7	24.1
20-30	7	24.1	4	13.8
above 30	8	27.6	9	31.0
No Answer	0	-	1	3.4
Total	29	100.0	29	100.0

Source: JICA Study Team -- Online Survey.

Table 1.4.3 Provision of Basic Urban Services

Basic Urban Services	Households with Provision (%)
Connection to sewage service	66
Connection to electricity service	100
Connection to piped water	97
Connection to fixed telephone	66
Solid waste collection services	97
Internet connection	86

Source: JICA Study Team -- Online Survey.

Table 1.4.4 Vulnerability to Disasters

Highly Vulnerable to	Households (%)
Flooding	9
Typhoon	14
Landslide	5
Fire	24
Earthquake	23

Source: JICA Study Team -- Online Survey.

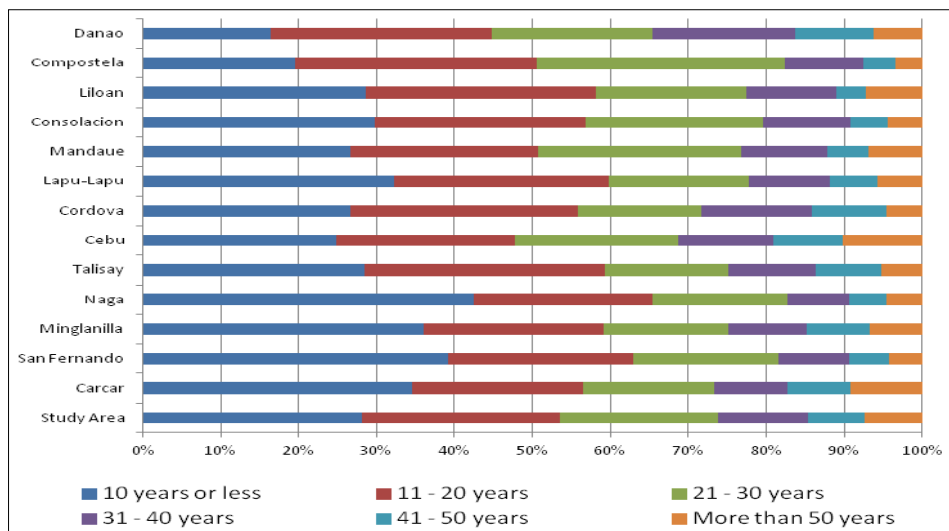
1.31 The awareness level regarding the Mega Cebu Vision 2050 is extremely high for online respondent group, with 73% knowledgeable of all its contents and 18% have heard about it.

1.5 Field HIS Results

1.32 The Field HIS was conducted through direct interviews. Interviewers were given extensive training in capturing good responses for Forms 1 to 4. In addition, the layers of quality checks of accomplished forms ensured that field results are reliable. Outputs from the four forms, many of which provided grassroots information for the sub-roadmaps planning, are presented hereafter. Tabular outputs are presented in succeeding sections of this report.

1) Form 1: Household Information

1.33 The conditions of habitation are reported by respondents per LGU in terms of age of houses, size (floor area and lot area), number of rooms, and construction materials. Many houses are relatively new, with 28% less than 10 years in age and 25% are between 11 to 20 years (see Figure 1.5.1). Most of the housing structures are made of permanent materials of concrete, stone, wood and steel (see Figure 1.5.2).



Source: JICA Study Team – HIS 2014.

Figure 1.5.1 Age of Houses of Respondents by LGU

Table 1.5.1 Housing Structures

LGU	Bamboo	Wood	Half Concrete / Half Wood	Concrete / Stone	Reinforced Concrete / Steel	Others
City of Carcar	1,078	7,432	7,223	3,689	3,573	0
Cebu City	15,184	55,678	102,714	30,887	15,892	99
Compostela	0	3,854	3,454	1,764	0	0
Consolacion	1,101	5,037	13,595	6,755	199	0
Cordova	1,310	2,090	6,100	1,491	209	0
Danao City	3,800	8,720	9,516	4,001	0	0
Lapu-Lapu City	9,079	32,191	40,304	17,179	3,177	0
Liloan	1,814	7,122	7,872	4,087	0	0
Mandaue City	3,495	22,609	43,740	3,707	7,401	99
Minglanilla	1,305	5,701	7,301	7,794	3,442	0
City of Naga	1,390	4,741	7,723	4,748	3,080	0
San Fernando	1,344	4,425	3,752	2,604	1,575	0
City of Talisay	2,370	17,773	19,203	4,808	1,001	0
Metro Cebu	43,270	177,373	272,497	93,514	39,549	198
%	6.9	28.3	43.5	14.9	6.3	0.0

Source: JICA Study Team – HIS 2014.

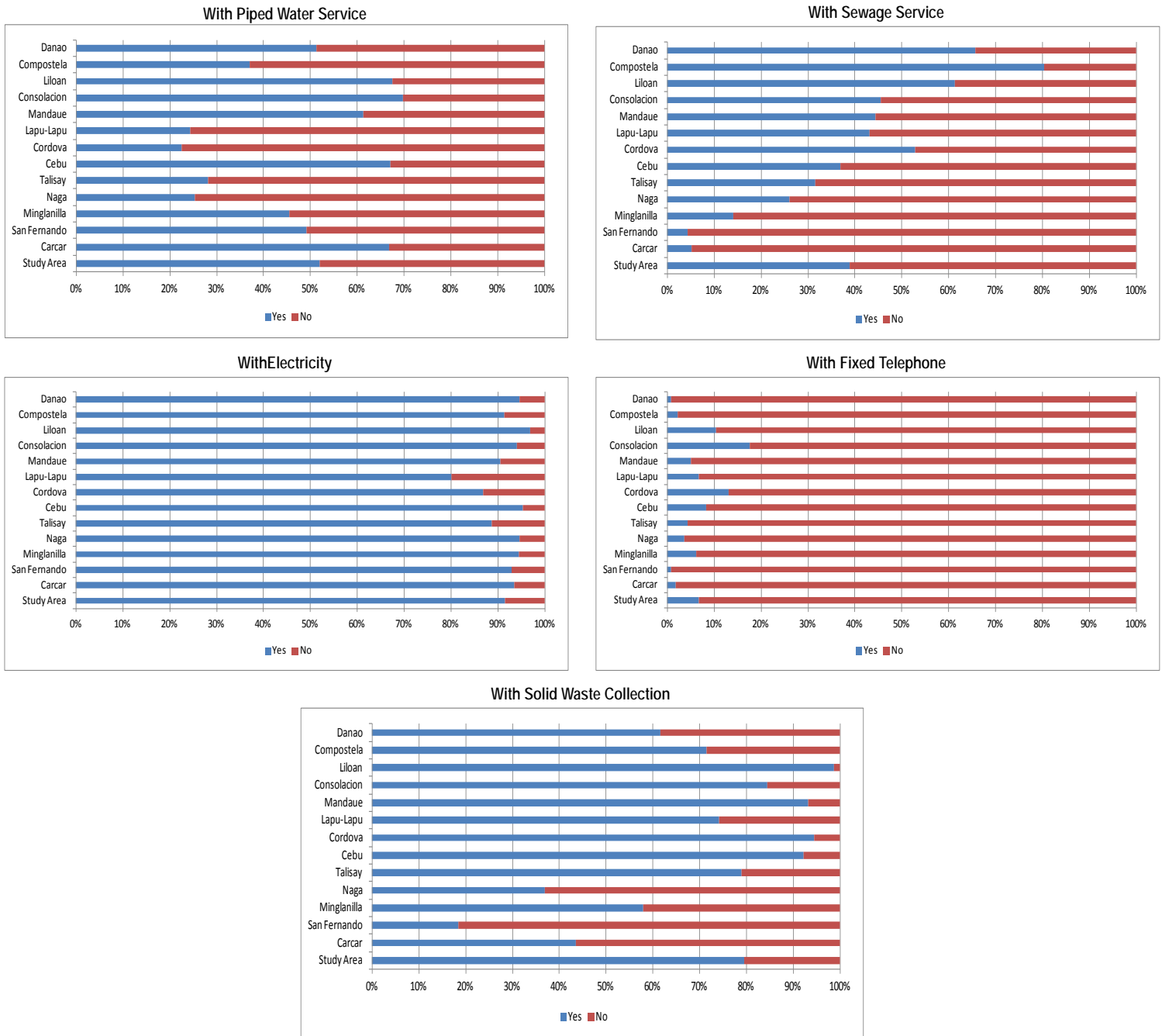
1.34 Showing the strong attraction of the metropolis in terms of in-migration, the length of habitation of many residents (33%) fall within the 10 years or less period (see Table 1.5.2).

Table 1.5.2 Length of Habitation

City / Municipality	10 Years or Less	11–20 yrs	21–30 yrs	31–40 yrs	41–50 yrs	More than 50 Years
City of Carcar	9,094	5,823	3,733	2,415	1,864	1,962
Cebu City	66,270	45,904	39,375	24,788	15,710	15,996
Compostela	2,229	2,644	3,270	926	420	555
Consolacion	9,908	7,442	6,758	3,800	1,266	910
Cordova	910	3,008	1,675	1,500	933	569
Danao City	5,631	9,840	6,899	6,340	3,440	1,990
Lapu-Lapu City	35,066	23,244	15,052	8,998	6,088	4,538
Liloan	8,516	7,414	4,998	3,249	6,088	1,768
Mandaue City	28,451	20,488	16,674	7,125	2,109	2,671
Minglanilla	10,128	6,645	4,153	2,439	2,237	1,496
City of Naga	10,270	5,221	3,977	2,439	2,237	1,496
San Fernando	5,930	3,098	2,408	1,437	590	287
City of Talisay	20,519	14,221	7,010	5,038	3,415	2,002
Total Metro Cebu	212,922	154,992	115,982	70,494	46,397	36,240
%	33.4	24.3	18.2	11.1	7.3	5.7

Source: JICA Study Team – HIS 2014.

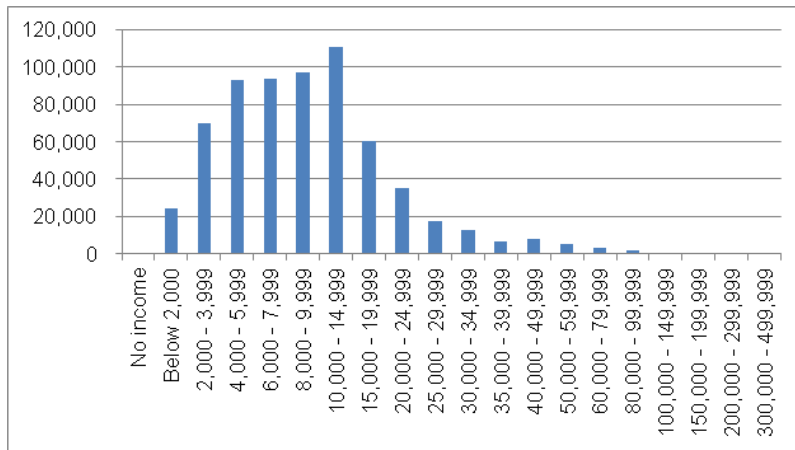
1.35 In terms of the level of urban services provided, Metro Cebu is enjoying a fairly good electricity connection for all areas but lacking piped water and sewage facilities. Solid waste collection is relatively well-served. The extent of fixed telephone connections is low but there was no query as to mobile phones, which expectedly most, if not, all households would have (see Figure 1.5.2).



Source: JICA Study Team – HIS 2014.

Figure 1.5.2 Basic Services in Metro Cebu

1.36 The declared monthly income of households in Metro Cebu is set by income ranges since this is one question that many households are hesitant to answer if made to divulge their actual incomes. It is apparent that many of the respondents are from the monthly income range of PHP15,000 and below (see Figure 1.5.3).



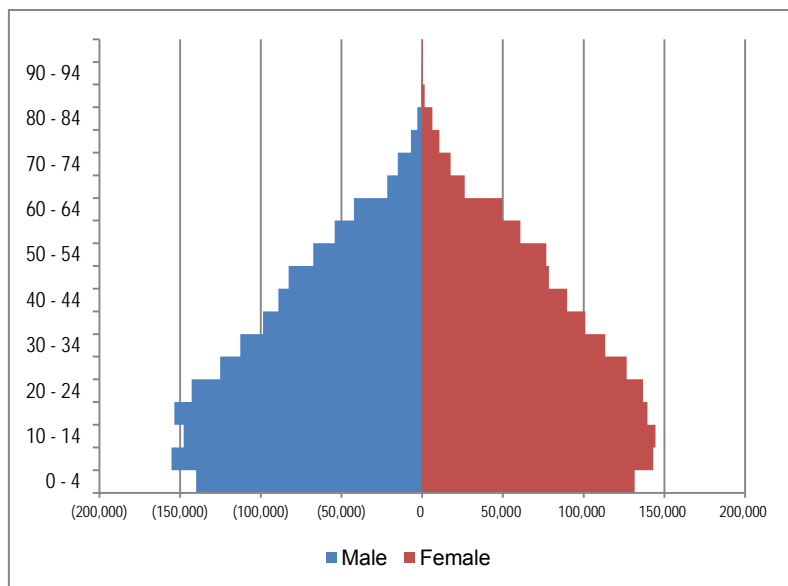
Source: JICA Study Team – HIS 2014.

Figure 1.5.3 Household Income

2) Form 2: Household Members' Information

1.37 Form 2 of the HIS contains information about each household member covering their age, gender, education level, driver's license, employment, and personal monthly income, addresses of their work or school, and vehicle ownership and usage.

1.38 The HIS results regarding gender and age was adjusted using the 2010 NSO results. The population pyramid shows a decreasing base of the young age group of below 4 years of age. This is an indication of a slowing down of population growth due to lesser natural births.



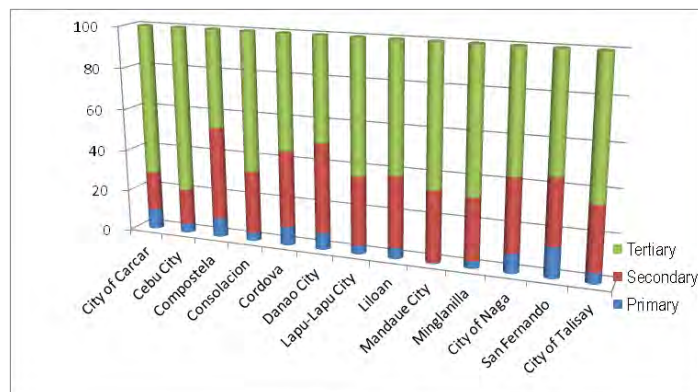
Source: JICA Study Team – HIS 2014.

Figure 1.5.4 Population Pyramid

1.39 For employment, a large number of workers are engaged in the tertiary or service sector followed by the secondary or manufacturing sector (see Figure 1.5.5). With urbanization taking hold of the metropolis, employment in the primary or agriculture sector is falling far from the other two sectors. However, when looking at the occupation of all the respondents, it is striking to note that a high share of unemployed people in Metro Cebu (close to 30%) exist. This is followed by the share of students/pupils (about 25%) (see Figure 1.5.6).

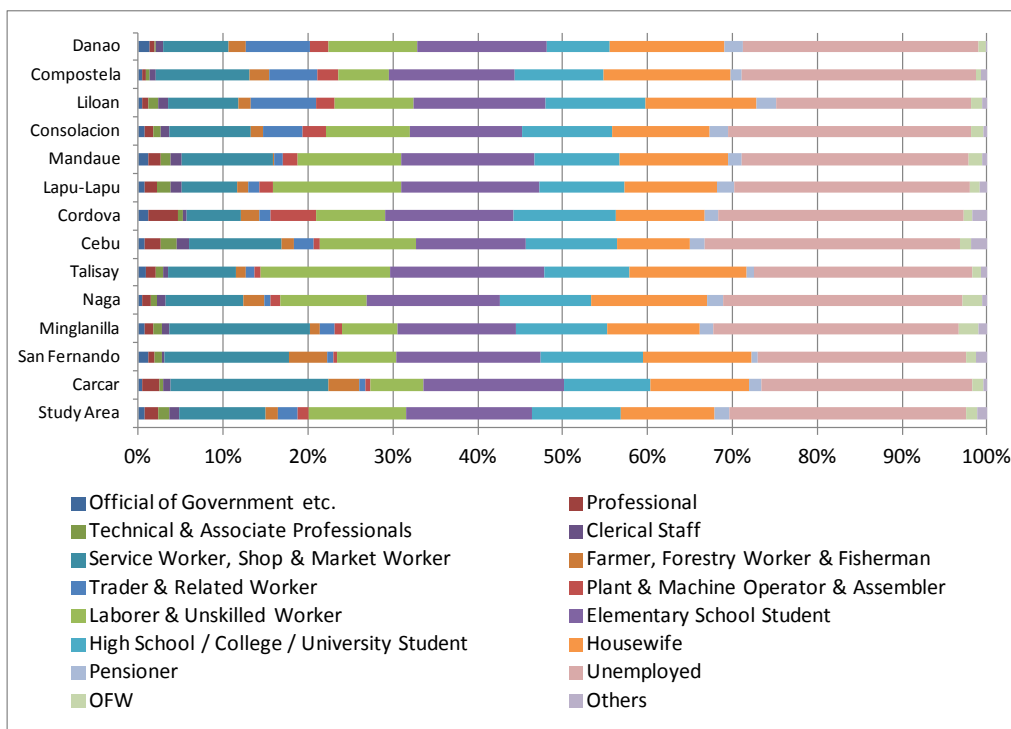
1.40 A comparison of addresses of where people reside and where they go for activities such as work or school would reveal the population of LGUs during the day (activities related) and during nighttime (residential). The ratio then of nighttime population to daytime population of an area would indicate the type of attraction it holds. As shown in Table 1.5.3, Cebu City, Lapu-Lapu City and Mandaue City are more of places for work and for school. The rest of the LGUs have higher attraction as residential places.

1.41 For people in the metropolis who have a driver's license, it seems that there is a huge number of professional drivers in Metro Cebu (see Figure 1.5.6).



Source: JICA Study Team – HIS 2014.

Figure 1.5.5 Employment by Industry Sector



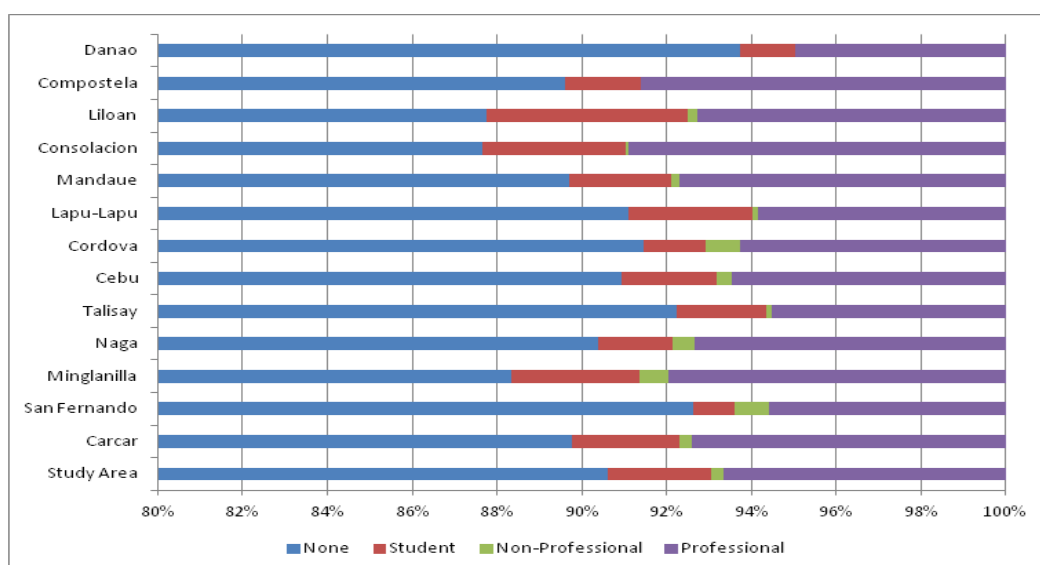
Source: JICA Study Team – HIS 2014.

Figure 1.5.6 Respondents by Occupation

Table 1.5.3 Daytime and Nighttime Population

	City / Municipality	At Residence	At Work / School
		Night-time	Day-time
1	City of Carcar	1.13	0.88
2	Cebu City	0.96	1.05
3	Compostela	1.08	0.92
4	Consolacion	1.12	0.89
5	Cordova	1.22	0.82
6	Danao City	1.00	1.00
7	Lapu-Lapu City	0.98	1.02
8	Liloan	1.18	0.85
9	Mandaue City	0.96	1.04
10	Minglanilla	1.11	0.90
11	City of Naga	1.11	0.90
12	San Fernando	1.17	0.85
13	City of Talisay	1.03	0.97

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

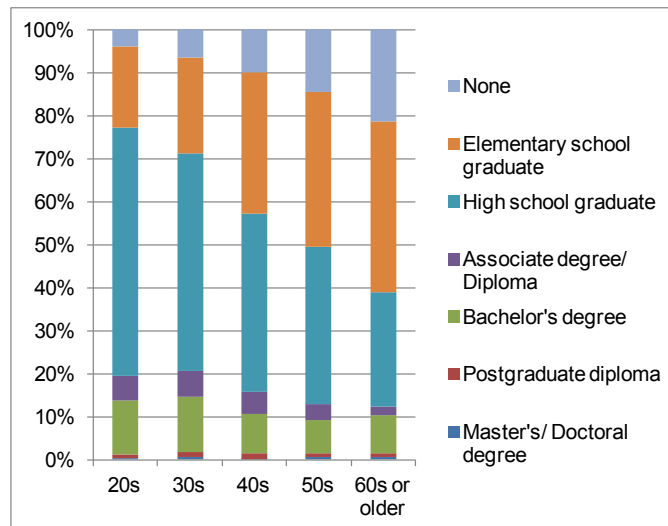
Figure 1.5.7 Driver's License Held

1.42 Adjusting the data of the HIS to NSO data, the education level of the population is given in Table 1.5.4. Inasmuch as the data shows a very large percentage of "none", this includes children of the pre-school ages. The same is true for the high school and elementary school graduates. The data was further processed to include only those of the working age for an indication of the education level of the workforce. It showed that the majority of the population aged 20 to 50 years old have only reached high school and elementary levels (see Figure 1.5.8). This would later justify their selection of development strategies envisioned for Mega Cebu Vision (results of Form 4).

Table 1.5.4 Education Level of Residents

Area	Master's / Doctoral Degree	Postgraduate Diploma	Bachelor's Degree	Associate Degree / Diploma	High School Graduate	Elementary School Graduate	None
Carcar	326	546	5,691	4,715	27,684	32,560	45,231
San Fernando	212	103	2,003	2,494	17,974	21,153	26,373
Minglanila	210	955	7,764	4,194	37,380	37,073	43,151
Naga	100	1,872	4,332	4,063	37,423	27,599	35,562
Talisay	237	118	10,408	4,184	50,634	68,549	98,996
Cebu	6,083	12,092	68,587	21,984	307,885	243,153	304,197
Cordova	276	655	6,105	189	17,372	13,718	20,060
Lapu-Lapu	353	1,965	32,057	19,332	143,001	107,284	143,314
Mandaue	273	0	28,014	9,332	116,727	81,584	112,688
Consolacion	222	232	9,207	6,610	51,778	33,303	38,019
Liloan	121	241	8,038	4,514	37,882	30,730	31,441
Compostela	0	0	2,429	1,424	16,780	12,669	14,505
Danao	154	397	6,308	8,379	47,397	30,303	42,064
Study Area	8,567	19,176	190,940	91,364	909,927	739,678	955,601

Source: JICA Study Team – HIS 2014.



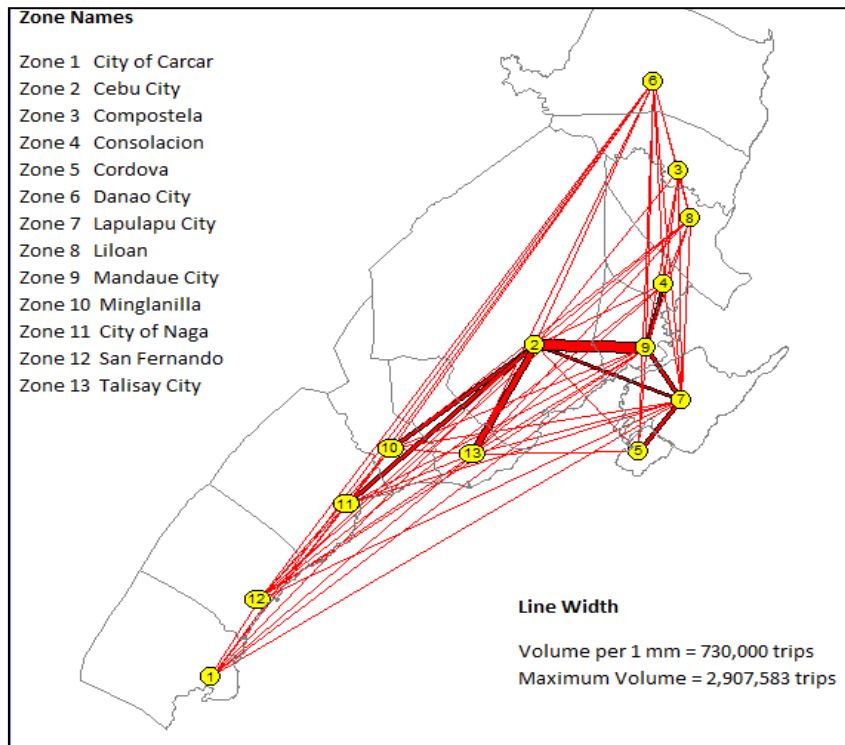
Source: JICA Study Team – HIS 2014.

Figure 1.5.8 Education Level of Workforce

3) Form 3: Trip Record

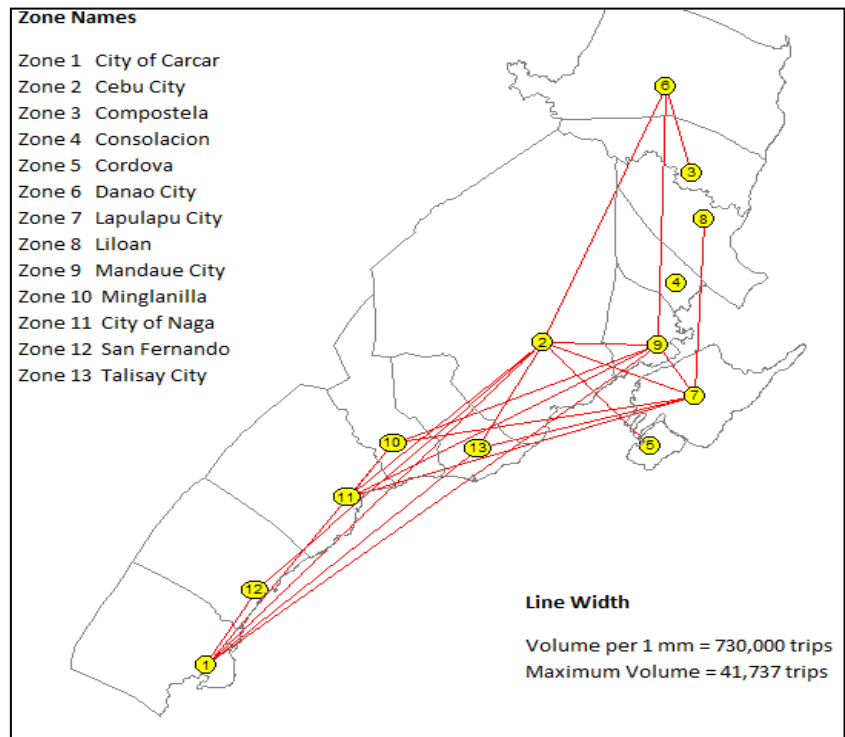
1.43 Form 3 of the HIS contains all the information pertaining to the trips made by the respondents on a given normal weekday. Data include the trip purpose, time, vehicle mode, reason for using said mode, cost, transfer points, and their assessment of trips made. Some of the resulting analyses from the data provided are shown in the following figures in terms of desire lines of trips made by mode, which is a visual illustration of the origin and destination (O-D) of trips. For all modes, the largest number of trips made is shown to be between the core urban areas comprising Cebu City, Mandaue City, and Talisay City (see Figure 1.5.9 to Figure 1.5.14).

1.44 Other trip information are also made available from Form 3 such as the trip attraction and generation by LGU and by purpose and number of trips by LGU and mode. Trip rates of households by income, age, gender, employment and occupation are, likewise, provided in Table 1.5.5 to Table 1.5.9 and in Figure 1.5.15 to Figure 1.5.18.



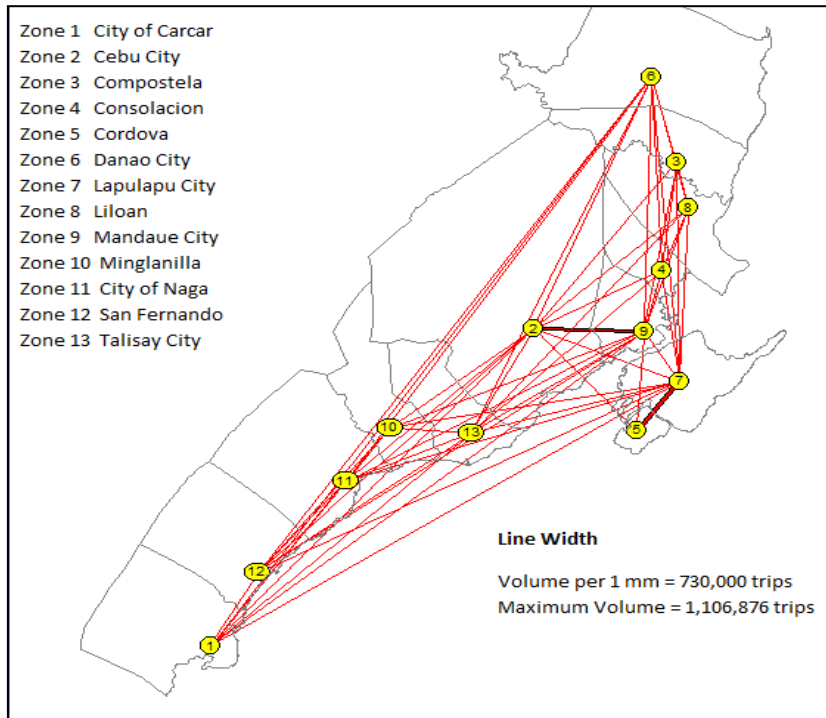
Source: JICA Study Team – HIS 2014.

Figure 1.5.9 Desire Lines of Trips by All Modes



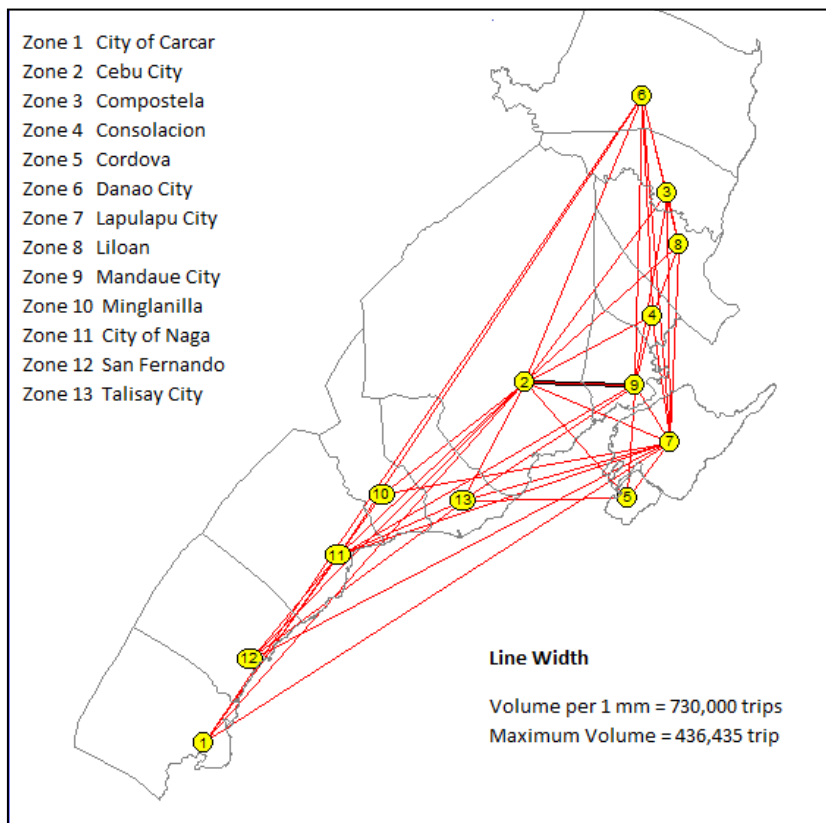
Source: JICA Study Team – HIS 2014.

Figure 1.5.10 Desire Lines of Trips by Truck



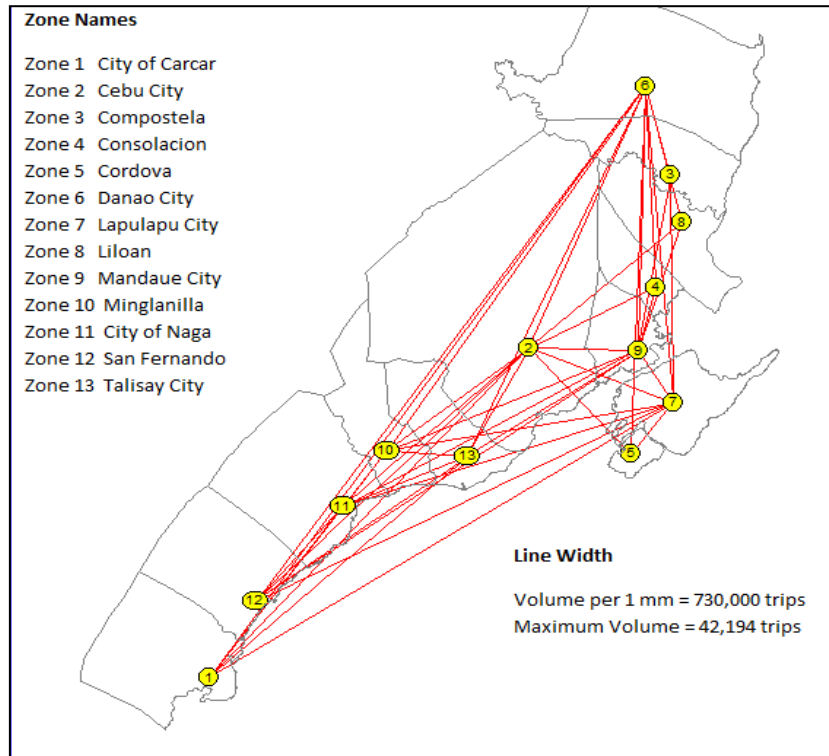
Source: JICA Study Team – HIS 2014.

Figure 1.5.11 Desire Lines of Trips by Jeepney



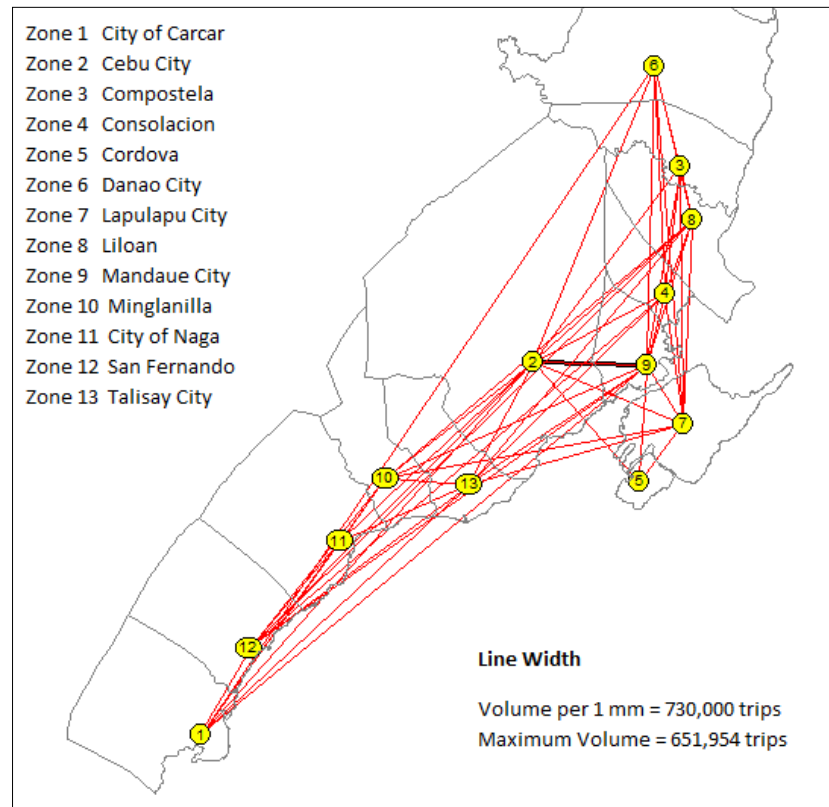
Source: JICA Study Team – HIS 2014.

Figure 1.5.12 Desire Lines of Trips by Car



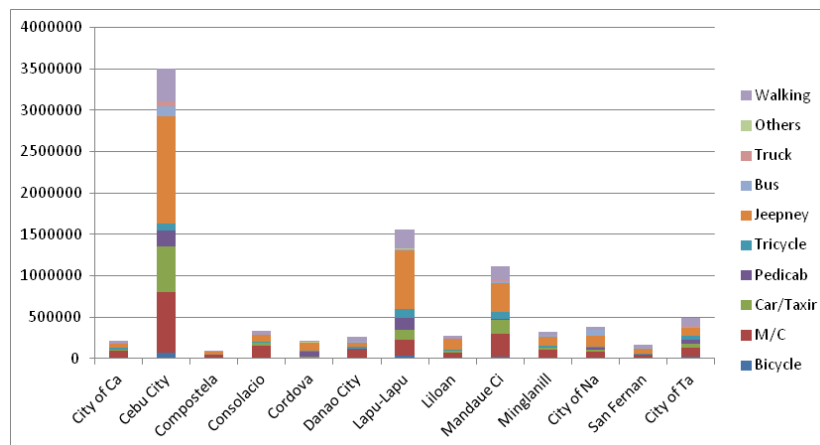
Source: JICA Study Team – HIS 2014.

Figure 1.5.13 Desire Lines of Trips by Bus



Source: JICA Study Team – HIS 2014.

Figure 1.5.14 Desire Lines of Trips by Motorcycle



Source: JICA Study Team – HIS 2014.

Figure 1.5.15 Trips by Mode by LGU

Table 1.5.5 Trip Rates by Age Group and Gender

Age Group	Male	Female	Total
0–4	0.04	0.15	0.10
5–9	2.60	2.86	2.72
10–14	3.66	3.67	3.67
15–19	3.55	4.40	3.99
20–24	3.85	3.22	3.53
25–29	3.93	2.40	3.15
30–34	5.14	2.46	3.80
35–39	5.46	2.06	3.77
40–44	5.02	1.86	3.44
45–49	5.01	2.02	3.51
50–54	4.58	2.05	3.30
55–59	3.92	2.30	3.08
60–64	2.48	1.39	1.90
65–69	1.62	1.02	1.28
70–74	1.29	0.63	0.91
75–79	2.08	1.12	1.48
80+	0.15	0.20	0.18
Total	3.50	2.45	2.97

Source: JICA Study Team – HIS 2014.

Table 1.5.6 Trip Generation by Purpose (No. of Trips)

City / Municipality	Generation					Total
	To Home	To Work	To School	Business	Private	
City of Carcar	93,296	61,551	48,788	2,638	11,220	217,493
Cebu City	1,693,193	812,849	612,624	92,012	285,683	3,496,361
Compostela	42,902	22,771	23,831	157	3,156	92,817
Consolacion	124,960	108,009	63,539	9,428	24,607	330,543
Cordova	68,172	68,698	66,052	4,416	8,002	215,340
Danao City	123,433	74,967	41,514	6,480	10,370	256,764
Lapu-Lapu City	732,750	426,538	267,169	74,524	56,901	1,557,882
Liloan	101,010	75,473	78,108	7,945	10,826	273,362
Mandaue City	522,268	255,785	181,617	53,634	94,153	1,107,457
Minglanilla	124,973	95,464	83,879	3,272	11,967	319,555
City of Naga	139,419	98,840	102,389	10,461	35,856	386,965
San Fernando	60,371	47,856	49,474	299	4,964	162,964
City of Talisay	210,258	135,164	96,137	28,477	19,021	489,057
Metro Cebu	4,037,005	2,283,965	1,715,121	293,743	576,726	8,906,560

Source: JICA Study Team – HIS 2014.

Table 1.5.7 Trip Attraction by Purpose (No. of Trips)

City / Municipality	Attraction					
	To Home	To Work	To School	Business	Private	Total
City of Carcar	113,731	46,580	46,689	2,587	12,087	221,674
Cebu City	1,451,714	940,149	753,786	111,972	315,411	3,573,032
Compostela	53,054	14,428	25,871	160	2,229	95,742
Consolacion	187,449	61,609	54,835	7,622	11,347	322,862
Cordova	124,478	24,360	43,990	1,203	1,880	195,911
Danao City	108,360	70,192	46,256	10,427	11,761	246,996
Lapu-Lapu City	678,706	478,811	266,046	77,278	57,818	1,558,659
Liloan	158,428	41,056	54,763	4,267	9,485	267,999
Mandaue City	474,172	352,910	174,800	52,438	93,329	1,147,649
Minglanilla	132,567	57,778	65,455	2,913	10,250	268,963
City of Naga	222,977	64,861	61,789	3,951	25,160	378,738
San Fernando	91,144	24,502	38,395	1,277	3,279	158,597
City of Talisay	215,349	105,806	86,346	22,100	26,726	456,327
Metro Cebu	4,012,129	2,283,042	1,719,021	298,195	580,762	8,893,149

Source: JICA Study Team – HIS 2014.

Table 1.5.8 Trip Generation by Purpose (%)

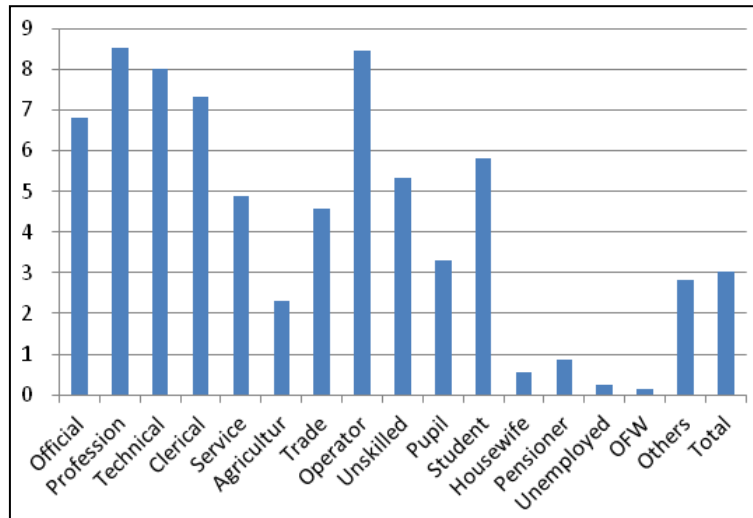
City / Municipality	To Home	To Work	To School	Business	Private	Total
City of Carcar	43	28	22	1	5	100
Cebu City	48	23	18	3	8	100
Compostela	46	25	26	0	3	100
Consolacion	38	33	19	3	7	100
Cordova	32	32	31	2	4	100
Danao City	48	29	16	3	4	100
Lapu-Lapu City	47	27	17	5	4	100
Liloan	37	28	29	3	4	100
Mandaue City	47	23	16	5	9	100
Minglanilla	39	30	26	1	4	100
City of Naga	36	26	26	3	9	100
San Fernando	37	29	30	0	3	100
City of Talisay	43	28	20	6	4	100
Metro Cebu	45	26	19	3	6	100

Source: JICA Study Team – HIS 2014.

Table 1.5.9 Trip Attraction by Purpose (%)

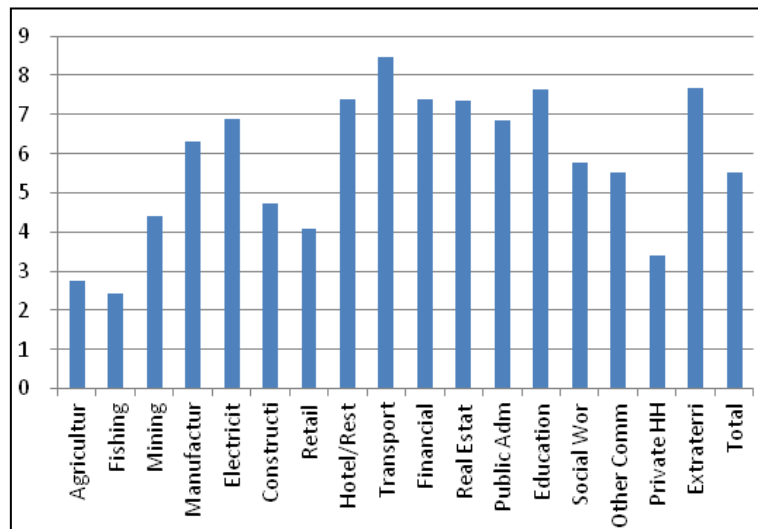
City / Municipality	To Home	To Work	To School	Business	Private	Total
City of Carcar	51	21	21	1	5	100
Cebu City	41	26	21	3	9	100
Compostela	55	15	27	0	2	100
Consolacion	58	19	17	2	4	100
Cordova	64	12	22	1	1	100
Danao City	44	28	19	4	5	100
Lapu-Lapu City	44	31	17	5	4	100
Liloan	59	15	20	2	4	100
Mandaue City	41	31	15	5	8	100
Minglanilla	49	21	24	1	4	100
City of Naga	59	17	16	1	7	100
San Fernando	57	15	24	1	2	100
City of Talisay	47	23	19	5	6	100
Metro Cebu	45	26	19	3	7	100

Source: JICA Study Team – HIS 2014.



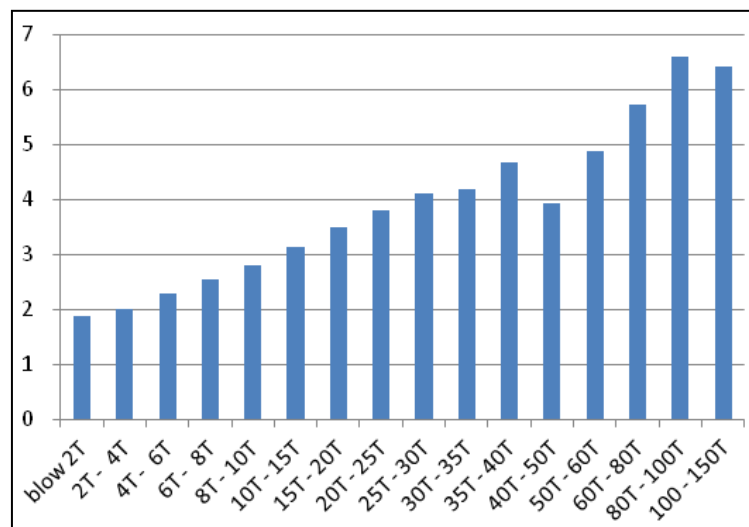
Source: JICA Study Team – HIS 2014.

Figure 1.5.16 Trip Rate by Occupation



Source: JICA Study Team – HIS 2014.

Figure 1.5.17 Trip Rate by Employment Sector



Source: JICA Study Team – HIS 2014.

Figure 1.5.18 Trip Rate by Household Income

4) Form 4: People's Satisfaction/ Perception on Existing Living Conditions and Urban Services

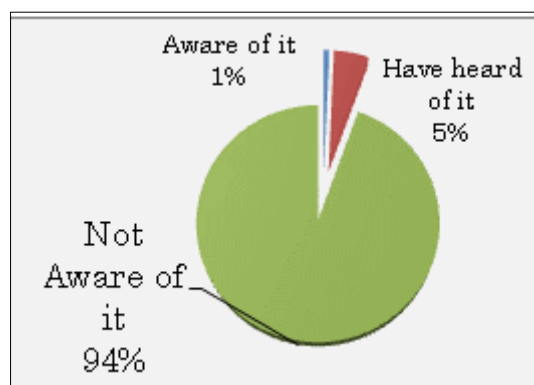
(1) Mega Cebu Vision 2050

1.45 Table 1.5.10 and Figure 1.5.19 below show that nearly all (94.5%) of the sample households surveyed in Metro Cebu were not aware of the implementation of the “Mega Cebu Vision 2050” urban development project. Less than 1% of the households was aware of the project and about 4.8% have only heard of it. Location-wise, more residents of Cordova and Cebu City have heard of the project than those of other cities and municipalities. To encourage more stakeholder participation for Metro Cebu's long-term plans, the LGUs and other development partners would need to mount a more aggressive public information campaign.

Table 1.5.10 Awareness of “Mega Cebu Vision 2050” by Number of Households and by LGU

City / Municipality	Aware of it		Have heard of it		Not aware of it	
	No.	%	No.	%	No.	%
City of Carcar	0	0	8	3.5	223	96.5
Cebu City	20	0.9	178	7.8	2,077	91.3
Compostela	0	0	1	1.1	94	98.9
Consolacion	5	1.8	18	6.6	250	91.6
Cordova	2	1.8	17	14.9	95	83.3
Danao City	1	0.4	3	1.1	280	98.6
Lapu-Lapu City	4	0.4	21	1.9	1,058	97.7
Liloan	1	0.4	9	4	213	95.5
Mandaue City	6	0.7	5	0.6	847	98.7
Minglanilla	1	0.4	12	4.7	244	94.9
City of Naga	1	0.5	2	0.9	219	98.6
San Fernando	2	1.4	2	1.4	137	97.2
City of Talisay	0	0	40	8.7	420	91.3
Metro Cebu	43	0.7	316	4.8	6,157	94.5

Source: JICA Study Team – HIS 2014.

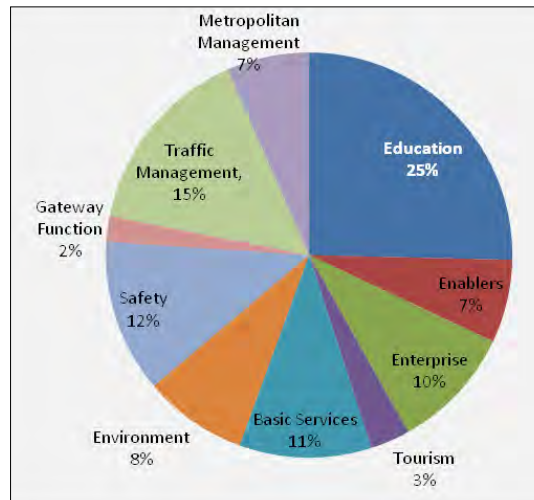


Source: JICA Study Team – HIS 2014.

Figure 1.5.19 Awareness of “Mega Cebu Vision 2050” in Metro Cebu

(2) Developmental Strategies

1.46 Among the 13 areas of developmental strategies of “Mega Cebu Vision 2050,” education (higher education, skills training, matching for workforce, foreign language) was deemed by 25% of HIS respondents as the topmost priority (see Figure 1.5.20 and Table 1.5.11). This was followed by traffic management, transportation network and public transport at 15%, and safety (resilience from natural disasters, crime and drugs prevention) running a close third at 12%.



Source: JICA Study Team – HIS 2014.

Figure 1.5.20 Perceived Importance of Developmental Strategies of “Mega Cebu Vision 2050”

Table 1.5.11 Perceived Importance of Developmental Strategies for “Mega Cebu Vision 2050” by Number of Households

City / Municipality	Areas of Development																			
	Education		Enablers		Enterprise		Tourism		Basic Services		Environment		Safety		Gateway Function		Traffic Management, Transportation Network, & Public Transport		Metropolitan Management, Organization, Planning, & Information	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	188	81	24	10.3	56	24.1	16	6.9	38	16.4	51	22	79	34.1	6	2.6	112	48.3	123	53
Cebu City	1,611	70.7	427	18.7	706	31	229	10	790	34.7	659	28.9	1030	45.2	128	5.6	773	33.9	476	20.9
Compostela	77	81.1	33	34.7	39	41.1	9	9.5	58	61.1	13	13.7	41	43.2	2	2.1	13	13.7	0	0
Consolacion	228	83.2	40	14.6	74	27	25	9.1	74	27	85	31	130	47.5	7	2.6	144	52.6	6	2.2
Cordova	85	73.9	13	11.3	45	39.1	2	1.7	69	60	16	13.9	33	28.7	29	25.2	52	45.2	1	0.9
Danao City	224	78.9	31	10.9	70	24.7	12	4.2	133	46.8	54	19	85	29.9	30	10.6	156	54.9	56	19.7
Lapu-Lapu City	755	69.7	278	25.7	299	27.6	181	16.7	500	46.2	288	26.6	287	26.5	87	8	467	43.1	108	10
Liloan	200	89.7	37	16.6	42	18.8	8	3.6	79	35.4	45	20.2	113	50.7	7	3.1	115	51.6	23	10.3
Mandaue City	717	83.4	195	22.7	251	29.2	73	8.5	73	8.5	141	16.4	259	30.1	55	6.4	552	64.2	127	14.8
Minglanilla	191	74	17	6.6	38	14.7	13	5	39	15.1	62	24	81	31.4	7	2.7	154	59.7	172	66.7
City of Naga	182	82	36	16.2	57	25.7	24	10.8	50	25.5	80	36	90	40.5	15	6.8	132	59.5	0	0
San Fernando	103	73.1	13	9.2	28	19.9	6	4.3	19	13.5	41	29.1	51	36.2	10	7.1	87	61.7	65	46.1
City of Talisay	366	79.6	142	30.9	211	45.9	15	3.3	129	28	71	15.4	89	19.4	17	3.7	219	47.6	120	26.1
Metro Cebu	4,927	75.5	1,286	19.7	1,916	29.4	613	9.4	2,051	31.4	1,606	24.6	2,368	36.3	400	6.1	2,976	45.6	1,277	19.6

Source: JICA Study Team – HIS 2014.

5) People’s Satisfaction/ Perception on Existing Living Conditions and Urban Services

(1) Preparation for Disasters

1.47 People get their information on hazards of impending natural and man-made disasters from different sources. Table 1.5.12 and Figure 1.5.21 reveal that, generally, the radio or TV serves as the primary means of collecting this information for residents of Metro Cebu, as mentioned by 91% of the sample households.

Table 1.5.12 Means of Collecting Information Regarding Hazards of Natural/Man-made Disasters, by City / Municipality

City / Municipality	Means of Collecting Information																
	Radio / TV		Newspaper		Barangay Officials		Neighbors		Children's School		Social Media		SMS / Text Message		No Information		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
City of Carcar	224	96.6	0	0	1	0.4	7	3	0	0	0	0	0	0	0	0	0
Cebu City	2,147	94.3	26	1.1	23	1	70	3.1	0	0	6	0.3	6	0.3	0	0	0
Compostela	87	91.6	0	0	1	1.1	7	7.4	0	0	0	0	0	0	0	0	0
Consolacion	236	86.1	4	1.5	28	10.2	4	1.5	0	0	2	0.7	0	0	0	0	0
Cordova	100	87	5	4.4	8	7	2	1.7	0	0	0	0	0	0	0	0	0
Danao City	223	78.5	0	0	57	20.1	3	1.1	0	0	1	0.4	0	0	0	0	0
Lapu-Lapu City	1,005	93.1	32	3	14	1.3	26	2.4	0	0	2	0.2	1	0.1	0	0	0
Liloan	189	84.8	7	3.1	17	7.6	10	4.5	0	0	0	0	0	0	0	0	0
Mandaue City	784	91.2	23	2.7	7	0.8	43	5	0	0	0	0	3	0.4	0	0	0
Minglanilla	243	94.2	0	0	8	3.1	6	2.3	0	0	1	0.4	0	0	0	0	0
City of Naga	212	95.9	0	0	4	1.8	5	2.3	0	0	0	0	0	0	0	0	0
San Fernando	128	90.8	0	0	10	7.1	3	2.1	0	0	0	0	0	0	0	0	0
City of Talisay	381	82.8	14	3	18	3.9	47	10.2	0	0	0	0	0	0	0	0	0
Metro Cebu	5,959	91.4	111	1.7	196	3	233	3.6	0	0	12	0.2	10	0.2	0	0	0

Source: JICA Study Team – HIS 2014.

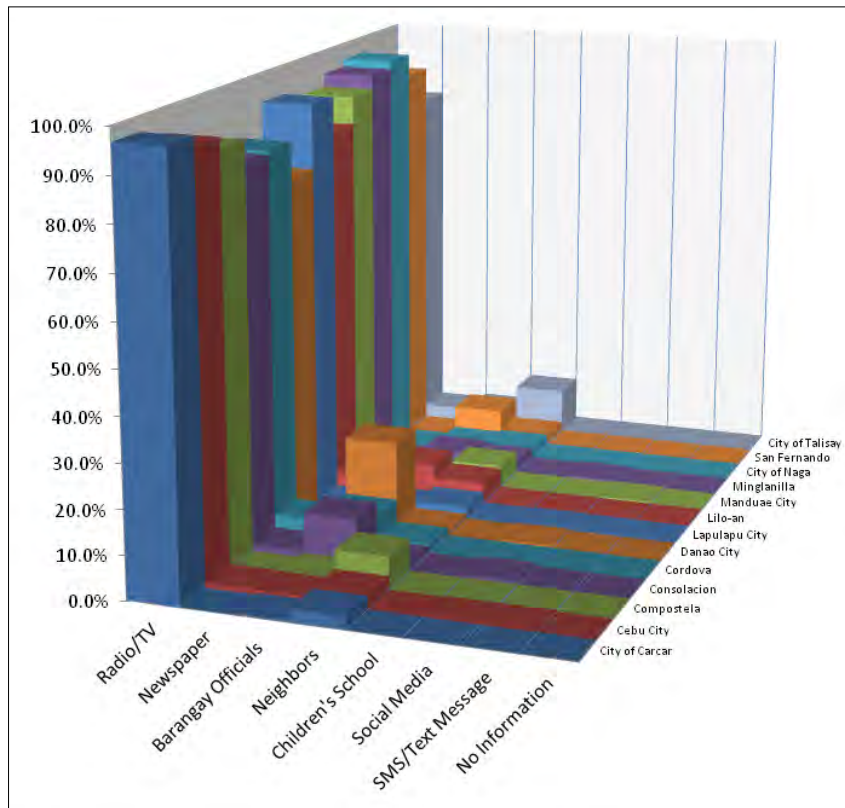
1.48 Nearly three-fourths of the sample households in Metro Cebu are also aware of places to evacuate when hit by natural / man-made disasters (see Table 1.5.13).

Table 1.5.13 Awareness of Places to Evacuate During Disasters

City / Municipality	Aware		Not Aware	
	No.	%	No.	%
Metro Cebu	4,738	72.6	1,786	27.4

Source: JICA Study Team – HIS 2014.

1.49 Perhaps, the relatively high awareness of evacuation places was partly brought about by the area's recent sad experience with another typhoon. When Super-typhoon Yolanda (international code name Haiyan) struck the Philippines in November 2013, 40% of the sample families in Metro Cebu did not evacuate from their houses to safer areas. Those who did evacuate moved to areas designated by the local governments (40%), houses of their relatives (12%), houses of neighbors (5%), sites designated by NGOs (2%), and to other safe places (2%) (see Table 1.5.14 and Figure 1.5.22).



Source: JICA Study Team – HIS 2014.

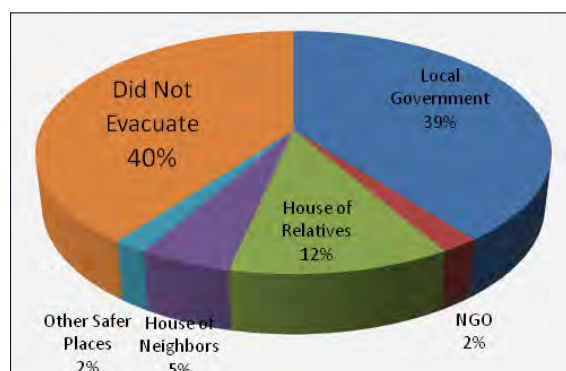
Figure 1.5.21 Means of Collecting Information Regarding Hazards of Disasters, by City / Municipality

1.50 Among the LGUs, a higher percentage of households in Cebu City and Compostela did not evacuate during the typhoon, as compared to the other cities and municipalities.

Table 1.5.14 Places of Evacuation During Typhoon Yolanda (per City / Municipality)

City / Municipality	Local Government		NGO		House of Relatives		House of Neighbors		Other Safe Places		Did Not Evacuate	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	48	31.0	9	5.8	25	16.1	5	3.2	0	0.0	68	43.9
Cebu City	496	30.4	13	0.8	96	5.9	47	2.9	30	1.8	952	58.3
Compostela	16	19.8	0	0.0	2	2.5	7	8.6	4	4.9	52	64.2
Consolacion	141	61.8	2	0.9	57	25.0	0	0.0	6	2.6	22	9.6
Cordova	101	88.6	2	1.8	3	2.6	1	0.9	0	0.0	7	6.1
Danao City	152	55.1	2	0.7	30	10.9	40	14.5	8	2.9	44	15.9
Lapu-Lapu City	361	53.0	4	0.6	1	0.1	34	5.0	5	0.7	276	40.5
Liloan	118	61.8	7	3.7	26	13.6	5	2.6	3	1.6	32	16.8
Mandaue City	191	31.9	10	1.7	151	25.3	30	5.0	10	1.7	206	34.4
Minglanilla	49	29.2	18	10.7	35	20.8	0	0.0	4	2.4	62	36.9
City of Naga	69	50.4	15	10.9	25	18.2	1	0.7	1	0.7	26	19.0
San Fernando	29	31.9	4	4.4	19	20.9	11	12.1	0	0.0	28	30.8
City of Talisay	84	25.9	8	2.5	75	23.1	47	14.5	14	4.3	96	29.6
Metro Cebu	1855	39.7	94	2.0	545	11.7	228	4.9	85	1.8	1871	40.0

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.22 Places of Evacuation During Typhoon Yolanda

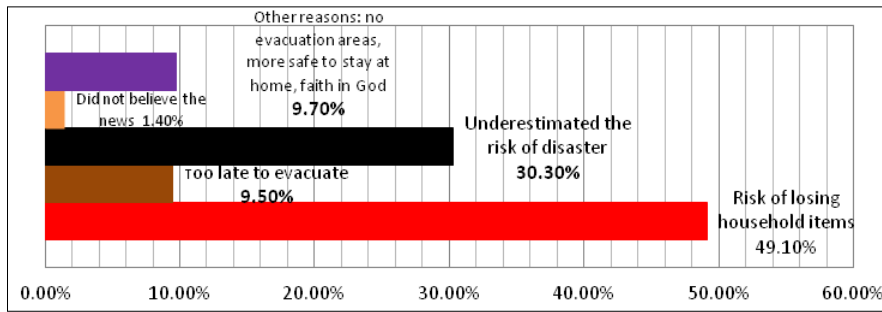
1.51 Interestingly, the chief reason (49.1%) why some households in Metro Cebu did not move out of their houses during typhoon Yolanda was that they were afraid to lose their household items, as reflected in Table 1.5.15 and Figure 1.5.23. Another one-third of them chose to stay home because they underestimated the risk of the disaster. Still a significant number said it was too late to evacuate. Though a very small number, some households did not believe the news.

1.52 Other reasons (not indicated in the survey form) for not evacuating include: (i) they felt that it was safer to stay at home given its strong house structure, (ii) there were no nearby evacuation vicinities, and (iii) they have strong faith in God. These results point to a need for a more effective public information campaign on disaster risk prevention and management.

Table 1.5.15 Reasons for Not Evacuating During Typhoon Yolanda

City / Municipality	Risk of Losing Household Items		Too Late To Evacuate		Underestimated the Risk of Disaster		Did Not Believe the News		Other Reasons: (not affected, no evacuation vicinity, more safe at home, faith in God, strong house structure)	
	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	25	36.8	8	11.8	35	51.5	0	0	0	0
Cebu City	87	9.4	46	5	689	74.2	15	1.6	91	9.8
Compostela	11	36.7	3	10	0	0	2	6.7	14	46.7
Consolacion	125	79.6	10	6.4	6	3.8	1	0.6	15	9.6
Cordova	86	82.7	15	14.4	2	1.9	0	0	1	1
Danao City	138	82.6	15	9	1	0.6	0	0	13	7.8
Lapu-Lapu City	325	90.3	30	8.3	3	0.8	1	0.3	1	0.3
Liloan	118	83.1	3	2.1	11	7.7	0	0	10	7
Mandaue City	135	45.5	55	18.5	11	3.7	7	2.4	89	30
Minglanilla	41	63.1	20	30.8	3	4.6	1	1.5	0	0
City of Naga	69	81.2	15	17.6	0	0	0	0	1	1.2
San Fernando	31	91.2	1	2.9	0	0	1	2.9	1	2.9
City of Talisay	56	55.4	19	18.8	8	7.9	8	7.9	10	9.9
Metro Cebu	1247	49.1	240	9.5	769	30.3	36	1.4	246	9.7

Source: JICA Study Team – HIS 2014.

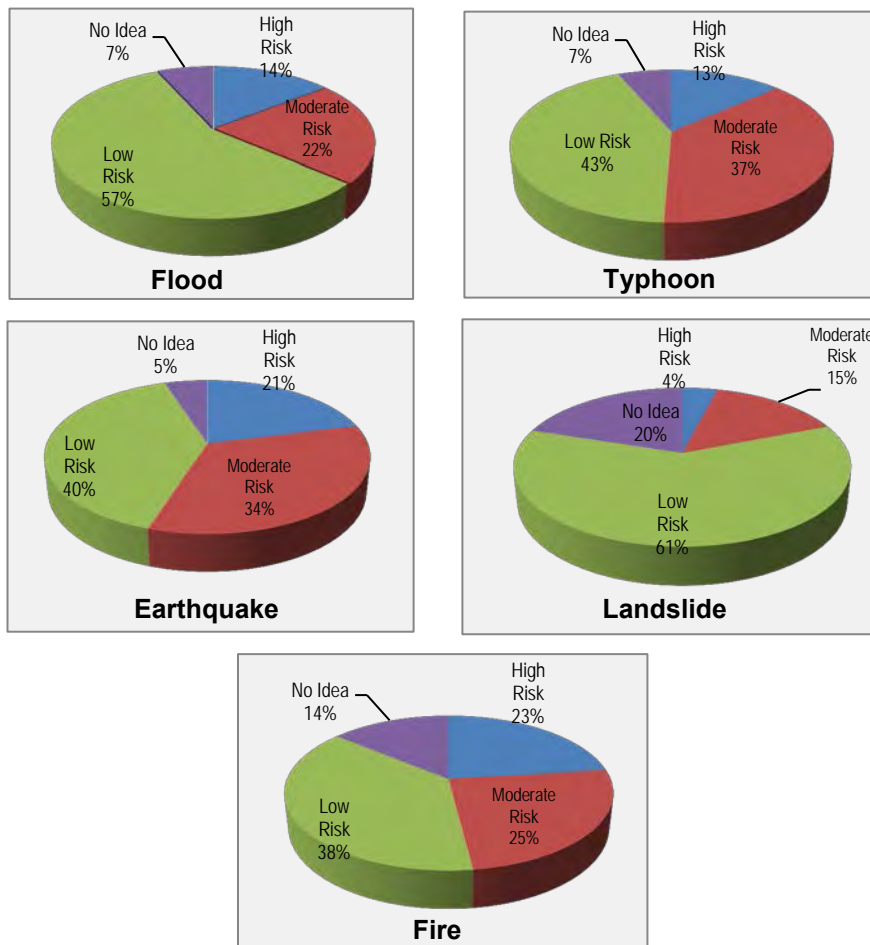


Source: JICA Study Team – HIS 2014.

Figure 1.5.23 Reasons for Not Evacuating During Typhoon Yolanda

1.53 Majority of people in Metro Cebu perceived the level of risk of their houses against disasters like flood, typhoon, landslide, earthquake, and fire to be low, accounting for 57%, 45%, 61%, 40%, and 38% of the entire sample households, respectively (see Figure 1.5.24). Landslide, in particular, was regarded to be the least risky. On the other hand, fire and earthquake were perceived to pose the highest risk (seen by 23% and 21% of the respondents, respectively, as high risk disasters).

1.54 Area-wise, Danao City recorded the biggest percentage of households who found flood and earthquake to be of high risk. People in Talisay City feared typhoon as posing the greatest risk to their houses. Households in Liloan said it was landslide while those in Mandaue City thought fire to be the riskiest.



Source: JICA Study Team – HIS 2014.

Figure 1.5.24 Perceived Risk of House Against Natural / Man-Made Disasters

Table 1.5.16 Perceived Risk of House Against Natural / Man-Made Disasters

City / Municipality	Flood								Typhoon							
	Level of Risk								Level of Risk							
	High		Moderate		Low		No Idea		High		Moderate		Low		No Idea	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	5	2.2	28	12.1	184	79.3	15	6.5	11	4.7	78	33.6	138	59.5	5	2.2
Cebu City	303	13.3	507	22.3	1318	57.9	147	6.5	204	9.0	883	38.8	1132	49.8	55	2.4
Compostela	4	4.2	18	18.9	73	76.8	0	0.0	5	5.3	65	68.4	25	26.3	0	0.0
Consolacion	17	6.2	100	36.5	154	56.2	3	1.1	28	10.2	149	54.4	86	31.4	11	4.0
Cordova	4	3.5	19	16.5	73	63.5	19	16.5	3	2.6	108	93.9	1	0.9	3	2.6
Danao City	99	34.9	39	13.7	146	51.4	0	0.0	48	17.0	129	45.6	106	37.5	0	0.0
Lapu-Lapu City	129	11.9	189	17.5	595	54.9	170	15.7	225	20.8	330	30.5	504	46.5	24	2.2
Liloan	27	12.1	61	27.4	134	60.1	0	0.0	46	20.7	104	46.8	72	32.4	0	0.0
Mandaue City	229	26.6	262	30.5	364	42.3	5	0.6	116	13.5	310	36.1	428	49.8	5	0.6
Minglanilla	7	2.7	39	15.1	176	68.2	36	14.0	28	10.9	89	34.5	123	47.7	18	7.0
City of Naga	7	3.2	40	18.0	160	72.1	15	6.8	52	23.5	96	43.4	73	33.0	0	0.0
San Fernando	5	3.5	12	8.5	115	81.6	9	6.4	19	13.5	54	38.3	67	47.5	1	0.7
City of Talisay	102	22.2	120	26.1	223	48.5	15	3.3	137	29.8	136	29.6	185	40.3	1	0.2
Metro Cebu	938	14.4	1434	22.0	3715	57.0	434	6.7	922	14.1	2531	38.8	2940	45.1	123	1.9

Source: JICA Study Team – HIS 2014.

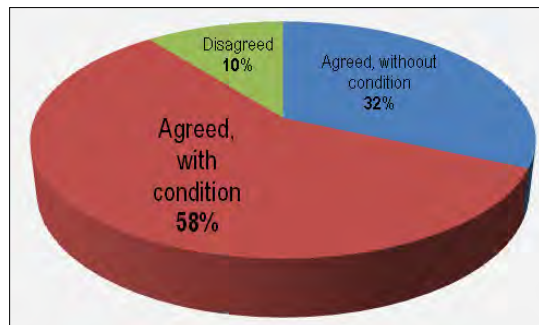
City / Municipality	Earthquake								Fire							
	Level of Risk								Level of Risk							
	High		Moderate		Low		No Idea		High		Moderate		Low		No Idea	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	17	7.3	68	29.3	128	55.2	19	8.2	4	1.7	28	12.1	181	78.0	19	8.2
Cebu City	534	23.5	627	27.6	966	42.5	145	6.4	433	23.0	550	29.2	671	35.7	228	12.1
Compostela	10	10.5	60	63.2	24	25.3	1	1.1	13	13.7	39	41.1	43	45.3	0	0.0
Consolacion	30	10.9	145	52.9	58	21.2	41	15.0	2	2.6	29	37.2	31	39.7	16	20.5
Cordova	5	4.3	100	87.0	5	4.3	5	4.3	4	4.8	6	7.1	45	53.6	29	34.5
Danao City	94	33.2	125	44.2	57	20.1	7	2.5	80	28.7	63	22.6	66	23.7	70	25.1
Lapu-Lapu City	262	24.2	368	34.0	412	38.1	40	3.7	49	5.6	190	21.6	385	43.7	257	29.2
Liloan	38	17.1	123	55.4	48	21.6	13	5.9	49	23.0	68	31.9	49	23.0	47	22.1
Mandaue City	201	23.4	224	26.0	426	49.5	9	1.0	323	48.3	190	28.4	143	21.4	13	1.9
Minglanilla	45	17.4	63	24.4	115	44.6	35	13.6	13	5.2	46	18.3	156	61.9	37	14.7
City of Naga	65	29.3	85	38.3	72	32.4	0	0.0	0	0.0	0	0.0	8	50.0	8	50.0
San Fernando	20	14.2	43	30.5	62	44.0	16	11.3	1	0.7	14	10.0	110	78.6	15	10.7
City of Talisay	44	9.6	170	37.0	241	52.5	4	0.9	213	50.0	94	22.1	111	26.1	8	1.9
Metro Cebu	1,365	21.0	2,201	33.8	2,614	40.1	335	5.1	1,184	22.6	1,317	25.1	1,999	38.1	747	14.2

Source: JICA Study Team – HIS 2014.

City / Municipality	Landslide							
	Level of Risk							
	High		Moderate		Low		No Idea	
	No.	%	No.	%	No.	%	No.	%
City of Carcar	5	2.16	35	15.1	173	74.6	19	8.19
Cebu City	71	3.1	242	10.7	1585	69.8	378	16.6
Compostela	3	3.2	29	30.5	62	65.3	1	1.1
Consolacion	12	4.4	88	32.1	121	44.2	53	19.3
Cordova	1	0.9	11	9.6	50	43.5	53	46.1
Danao City	7	2.5	112	39.6	106	37.5	57	20.1
Lapu-Lapu City	3	0.3	173	16.0	538	49.7	368	34.0
Liloan	24	10.8	37	16.7	122	55.0	39	17.6
Mandaue City	23	2.7	117	13.6	599	69.7	113	13.1
Minglanilla	9	3.5	20	7.8	185	71.7	44	17.1
City of Naga	22	9.9	41	18.5	151	68.0	8	3.6
San Fernando	9	6.4	14	9.9	101	71.6	16	11.3
City of Talisay	36	7.8	42	9.2	196	42.7	182	39.7
Metro Cebu	225	3.5	961	14.8	3989	61.2	1331	20.4

Source: JICA Study Team – HIS 2014.

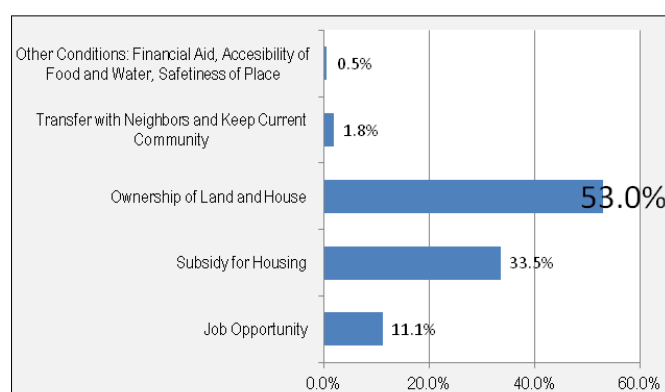
1.55 If necessary, 90% of the sample households in Metro Cebu would consent to the transfer of their houses to a safer place provided by the government (see Figure 1.5.25). Nearly a third would do this without any condition, while 58% would only agree to relocation given certain favorable conditions that must be provided. A tenth of the sample did not agree at all to any relocation.



Source: JICA Study Team – HIS 2014.

Figure 1.5.25 Decision on House Relocation in Metro Cebu

1.56 The most important condition for agreeing to house relocation is that the households would have ownership of the land where they would be transferred (see Figure 1.5.26). They would also like to avail of subsidies for their housing. Other important considerations were provision of job opportunities, accessibility of water and food, financial aid, distance from school and work, and safety in the relocation area.



Source: JICA Study Team – HIS 2014.

Figure 1.5.26 Priority Conditions for House Relocation

(2) Water

1.57 Nearly 70% of the sample households in Metro Cebu rely on water refilling stations as their main sources of drinking water (see Table 1.5.17). Only 12% mainly rely on the piped water supply system for drinking. Aside from the piped system, other supplementary sources of drinking water are public wells, bottled water and water refilling stations. Perhaps, this general preference for commercially purchased drinking water than other sources reflects either poor quality and/or poor distribution of water by the piped system.

1.58 While half of the households use water supplied from the piped system for purposes other than drinking, the public wells are the next popular source of water for other uses.

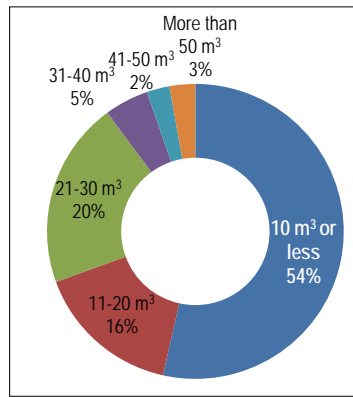
Table 1.5.17 Sources of Water in Metro Cebu

Source of Water	Main Source				Supplementary Source			
	Drinking		For Other Purposes		Drinking		For Other Purposes	
	No.	%	No.	%	No.	%	No.	%
1 Piped water supply system	812	12.5	3,249	49.9	20	25.0	14	5.6
2 Public tap	234	3.6	661	10.1	11	13.8	9	3.6
3 Public well	222	3.4	1,057	16.2	24	30.0	205	82.3
4 Household's own well	96	1.5	434	6.7	1	1.3	4	1.6
5 Neighbor's well / tap	281	4.3	684	10.5	3	3.8	5	2.0
6 Bottled water	140	2.1	24	0.4	11	13.8	2	0.8
7 Water refilling station	4,488	68.9	27	0.4	8	10.0	1	0.4
8 Rain, spring, creek, canal or pond	239	3.7	378	5.8	2	2.5	9	3.6

Source: JICA Study Team – HIS 2014.

1.59 Some 54% of the Metro Cebu sample population consumes an average of 10 m³ or less of water a month from the piped water supply system (see Figure 1.5.27). About a third consumes between 11 and 30 m³. This corroborates the earlier observation that most of the households rely less on the piped system for their water for drinking and other purposes.

1.60 Households in Lapu-Lapu City, Minglanilla, Carcar, Compostela, Consolacion and Liloan exhibit a relatively higher reliance on piped water supply based on their average consumption, as compared to the other LGUs (see Table 1.5.18 and Figure 1.5.28).



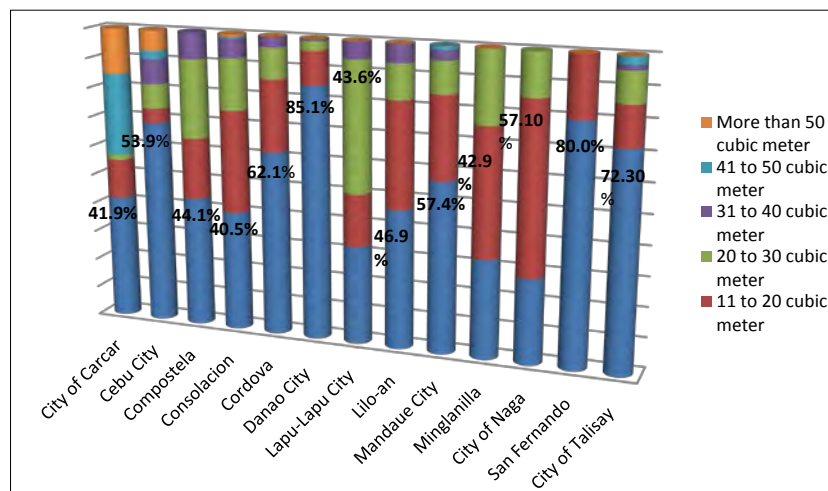
Source: JICA Study Team – HIS 2014.

Figure 1.5.27 Average Monthly Water Consumption in Metro Cebu (in cubic meter)

Table 1.5.18 Average Monthly Water Consumption per City / Municipality (in cubic meter)

City / Municipality	Average Water Consumption a Month											
	10 m³		11–20 m³		21–30 m³		31–40 m³		41–50 m³		More than 50 m³	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	44	41.9	14	13.3	2	1.9	0	0.0	29	27.6	16	15.2
Cebu City	507	53.9	37	3.9	264	6.5	61	6.5	21	2.2	50	5.3
Compostela	15	44.1	7	20.6	9	26.5	3	8.8	0	0.0	0	0.0
Consolacion	68	40.5	58	34.5	29	17.3	11	6.5	1	0.6	1	0.6
Cordova	18	62.1	7	24.1	3	10.3	1	3.4	0	0.0	0	0.0
Danao City	114	85.1	15	11.2	4	3.0	1	0.7	0	0.0	0	0.0
Lapu-Lapu City	70	33.2	37	17.5	92	43.6	12	5.7	0	0.0	0	0.0
Liloan	69	46.9	52	35.4	17	11.6	9	6.1	0	0.0	0	0.0
Mandaue City	240	57.4	115	27.5	44	10.5	14	3.3	5	1.2	0	0.0
Minglanilla	7	33.3	9	42.9	5	23.8	0	0.0	0	0.0	0	0.0
City of Naga	2	28.6	4	57.1	1	14.3	0	0.0	0	0.0	0	0.0
San Fernando	20	80.0	5	20.0	0	0.0	0	0.0	0	0.0	0	0.0
City of Talisay	86	72.3	16	13.4	12	10.1	2	1.7	3	2.5	0	0.0
Metro Cebu	1,260	53.4	376	15.9	482	20.4	114	4.8	59	2.5	67	2.8

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

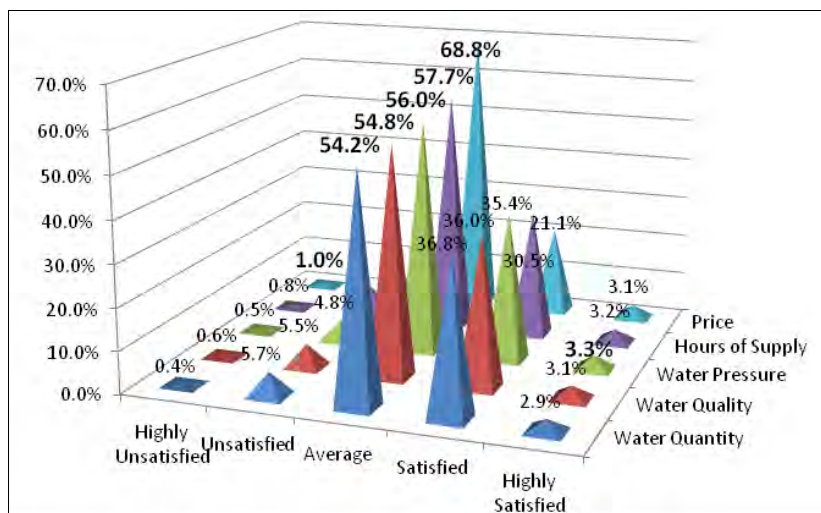
Figure 1.5.28 Average Monthly Water Consumption per City / Municipality (in cubic meter)

1.61 Most of the households connected to the piped water supply system in Metro Cebu perceived its current service level in terms of water quantity, water quality, water pressure, hours of supply, and price as average to satisfactory (see Table 1.5.19 and Figure 1.5.29). Among the service criteria, price seems to be the least satisfactory.

Table 1.5.19 Satisfaction with Current Service Level of Piped Water Supply in Metro Cebu

Dimension / Area	Level of Satisfaction									
	Highly Unsatisfied		Unsatisfied		Average		Satisfied		Highly Satisfied	
	No.	%	No.	%	No.	%	No.	%	No.	%
Water Quantity	14	0.4	192	5.7	1,826	54.2	1,238	36.8	97	2.9
Water Quality	20	0.6	186	5.5	1,845	54.8	1,213	36.0	104	3.1
Water Pressure	18	0.5	162.0	4.8	1,886	56.0	1,191	35.4	111	3.3
Hours of Supply	28	0.8	263	7.8	1,941	57.7	1,026	30.5	107	3.2
Price	32	1.0	202	6.0	2,308	68.8	706	21.1	105	3.1

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.29 Satisfaction with Current Service Level of Piped Water Supply System in Metro Cebu

1.62 Most of the families in Metro Cebu with their own private wells are still able to use these wells daily (i.e., 88% of families with wells), while the rest have not used them recently (see Table 1.5.20). Many found the current conditions of their household wells as still satisfactory in terms of water quantity and quality.

Table 1.5.20 Satisfaction with Current Conditions of Household Wells

Dimension / Area	Level of Satisfaction									
	Highly Unsatisfied		Unsatisfied		Average		Satisfied		Highly Satisfied	
	No.	%	No.	%	No.	%	No.	%	No.	%
Water Quantity	5	1.1	15	3.4	219	49.4	157	35.4	47	10.6
Water Quality	5	1.1	23	5.2	226	51.1	161	36.4	27	6.1

Source: JICA Study Team – HIS 2014.

1.63 For households who have not used their wells recently, their main reason for non-use was the introduction of the piped water supply system (40%), the drying up of wells and pollution (both 26.7%), and salt water intrusion (6.7%) (see Table 1.5.21).

Table 1.5.21 Reasons for Not Using Well

Reason for Not using Well	No.	%
Drying up	4	26.7
Pollution	4	26.7
Salt water intrusion	1	6.7
Introduction of piped water supply	6	40.0

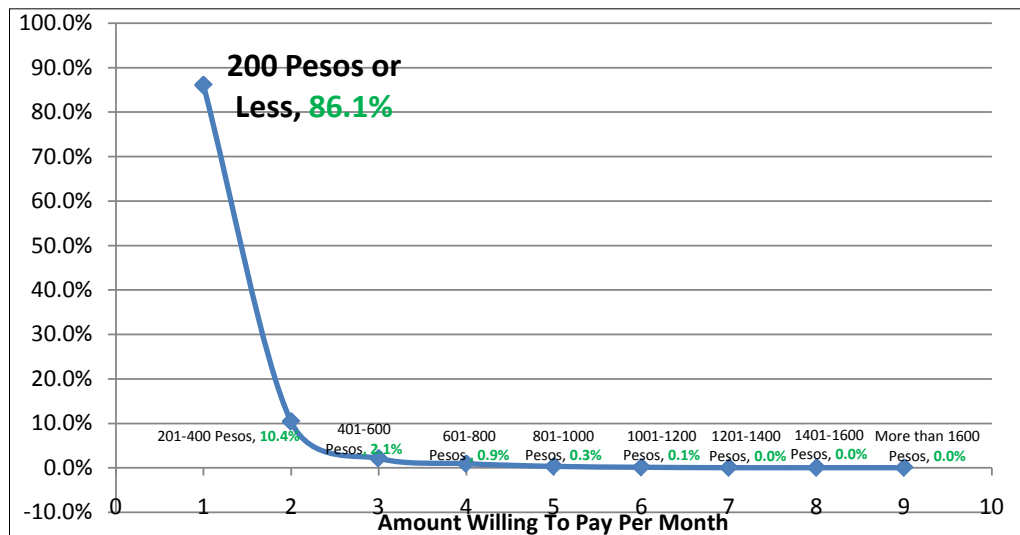
Source: JICA Study Team – HIS 2014.

1.64 Apparently, households in Metro Cebu are sensitive to the pricing of improved water supply. About 86% of the sample population is only willing to pay PHP200 or less a month if a stable and 24-hour water supply is provided (see Figure 1.5.30). Only a fairly small population is willing to pay higher than this amount.

(3) Sanitation

1.65 Many (80%) of the sample households in Metro Cebu use pour-flush toilet in their houses (see Table 1.5.22). Only 4% have flush toilets while 9% use pit latrine. The rest have no toilet facility in their houses at all.

1.66 The cities of Lapu-Lapu and Talisay have the highest number of households either with no flush toilet or no toilet at all.



Source: JICA Study Team – HIS 2014.

Figure 1.5.30 Amount Households are Willing to Pay for Improved Water Supply

Table 1.5.22 Toilet Facility per City / Municipality

City / Municipality	Toilet Facility							
	No Toilet		Pit Latrine		Pour-Flush Toilet		Flush Toilet	
	No.	%	No.	%	No.	%	No.	%
City of Carcar	1	0.4	33	14.2	196	84.5	2	0.9
Cebu City	137	5.8	88	3.7	2,041	86.1	105	4.4
Compostela	3	3.2	2	2.1	89	93.7	1	1.1
Consolacion	3	1.1	19	6.9	232	84.7	20	7.3
Cordova	9	7.8	4	3.5	86	74.8	16	13.9
Danao City	4	1.4	46	16.2	234	82.4	0	0.0
Lapu-Lapu City	148	13.7	241	22.3	642	59.3	51	4.7
Liloan	4	1.8	10	4.5	204	91.5	5	2.2
Mandaue City	63	7.3	30	3.5	716	83.3	51	5.9
Minglanilla	7	2.7	18	7.0	222	86.0	11	4.3
City of Naga	3	1.4	18	8.1	195	87.8	6	2.7
San Fernando	2	1.4	12	8.5	126	89.4	1	0.7
City of Talisay	49	10.7	55	12.0	335	72.8	21	4.6
Metro Cebu	433	6.5	576	8.7	5,318	80.4	290	4.4

Source: JICA Study Team – HIS 2014.

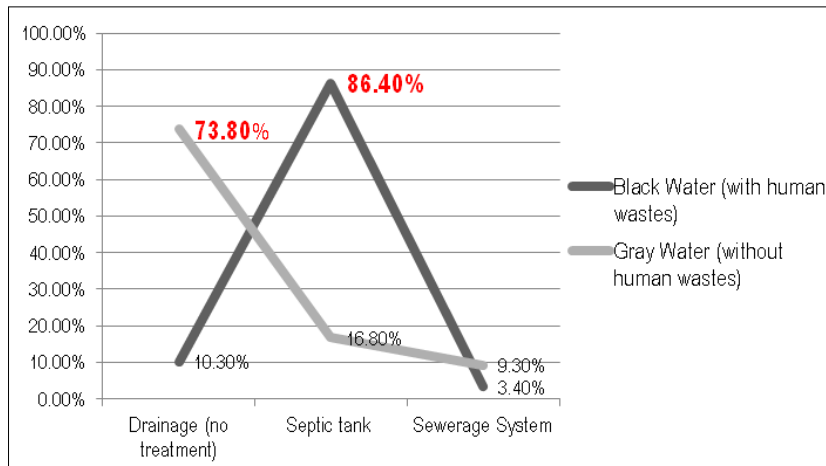
1.67 Some 86.4% of the households in Metro Cebu have septic tanks to dispose of black water (waste water with human wastes), as shown in Table 1.5.23 and Figure 1.5.31). Gray water (waste water without human wastes), on the other hand, is taken care of mainly through drainage (no treatment).

1.68 For those with septic tanks, almost half of them have never tried removing sludge from the tank (see Table 1.5.24). Only 17% do it at least every 3 or 5 years, while a lesser number (4%) clean their septic tanks annually.

Table 1.5.23 Sewerage Treatment per City / Municipality

City / Municipality	Black Water (waste water with human wastes)						Gray Water (waste water without human wastes)					
	Drainage (no treatment)		Septic Tank		Sewerage System		Drainage (no treatment)		Septic Tank		Sewerage System	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	18	7.8	214	92.2	0	0.0	174	76.0	55	24.0	0	0.0
Cebu City	145	6.6	2,037	92.6	17	0.8	1,796	81.9	361	16.5	37	1.7
Compostela	1	1.1	93	98.9	0	0.0	81	88.0	11	12.0	0	0.0
Consolacion	7	2.6	267	97.4	0	0.0	2,324	98.5	35	1.5	0	0.0
Cordova	13	11.3	93	80.9	9	7.8	77	67.5	30	26.3	7	6.1
Danao City	1	0.4	279	99.6	0	0.0	272	97.8	4	1.4	2	0.7
Lapu-Lapu City	143	13.3	827	76.8	107	9.9	626	58.7	264	24.8	176	16.5
Liloan	2	0.9	220	99.1	0	0.0	201	90.5	21	9.5	0	0.0
Mandaue City	152	17.9	632	74.6	63	7.4	505	59.4	103	12.1	242	28.5
Minglanilla	27	10.5	228	89.1	1	0.4	190	75.1	56	22.1	7	2.8
City of Naga	28	12.8	188	85.8	3	1.4	158	72.1	58	26.5	3	1.4
San Fernando	6	4.3	135	95.7	0	0.0	113	80.7	25	17.9	2	1.4
City of Talisay	113	25.4	316	71.0	16	3.6	281	62.6	50	11.1	118	26.3
Metro Cebu	656	10.2	5,529	86.4	216	3.4	6,798	80.3	1,073	12.7	594	7.0

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

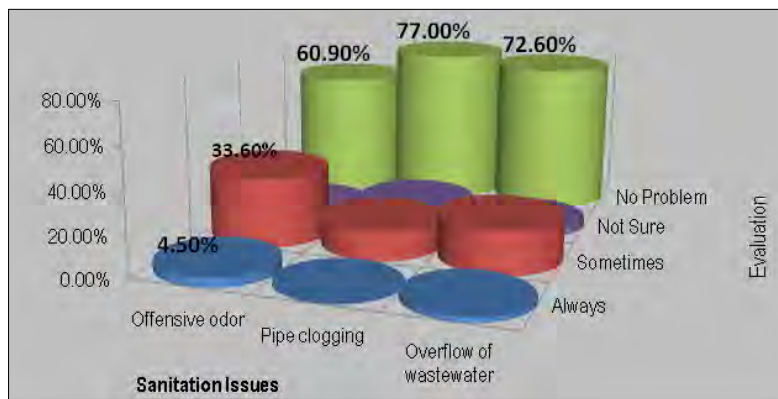
Figure 1.5.31 Sewerage Treatment in Metro Cebu

Table 1.5.24 Frequency of Removing Sludge from Septic Tank

Frequency									
Annually		Every 3 years		Every 5 years or more		Never		Not Sure	
No.	%	No.	%	No.	%	No.	%	No.	%
228	4.2	305	5.6	604	11.2	2,388	44.2	1,880	34.8

Source: JICA Study Team – HIS 2014.

1.69 A great majority (up to 77%) of the households in Metro Cebu did not see the sanitation issues of offensive odor, pipe clogging, and overflow of wastewater as problems (see Figure 1.5.32). Among these issues, however, offensive odor stands out as a more common complaint especially in Talisay City, Cordova and Cebu (see Table 1.5.25).



Source: JICA Study Team – HIS 2014.

Figure 1.5.32 Evaluation of Household Sanitation in Metro Cebu

Table 1.5.25 Evaluation of Household Sanitation per City / Municipality

City / Municipality	Sanitation Issues															
	Offensive Odor								Pipe Clogging							
	Always		Sometimes		No problem		Not Sure		Always		Sometimes		No problem		Not Sure	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	1	0.4	77	33.2	153	65.9	1	0.4	0	0.0	19	8.2	173	74.6	40	17.2
Cebu City	166	7.3	937	41.2	1,149	50.5	21	0.9	22	1.0	444	19.5	1,717	75.5	90	4.0
Compostela	0	0.0	44	46.3	51	53.7	0	0.0	0	0.0	4	4.2	91	95.8	0	0.0
Consolacion	6	2.2	76	27.7	192	70.1	0	0.0	1	0.4	37	13.5	235	85.8	1	0.4
Cordova	2	1.7	56	48.7	55	47.8	2	1.7	0	0.0	9	7.8	43	37.4	63	54.8
Danao City	0	0	134	47.2	150	52.8	0	0.0	0	0.0	18	6.3	266	93.7	0	0.0
Lapu-Lapu City	16	1.9	38	4.5	776	91.0	23	2.7	0	0.0	101	9.4	787	72.9	191	17.7
Liloan	4	1.8	74	33.2	145	65.0	0	0.0	1	0.4	13	5.8	206	92.4	3	1.3
Mandaue City	49	5.6	262	30.1	544	62.6	5	0.6	6	0.7	158	18.5	657	76.9	33	3.9
Minglanilla	2	0.8	78	30.2	173	67.1	5	1.9	0	0.0	16	6.2	209	81.0	33	12.8
City of Naga	2	0.9	54	24.3	165	74.3	1	0.5	0	0.0	13	5.9	192	86.5	17	7.7
San Fernando	1	0.7	45	31.9	95	67.4	0	0.0	0	2.1	6	51.8	111	78.7	24	41.8
City of Talisay	32	7.0	240	52.2	185	40.2	3	0.7	3	0.7	73	15.9	325	70.7	59	12.8
Metro Cebu	281	4.5	2115	33.6	3,833	60.9	61	1.0	33	0.5	911	14.0	5,012	77.0	554	8.5

City / Municipality	Sanitation Issues							
	Overflow of Wastewater							
	Always		Sometimes		No problem		Not Sure	
	No.	%	No.	%	No.	%	No.	%
City of Carcar	0	0.0	25	10.8	174	75.0	33	14.2
Cebu City	83	3.7	676	29.8	1,458	64.2	55	2.4
Compostela	0	0.0	4	4.2	91	95.8	0	0.0
Consolacion	2	0.7	50	18.2	221	80.7	1	0.4
Cordova	0	0.0	22	19.1	63	54.8	30	26.1
Danao City	0	0.0	48	16.9	236	83.1	0	0.0
Lapu-Lapu City	7	0.6	184	17.1	788	73.0	100	9.3
Liloan	1	0.4	27	12.1	195	87.4	0	0.0
Mandaue City	43	5.0	196	22.8	614	71.5	6	0.7
Minglanilla	1	0.4	19	7.4	215	83.3	23	8.9
City of Naga	0	0.0	12	5.4	192	86.5	18	8.1
San Fernando	0	0.0	15	12.8	102	87.2	0	0.0
City of Talisay	10	2.2	87	18.9	360	78.3	3	0.7
Metro Cebu	147	2.3	1365	21.0	4,709	72.6	269	4.1

Source: JICA Study Team – HIS 2014.

1.70 Table 1.5.26 shows that 66.4% of sample households in Metro Cebu are not willing to pay any amount if sanitary conditions in their houses were to be improved. Most of those willing to pay would only do so for up to PHP200 only.

Table 1.5.26 Amount Willing to Pay for Improved Household Sanitary Condition in Metro Cebu

None		1–100 Pesos		101–200 Pesos		201–400 Pesos		401–600 Pesos		601–800 Pesos		801–1000 Pesos		More than 1000 Pesos	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
4,302	66.4	1,569	24.2	378	5.8	137	2.1	51	0.8	20	0.3	4	0.1	18	0.3

Source: JICA Study Team – HIS 2014.

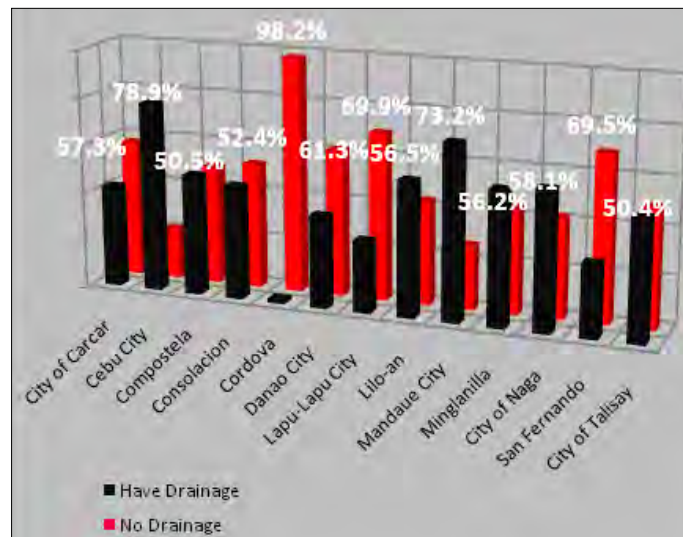
(4) Drainage

1.71 About 58% of sample households in Metro Cebu have drainage systems in their respective neighborhoods (see Table 1.5.27 and Figure 1.5.33). Most of those without drainages are in Cordova, Lapu-Lapu City, San Fernando, Danao City, and the City of Carcar. Cordova, in particular, posted the highest rate (98.2%) of households with no drainage. On the other hand, Cebu City had the highest rate (78.9%) of households with area drainages, followed closely by Mandaue City with 73.2%. More or less around half of the households in the other LGUs reported having drainage systems.

Table 1.5.27 Area Drainage System per City / Municipality

City / Municipality	Have Drainage		No Drainage	
	No.	%	No.	%
City of Carcar	99	42.7	133	57.3
Cebu City	1,778	78.9	476	21.1
Compostela	48	50.5	47	49.5
Consolacion	130	47.6	143	52.4
Cordova	2	1.8	112	98.2
Danao City	110	38.7	174	61.3
Lapu-Lapu City	324	30.1	754	69.9
Liloan	126	56.5	97	43.5
Mandaue City	627	73.2	230	26.8
Minglanilla	145	56.2	113	43.8
City of Naga	129	58.1	93	41.9
San Fernando	43	30.5	98	69.5
City of Talisay	232	50.4	228	49.6
Metro Cebu	3,793	58.4	2,698	41.6

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

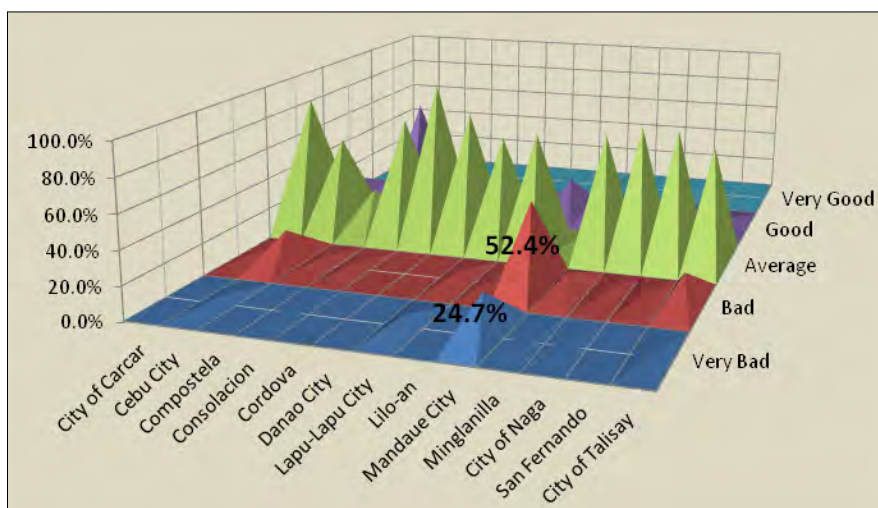
Figure 1.5.33 Area Drainage System per City / Municipality

1.72 Metro Cebu-wide, majority (61.5%) of households rated the drainage systems in their vicinities as average (see Table 1.5.28 and Figure 1.5.34). Compared across LGUs, however, it shows that people in Mandaue City were the least satisfied with their drainage system, rating it bad or very bad.

Table 1.5.28 Drainage Conditions in the Neighborhood

City / Municipality	Drainage Condition									
	Very Bad		Bad		Average		Good		Very Good	
	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	0	0.0	3	3.0	84	84.8	12	12.1	0	0.0
Cebu City	67	3.8	353	20.0	1053	59.6	292	16.5	2	0.1
Compostela	0	0.0	2	4.2	13	27.1	33	68.8	0	0.0
Consolacion	1	0.8	4	3.1	98	75.4	26	20.0	1	0.8
Cordova	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0
Danao City	0	0.0	0	0.0	91	82.7	19	17.3	0	0.0
Lapu-Lapu City	21	6.5	16	4.9	223	68.8	63	19.4	1	0.3
Liloan	0	0.0	4	3.2	92	73.0	30	23.8	0	0.0
Mandaue City	57	24.7	121	52.4	8	3.5	41	17.7	4	1.7
Minglanilla	1	0.7	18	12.4	109	75.2	17	11.7	0	0.0
City of Naga	1	0.8	4	3.1	106	82.2	16	12.4	2	1.6
San Fernando	0	0.0	2	4.7	35	81.4	6	14.0	0	0.0
City of Talisay	5	2.2	44	19.0	168	72.4	15	6.5	0	0.0
Metro Cebu	153	4.5	571	16.9	2082	61.5	570	16.8	10	0.3

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

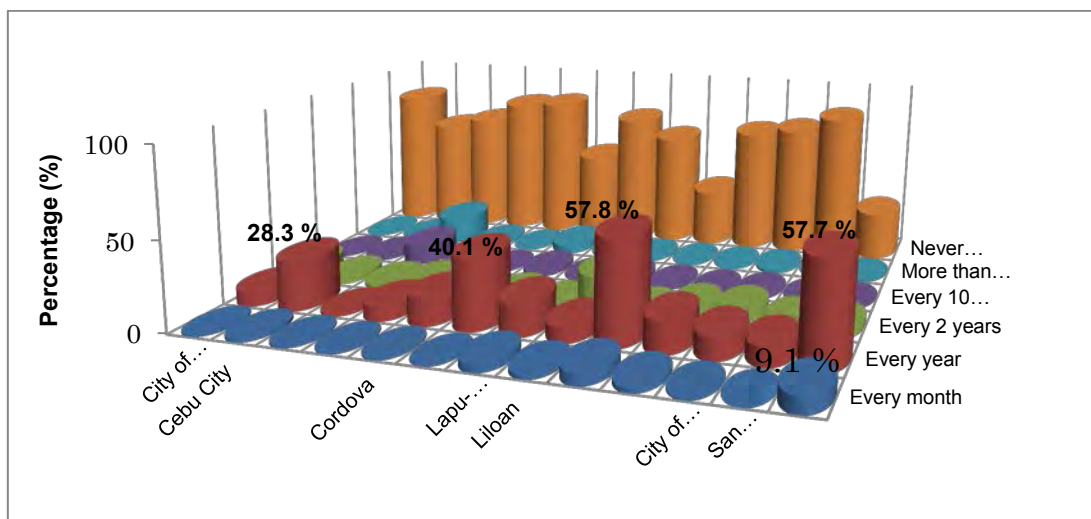
Figure 1.5.34 Drainage Conditions in the Neighborhood

1.73 According to the sample households, flooding more frequently occurs--that is, at least yearly--in Mandaue City (as cited by 57.8% of respondents), City of Talisay (57.7%), Danao City (40.1%), and Cebu City (28.3%) (see Table 1.5.29 and Figure 1.5.35). For a significant number of households in the cities of Talisay, Mandaue and Lapu-Lapu, flooding is a monthly occurrence. Most people in the rest of the cities and municipalities said they have never experienced flooding in their areas.

Table 1.5.29 Frequency of Flooding per City / Municipality

City / Municipality	Frequency											
	Every Month		Every Year		Every 2 Years		Every 10 Years		More than Every 10 Years		Never Experienced	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	2	0.9	20	8.7	18	7.8	0	0.0	1	0.4	190	82.3
Cebu City	42	1.9	625	28.3	71	3.2	38	1.7	16	0.7	1,419	64.2
Compostela	1	1.1	1	1.1	2	2.2	10	10.8	14	15.1	65	69.9
Consolacion	2	0.7	23	8.5	15	5.5	7	2.6	3	1.1	222	81.6
Cordova	1	0.9	18	15.7	0	0.0	0	0.0	0	0.0	96	83.5
Danao City	0	0.0	114	40.1	8	2.8	6	2.1	14	4.9	142	50.0
Lapu-Lapu City	47	4.4	198	18.3	7	0.6	3	0.3	3	0.3	822	76.1
Liloan	5	2.3	19	8.6	45	20.4	5	2.3	2	0.9	145	65.6
Mandaue City	56	6.5	495	57.8	19	2.2	3	0.4	2	0.2	281	32.8
Minglanilla	7	2.7	46	17.8	18	7.0	0	0.0	1	0.4	186	72.1
City of Naga	2	0.9	28	12.7	19	8.6	2	0.9	3	1.4	167	75.6
San Fernando	0	0.0	15	10.7	7	5.0	0	0.0	0	0.0	118	84.3
City of Talisay	41	9.1	261	57.7	25	5.5	1	0.2	1	0.2	123	27.2
Metro Cebu	206	3.2	1,863	29.0	254	3.9	75	1.2	60	0.9	3,976	61.8

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.35 Frequency of Flooding per City / Municipality

(5) Electricity and Fuel

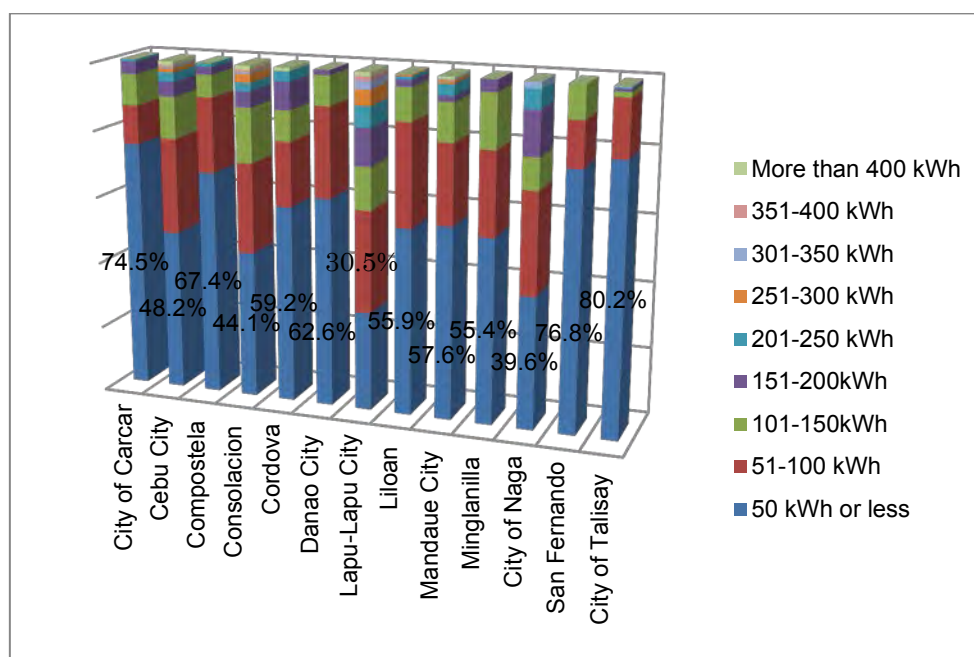
1.74 Half of the households in Metro Cebu only consumes an average of 50 kWh or less of electricity per month (see Table 1.5.30 and Figure 1.5.36). Another fourth of the total averages 51–100 kWh.

1.75 Households in Talisay City, San Fernando, City of Carcar and Compostela use relatively less electricity than those in the other LGUs. On the other hand, there are more high electricity consumers in the cities of Lapu-Lapu and Naga than any other place.

Table 1.5.30 Average Monthly Household Consumption of Electricity per City / Municipality (in kWh)

City / Municipality	Monthly Consumption of Electricity																	
	50 kWh or less		51-100 kWh		101-150kWh		151-200kWh		201-250 kWh		251-300 kWh		301-350 kWh		351-400 kWh		More than 400 kWh	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	102	74.5	16	11.7	13	9.5	5	3.6	1	0.7	0	0.0	0	0.0	0	0.0	0	0.0
Cebu City	984	48.2	585	28.6	259	12.7	89	4.4	56	2.7	27	1.3	11	0.5	8	0.4	23	1.1
Compostela	60	67.4	20	22.5	6	6.7	2	2.2	1	1.1	0	0.0	0	0.0	0	0.0	0	0.0
Consolacion	104	44.1	64	27.1	39	16.5	11	4.7	6	2.5	6	2.5	1	0.4	2	0.8	3	1.3
Cordova	58	59.2	19	19.4	9	9.2	8	8.2	3	3.1	0	0.0	0	0.0	0	0.0	1	1.0
Danao City	169	62.6	73	27.0	24	8.9	4	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Lapu-Lapu City	223	29.7	229	30.5	97	12.9	84	11.2	47	6.3	35	4.7	18	2.4	10	1.3	9	1.2
Liloan	113	55.9	62	30.7	20	9.9	4	2.0	2	1.0	1	0.5	0	0.0	0	0.0	0	0.0
Mandaue City	407	57.6	170	24.0	81	11.5	12	1.7	23	3.3	7	1.0	3	0.4	0	0.0	4	0.6
Minglanilla	31	55.4	14	25.0	9	16.1	2	3.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
City of Naga	21	39.6	16	30.2	5	9.4	7	13.2	3	5.7	0	0.0	1	1.9	0	0.0	0	0.0
San Fernando	63	76.8	11	13.4	8	9.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
City of Talisay	292	80.2	61	16.8	6	1.6	3	0.8	1	0.3	0	0.0	1	0.3	0	0.0	0	0.0
Metro Cebu	2,627	51.6	1,340	26.3	576	11.3	231	4.5	143	2.8	76	1.5	35	0.7	20	0.4	40	0.8

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

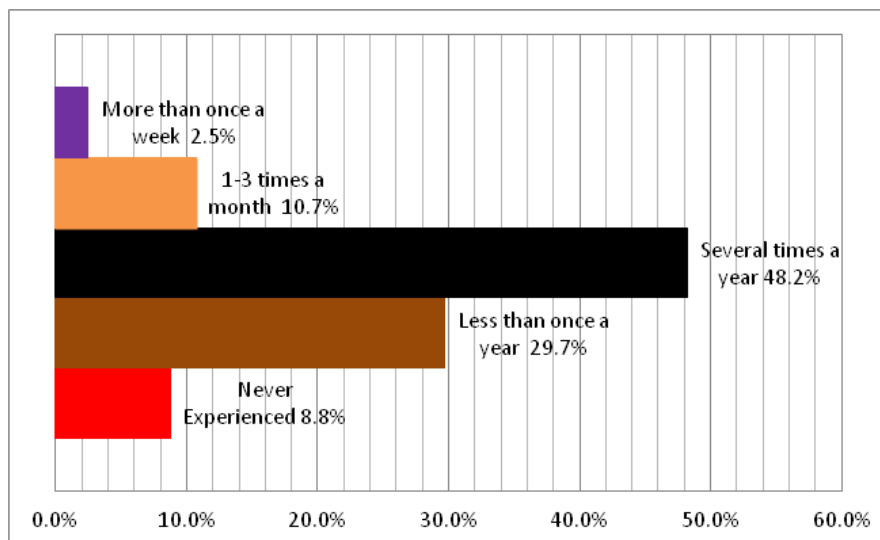
Figure 1.5.36 Average Monthly Household Consumption of Electricity per City / Municipality (in kWh)

1.76 As shown in Table 1.5.31 and Figure 1.5.37, about half of the sample households in Metro Cebu experience electricity blackout several times a year. Power supply seems to be more a problem for residents in Liloan, Cebu City, Compostela and Consolacion where around a fifth of households suffer power outages one to three times a month, with some losing their electricity more than once a week. On the other hand, the power supply is more stable in Mandaue City, Danao City, Talisay City and Minglanilla where at least half of the households reported that they either do not experience any blackout or only do so less than once a year.

Table 1.5.31 Frequency of Electricity Blackout in Metro Cebu per City / Municipality

City / Municipality	Frequency of Experiencing Blackout									
	Never Experienced		Less than Once a Year		Several Times a Year		1-3 Times a Month		More than Once a Week	
	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	25	11.5	51	23.5	110	50.7	31	14.3	0	0.0
Cebu City	169	7.7	505	23.1	1,043	47.8	431	19.7	35	1.6
Compostela	4	4.4	21	23.3	47	52.2	17	18.9	1	1.1
Consolacion	15	5.6	97	36.3	106	39.7	13	4.9	36	13.5
Cordova	6	6.0	3	3.0	89	89.0	1	1.0	1	1.0
Danao City	64	23.9	77	28.7	90	33.6	0	0.0	37	13.8
Lapu-Lapu City	67	7.7	96	11.1	674	77.7	20	2.3	10	1.2
Liloan	18	8.4	75	34.9	76	35.3	15	7.0	31	14.4
Mandaue City	66	8.3	395	49.7	313	39.4	20	2.5	0	0.0
Minglanilla	46	18.8	77	31.4	101	41.2	21	8.6	0	0.0
City of Naga	19	8.9	76	35.7	85	39.9	33	15.5	0	0.0
San Fernando	4	3.0	46	34.8	73	55.3	9	6.8	0	0.0
City of Talisay	26	6.4	264	65.2	86	21.2	29	7.2	0	0.0
Metro Cebu	529	8.8	1,783	29.7	2,893	48.2	640	10.7	151	2.5

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.37 Frequency of Electricity Blackout in Metro Cebu

1.77 Some 53.5% of the sample size in Metro Cebu assessed the current electricity charges as reasonable, 45.7% as expensive, and 0.8% as inexpensive (see Table 1.5.32 and Figure 1.5.38).

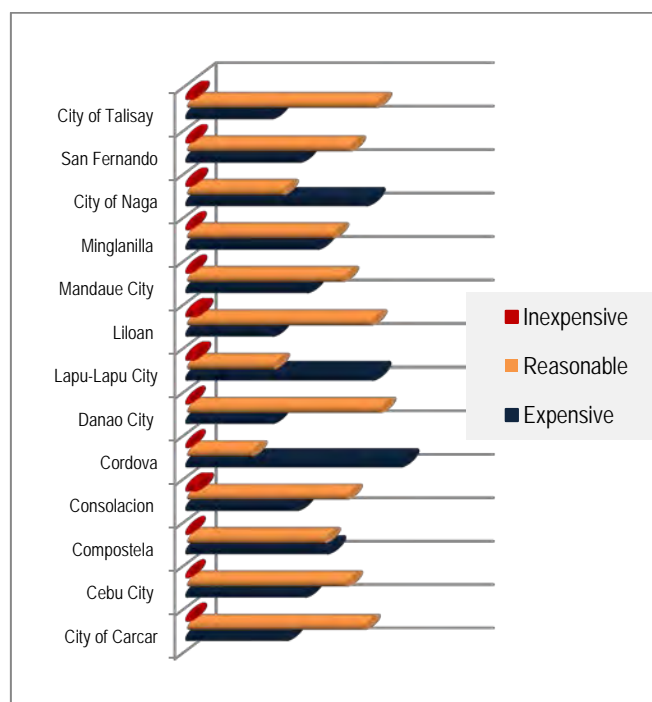
1.78 From 50–77% of the households in Cordova, Lapu-Lapu City, City of Naga and Compostela find their electricity charges expensive while those in the other cities and municipalities generally think that the power rates are at least reasonable.

1.79 As illustrated in Figure 1.5.39 below, over a third of the households in Metro Cebu said that they have no need for better electricity services (that is, without blackout and voltage fluctuation). For those who desire improved electricity services, about the same number do not want to pay any additional charge for such improved services. Another 14% said they would pay only an additional PHP50 or less per month while the rest would pay from PHP51–300 for improved electricity services.

Table 1.5.32 Evaluation of Current Household Electricity Charges per City / Municipality

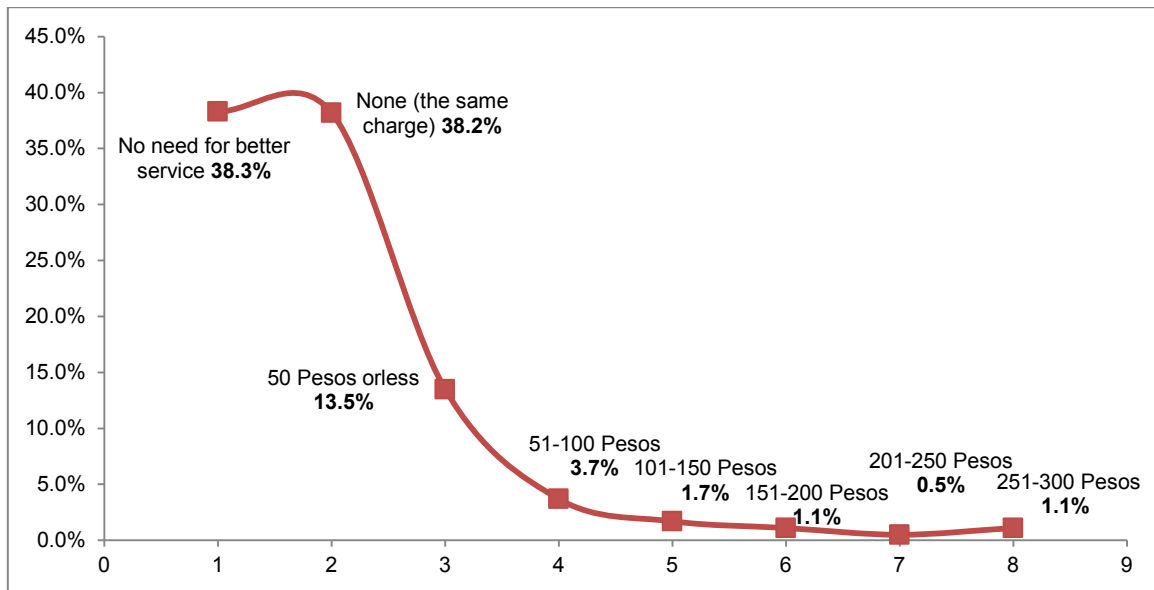
City / Municipality	Appraisal					
	Expensive		Reasonable		Inexpensive	
	No.	%	No.	%	No.	%
City of Carcar	78	35.8	139	63.8	1	0.5
Cebu City	929	42.6	1,253	57.4	0	0.0
Compostela	45	50.6	44	49.4	0	0.0
Consolacion	106	39.7	153	57.3	8	3.0
Cordova	77	77.0	23	23.0	0	0.0
Danao City	82	30.6	186	69.4	0	0.0
Lapu-Lapu City	583	66.9	271	31.1	17	2.0
Liloan	67	31.0	143	66.2	6	2.8
Mandaue City	344	43.4	444	56.0	5	0.6
Minglanilla	116	47.2	129	52.4	1	0.4
City of Naga	138	64.8	73	34.3	2	0.9
San Fernando	53	40.8	76	58.5	1	0.8
City of Talisay	125	30.6	277	67.9	6	1.5
Metro Cebu	2,743	45.7	3,211	53.5	47	0.8

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.38 Evaluation of Current Electricity Charges per City / Municipality



Source: JICA Study Team – HIS 2014.

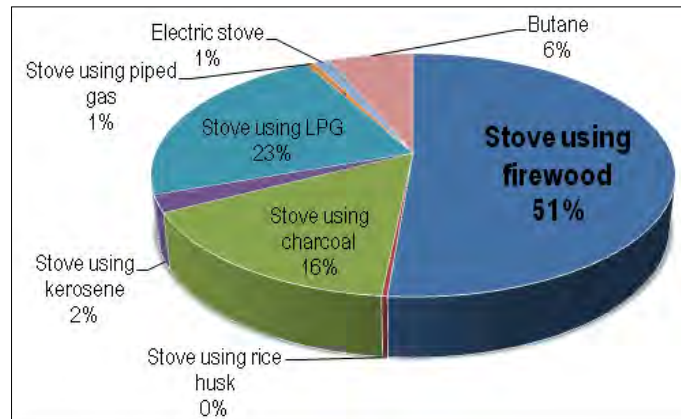
Figure 1.5.39 Additional Payment for Improved Electricity Services in Metro Cebu

1.80 Table 1.5.33 and Figure 1.5.40 shows that the stove is the primary means of cooking and boiling water in Metro Cebu. A diversity of materials is used to fuel the stove, including firewood (used by 51% of households), LPG (22%), charcoal (16%), butane (6%), kerosene (2%), electricity (1%), piped gas (0.6%), and even rice husk (0.3%).

Table 1.5.33 Means of Cooking and Boiling Water in Metro Cebu

City / Municipality	Means															
	Stove Using Firewood		Stove Using Rice Husk		Stove Using Charcoal		Stove Using Kerosene		Stove Using LPG		Stove Using Piped Gas		Electric Stove		Butane	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	204	87.9	1	0.4	6	2.6	1	0.4	19	8.2	0	0	1	0.4	0	0
Cebu City	798	35.3	2	0.1	566	25	82	3.6	560	24.8	27	1.2	47	2.1	180	8.0
Compostela	76	80.0	0	0	2	2.1	1	1.1	13	13.7	1	1.1	0	0	2	2.1
Consolacion	152	55.7	0	0	14	5.1	9	3.3	85	31.1	0	0	1	0.4	12	4.4
Cordova	59	51.8	0	0	7	6.1	4	3.5	42	36.8	0	0	1	0.9	1	0.9
Danao City	246	87.2	0	0	13	4.6	0	0	14	5.0	0	0	1	0.4	8	2.8
Lapu-Lapu City	636	60.2	6	0.6	56	5.3	26	2.5	230	21.8	2	0.2	2	0.2	99	9.4
Liloan	143	64.1	4	1.8	4	1.8	2	0.9	54	24.2	1	0.4	0	0	15	6.7
Mandaue City	273	33.8	1	0.1	232	28.7	5	0.6	245	30.3	2	0.2	4	0.5	46	5.7
Minglanilla	171	66.5	0	0	8	3.1	1	0.4	61	23.7	0	0	5	1.9	11	4.3
City of Naga	149	67.4	2	0.9	12	5.4	2	0.9	45	20.4	0	0	4	1.8	7	3.2
San Fernando	90	84.1	0	0	5	4.7	0	0	10	9.3	0	0	1	0.9	1	0.9
City of Talisay	279	61.2	5	1.1	75	16.4	17	3.7	55	12.1	4	0.9	7	1.5	14	3.1
Metro Cebu	3,276	51.3	21	0.3	1,000	15.7	150	2.3	1,433	22.4	37	0.6	74	1.2	396	6.2

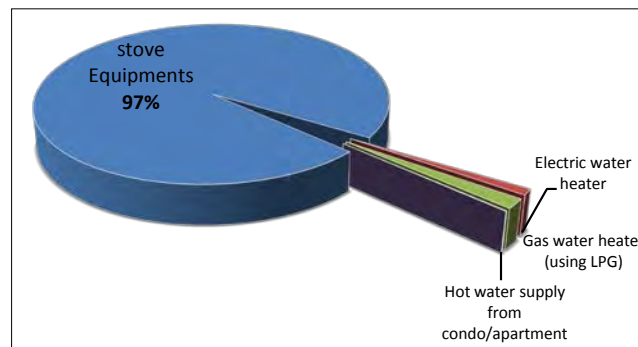
Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.40 Means of Cooking and Boiling Water

1.81 The aforementioned stove equipments are also the ones mainly used by Metro Cebu households (97%) for making hot water for bathing purposes (see Figure 1.5.41). Only a few households use electric water heaters and gas water heaters (using LPG), or obtain it from their condominiums' hot water supply.



Source: JICA Study Team – HIS 2014.

Figure 1.5.41 Means of Hot Water for Shower/Bath

(6) Solid Waste Disposal

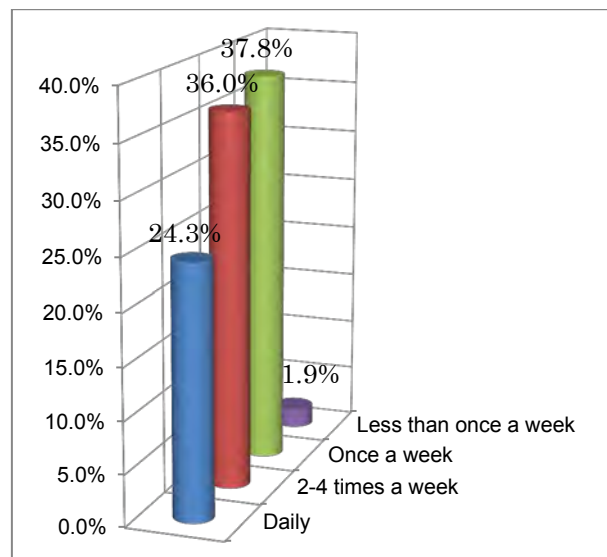
1.82 Most (95.3%) of the households in Metro Cebu said that residential solid waste collection services are available in their areas (see Table 1.5.34). Almost a tenth of the households in San Fernando, the City of Naga, and Cebu City reported having none of such services available.

1.83 Figure 1.5.42 shows that the schedule of solid waste collection in Metro Cebu is quite regular and fairly frequent, with 24.3% of households reporting a daily collection, 36.0% being served 2–4 times a week, and 37.8% having their solid waste picked up at least once a week. Collection services are more frequent in Cebu City, Lapu-Lapu City, and Mandaue City.

Table 1.5.34 Availability and Frequency of Residential Solid Waste Collection Services in Metro Cebu per City / Municipality

City / Municipality	Availability				Frequency / Schedule of Service							
	Available		Not Available		Daily		2-4 Times A Week		Once a Week		Less than Once a Week	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	94	94.9	5	5.1	7	7.6	30	32.6	51	55.4	4	4.3
Cebu City	2,009	92.4	166	7.6	655	32.8	799	40.0	510	25.5	35	1.8
Compostela	68	100.0	0	0.0	0	0.0	29	42.6	39	57.4	0	0.0
Consolacion	228	97.0	7	3.0	8	3.5	124	54.6	95	41.9	0	0.0
Cordova	108	98.2	2	1.8	2	1.9	4	3.7	102	94.4	0	0.0
Danao City	171	100.0	0	0.0	41	24.0	35	20.5	92	53.8	3	1.8
Lapu-Lapu City	820	99.0	8	1.0	281	34.5	271	33.3	251	30.8	11	1.4
Liloan	220	99.5	1	0.5	29	13.2	79	35.9	104	47.3	8	3.6
Mandaue City	792	96.1	32	3.9	159	20.2	310	39.3	310	39.3	10	1.3
Minglanilla	145	95.4	7	4.6	24	16.6	46	31.7	72	49.7	3	2.1
City of Naga	76	90.5	8	9.5	20	26.3	17	22.4	36	47.4	3	3.9
San Fernando	24	88.9	3	11.1	1	4.2	14	58.3	8	33.3	1	4.2
City of Talisay	358	96.5	13	3.5	12	3.4	75	21.0	253	70.9	17	4.8
Metro Cebu	5,113	95.3	252	4.7	1,239	24.3	1,833	36.0	1,923	37.8	95	1.9

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.42 Frequency/Schedule of Residential Trash Collection in Metro Cebu

1.84 While residential trash collection services in Metro Cebu are quite efficient, the same may not be said of its provision of public waste containers. Only 41.9% of households reported having such trash containers made available to the public (see Table 1.5.35). Such containers are relatively more visible in Consolacion (63.2%), Liloan (56.1%), Compostela (54.4%), Lapu-Lapu City (51.7%), and Danao City (51.2%). On the other hand, there are not many public waste containers particularly in the City of Carcar, Cordova, and even in Cebu City.

1.85 For those being provided with public waste containers for disposal of solid waste materials, these containers are more often provided once a week or at least 2–4 times a week.

Table 1.5.35 Availability and Frequency of Trash Disposal (Public Waste Container)

City / Municipality	Public Waste Container				Frequency of Service							
	Available		Not Available		Daily		2-4 Times a Week		Once a Week		Less than Once a Week	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	21	22.3	73	77.7	2	9.5	6	28.6	13	61.9	0	0.0
Cebu City	716	34.9	1,335	65.1	244	34.6	217	30.7	238	33.7	7	1.0
Compostela	37	54.4	31	45.6	8	21.6	16	43.2	13	35.1	0	0.0
Consolacion	148	63.2	86	36.8	37	25.2	62	42.2	47	32.0	1	0.7
Cordova	25	22.9	84	77.1	1	4.0	2	8.0	19	76.0	3	12.0
Danao City	88	51.2	84	48.8	59	67.8	7	8.0	18	20.7	3	3.4
Lapu-Lapu City	421	51.7	393	48.3	116	27.8	161	38.5	127	30.4	14	3.3
Liloan	124	56.1	97	43.9	44	35.5	42	33.9	36	29.0	2	1.6
Mandaue City	340	42.4	462	57.6	115	34.1	81	24.0	132	39.2	9	2.7
Minglanilla	46	30.5	105	69.5	0	0.0	13	28.3	31	67.4	2	4.3
City of Naga	40	47.6	44	52.4	3	7.5	11	27.5	24	60.0	2	5.0
San Fernando	2	10.0	18	90.0	0	0.0	1	50.0	1	50.0	0	0.0
City of Talisay	166	45.0	203	55.0	3	1.8	48	28.9	114	68.7	1	0.6
Metro Cebu	2,174	41.9	3,015	58.1	632	29.3	667	30.9	813	37.7	44	2.0

Source: JICA Study Team – HIS 2014.

1.86 Households in Metro Cebu generally find the current solid waste collection services provided to them as acceptable, with many of them rating their level of satisfaction as either average or satisfactory especially in terms of the situation of the city's dumpsite, cleanliness of the surroundings, and the frequency and method of collection (see Table 1.5.36). As to the collection fee, a significant number (38%) are either satisfied or highly satisfied, while some could not respond probably because they do not know about the fee rates.

Table 1.5.36 Level of Satisfaction with Solid Waste Collection Services in Metro Cebu

Area / Facet	Level of Satisfaction											
	Highly Unsatisfied		Unsatisfied		Average		Satisfied		Highly Satisfied		Don't know	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Frequency of Collection	70	1.3	830	15.5	2,846	53.3	1,394	26.1	194	3.6	7	0.1
Method of Collection	68	1.3	797	14.9	2,899	54.3	1,396	26.2	175	3.3	2	0.0
Fee	29	0.5	222	4.2	2,113	39.8	1,511	28.4	509	9.6	929	17.5
Cleanliness of the surrounding	64	1.2	571	10.7	3,362	63.0	1,157	21.7	165	3.1	15	0.3
Situation of the city's dumpsite	119	2.9	427	10.5	2,759	67.7	675	16.6	94	2.3	0	0.0

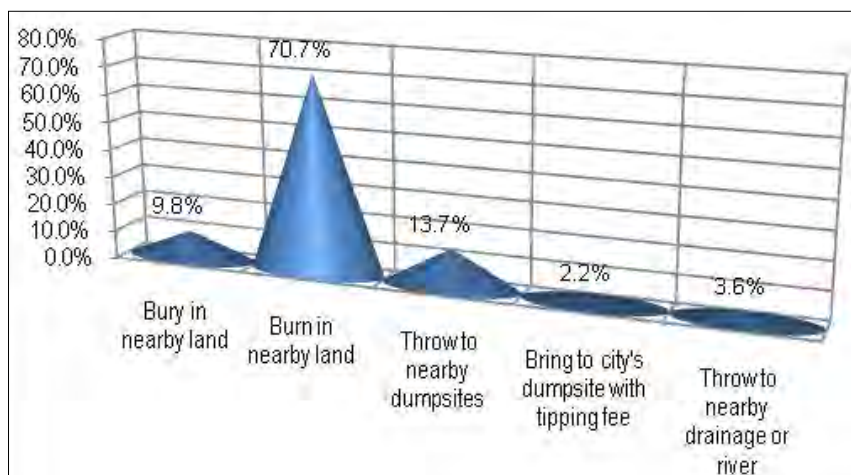
Source: JICA Study Team – HIS 2014.

1.87 Aside from the residential waste collection system, households also employ several methods of disposing their solid waste. The most common method, used by 70.7% of households, is burning trash in nearby land (see Table 1.5.37 and Figure 1.5.43). This is followed by throwing in nearby dumpsites (13.7%) and burying in nearby land (9.8%). A small number throw their trash in nearby drainage or river (3.6%) or bring it to the city's dumpsite (2.2%). The situation in Cordova, and to a lesser extent in Talisay City, is quite alarming as 40% and 22%, respectively, of households there dispose of their trash in nearby drainage or rivers.

Table 1.5.37 Alternative Methods of Solid Waste Disposal in Metro Cebu per City / Municipality

City / Municipality	Alternative Method of Disposing Solid Waste									
	Bury in Nearby Land		Burn in Nearby Land		Throw to Nearby Dumpsites		Bring to City's Dump Sites with Tipping Fee		Throw to Nearby Drainage or River	
	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	6	5.0	112	92.6	1	0.8	1	0.8	1	0.8
Cebu City	6	7.1	42	50.0	25	29.8	5	6.0	6	7.1
Compostela	6	22.2	21	77.8	0	0.0	0	0.0	0	0.0
Consolacion	3	9.1	30	90.9	0	0.0	0	0.0	0	0.0
Cordova	1	20.0	0	0.0	2	40.0	0	0.0	2	40.0
Danao City	9	8.1	89	80.2	12	10.8	0	0.0	1	0.9
Lapu-Lapu City	15	6.2	148	61.4	62	25.7	15	6.2	1	0.4
Liloan	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
Mandaue City	2	6.1	20	60.6	6	18.2	1	3.0	4	12.1
Minglanilla	15	14.6	78	75.7	8	7.8	1	1.0	1	1.0
City of Naga	31	23.8	75	57.7	20	15.4	0	0.0	4	3.1
San Fernando	7	6.3	96	86.5	7	6.3	0	0.0	1	0.9
City of Talisay	4	4.9	53	65.4	5	6.2	1	1.2	18	22.2
Metro Cebu	106	9.8	765	70.7	148	13.7	24	2.2	39	3.6

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.43 Alternative Methods of Solid Waste Disposal in Metro Cebu

1.88 Households in Metro Cebu are conscious of waste segregation and recycling. More than 90% of them segregate their wet waste, food waste, plastic bottles and other plastic waste, aluminium cans, metal, and glass bottles (see Table 1.5.38). For non-wet and non-food waste, the most common method of segregation is to sell them to buyers who come to their houses or to bring them to scrap buyers. Wet waste is usually given to the waste collection service while food waste is normally used as food for animals.

Table 1.5.38 Method of Separating Garbage by Type of Garbage

Waste Material	Separation of Garbage				Method of Separating Garbage											
	Yes		No		Give to Collection Service		Used as Containers		Used as Food for Animals		Used for Composting		Sell to Buyers Who come to Houses		Bring And Sell To Buyers	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Wet waste including food waste	6,028	92.5	491	7.5	3,950	65.8	4	0.1	1,813	30.2	225	3.7	14	0.2	0	0.0
Food waste	6,262	96.1	257	3.9	1,560	25.0	15	0.2	4,551	72.8	26	0.4	83	1.3	16	0.3
Plastic bottle	6,318	96.9	199	3.1	751	11.9	227	3.6	57	0.9	13	0.2	4,173	66.4	1,064	16.9
Other plastic waste	6,214	95.3	306	4.7	1,509	24.5	248	4.0	22	0.4	16	0.3	3,497	56.8	869	14.1
Aluminium can	6,292	96.5	225	3.5	695	11.1	20	0.3	6	0.1	7	0.1	4,304	68.8	1,220	19.5
Metal	6,263	96.2	248	3.8	628	10.1	7	0.1	9	0.1	5	0.1	4,384	70.5	1,188	19.1
Glass Bottle	6,152	94.6	351	5.4	978	16.0	168	2.7	11	0.2	21	0.3	3,837	62.8	1,095	17.9

Source: JICA Study Team – HIS 2014.

(7) Traffic Congestion

1.89 Traffic congestion on the way to the work place/ school place is almost consensually assessed as bad by LGUs in Metro Cebu—apart from the average evaluation of cities of Lapu-Lapu, Naga, and Talisay (see Table 1.5.39).

1.90 All of the households of the 13 LGUs reported that the main cause of traffic congestion is the increasing number of automobiles (see Table 1.5.40). Comparatively, reasons like lack of roads / bad roads, undisciplined manner of driving, and lack of traffic management and enforcement were considered as secondary causes.

1.91 In a metropolitan scale level, the two primary causes of traffic congestions in Metro Cebu are the increasing usage in automobiles (36.8%) and the lack of discipline of drivers (16.9%) (see Figure 1.5.44).

Table 1.5.39 Perception on Traffic Condition for Trips to Work and to School

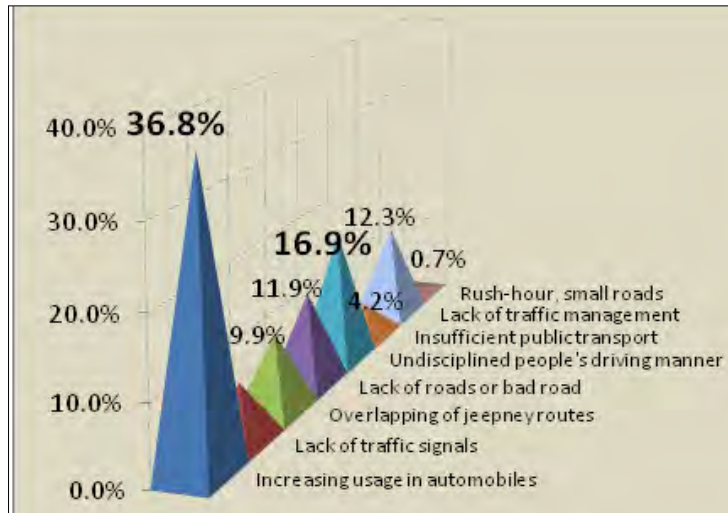
City / Municipality	Evaluation of Traffic Congestions									
	Very bad		Bad		Average		Good		Very Good	
	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	7	3.0	134	58.0	68	29.4	22	9.5	0	0.0
Cebu City	250	11.0	1,007	44.5	954	42.2	48	2.1	4	0.2
Compostela	6	6.4	61	64.9	18	19.1	9	9.6	0	0.0
Consolacion	29	10.6	127	46.4	112	40.9	6	2.2	0	0.0
Cordova	34	29.8	46	40.4	31	27.2	2	1.8	1	0.9
Danao City	21	7.4	158	55.8	99	35.0	5	1.8	0	0.0
Lapu-Lapu City	210	19.5	342	31.7	411	38.1	82	7.6	33	3.1
Liloan	3	1.4	132	59.5	85	38.3	2	0.9	0	0.0
Mandaue City	107	12.5	451	52.6	271	31.6	29	3.4	0	0.0
Minglanilla	45	17.6	132	51.8	56	22.0	21	8.2	1	0.4
City of Naga	27	12.4	50	22.9	125	57.3	16	7.3	0	0.0
San Fernando	5	3.6	86	62.3	36	26.1	11	8.0	0	0.0
City of Talisay	34	7.4	201	43.8	219	47.7	5	1.1	0	0.0
Metro Cebu	778	12.0	2,927	45.1	2,485	38.3	258	4.0	39	0.6

Source: JICA Study Team – HIS 2014.

Table 1.5.40 Perceived Causes of Traffic Congestions

City / Municipality	Causes of Traffic Congestions															
	Increasing Usage in Automobiles		Lack of Traffic Signals		Overlapping of Jeepney Routes		Lack of Roads or Bad Road		Undisciplined People's Driving Manner		Insufficient Public Transport		Lack of Traffic Management and Enforcement		Rush-hour, Small Roads, Sidewalk Vendors, On-Going Construction & Repairs, and Improper Parking	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
City of Carcar	64	27.4	12	5.1	13	5.6	9	3.8	61	26.1	47	20.1	28	12.0	0	0.0
Cebu City	914	35.9	152	6.0	284	11.2	387	15.2	370	14.5	87	3.4	310	12.2	41	1.6
Compostela	60	44.8	6	4.5	7	5.2	20	14.9	12	9.0	0	0.0	29	21.6	0	0.0
Consolacion	133	42.5	33	10.5	38	12.1	50	16.0	21	6.7	6	1.9	32	10.2	0	0.0
Cordova	72	46.2	1	0.6	2	1.3	18	11.5	24	15.4	5	3.2	34	21.8	0	0.0
Danao City	170	47.5	18	5.0	37	10.3	58	16.2	2	0.6	1	0.3	72	20.1	0	0.0
Lapu-Lapu City	394	35.9	121	11.0	137	12.5	127	11.6	149	13.6	50	4.6	118	10.8	0	0.0
Liloan	120	43.3	36	13.0	28	10.1	49	17.7	6	2.2	2	0.7	36	13.0	0	0.0
Mandaue City	409	36.1	81	7.1	106	9.3	113	10.0	277	24.4	25	2.2	117	10.3	6	0.5
Minglanilla	106	29.9	25	7.1	30	8.5	21	5.9	96	27.1	48	13.6	28	7.9	0	0.0
City of Naga	45	29.8	27	17.9	22	14.6	10	6.6	30	19.9	8	5.3	9	6.0	0	0.0
San Fernando	60	31.6	13	6.8	11	5.8	8	4.2	43	22.6	26	13.7	27	14.2	2	1.1
City of Talisay	174	38.3	15	3.3	20	4.4	12	2.6	156	34.4	9	2.0	67	14.8	1	0.2
Metro Cebu	2,721	36.8	540	7.3	735	9.9	882	11.9	1,247	16.9	314	4.2	907	12.3	50	0.7

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.44 Perceived Causes of Traffic Congestions

1.92 Comparatively, traffic congestion in Metro Cebu has worsened to a significant degree backtracking the situation five years ago (see Table 1.5.41). On the other hand, the traffic situation in Metro Cebu, particularly in the areas of safety, convenience, road condition, and air pollution, has worsened but not as much compared to five years ago (see Table 1.5.42).

Table 1.5.41 Comparison of Past versus Current Traffic Situation in Metro Cebu

Area / Dimension	Evaluation of Past vs. Current Traffic Situation									
	Very Much Worse		Worse		Worse but Not Much		Same		Better	
	No.	%	No.	%	No.	%	No.	%	No.	%
Congestion	492	7.3	2,384	35.5	2,117	31.5	1,213	18.0	518	7.7
Safety	366	5.4	1,530	22.8	2,829	42.1	1,435	21.3	562	8.4
Convenience	240	3.6	1,396	20.8	2,784	41.4	1,600	23.8	703	10.5
Road Condition	169	2.5	1,494	22.2	2,015	29.9	1,618	24.0	1,437	21.3
Air Pollution	948	14.1	2,180	32.4	1,859	27.7	1,225	18.2	509	7.6

Source: JICA Study Team – HIS 2014.

Table 1.5.42 Comparison of Past versus Current Traffic Situation by LGU

City / Municipality	Evaluation of Past vs. Current Traffic Situation by Area/ Dimension				
	Congestion	Safety	Convenience	Road Condition	Air Pollution
City of Carcar	Worse	Worse but not much	Worse but not much	Same	Same
Cebu City	Worse	Worse but not much	Worse but not much	Worse but not much	Worse
Compostela	Worse	Worse but not much	Worse but not much	Worse	Worse
Consolacion	Worse	Worse but not much	Worse but not much	Worse	Worse
Cordova	Worse but not much	Worse but not much	Worse but not much	Worse but not much	Worse
Danao City	Worse	Worse but not much	Worse but not much	Worse	Worse
Lapu-Lapu City	Worse but not much	Worse but not much	Worse but not much	Same	Worse but not much
Liloan	Worse	Worse but not much	Worse but not much	Worse	Worse
Mandaue City	Worse	Worse but not much	Worse but not much	Worse but not much	Worse but not much
Minglanilla	Worse	Worse but not much	Worse but not much	Same	Same
City of Naga	Same	Same	Worse but not much	Same	Same
San Fernando	Worse	Worse but not much	Worse but not much	Same	Worse
City of Talisay	Worse	Worse but not much	Worse but not much	Worse but not much	Same

Source: JICA Study Team – HIS 2014.

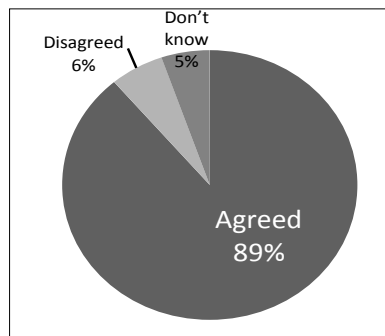
(8) Transport Measures

1.93 The households in each LGU mostly agreed that public transport services should be improved and expanded in the future. All in all, 89% of the sample households in Metro Cebu agreed to this amendment in transport services (see Table 1.5.43 and Figure 1.5.45).

Table 1.5.43 Viewpoint on Expansion and Improvement of Public Transport Services by LGU

City / Municipality	In Favor of Expanding/ Improving Public Transport Services	
	No.	%
City of Carcar	210	91.3
Cebu City	1,845	81.0
Compostela	94	98.9
Consolacion	254	93.0
Cordova	114	99.1
Danao City	283	99.6
Lapu-Lapu City	1,002	92.6
Liloan	221	99.1
Mandaue City	799	93.1
Minglanilla	234	90.7
City of Naga	187	84.2
San Fernando	135	97.1
City of Talisay	411	89.3
Metro Cebu	5,789	89.0

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.45 Overall Viewpoint for Expanding / Improving Public Transport Services in Metro Cebu

1.94 The top two choices of a majority number of respondents in each LGU for the type of public transport services that should be introduced are (i) urban railway, and (ii) street car/ tramway/ on-street LRT (see Table 1.5.44, Table 1.5.45 and Figure 1.5.46). The respondents of Consolacion and Cordova also included bus rapid transit aside from street car/ tramway/ on-street LRT in their top two choices of public transport services.

Table 1.5.44 Top Choices of Public Transport Services of Respondents by LGU

City / Municipality	Type of Public Transport (in %)		
	Bus Rapid Transit (BRT)	Urban Railway	Street Car/ Tramway/ On-Street LRT
City of Carcar		80.0	69.5
Cebu City		45.2	49.4
Compostela		66.0	50.0
Consolacion	51.2		61.4
Cordova	59.6		34.2
Danao City		55.8	65.4
Lapu-Lapu City		61.5	57.7
Liloan		48.9	98.2
Mandaue City		56.7	72.0
Minglanilla		74.8	73.8
City of Naga		64.7	74.3
San Fernando		75.6	47.4
City of Talisay		92.5	80.8

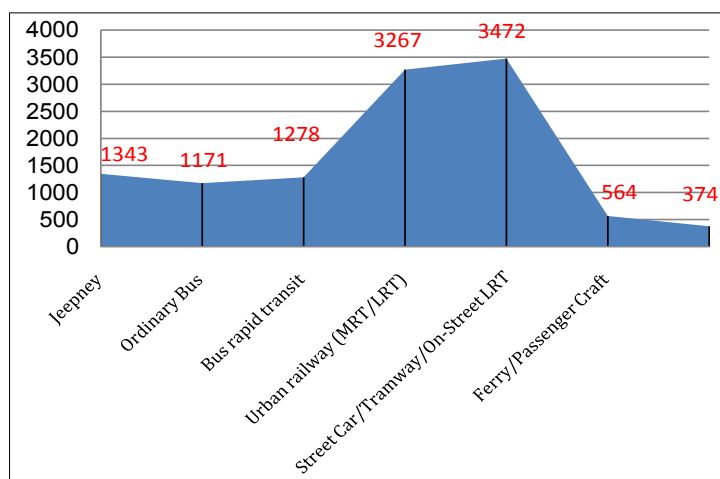
Source: JICA Study Team – HIS 2014.

Note: The jeepney, ordinary bus, ferry/ passenger craft, and monorail / automated guideway transit were not among the top choices made by respondents.

Table 1.5.45 Choices of Public Transport Services for Metro Cebu

Type of Public Transport		No.	%
1	Jeepney	1,343	23.2
2	Ordinary Bus	1,171	20.2
3	Bus Rapid Transit	1,278	22.1
4	Urban Railway (MRT/LRT)	3,267	56.4
5	Street Car/ Tramway/ On-Street LRT	3,472	60.0
6	Ferry/ Passenger Craft	564	9.7
7	Monorail/ Automated Guideway Transit	374	6.5

Source: JICA Study Team – HIS 2014.



Source: JICA Study Team – HIS 2014.

Figure 1.5.46 Choices of Public Transport Services for Metro Cebu

1.95 Majority of the households in Metro Cebu indicated some transport improvement measures, as shown in Table 1.5.46. The top selections include construction and improvement of roads (96%), followed closely by installation and improvement of traffic signals (95.2%), control of air pollution (94.3%), and improvement of sidewalks, pedestrian crossings, and bridges (94.1%). However, two transport improvement areas met a fairly large disapproval, particularly the measures pertaining to increase of user charges for cars or motorcycles (67.7%) and the restriction of motorcycles, pedicabs, tricycles, and calesa (48.7%).

Table 1.5.46 Transport Improvement Measures

Transport Improvement Measures		Agree		Disagree		Not Sure	
		No.	%	No.	%	No.	%
1	Construction/ Improvement of roads	6,261	96.0	155	2.4	106	1.6
2	Construction/ Improvement of flyovers	5,485	84.2	759	11.6	272	4.2
3	Installation/ Improvement of traffic signals	6,204	95.2	177	2.7	135	2.1
4	Improvement of sidewalks, pedestrian crossings and bridges	6,119	94.1	243	3.7	144	2.2
5	Introduction of bus rapid transit	3,333	51.2	2,405	36.9	775	11.9
6	Construction of urban railway	5,088	78.1	874	13.4	555	8.5
7	Improvement of water transportation system	5,443	83.5	454	7.0	619	9.5
8	Restriction of truck traffic	4,149	63.6	1,488	22.8	882	13.5
9	Restriction of cars/ motorcycles	3,276	50.3	2,286	35.1	946	14.5
10	Increase of user charges for cars/ motorcycles	1,295	19.9	4,410	67.7	813	12.5
11	Restriction of motorcycles, pedicabs, tricycles, and calesa	2,473	37.9	3,174	48.7	877	13.4
12	Development of public parking facilities	5,533	84.8	592	9.1	399	6.1
13	Control of air pollution	6,156	94.3	257	3.9	114	1.7
14	Promotion of people's understanding on transport problems	6,079	93.3	260	4.0	174	2.7
15	Promotion of bicycles	3,482	67.5	1,063	20.6	610	11.8

Source: JICA Study Team – HIS 2014.

2 SUPPLEMENTAL SURVEY ON WILLINGNESS-TO-PAY FOR WATER SUPPLY

2.1 Introduction

2.1 One of the challenging issues that confront Metro Cebu is the inadequacy and poor quality of its water supply. With its fast growing population and economy, Metro Cebu's current water supply will be unable to meet its future demand. It has been estimated in this Roadmap Study that by 2030, water deficit within the Metro Cebu Water District (MCWD) service area will amount to 29,000 m³/day and 94,000 m³ for the entire Metro Cebu.

2.2 Moreover, Metro Cebu is heavily dependent on groundwater sources for its water supply and salt water intrusion is already evident at this source. In fact, three of the MCWD wells in Mactan Island and Cebu City were already abandoned for this reason. According to a study conducted by the University of San Carlos Water Resource Center (USC-WRC), salt water intrusion has already encroached up to Lahug, which is about 1.8 to 5 km inland from Cebu City's shore.



Source: JICA Study Team.

Figure 2.1.1 Girls Fetching Water from a Deep Well at Budlaan, Cebu City, October 2014

2.3 This scenario has led to the idea of harnessing Cebu's surface water, which is underutilized at the moment, for water supply. It is in this light that this study is looking into the viability of developing the Mananga Dam which will be able to supply reliable and clean water of about 68,000 m³ per day for domestic and industrial uses. The investment that will be poured into developing the dam will expectedly increase the cost of water to the consumers. As such, a supplemental survey on the people's willingness-to-pay was necessary.

2.2 Purpose of the Survey

2.4 One of the critical factors in determining the viability of any proposed water supply development project is to ascertain the willingness of the consumers to pay for this resource. It was also proposed that a wastewater treatment project be considered in tandem with the water supply project. As such, the survey will have to include the consumers' willingness-to-pay for wastewater treatment as well. Specifically, the survey aims to:

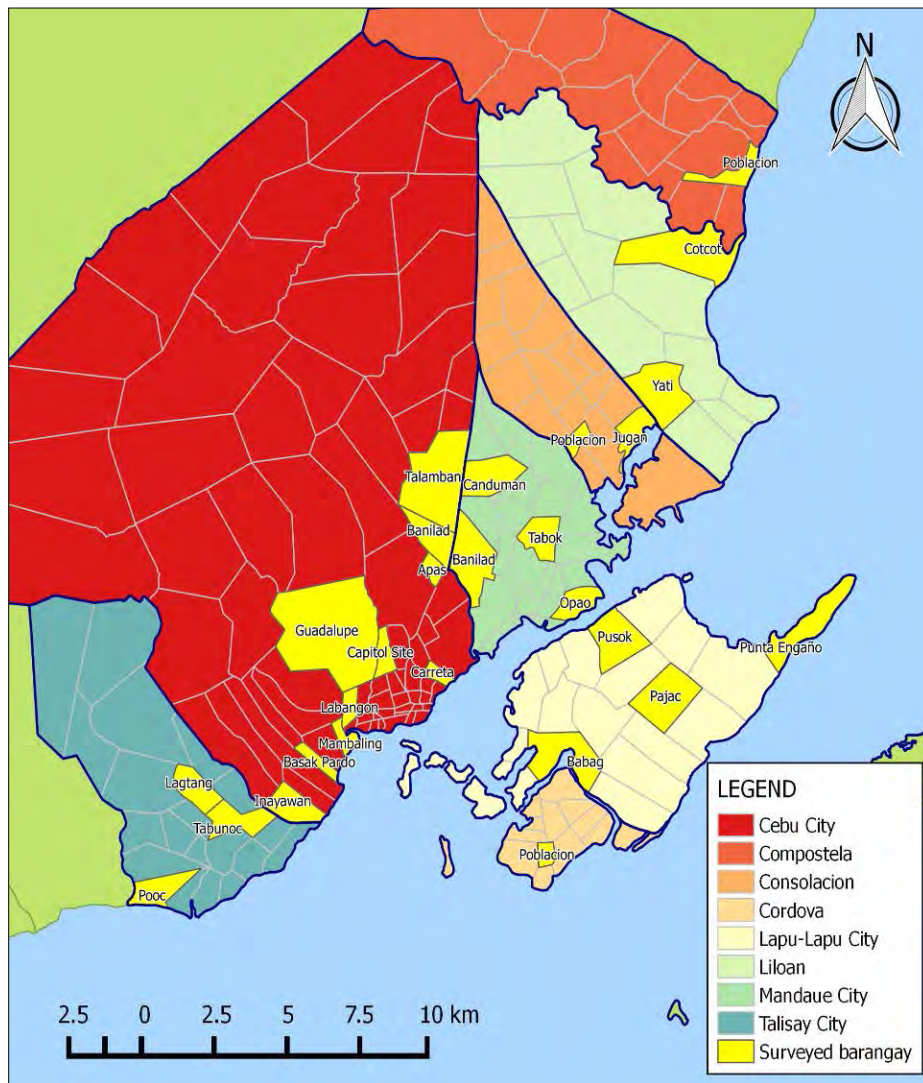
- (a) examine the current status of water usage of those served and unserved by MCWD;
- (b) examine the extent of the desludging and septic treatment practices; and
- (c) determine the households' willingness-to-pay on top of what they are currently spending for water with better and sustainable supply.

2.3 Methodology

1) Target Area

2.5 The survey was conducted in MCWD service areas, namely: municipalities of Compostela, Liloan, Consolacion and Cordova, and the cities of Lapu-Lapu, Mandaue, Cebu and Talisay. Figure 2.3.1 shows the barangays within each LGU where households were sampled.

2.6 The estimated number of residential connections as of 2013 was 154,919. This brings the MCWD service connections in the area to only 45% of the combined number of households in its coverage area at 344,264.



Source: JICA Study Team.

Figure 2.3.1 Survey Area Coverage

2) Sampling Procedure

2.7 Under a 95% confidence level of sampling based on the mathematics of probability, the number of households to sample should be more than 384. Under this condition, the 416 household samples were selected in the following manner:

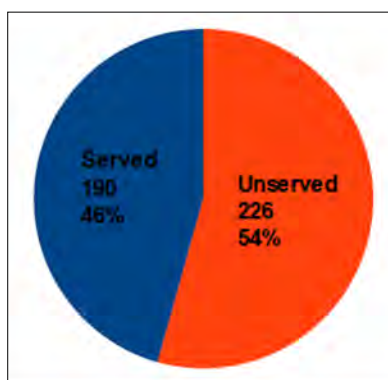
(1) Distribution at LGU Level

2.8 The 416 survey samples were distributed in 8 LGUs and proportioned to the number of households as of February 2014. The samples were identified according to the ratio of connection to MCWD in each LGU and were categorized into two: (i) served and (ii) unserved households by MCWD. As a result, the number of samples from served households is 190 and that from unserved is 226 in total. Table 2.3.1 and Figure 2.3.2 show the distribution of these samples by LGU.

Table 2.3.1 Number of Samples by LGU

LGU	Total	Served	Unserved
Compostela	7	2	5
Liloan	17	8	9
Consolacion	20	10	10
Cordova	9	3	6
Lapu-Lapu City	84	27	57
Mandaue City	67	25	42
Cebu City	176	97	79
Talisay City	36	18	18
Total	416	190	226

Source: JICA Study Team.



Source: JICA Study Team.

Figure 2.3.2 Sample Distribution by Water Supply Connection

(2) Selection of Barangays

2.9 Considering time constraints, representatives of barangays of each LGU were selected. The number of barangays was determined based on the number of samples.

2.10 The criteria for selecting the sample barangays are as follows:

- (a) **Number of Connections:** largest and smallest;
- (b) **Geographical Characteristics:** north / middle / south and coastal / inland/ hilly; and
- (c) **Others:** population and other conditions were considered as necessary.

2.11 The distribution of sample barangays by LGU is presented in Table 2.3.2.

Table 2.3.2 Number of Barangays and Samples per LGU

LGU	Total No. of Barangays	No. of Barangays Sampled	Total No. of Samples
Compostela	17	1	7
Liloan	14	2	17
Consolacion	21	2	20
Cordova	13	1	9
Lapu-Lapu City	30	4	84
Mandaue City	27	4	67
Cebu City	80	10	176
Talisay City	22	3	36
Total	224	27	416

Source: JICA Study Team.

(3) Distribution at Barangay Level

2.12 The samples by LGU were distributed in each barangay based on proportion to the number of households. Division by MCWD connection (served and unserved) is proportional to the connection rate with MCWD. Table 2.3.3 summarizes the number of samples in the target barangays.

Table 2.3.3 Number of Samples per Barangay

LGU	Barangay	Population	Households	Served	Unserved
Compostela	1 Poblacion	9,669	1,903	2	5
Liloan	2 Cotcot	6,215	1,233	2	2
	3 Yati	23,668	4,659	6	7
Consolacion	4 Poblacion	5,669	1,116	3	3
	5 Jugan	13,512	2,660	7	7
Cordova	6 Poblacion	9,449	1,860	3	6
Lapu-Lapu	7 Babag	16,979	4,101	6	14
	8 Pusok	24,778	5,985	12	21
	9 Punta Engano	7,822	1,889	3	7
	10 Pajac	18,098	4,372	6	15
Mandaue	11 Banilad	26,207	6,473	8	15
	12 Canduman	21,423	5,291	6	12
	13 Opao	8,878	2,193	3	5
	14 Tabok	18,174	4,489	8	10
Cebu	15 Carreta	12,242	2,886	5	3
	16 Apas	27,513	6,486	9	6
	17 Banilad	11,353	2,677	3	3
	18 Talamban	32,086	7,565	10	11
	19 Mambaling	39,246	9,253	13	9
	20 Labangon	33,232	7,835	10	8
	21 Capitol site	18,807	4,434	6	4
	22 Guadalupe	78,892	18,600	25	21
	23 Inayawan	32,043	7,554	10	9
	24 Basak Pardo	18,984	4,476	6	5
Talisay	25 Tabunok	21,509	4,234	10	9
	26 Lagtang	11,255	2,216	4	4
	27 Pooc	11,490	2,262	4	5
Grand Total				190	226

Source: JICA Study Team.

3) Survey

2.13 Prior to the conduct of the household survey, both the city and municipal mayors and the barangay captains of the target barangays were informed about the survey. With the guidance of local contacts in the barangays, locations of the MCWD served and unserved households were identified. Houses were selected at random and, in most cases, based on the household's availability and willingness to be interviewed (see Figure 2.3.3). The questionnaire used for the survey is given in the Appendix.



Source: JICA Study Team.

Figure 2.3.3 Conduct of Interviews

2.4 Findings

1) Household Profile

2.14 This report presents the result of the willingness-to-pay survey conducted with 416 households with an average household size of 5.6 persons (i.e., total population is 2,335), wherein 36% has a size of 4 to 5 persons. The biggest household size recorded is 20, wherein four families live within a dwelling place while there are also two individuals living on their own.

(1) Gender and Occupation of Household Head

2.15 Typical in a metropolitan area, the surveyed household heads are engaged in various types of occupation, as shown in Table 2.4.1. Running a small business recorded the highest percentage of 15.4% among the list of occupations. Most of them are managing their own sari-sari or convenience store. Driving (tricycle, motorbike, jeepney, truck, taxi, private) is another common source of living (8.7%). This is followed by those engaged in vending at 6.5%.

Table 2.4.1 Household Head's Occupation by Gender

Household Head's Occupation		Female	Male	Total	%
1	Accountant	2		2	0.48
2	Administrative Officer		1	1	0.24
3	Aircon / Aircon Maintenance		2	2	0.48
4	Assembler (for "fancy jewelries")		1	1	0.24
5	Auditor		1	1	0.24
6	Baker	1	3	4	0.96
7	Barangay Worker /Official	2	4	6	1.44
8	Boarding House Owner	2	2	4	0.96
9	Bookkeeper		1	1	0.24
10	Broker		1	1	0.24
11	Business (small)	34	30	64	15.38
12	Call Center Agent	2	5	7	1.68

	Household Head's Occupation	Female	Male	Total	%
13	Caretaker		1	1	0.24
14	Chef		1	1	0.24
15	Chief Engineer		1	1	0.24
16	City Veterinarian	1		1	0.24
17	Civil Engineer		1	1	0.24
18	Clerk	1		1	0.24
19	Company Employee / Supervisor	2	1	3	0.72
20	Construction Worker		16	16	3.85
21	Contractor		2	2	0.48
22	Contractor / Interior Designer / Designer	1	1	2	0.48
23	Crane operator		1	1	0.24
24	Dog Trainer / Buy and Sell (dogs)		1	1	0.24
25	Driver (taxi, tricycle, truck, private)		36	36	8.65
26	DSWD Worker	1		1	0.24
27	Electronic Technician		1	1	0.24
28	Farmer		1	1	0.24
29	Fast Food Worker	1		1	0.24
30	Fighting Cock Caretaker		1	1	0.24
31	Fisherman		3	3	0.72
32	Foreman		1	1	0.24
33	Furniture Maker/ Weaver		1	1	0.24
34	Glass Installer		1	1	0.24
35	Government Employee	1	6	7	1.68
36	Guard (Security)		4	4	0.96
37	Hotel Housekeeper		1	1	0.24
38	House helper	2		2	0.48
39	Housewife	27		27	6.49
40	HR Officer	1		1	0.24
41	Janitor		1	1	0.24
42	Jeep Operator		2	2	0.48
43	Kitchen Staff		1	1	0.24
44	Laundry Services	5		5	1.20
45	Liaison Officer		1	1	0.24
46	Lineman VECO		1	1	0.24
47	Loader		1	1	0.24
48	Machine Operator		1	1	0.24
49	Maintenance		1	1	0.24
50	Manufacturer		1	1	0.24
51	Manicurist	3		3	0.72
52	Manager		1	1	0.24
53	Mechanic Driver		1	1	0.24
54	Messenger		1	1	0.24
55	Minister		1	1	0.24
56	Musician		2	2	0.48
57	Nanny (Yaya), Laundry Woman	2		2	0.48
58	Office Staff		3	3	0.72
59	Overseas Filipino Worker	6	7	13	3.13
60	Owner of a Compound (rental)		1	1	0.24
61	Pharmacist - Manager Rose Pharmacy	1		1	0.24
62	Police		2	2	0.48
63	Pensioner / Retired	8	13	21	5.05
64	Production Operator / Worker	3	4	7	1.68
65	Quality Assurance Engineer 3		1	1	0.24
66	Right-of-Way Officer		1	1	0.24
67	Sales	5	1	6	1.44
68	Sample Maker (MEPZ4)		1	1	0.24
69	Seaman	1		1	0.24
70	Selecta Franchiser		1	1	0.24

Household Head's Occupation		Female	Male	Total	%
71	Senior Chemist	1		1	0.24
72	Service Engineer		1	1	0.24
73	Sewing Business	1		1	0.24
74	Tailor	1	2	3	0.72
75	Teacher		2	2	0.48
76	Team Leader		1	1	0.24
77	Technical Support (Senior Coating Advisor)		1	1	0.24
78	Technician		1	1	0.24
79	Unemployed	5	1	6	1.44
80	Vendor	21	6	27	6.49
81	Vulcanizing Shop		1	1	0.24
82	Waiter		1	1	0.24
83	Warehouse Supervisor		1	1	0.24
84	Water Dealer		1	1	0.24
85	Welder		2	2	0.48
86	Widow		1	1	0.24
87	Worker (Home for the Aged)	1		1	0.24
88	No Response	37	28	65	15.63
Total		182	234	416	100.00
Percentage		43.75	56.25	100.00	

Source: JICA Study Team.

2.16 In terms of gender, 56% of the households are headed by males. Worth noting is the high percentage (44%) of female household heads, which shows the changing trend of the Filipino family setup which used to be patriarchal.

(2) Housing Conditions

2.17 Majority or 64% of the survey respondents live in private independent properties while about 14% live in informal settlements (see Table 2.4.2). The remaining 22% live in housing subdivisions or compounds. In terms of construction materials used, many houses are made of light materials combined with concrete (44%), followed by houses made of combined average construction materials.

Table 2.4.2 Type of Housing Settlement and Materials

Type	Served	Unserved	Total	%
Settlement				
Informal settlement	12	46	58	13.94
Inside subdivision or compound	54	37	91	21.88
Outside subdivision / independent	124	143	267	64.18
Grand Total	190	226	416	100
House				
Type 1 - makeshift to light materials	10	45	55	13.22
Type 2 - light materials + combination	67	116	183	43.99
Type 3 - average - combination	79	54	133	31.97
Type 4 - above average	32	11	43	10.34
Type 5 – high end	2	-	2	0.48
Total	190	226	416	100.00

Source: JICA Study Team.

2.18 Owning the house they live in is quite common among the surveyed households both in served and unserved areas, as reported by about 84% of the respondents (see Table 2.4.3). Two respondents are amortizing their houses while about 8% are renting and 3% are rent-free. Most houses are owned, including those households in informal settlements which are normally built by the occupants

themselves using light materials. Whether or not these houses are built on the lots they owned is not covered in this survey, except for the 16% who stated that they are settling in a private or government property without formal arrangement.

2.19 In terms of length of stay, 85% said they have stayed long enough in their current homes from 6 to over 50 years (see Table 2.4.4). On the other hand, there are only 15% of households who have spent less than five years in their current residences. A few households visited are awaiting their eviction, thus influencing their decision on their willingness- to-pay for an improved water supply.

Table 2.4.3 House Ownership Status

House Ownership	Served	Unserved	Total	%
Amortizing	2		2	0.48
Free	9	4	13	3.13
Owned	157	191	348	83.65
Renting	20	29	49	11.78
No Response	2	2	4	0.96
Total	190	226	416	100.00

Source: JICA Study Team.

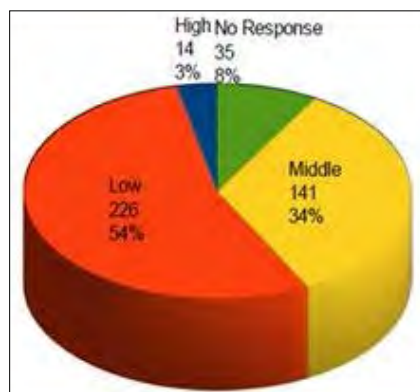
Table 2.4.4 Length of Stay Status

Length of Stay (Years)	Served	Unserved	Total	%
1-5	30	33	63	15.14
6-10	26	35	61	14.66
11-15	15	30	45	10.82
16-20	19	35	54	12.98
21-25	19	25	44	10.58
26-30	21	20	41	9.86
31-35	7	10	17	4.09
36-40	8	6	14	3.37
41-45	9	4	13	3.13
46-50	8	9	17	4.09
More than 50 years	21	10	31	7.45
No Response	7	9	16	3.85
Total	190	226	416	100.00

Source: JICA Study Team.

(3) Household Income Level

2.20 Surveyed households were categorized into three income levels, namely: low, middle, and high whose monthly household income is equivalent to PHP15,000 and below, > PHP15,000–PHP50,000, and above PHP50,000, respectively. As indicated in Figure 2.4.1, slightly more than half (54%) of the surveyed households belong to the low income level while 21% belong to the middle income. Only 3% belong to the high income level while the remaining 8% refused to share their income data. Generally, households currently served by MCWD have relatively higher income levels than those unserved (see Figure 2.4.2).



Source: JICA Study Team.

Figure 2.4.1 Distribution of Respondents by Household Income Level



Source: JICA Study Team.

Figure 2.4.2 Income Level by Water Supply Connection

2) Source of Water Supply

2.21 The households covered in this survey source their main and supplementary water supply from MCWD and from other sources such as (i) neighbor's connection, (ii) own well, (iii) private waterworks, (iv) public faucet, (v) public well, and (vi) water vendor (see Table 2.4.5). The main source of water is usually used for general domestic use such as bathing, cleaning, and flushing toilets. When their main water source is not available or lacking, people supplement this by tapping into the most convenient and available other water sources. However, with regard to water for drinking, 368 or 88.5% of the respondents are buying bottled water. This reveals that a great majority do not consider their main source of water safe for drinking, including 90% of those connected to MCWD. The following section describes the correlation between the respondents' main and supplementary sources of water and their level of income.

(1) Main Source of Water by Income Level

2.22 Among the low income level households, majority or 68% are not connected to MCWD. The situation is reversed among the middle income households where majority or 66% are connected to MCWD. Meanwhile, among the high income families 78% source their water from MCWD while the remaining have their own well or are connected to a private or barangay water system.

2.23 Among those using the public wells, 80% are from the low income class. For the households buying more expensive water from a neighbor's MCWD connection and from water vendors or delivery trucks, some 89% and 86%, respectively, come from low income level households.

Table 2.4.5 Main Water Sources by Income Level

Main Water Source	Income Level				Total	%
	Low	Middle	High	Withheld Data		
Served (MCWD)	72	93	11	14	190	45.7
Public well	43	9		2	54	13.0
Own well	18	19	2	13	52	12.5
Neighbor's MCWD connection	39	4		1	44	10.6
Private / Barangay Waterworks	22	7	1	4	34	8.2
Jetmatic pump / poso (ownership no data)	13	3			16	3.8
Dug well (tabay)	5	1		1	7	1.7
Water vendor / truck delivery	6	1			7	1.7
Neighbor's well	5	2			7	1.7
Public faucet	1	1			2	0.5
Own dug well (tabay)		1			1	0.2
Shallow well	1				1	0.2
Spring (tubod)	1				1	0.2
Total	226	141	14	35	416	100.0

Source: JICA Study Team.

(2) Supplemental Source of Water by Income Level

2.24 A large percentage of the households do not depend on one source of water. Out of the 416 respondents, 383 or about 92% use supplemental sources of water as against the rest that solely depend on their main water source (see Table 2.4.6). The need for supplemental water source is driven by various reasons. One of the most popular reason is the potable state of their main water source. About three quarters or 76% of the surveyed households consider water refilling stations as their primary supplemental source of water, especially for drinking. Whenever there is need for alternative water source due to prolonged brownouts or shortage from the main source, people resort to tapping the most convenient sources. Among the other sources, buying from water vendors is practiced by 25 households (6% of total). Water delivered by vendors usually cost about PHP30.00 per drum or per 220 liters. There are 11 households served by MCWD who use their own well for back-up. Meanwhile, the households that depend totally on their main water source for everything store water before brownouts and/or wait until the power or water service is back on.

Table 2.4.6 Primary Supplementary Source of Water by Level of Income

Supplemental Source of Water	Supplemental Source					
	Income Level				Total	%
	Low	Middle	High	Withheld Data		
MCWD	3	-	-	2	5	1.2
Private / Brgy Waterworks	1	1	1		3	0.7
Neighbor's Connection	4	1	-		5	1.2
Own Well	1	6	1	3	11	2.6
Public Well	3	5		1	9	2.2
Vendor Delivery	12	12		1	25	6
Water Refilling	171	106	12	27	316	76
Rain Water	6	3	-	-	9	2.2
No Supplement	25	7	-	1	33	7.9
Total	226	141	14	35	416	100

Source: JICA Study Team.

(3) Reasons for Non-Connection with MCWD

2.25 Among the 226 households who are currently not served directly by MCWD, the following table presents the reasons for their non-connection.

Table 2.4.7 Reasons Why Not Connected to MCWD

Reasons for Non-Connection to MCWD	No.	%
MCWD does not have pipelines in our area	58	25.66
MCWD water is very expensive	48	21.24
MCWD has plenty of requirement which we cannot satisfy	10	4.42
Quality of MCWD water is not good	8	3.54
Contented and satisfied with existing	8	3.54
House and land ownership problem / renting	6	2.65
Dissatisfied with MCWD service (supply shortage)	3	1.33
Expensive installation of lines	2	0.88
Economic reasons	2	0.88
Have own plan	2	0.88
New transferee	1	0.44
Not always in the area / not permanent	2	0.88
Not interested/Unsure	2	0.88
Pipes are leaking / needs repair	2	0.88
Free water already at present	1	0.44

Source: JICA Study Team.

2.26 The top two cited reasons why they are not connected with MCWD as expressed by almost half or 47% of the unserved households are: (i) MCWD does not have pipelines in their area, and (ii) MCWD water is expensive.

2.27 As gathered, those who are buying MCWD water from their neighbors are normally paying PHP1.00–3.00 per pail or container of about 5 gallons or 19 liters. This amount translates to PHP50–150 per m³. This practice may have brought about the idea that MCWD water is expensive.

2.28 Other reasons that were gathered for non-connection are the households' inability to comply with MCWD requirements and the perceived poor quality of MCWD water as expressed by 10 and 8 respondents, respectively. MCWD connection requirements include land title and building permit and connection fee of PHP4,950.

2.29 Meanwhile, 8 respondents are already satisfied with their current water supply and do not see the need for MCWD's services.

2.30 When asked whether they want to be connected to MCWD, 90 (40%) of the 226 unserved households expressed their desire to be connected with MCWD with the following reasons:

- (i) We need water daily / consistent supply;
- (ii) Budgetary consideration / cheaper;
- (iii) Cleaner and safe;
- (iv) Will be informed in cases of no water supply;
- (v) For convenience; and
- (vi) Currently buying expensively from neighbor's connection.

2.31 On the other hand, the remaining 136 (60%) stated that they still do not desire to be connected with MCWD with reasons given below while 118 (87%) of them did not state

any reason for unwillingness to be connected with MCWD:

- (i) Installation is expensive;
- (ii) Do not own the house;
- (iii) No budget / Not enough money;
- (iv) If there is no electricity, no water;
- (v) No need / contented with current water supply;
- (vi) Not interested;
- (vii) Our water is better than MCWD;
- (viii) They might get demolished at the area anyway; and
- (ix) Undecided because they have no information.

3) Average Monthly Water Consumption and Expense

(1) Average Monthly Water Consumption by Income Level

2.32 A significant percentage (39%) of the respondents do not know how much water they consume. This is common among those who source their water from public wells and those who are not paying for their water. As indicated in Table 2.4.8, almost 48% of the low income households and 25% of middle income households do not know how much water they consume. This includes 51% of those who withheld their income data. In addition, 39% of the respondents are not aware of their water consumption in terms of volume.

Table 2.4.8 Average Monthly Water Consumption by Income Level

Water Consumption	Income Level				Total	%
	High	Low	Middle	Withheld Data		
Below 10 m ³		41	17	3	61	15
10–20 m ³		35	19	4	58	14
21–30 m ³		23	27	6	56	13
31–40 m ³	5	11	25	1	42	10
41–50 m ³		5	10	1	16	4
51–60 m ³	1	2	4		7	2
More than 60 m ³	7		4	2	13	3
Unknown	1	109	35	18	163	39
Total	14	226	141	35	416	100.00

Source: JICA Study Team.

2.33 The survey revealed that households with high income consumes more water than their counterparts. Their recorded minimum consumption is 31 m³ per month while the low and middle income households' minimum consumption is 10 m³ and below.

(2) Average Monthly Main Water Source Expense / Cost

2.34 The average monthly expense on water of the respondents can be as low as free and to as high as more than PHP5,000 (see Table 2.4.9). Among those paying for their water, the highest number of households pay between PHP201–300 (12%), followed by those paying PHP301–400 (10%), and those paying PHP401–500 (10%). Households who reported high cost of water are usually selling water and associate their water expenditure with their electric bill due to the electric water pump they use while others are merely buying from their neighbor's MCWD connection. It was learned during the survey that the most common amount paid for water by those buying in retail

from neighbor's MCWD connection or private wells is from PHP1.00–PHP3.00 per pail or container (5 gallons). Meanwhile, 32% of the respondents either get their water for free or did not know how much they pay at the time of the interview.

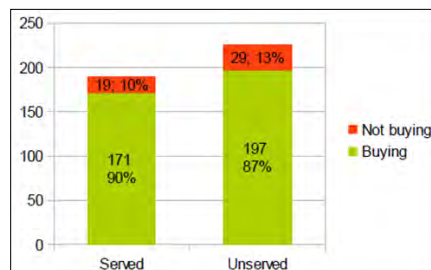
Table 2.4.9 Average Monthly Main Water Source Expense / Cost

Water Expenditure (PHP)	Served	Unserved	Total	%
Below 100	1	8	9	2.2
101–200	26	7	33	7.9
201–300	32	19	51	12.3
301–400	32	11	43	10.3
401–500	30	12	42	10.1
501–600	10	4	14	3.4
601–700	7	4	11	2.6
701–800	7	2	9	2.2
801–900	10	8	18	4.3
901–1000	9	4	13	3.1
1,001–1,250	1	1	2	0.5
1,251–1,500	9	9	18	4.3
1,501–1,750	3		3	0.7
1,751–2,000	1	2	3	0.7
2,001–2,500	1	2	3	0.7
2,501–3,000	4	3	7	1.7
4,501–5,000	1	1	2	0.5
More than 5,000	1	1	2	0.5
Undetermined amount or free	5	128	133	32.0
Total	190	226	416	100.0

Source: JICA Study Team.

(3) Bottled Water Consumption and Expense

2.35 A high percentage (88%) of the respondents buy bottled water for drinking. Among those served by MCWD, 169 or 89% are still buying bottled water despite the fact that MCWD is said to be potable for drinking. Among those who are not connected to MCWD, 197 or 87% are buying bottled water (see Figure 2.4.3). This situation cuts across the respondents' income levels and whether they are served by MCWD or not. Bottled water is perceived as safer for drinking than water from other sources. This can be corroborated by the water supply quality problems that will be presented in the following section.



Source: JICA Study Team.

Figure 2.4.3 Households Buying Bottled Water by Connection to MCWD

2.36 In terms of consumption, about 52% among those buying bottled water consume 2–3 5-gallon containers of water per week (see Table 2.4.10). This is followed by those who consume 4–5 containers per week (19%). Meanwhile, there are 11 households or 3% who consume 10 containers and above. These households are big or are unable to segregate their domestic and business water consumption.

Table 2.4.10 Bottled Water Consumption per Week

Container Capacity	No. of Bottles Consumed per Week	Served		Unserved		Total	
		No.	%	No.	%	No.	%
1-Gallon Bottle							
	1		0.0	1	0.5	1	0.3
	2	1	0.6	3	1.5	4	1.1
	3	1	0.6	1	0.5	2	0.5
	4	1	0.6		0.0	1	0.3
	5	1	0.6	1	0.5	2	0.5
	7	1	0.6	2	1.0	3	0.8
	8	1	0.6		0.0	1	0.3
5-Gallon Bottle							
	1	23	13.5	28	14.2	51	13.9
	2	38	22.2	58	29.4	96	26.1
	3	40	23.30	56	28.4	96	26.1
	4	19	11.1	17	8.6	36	9.8
	5	20	11.7	15	7.6	35	9.5
	6	10	5.8	4	2.0	14	3.8
	7	4	2.3	4	2.0	8	2.2
	8	2	1.2	2	1.0	4	1.1
	9	1	0.6	1	0.5	2	0.5
	10	5	2.9	2	1.0	7	1.9
	14	2	1.2		0.0	2	0.5
	15		0.0	1	0.5	1	0.3
	20		0.0	1	0.5	1	0.3
Others:							
hug-hug piso (water vendo machine)		1	0.6		0.0	1	0.3
Total		171	100	197	100	368	100

Source: JICA Study Team.

2.37 Households buying bottled water for drinking spend from PHP100 to as high as PHP500.00 above a month (see Table 2.4.11). Out of the 366 households who buy bottled water, 128 (35%) spend PHP25–50 a week or PHP100–200 a month for drinking water and 25% spend more than PHP200–300. This amount is already within or a little more than MCWD's minimum charge of PHP129 for a maximum of 10 m³ of water. This indicates that households generally spend extra money for drinking water. The cost of bottled or containerized water varies depending on the source or purification process done. It ranges from PHP10.00–PHP40.00 for every five gallons. Buying drinking water from an automatic water machine, which costs PHP1.00 per 250 ml, is also common in many places in Cebu. Two respondents said they buy drinking water through this way once in a while.

2.38 This behavior shows that for safer water, people are willing to spend extra. This extra expense may be considered as a disposable income which can be diverted to pay for a safer and cheaper water supply which can be an alternative to bottled water. However, this would require convincing proof that such water is potable and very much safe for drinking compared to bottled water which has already gained the trust of the people.

Table 2.4.11 Bottled Water Expense per Week by Water Supply Connectivity

Bottled Water Expense (PHP) per Week	Served		Unserved		Total	
	No.	%	No.	%	No.	%
Below 25	15	7.89	19	8.41	34	8.17
25–50	49	25.79	84	37.17	133	31.97
51–75	49	25.79	50	22.12	99	23.80
76–100	19	10.00	21	9.29	40	9.62
101–150	19	10.00	17	7.52	36	8.65
151–200	7	3.68	5	2.21	12	2.88
201–300	9	4.74	1	0.44	10	2.40
301–500	2	1.05	1	0.44	3	0.72
More than 500	1	0.53			1	0.24
Buying	170	89.47	198	87.61	368	88.46
Not buying	20	10.53	28	12.39	48	11.54
Total	190	100.00	226	100.00	416	100.00

Source: JICA Study Team.

4) Problems Encountered in Relation to Water Supply

(1) Problems Encountered by Those Served by MCWD

2.39 When those connected with MCWD were asked what problems they have encountered with their water supply, 78 or about 41% said they have no problem while the remaining 112 or 59% stated the problems as listed in Table 2.4.12.

Table 2.4.12 Problems Encountered by Those Served by MCWD

Problems Encountered (multiple answers)	No.	%
No problem encountered	78	41.05
Problems:		
Insufficient water supply from MCWD	38	20.00
Limited hours of service	37	19.47
Low pressure	19	10.00
No electricity, no water (brownout)	15	7.89
Limited access to water in cases of emergencies	12	6.32
Tap/piped water not safe for drinking	8	4.21
Quality problem (rusty odor, murky, with sand)	6	3.16
Too much chlorine	2	1.05
Faulty plumbing/ leaking	5	2.63
Higher cost/charges from water vendors	2	1.05
No water when there is typhoon	1	0.53

Source: JICA Study Team

2.40 The most commonly mentioned problem by the respondents is the insufficient water supply of MCWD brought about by the limited hours of service and low pressure. During brownouts, water supply is also affected leading to a problem of where to get water especially when the absence of water is prolonged. A household in Opa, Mandaue reported that for three days they had no water from MCWD. There are places where water supply service shuts down at 8:00 am and comes back only in the afternoon. These problems are experienced in 19 out of the 27 barangays covered in the survey. The place with the most number of respondents who expressed this problem is Barangay Pusok in Lapu-Lapu City.

(2) Problems Encountered by Those Served by Other Sources

2.41 Like those served by MCWD, 102 or 45% of respondents using other sources as their main water source share similar problems and concerns, with the additional issue of inconvenience (see Table 2.4.13). The rest said they have not encountered any problem.

Table 2.4.13 Problems Encountered by Those Supplied by Other Sources

Problems Encountered	No.	%
No problem encountered	124	54.87
Low pressure	22	9.73
Higher cost/charges from water vendors	19	8.41
No electricity, no water	17	7.52
Limited access to water in cases of emergencies	16	7.08
Plumbing problem, leaking, need repair	11	4.87
Tap/piped water not safe for drinking	10	4.42
Inconvenience	5	2.21
Expensive, keeps on buying	5	2.21
Not safe for drinking	3	1.33
Expensive to pay water stevedores	3	1.33
Quality problem	2	0.88
No water in the well	1	0.44
Too much chlorine	1	0.44

Source: JICA Study Team.

(3) Frequency of Water Supply Problems

2.42 When asked how often they experienced the problems, the worst scenario was expressed by 7% of those who encountered problems, who said that they experience problems daily (see Table 2.4.14). Problems of these households are mostly in relation to irregularity of the water supply as mentioned earlier.

2.43 Once a month is the most common frequency of encountering problems, as reported by 29% and 21% of those served and unserved households by MCWD with problems, respectively. Among the 112 households served by MCWD who encounter problems, 21% experienced problems more than once a week while among the unserved, 16% are in the same predicament. Meanwhile, of those who encountered problems once a week, 5% and 4% come from the served and unserved, respectively.

Table 2.4.14 Frequency of Problems Encountered by Water Supply Connection

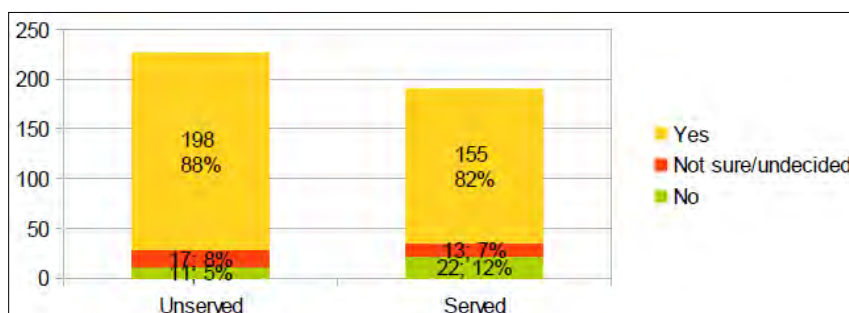
How often experienced?	Served		Unserved		Total	%
	No.	%	No.	%		
Everyday	12	11	2	2	14	7
More than once a week	24	21	11	11	35	16
Once a week	6	5	4	4	10	5
Thrice a month	0	0	1	1	1	0.4
Once a month	32	29	21	21	53	25
2-3 times a year	17	15	9	9	26	12
Once a year	16	14	8	8	24	11
Less than once a year	4	4	2	2	6	3
Others / Occasional	3	3	2	2	5	2

Source: JICA Study Team.

5) Willingness-to-Pay for Improved Water Supply

2.44 Some 85% of the respondents expressed their willingness-to-pay on top of what they are currently paying for water in exchange for a better water supply and service (see Figure 2.4.4). This decision was made after hearing the scenario of Metro Cebu's water problem and the proposed solution of establishing the Mananga Dam which will bring about sustainable, clean and 24-hour water supply.

2.45 Among those who are not presently connected to MCWD, 82% are willing to pay extra for better and cleaner water supply. Similarly, 88% of those connected expressed willingness as well. Meanwhile, 7.2% of the respondents are not sure or undecided. The willingness-to-pay by those who are served and unserved shows a similar trend. In both cases, majority are willing to pay. As to how much they are willing to pay, this will be presented in the following section.



Source: JICA Study Team.

Figure 2.4.4 Respondents' Willingness-to-Pay by Water Supply Connection

(1) Willingness-to-Pay by Income Level

2.46 In relating the willingness-to-pay with the level of income of the respondents, the survey revealed that more than three quarters in each income level are willing to pay (see Table 2.4.15). However, the higher the income level, the percentage of this willingness slightly increased. Nearly all the respondents with income above PHP50,000 a month are willing to pay except for one who is undecided. Meanwhile, the low income level recorded the highest percentage of those unwilling to pay. One in every 10 of the low income households are unwilling to pay.

Table 2.4.15 Willingness-to-Pay by Income Level

Income Level	Frequency						Total
	Willing to Pay		Not Willing to Pay		Undecided		
	No.	%	No.	%	No.	%	
Low	189	84	22	10	15	7	226
Middle	123	87	10	7	8	6	141
High	13	93	-	-	1	7	14
Withheld Data	28	80	1	3	6	17	35
Total	353	85.00	33	8.00	30	7.20	416

Source: JICA Study Team.

2.47 The survey data show that the willingness-to-pay is somehow affected by the economic condition of the family, although majority are still willing to pay considering that water is a basic commodity. This shows how critical water is to every household regardless of its economic condition.

(2) Amount Willing to Pay

2.48 In terms of how much the respondents can pay in addition to what they are currently spending for water, the survey revealed that 84% of the respondents, excluding the 12 (3%) who are willing but are undecided on how much they can pay, are willing and can pay below PHP50 (see Table 2.4.16). Meanwhile, more than half (55%) or between 5 and 6 in every 10 households are willing and can pay between PHP51–PHP60. Only 16% are willing and can pay more than PHP100.00.

Table 2.4.16 Additional Amount Willing to be Paid

Amount Willing to Pay	No.	%
Below PHP50	118	33.43
PHP51–60	49	13.88
PHP61–70	26	7.37
PHP71–80	12	3.40
PHP81–90	12	3.40
PHP91–100	58	16.43
more than PHP100	66	18.70
Undecided how much to pay	12	3.40
Total	353	100.00

Source: JICA Study Team.

(3) Willingness-to-Pay by Location

2.49 In terms of location, more than three quarters of the respondents in each location are willing to pay for better water supply. Mandaue City has the least percentage of 82%, followed by Cebu City at 83% (see Table 2.4.17). Meanwhile, 100% of the respondents of Compostela and Cordova are willing to pay.

Table 2.4.17 Willingness-to-Pay by Location

Location	Frequency						Total
	Willing to Pay		Not Willing to Pay		Undecided		
	No.	%	No.	%	No.	%	
Cebu City	146	83	12	7	18	10	176
Compostela	7	100	-	-	-	-	7
Consolacion	17	85	-	-	3	15	20
Cordova	9	100	-	-	-	-	9
Lapu-Lapu City	72	86	8	10	4	5	84
Liloan	16	94	-	-	1	6	17
Mandaue City	55	82	11	16	1	1	67
Talisay City	31	86	2	6	3	8	36
Total	353		33		30		416
Percent	85		8		7		100

Source: JICA Study Team.

(4) Willingness-to-Pay by Main Source of Water Supply

2.50 When it comes to the respondents' willingness to pay by their main water source, more than 75% of the respondents from each category expressed their willingness to pay as well (see Table 2.4.18). There is only one household, who is using an open dug well, who expressed an unwillingness to pay.

Table 2.4.18 Willingness-to-Pay by Main Source of Water

Main Water Source	Willingness to Pay for Improved Water Supply				% WTP
	Yes	No	Not Sure / Undecided	Total	
Piped water supply system (MCWD)	155	22	13	190	81.6
Public Well	46	3	5	54	85.2
Own Well	49	1	2	52	94.2
Neighbor's MCWD connection	40	2	2	44	90.9
Private / Barangay Waterworks	26	2	6	34	76.5
Jetmatic pump / poso (ownership no data)	14	1	1	16	87.5
Dug well (tabay)	7			7	100.0
Water vendor / truck delivery	6	1		7	85.7
Neighbor's well	6		1	7	85.7
Public faucet	2			2	100.0
Own dug well (tabay)		1		1	
Shallow well	1			1	100.0
Spring /tubod	1			1	100.0
Total	353	33	30	416	
Percentage	84.9	7.9	7.2	100.0	

Source: JICA Study Team.

(5) Reasons for Willingness and Unwillingness to Pay

2.51 The most popular reason why the respondents are willing to pay, as expressed by about 61% of those willing to pay, is the assurance of a stable water supply in the future, particularly once Mananga Dam is implemented which will bring a sustainable, clean and 24-hour available water supply to the people as presented to them during the interview (see Table 2.4.19).

2.52 Worth noting is the reason given by about 15% who are willing to pay, who opined that with the proposed water development project, their water will be cost-efficient and cheaper than other sources. There are households paying PHP1.00–3.00 per pail or container of water for domestic use, which is about thrice the cost of MCWD water per m³. In like manner, two respondents gave a conditional willingness to pay who said that they are willing to pay as long as it is affordable to them.

Table 2.4.19 Reasons for Willingness-to-Pay

Reasons why willing to Pay (353 respondents)	No.	%
Future water supply will be assured	214	60.6
Regular, steady and consistent supply of water	190	53.8
MCWD can expand its coverage and connect more households and establishments	87	24.6
Water storage to provide water in times of drought/ El Niño	87	24.6
Improved sanitation and well-being	60	17.0
Piped water supply is the most cost-efficient compared to the other sources	54	15.3
Dam can control flooding downstream (urban)	46	13.0
Getting water from water vendors is costlier, inconvenient and makes us worry about quality	37	10.5
For the good of everyone particular those without water	8	2.3
Water is important, the more water the better	8	2.3
For convenience	1	0.3
To harness rainwater and make use of it	1	0.3
For cleaner and safe resource of water	3	0.8
As long as it is affordable	2	0.6
For savings and cheaper water	2	0.6

Source: JICA Study Team.

2.53 For those who are not willing to pay, on the other hand, more than half said that they are simply unwilling to pay while about 21% are already satisfied with their current water supply and are not willing to incur additional expense (see Table 2.4.20). Other reasons cited are related to their capacity to pay, some want to see the project first, while others believe that it is not their responsibility to shoulder the expense for the development but, instead, it should be the government or MCWD.

Table 2.4.20 Reasons for Non-willingness to Pay

Reasons Why Not Willing to Pay	No.	%
We have had no experience of water shortage and do not appreciate the inconvenience	3	9.1
We are satisfied with our current service and, therefore, do not see the need to improve it at an additional cost to us	7	21.2
We do not want to pay for the improved distribution system	18	54.5
Wants to see the project first	1	3.0
Unstable/ insufficient family income/ no money	4	12.1
Only the government will benefit	1	3.0
It is the government's responsibility	1	3.0
MCWD should pay for it	1	3.0
Renting house only	1	3.0
We have our own supply and we can buy drinking water	1	3.0
Have their own water business	1	3.0

Source: JICA Study Team.

6) Septage Management Conditions

(1) Availability and Type of Toilet

2.54 About 93% of the respondents have toilets in their homes, which include 88%, 97% and 100% of those in the low, middle and high income levels, respectively (see Table 2.4.21). Among those who withheld their income data, 97% have toilets as well. Those without toilets in their homes either use communal toilets or shared toilets with neighbors which are usually their family or relatives (see Table 2.4.22). Among those

with toilets, 75% are manually flushing their toilets by pouring water (see Figure 2.4.5) while about 24% have flush toilets. Two households admitted that they have toilets but they flush directly to the river.

Table 2.4.21 Availability of Toilet Facility by Income Level

Income Level	With Toilet				Total
	No	%	Yes	%	
Low	26	11.5	200	88.4	226
Middle	4	2.8	137	97.1	141
High			14	100	14
Withheld Information	1	2.8	34	97.1	35
Total	31		385		416
Percent	7.0		93.0		100.0

Source: JICA Study Team.



Source: JICA Study Team.

Figure 2.4.5 Communal Toilet (Pour Flush)

Table 2.4.22 Type of Toilet

Type of Toilet	No.	%
Flush	92	23.9
Open Pit	2	0.6
Pour Flush	289	75.0
Others - River	2	0.6
Total with toilet	385	100

Source: JICA Study Team.

(2) Presence of Septic Tank

2.55 Among those 385 households with toilets, 371 or 96.4% claimed to have septic tanks (see Table 2.4.23). This includes the 194 or 97% and 131 or 96% of those

households with toilets belonging to the low and middle income levels, respectively. All high income level households have both toilets and septic tanks. On the other hand, 3.6% either do not have septic tanks or are unaware if they have one or not.

Table 2.4.23 Availability of Septic Tank by Income Level

Income Level	With Septic Tank			Total with Toilet
	No	Yes	No Response	
Low	4	194	2	200
Middle	5	131	1	137
High		14		14
Withheld Information	1	32	1	34
Total	10	371	4	385
Percentage	2.5	96.40	1.00	100.00

Source: JICA Study Team.

(3) Frequency and Cost of Desludging Service

2.56 Regular desludging of septic tanks at the household level should be done between 3 and 5 years to maintain its treatment efficiency. Unfortunately, the survey revealed that this is not commonly practiced among the surveyed households. Among those 371 households who claimed to have septic tanks, majority or 66% have not tried desludging their septic tanks ever since while 29 or 7.8% did their desludging between 6 and 25 years (see Table 2.4.24). Others desludge only when it is full or clogged (2.7%), once ever since (2.7%), and have no idea if they did it or not (2.4%).

2.57 On the other hand, there are households who claimed to have done it more than the standard. Five households said they do it once a year, 1 household said four times a year, and another every six months.

Table 2.4.24 Frequency of Desludging

Desludging Frequency	No.	%
Not at all	245	66.04
When full	10	2.70
Recently (60 years residing)	1	0.27
Once ever since	10	2.70
More than 6 years	29	7.82
Once every 5 years	18	4.85
Once every 3 years	19	5.12
Once every 2 years	13	3.50
Once a year	6	1.61
4-6 times since	2	0.54
Twice since	2	0.54
Every six months	1	0.27
4 times a year	1	0.27
New septic tank	4	1.08
Just renting	1	0.27
No Idea/ Unknown	9	2.43
Total	371	100.00

Source: JICA Study Team.

2.58 A large percentage (74%) has no idea on how much is the cost for desludging their septic tank. It was gathered from those who know that the cost of desludging ranges from PHP500 to as high as PHP8,000 but most said it is around PHP1,500

followed by those who said PHP2,000 (see Table 2.4.25).

Table 2.4.25 Desludging Cost According to the Respondents

Amount (PHP)	No.	%
500	1	1
700	2	2
800	1	1
1,200	2	2
1,500	25	23
1,600	1	1
1,700	2	2
1,800	2	2
2,000	23	21
2,200	1	1
2,300	1	1
2,500	10	9
2,800	2	2
3,000	14	13
3,400	1	1
3,500	2	2
3,800	1	1
4,000	6	6
5,000	7	6
6,000	3	3
8,000	1	1
	108	100

Source: JICA Study Team.

2.59 As to the awareness whether or not the sludge is properly treated before it is disposed, only 15 or 4% of those who have septic tanks claimed to know.

(4) Water-borne Diseases

2.60 Incidence of water-borne diseases among the sample households is low, based on the survey. More than three quarters or about 79% of the respondents claimed that they have not encountered any water-borne diseases (see Table 2.4.26). As stated by a woman interviewed who gets their water from a well, “Sa kaluoy sa Ginoo wala man mi nasakit gikan sa tubig” (by God's mercy, we did not get any sickness from our water). Of the 88 households who reported to have contracted water-borne diseases, 47 or 53% were cases of diarrhea and skin disease (38.6%).

Table 2.4.26 Incidents of Water-borne Diseases (Multiple Answers)

Water-borne Decease	Frequency
None	328
Diarrhea	47
Skin Diseases	34
Dysentery	7
Amoebiasis	8
Hay Fever	1

Source: JICA Study Team.

2.61 Among the 96 reported incidences of water-borne diseases, 36.5% and 16.7% of these diseases were experienced by households connected with MCWD and those using neighbor's MCWD connections, respectively (see Table 2.4.27).

Table 2.4.27 Incidents of Water-borne Diseases by Main Water Source

Main Source of Water	Diarrhea	Skin Diseases	Amoebiasis	Dysentery	Total	%
Neighbor's connection	9	5		2	16	16.7
Others	5	3			8	8.3
Own well	6	4		1	11	11.5
Piped water supply system (MCWD)	14	12	6	3	35	36.5
Private / Barangay Waterworks	8	5		1	14	14.6
Public Well	5	5	1		11	11.5
Vendor / truck delivery			1		1	1.0
Total	47	34	8	7	96	100.0

Source: JICA Study Team.

7) Willingness-to-Pay for Desludging Service

2.62 After listening to the scenario presented in relation to the current septage management of Metro Cebu, how it is affecting its water resources and environment, and the proposed solution to the problem, about 88% of the respondents indicated a “yes” answer when they were asked if they are willing to pay for a septage management and treatment service. On the other hand, 6.5% were unwilling and the remaining 6% were uncertain or did not give a response. The following section presents how the willingness to pay is reflected according to respondents' level of income, main water source and house ownership.

(1) Willingness-to-Pay by Income Level

2.63 A positive response to the willingness-to-pay for desludging and treatment cuts across all the income levels of the respondents. All those belonging to the high income level are willing to pay (see Table 2.4.28). Similarly, 91% of those in the middle and 87% of those in the low income level are willing to pay as well. Regardless of the income level, people are generally willing to pay although the percentage decreases as the income level goes down.

Table 2.4.28 Willingness-to-Pay for Desludging Service by Income Level

Income Level	Frequency				Total	WTP (%)
	Willing to Pay	Not willing to pay	Not Sure / Undecided	No Response		
Low Income Level	196	16	12	2	226	87
Middle Income Level	128	7	6		141	91
High Income Level	14	-	-	-	14	100
Withheld Information	27	4	3	1	35	77
Total	365	27	21	3	416	
Percentage	87.7	6.5	5.0	0.7	100.0	

Source: JICA Study Team.

(2) Willingness-to-Pay by Main Water Source

2.64 The respondents' willingness-to-pay by their main water source reflects that between 79.5%–100% of the households across most water sources are willing to pay for regular desludging and treatment service every three to five years (see Table 2.4.29). On the other hand, the two households that are sourcing their water from open dug well and spring are unwilling to pay for such service, together with a household utilizing a public faucet as well as 6% of those connected with MCWD.

Table 2.4.29 Willingness-to-Pay for Desludging Service by Main Water Source

Main Water Source	Willingness to Pay for Septage Management					% WTP
	Yes	No	Not Sure / Undecided	Withheld Info	Total	
Piped water supply system (MCWD)	170	12	7	1	190	89.5
Public well	46	3	4	1	54	85.2
Own well	48	1	2	1	52	92.3
Neighbor's MCWD connection	35	7	2		44	79.5
Private / Barangay Waterworks	31	1	2		34	91.2
Jetmatic pump / poso (ownership no data)	15		1		16	93.8
Dug well (tabay)	6	1			7	85.7
Water vendor / truck delivery	6	1			7	85.7
Neighbor's well	6		1		7	85.7
Public faucet	1		1		2	50.0
Own dug well (tabay)		1			1	Negative
Shallow well	1				1	100.0
Spring / tubod			1		1	negative
Total	365	27	21	3	416	
Percentage	87.7	6.5	5.0	0.7	100	

Source: JICA Study Team.

(3) Willingness-to-Pay by House Ownership

2.65 Regardless of their type of home ownership, the willingness-to-pay of the respondents is relatively high. Among those who are occupying their houses for free, 92% are willing to pay while 100% of those amortizing their homes and 90% of those renting shares the same opinion (see Table 2.4.30). Among those who own their houses 87% said that they are likewise willing. It is noted that the latter rate is slightly lower than the others as this category includes those in informal settlements who built their own temporary housing structures.

Table 2.4.30 Willingness-to-Pay for Septage Management by House Ownership

House Owner	Willingness to Pay for Septage Management					% WTP
	Yes	No	Not sure/ undecided	Withheld Info	Total	
Amortizing	2				2	100
Free	12		1		13	92
Owned	303	23	19	3	348	87
Renting	44	4	1		49	90
No data	4				4	100
Total	365	27	21	3	416	
Percentage	87.7	6.5	5.0	0.7	100.0	

Source: JICA Study Team.

(4) Amount Willing to Pay for Septage Management and Treatment

2.66 The average amount that the respondents who are willing to pay for septage management and treatment is PHP1,242.00 (see Table 2.4.31). However, the most popular amount that the respondents are willing to pay is PHP500.00, as mentioned by 127 or 30% of the respondents, followed by PHP1,000 as indicated by 12%. These preferred figures are much lower than the current cost of desludging in the market which about PHP3,000.

Table 2.4.31 Amount Willing to Pay for Septage Management and Treatment

Amount WTP	Income Level				Total
	High	Low	Middle	No Response	
PHP50	1	4			5
PHP100	1	13	2	1	17
PHP200		2	4		6
PHP250		1			1
PHP300		1	1		2
PHP400	1	1			2
PHP500	2	77	37	11	127
PHP600		1			1
PHP1,000	1	27	18	5	51
PHP1,500	1	23	16	1	41
PHP2,000	2	10	21	4	37
PHP2,500		16	15	5	36
PHP3,000	4	11	6		21
>PHP3,000		5	5		10
No Response	1	34	16	8	59
Total	14	226	141	35	416

Source: JICA Study Team.

(5) Reasons for Willingness and Non-Willingness to Pay

2.67 When asked why they are willing to pay for septage management and treatment, almost half or 49.4% of the 364 respondents who are willing to pay believe or are convinced that it can improve the efficiency of their septic tanks and reduce pollution from wastewater (see Table 2.4.32). This is followed by those who are concerned with the quality of water in relation to water-borne diseases (38.7%).

Table 2.4.32 Reasons for Willingness-to-Pay for Desludging Service

Reasons	No.	%
They can improve efficiency of septic tanks to reduce pollution from wastewater	180	49.4
They can improve water quality and reduce water-borne diseases	141	38.7
They can increase coverage of septage collection, treatment and proper disposal	93	25.5
They can prevent the deterioration of the aquatic environment	107	29.3

Source: JICA Study Team.

2.68 Meanwhile, among those 27 households who are not willing to pay for septage management and treatment, the most common reason is their lack of budget and they do not want to pay for the service improvement (see Table 2.4.33).

Table 2.4.33 Reasons for Non-Willingness to Pay for Desludging Service

Reasons	No.
We have no problem with the current septic tanks / desludging service and do not understand the need for it	3
We have no budget and do not want to pay for the service improvement	16
I do not think we will have serious water pollution	1
Other reasons	14

Source: JICA Study Team.

2.69 The other reasons include the following:

- (i) "Once our septic tank will be filled (estimate 10 years or more)";
- (ii) "We are dependent on the owner of the toilet";
- (iii) "Depends on the situation";
- (iv) "Insufficient income, no budget";
- (v) "We are just renting";
- (vi) "Treatment should be charged to those desludging the septic tank";
- (vii) "We already have too many bills to pay";
- (viii) "We never desludge";
- (ix) "We think that the project will not be effective or implemented properly"; and
- (x) "We will just build a new septic tank if our current septic tank is filled."

2.70 The reasons stated for the non-willingness to pay relate to the economic condition and level of understanding about the need for regular desludging. Aside from economic reasons, majority think that desludging is only needed when the septic tanks are filled up, hence regular desludging (every 3–5 years) is not common.

2.5 Conclusion

2.71 Given the above findings, the following are the conclusions drawn from the survey:

- (a) After being made aware of the present and future scenario of Metro Cebu's water supply condition, 85% of the respondents expressed their willingness-to-pay for improved water supply at an acceptable quality, 24/7 service and adequate pressure through the Mananga Dam II project. The willingness-to-pay cuts across the people's income level, location and source of water.
- (b) The most acceptable extra amount that people are willing pay for improved water supply is between PHP50 and PHP100.
- (c) Buying bottled water for drinking is done by many households (88%), including those in the low income level and those connected with MCWD (90%). This behavior shows that people will be willing to spend extra for safer water. This extra expense may be considered as a disposable income which can be diverted to pay for a safer and cheaper water supply as an alternative to bottled water. However, this would require convincing proof that such water is potable and safe for drinking compared to bottled water which has gained the trust of people.
- (d) Households buying water by retail from water refilling stations, which costs from PHP1–3.00 per 5-gallon containers, are spending more than those who are directly served by MCWD. With the retail amount they are paying, these households are paying about PHP50 to PHP150 per m³ of water which is much higher than MCWD's water.
- (e) There is a general clamor for a clean, safe, consistent and sufficient supply of water.
- (f) After being made aware of the present scenario of Metro Cebu's septage management, how it is affecting people's health and environment, and by presenting the proposed intervention, a high percentage (87.7%) of the respondents expressed their willingness-to-pay for desludging services.

- (g) Payment for septage management and treatment may be considered as a new expense to most households. Despite a high percentage (87.7%) of willingness-to-pay, the average amount they are willing to pay is PHP1,242 per desludging service. This amount is much lower than what is currently charged (PHP3,000) by septage collectors. There is an apparent need for further information dissemination and education on this matter.

3 TRAFFIC DATABASE

3.1 Cordon Line Survey

1) Survey Methodology

3.1 The Cordon Line Survey aims to determine the trips from/to the study area made by residents living outside the study area and to calibrate the distributed traffic volume obtained from the HIS. To obtain such data, origin-destination (O-D) interview survey, traffic count survey, and vehicle occupancy survey were conducted simultaneously at each survey station.

3.2 There were seven survey stations for the roadside at the study area's boundary, six stations at ferry terminals, and two stations at the Mactan Cebu International Airport (MCIA), as listed in Table 3.1.1 together with their respective survey durations. Surveys were conducted on Tuesdays, Wednesdays, or Thursdays but not on a holiday or day with special activities (such as local festivals) or bad weather. The actual survey time and dates, and longitude and latitude for each survey station are shown in Table 3.1.2. Their locations are shown in Figure 3.1.1.

Table 3.1.1 List of Cordon Line Survey Stations

Seq.	Category	Code	Survey Station	Location	Survey Period (hours)		
					Traffic Count ^{1/}	Vehicle Occupancy	O-D Interview
1	Roadside	R1	Central Nautical Hwy	Boundary of Danao and Carmen	24	24	24
2		R2	Cebu Transcentral Hwy	Boundary of Cebu and Balamban	24	24	24
3		R3	Cebu – Toledo Wharf Rd	Boundary of Minglanilla and Toledo	16	16	16
4		R4	Naga –Uling Rd	Boundary of Naga and Toledo	24	24	24
5		R5	Liburon Rd	Boundary of Carcar and Aloguinsan	16	16	16
6		R6	Carcar–Barili Rd	Boundary of Carcar and Barili	24	24	24
7		R7	South National Hwy	Boundary of Carcar and Sibonga	24	24	24
8	Ferry	F1	Cebu Terminal 1	Pier 1, Cebu Port	-	-	24
9	Terminal ^{2/}	F2	Cebu Terminal 2	Pier 3, Cebu Port ^{3/}	-	-	24
10		F4	Cordova Pier	Pier for the Cordova –Jetafe Ferry, Cordova Port	-	-	8
11		F5	Danao Terminal	Pier for the Danao–Camotes Ferry, Danao Port	-	-	14
12		F7	2GO Travel ^{4/}	Pier 4, Cebu Port	-	-	18
13		F9	Sulpicio Lines, Inc. ^{4/}	Pier 5, Cebu Port	-	-	18
14	Airport	A1	Domestic Terminal	Mactan Cebu International Airport	-	-	24
15	Terminal	A2	International Terminal	Mactan Cebu International Airport	-	-	24

Source: JICA Study Team.

Notes:

^{1/} Ferry and air passenger data were provided by Cebu Ports Authority (CPA) and Mactan Cebu International Airport Authority (MCI AA).

^{2/} The Study originally planned surveys at F3 (Terminal 3 at Pier 4), F6 (private terminal of Roble Shipping Inc.) and F8 (private terminal of Carlos A. Gothong Lines). However, functions of F3 and F6 have been transferred to F1 and F2 and Carlos A. Gothong Lines is suspending passenger services due to MARINA's order. Therefore surveys at these three stations were not necessary.

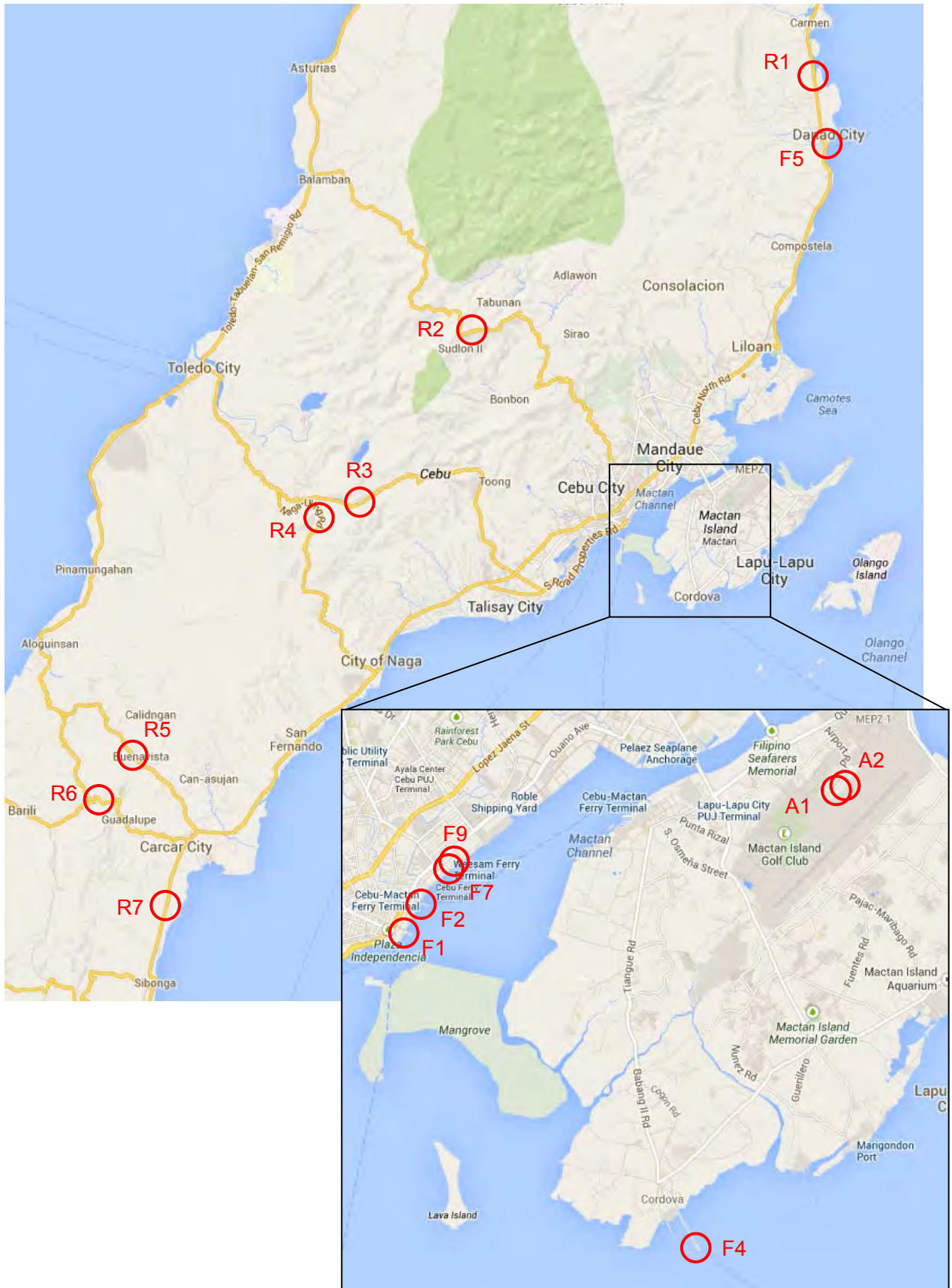
^{3/} The Cordon Line Survey did not target passengers of the Cebu–Mactan Ferry terminal located at Pier 3.

^{4/} F7 and F9 are private terminals owned by the shipping lines.

Table 3.1.2 Location and Survey Date and Time of Cordon Line Survey Stations

Seq.	Category	Code	Survey Station	Location	Date of Start	Time Started	Time Completed
1	Roadside	R1	Central Nautical Hwy	10° 33' 20.88" N 124° 01' 18.48" E	February 26, 2014	6:00 AM	6:00 AM the following day
2		R2	Cebu Transcentral Hwy	10° 24' 40.68" N 123° 48' 21.96" E	February 26, 2014	6:00 AM	6:00 AM the following day
3		R3	Cebu – Toledo Wharf Rd	10° 18' 43.20" N 123° 45' 18.00" E	February 20, 2014	6:00 AM	10:00 PM
4		R4	Naga –Uling Rd	10° 15' 24.84" N 123° 42' 38.88" E	February 20, 2014	6:00 AM	6:00 AM the following day
5		R5	Liburon Rd	10° 09' 20.52" N 123° 36' 21.24" E	February 27, 2014	6:00 AM	10:00 PM
6		R6	Carcar–Barili Rd	10° 07' 41.52" N 123° 35' 02.04" E	February 27, 2014	6:00 AM	6:00 AM the following day
7		R7	South National Hwy	10° 03' 55.08" N 123° 37' 40.44" E	February 27, 2014	6:00 AM	6:00 AM the following day
8	Ferry Terminal	F1	Cebu Terminal 1	10° 17' 33.94" N 123° 54' 29.27" E	March 5, 2014	6:00 AM	6:00 AM the following day
9		F2	Cebu Terminal 2	10° 17' 51.02" N 123° 54' 37.16" E	March 4, 2014	6:00 AM	6:00 AM the following day
10		F4	Cordova Pier	10° 14' 32.25" N 123° 57' 22.06" E	March 5, 2014	6:00 AM	2:00 PM
11		F5	Danao Terminal	10° 31' 13.36" N 124° 01' 48.57" E	March 6, 2014	4:00 AM	6:00 PM
12		F7	2GO Travel	10° 18' 06.95" N 123° 54' 51.33" E	March 11, 2014	4:00 AM	10:00 PM
13		F9	Sulpicio Lines, Inc.	10° 18' 15.42" N 123° 54' 59.57" E	March 12, 2014	4:00 AM	10:00 PM
14	Airport Terminal	A1	Domestic Terminal	10° 18' 54.92" N 123° 58' 43.31" E	February 26, 2014	12:00 AM	12:00 AM the following day
15		A2	International Terminal	10° 18' 56.14" N 123° 58' 44.32" E	February 26, 2014	12:00 AM	12:00 AM the following day

Source: JICA Study Team.



Source: JICA Study Team.

Figure 3.1.1 Locations of Cordon Line Survey Stations

3.3 In the case of roadside surveys, vehicular traffic volume and vehicle occupancy were observed every 30 minutes by vehicle type and direction. The number of passengers on vehicles chosen at random was recorded for the vehicle occupancy survey. For the roadside surveys, vehicles were classified as follows:

- (1) Bicycle;
- (2) Motorcycle;
- (3) Car/ Owner-type Jeep;
- (4) Pedicab;
- (5) Tricycle;
- (6) Taxi;
- (7) Jeepney / Multicab;
- (8) V-hire (vehicle for hire)/ GT Express (garage-terminal);
- (9) Minibus;
- (10) Standard Bus;
- (11) School / Company / Tourist Bus;
- (12) Pickup / Delivery Truck;
- (13) Truck;
- (14) Trailer; and
- (15) Others (including ambulance, fire truck, towing car, construction vehicle, armored car, animal-driven cart, etc.).

3.4 For the roadside survey sites, the 24-hour traffic count, vehicle occupancy, and O-D interview surveys were conducted at five stations, while 16-hour surveys were conducted at the remaining two stations. The survey period was from 6:00 a.m. to 10:00 p.m. at the 16-hour sites and from 6:00 a.m. to 6:00 a.m. the next day at the 24-hour sites.

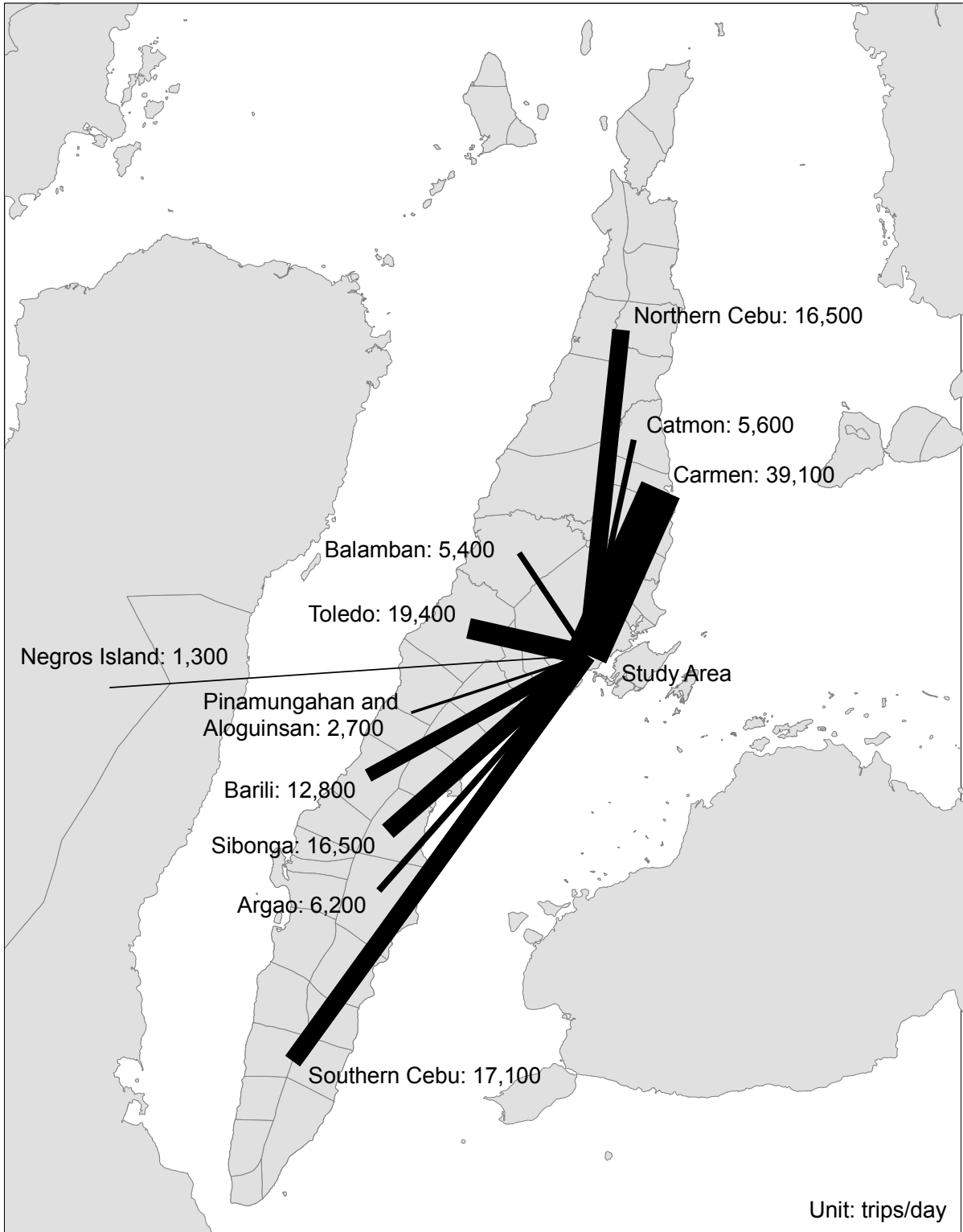
3.5 O-D interview surveys were conducted at major public and private ferry terminals in the study area. The survey period was fitted to the terminal's operating hours for those not open for 24 hours. At ferry terminals, only departing passengers were interviewed because arriving passengers are usually in a hurry to go to their final destinations. The Cebu Ports Authority (CPA) provided passenger count data by vessel for the survey date to expand the O-D data.

3.6 O-D interview surveys were also conducted at the domestic and the international terminals of MCIA for 24 hours. Both the departing and arriving passengers were interviewed there. The Mactan Cebu International Airport Authority (MCIAA) provided passenger count data by aircraft for the survey date.

3.7 The O-D interview survey forms are shown in Appendix 3A.

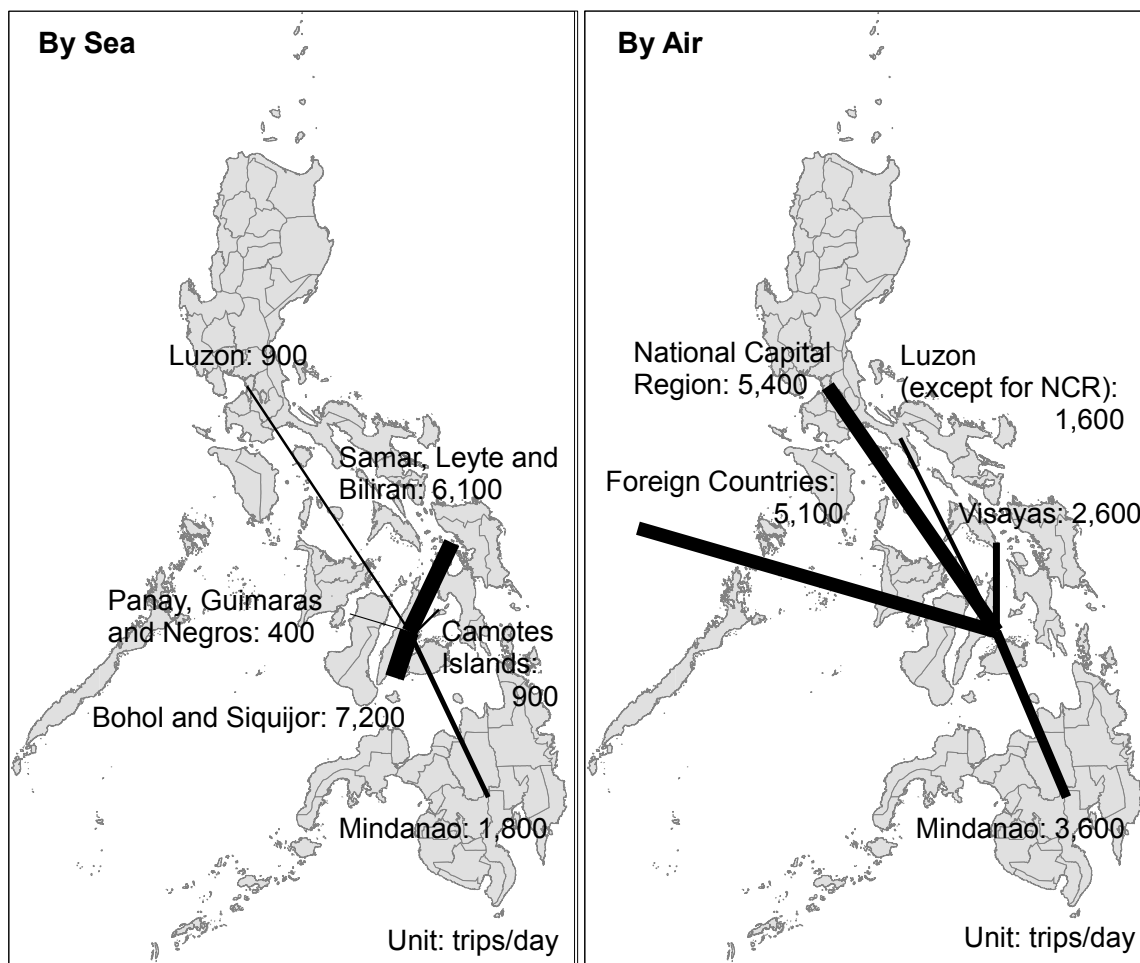
2) Cordonline Survey Results

3.8 Figure 3.1.2 and Figure 3.1.3 show the number of daily trips from/to the study area by mode. There is a considerable amount of intercity traffic from/to other LGUs in Cebu Island thanks to bus and v-hire services and well-maintained trunk roads. With regard to sea and air transport, passengers from/to nearby destinations (e.g., Bohol, Camotes, Leyte, Cagayan de Oro, etc.) use fast craft, ferry and RO-RO services while long-haul shipping services are no longer competitive against reasonably priced and frequent air services.



Source: JICA Study Team.

Figure 3.1.2 Number of Daily Trips from/to the Study Area by Land

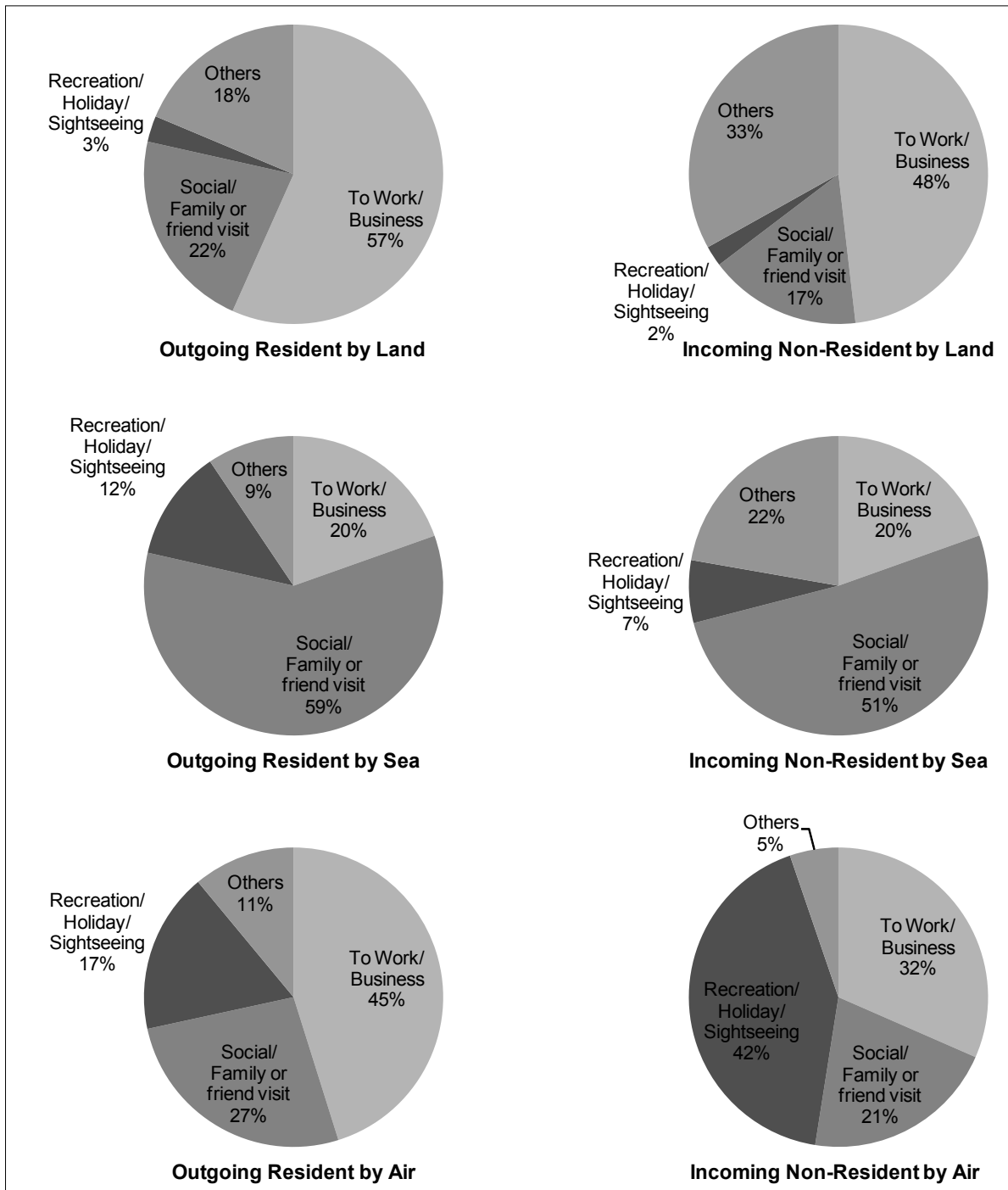


Source: JICA Study Team.

Figure 3.1.3 Number of Daily Trips from/to the Study Area by Sea and Air

3.9 Figure 3.1.4 shows the share of trip purpose by resident / non-resident and travel mode. The results suggest the following:

- (a) **Land:** Many people across the study area boundary have daily work and business affairs. The study area seems to have strong economic and social relationships with the other LGUs in Cebu Island.
- (b) **Sea:** More than half of the passengers use shipping services to see relatives or friends across the islands, while about a fifth travel across for work or business. Reliable and affordable shipping services should be maintained to support ties among Visayan provinces.
- (c) **Air:** More than 30% of passengers from distant cities come to the study area for work or business purposes while tourists account for more than 40% of the traffic. Nearly half of the residents also fly out on work or business trips while most of the rest do so either to visit family and friends or for holiday/ leisure. Traffic demand for business trips due to the growing economy in the study area would require punctual, convenient and comfortable access transit to MCIA as well as expansion of the airport terminal capacity.



Source: JICA Study Team.
 Note: "Others" include education, medical care, shopping, eating, worship etc.

Figure 3.1.4 Trip Purpose by Resident / Non-Resident and Mode

3.2 Screen Line Survey

1) Survey Methodology

3.10 The Screen Line Survey aims to provide vehicular and passenger traffic information to calibrate the current distributed traffic volume obtained from the HIS. To obtain the required data, the traffic count survey and the vehicle occupancy survey were conducted at road sections crossing the screen lines in the study area.

3.11 There were a total of 20 survey stations at roadsides and at Pier 3, Cebu Port. These are listed in Table 3.2.1. As in the Cordon Line Survey, the Screen Line Survey was conducted on Tuesdays, Wednesdays, or Thursdays, but not on a holiday or day with special activities (such as local festivals) or bad weather. The actual survey time and dates, and longitude and latitude for each survey station are shown in Table 3.2.2, and their locations are shown in Figure 3.2.1.

Table 3.2.1 List of Screen Line Survey Stations

Seq.	Code	Survey Station	Location	Survey Period (hours)	
				Traffic Count	Vehicle Occupancy
1	S1	Haarlemmermeer Bridge	-	16	16
2	S2	G. Binghay Bridge	-	16	16
3	S3	M. Velez Bridge	-	24	24
4	S4	B. Rodriguez Bridge	-	24	24
5	S5	J. Alcantara Bridge	-	16	16
6	S6	Guadalupe Bridge	-	24	24
7	S7	Sanciangko Bridge	-	16	16
8	S8	Colon Bridge	-	24	24
9	S9	Forbes Bridge	-	16	16
10	S10	South Coastal Road	The west end of the bridge at SRP	24	24
11	S11	Mandaue–Mactan Bridge (Old Bridge)	-	24	24
12	S12	Senator Marcelo B. Fernan Bridge (New Bridge)	-	24	24
13	S13	Cebu–Mactan Ferry Terminal	-	- ^{1/}	-
14	S14	Mahiga Bridge	In front of Banilad Town Center	24	-
15	S15	Hernan Cortes	In front of PTT at the east of Cebu Country Club	24	-
16	S16	M. C. Briones	In front of Tipolo Square	24	-
17	S17	Ouano Avenue	In front of Parkmall	24	-
18	S18	Cebu North Road	Boundary of Mandaue City and Consolacion	24	-
19	S19	Cansaga Bay Bridge	-	24	-
20	S20	Cebu South Road	Boundary of Talisay City and Minglanilla	24	-

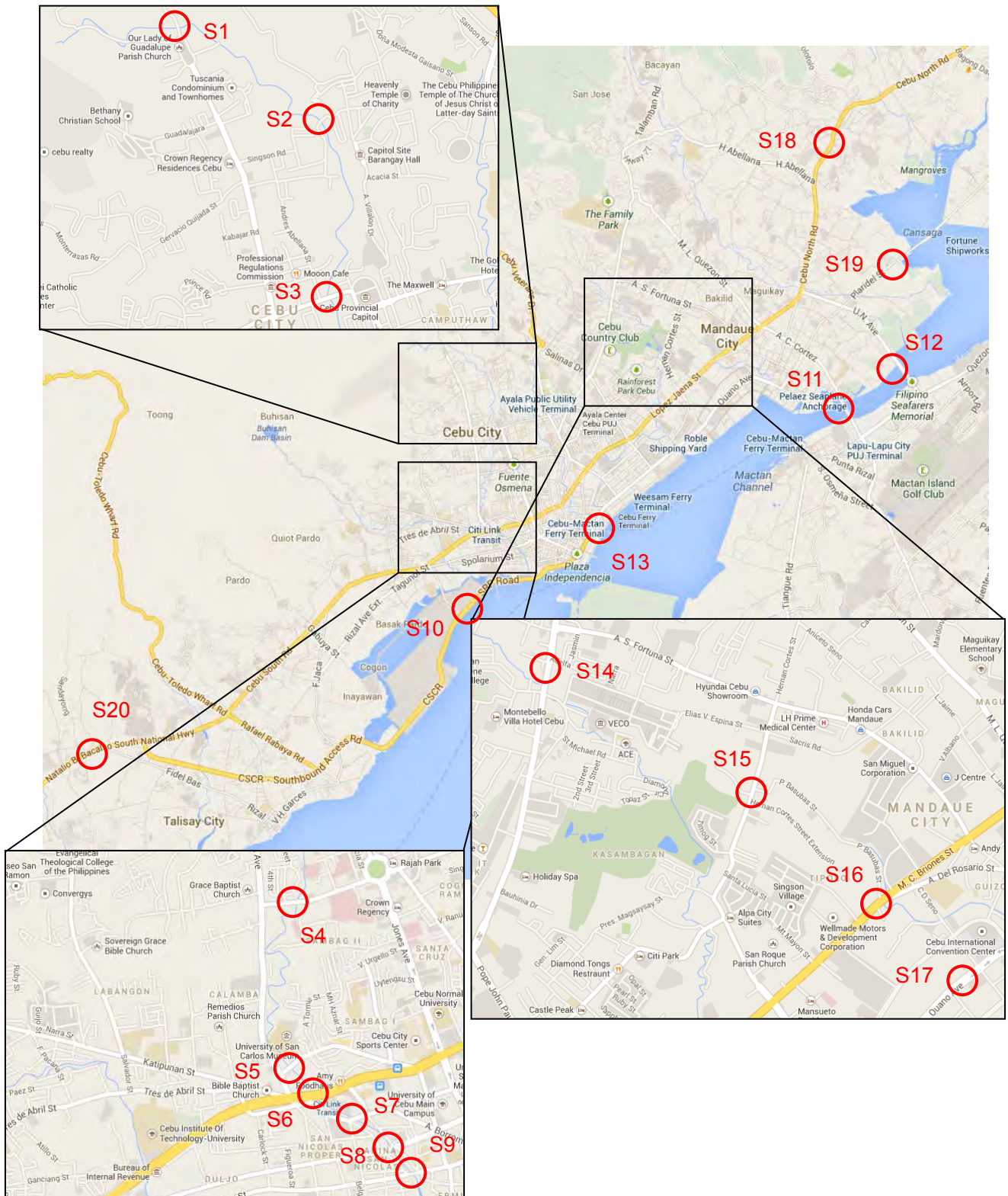
Source: JICA Study Team.

Note:^{1/} Ferry passenger data was provided by Cebu Ports Authority (CPA).

Table 3.2.2 Location and Survey Date and Time of Cordon Line Survey Stations

Seq.	Code	Survey Station	Location	Date of Start	Time Started	Time Completed
1	S1	Haarlemmermeer Bridge	10° 19' 55.88" N 123° 52' 47.26" E	February 11, 2014	6:00 AM	10:00 PM
2	S2	G. Bingham Bridge	10° 19' 36.11" N 123° 53' 17.35" E	February 11, 2014	6:00 AM	10:00 PM
3	S3	M. Velez Bridge	10° 19' 0.66" N 123° 53' 18.81" E	February 5, 2014	6:00 AM	6:00 AM the following day
4	S4	B. Rodriguez Bridge	10° 18' 29.92" N 123° 53' 18.86" E	February 5, 2014	6:00 AM	6:00 AM the following day
5	S5	J. Alcantara Bridge	10° 17' 56.08" N 123° 53' 17.42" E	February 11, 2014	6:00 AM	10:00 PM
6	S6	Guadalupe Bridge	10° 17' 50.42" N 123° 53' 22.46" E	February 5, 2014	6:00 AM	6:00 AM the following day
7	S7	Sanciangko Bridge	10° 17' 45.93" N 123° 53' 30.53" E	February 13, 2014	6:00 AM	10:00 PM
8	S8	Colon Bridge	10° 17' 39.95" N 123° 53' 37.79" E	February 6, 2014	6:00 AM	6:00 AM the following day
9	S9	Forbes Bridge	10° 17' 35.04" N 123° 53' 42.13" E	February 11, 2014	6:00 AM	10:00 PM
10	S10	South Coastal Road	10° 16' 55.28" N 123° 53' 1.18" E	February 6, 2014	6:00 AM	6:00 AM the following day
11	S11	Mandaue - Mactan Bridge (Old Bridge)	10° 19' 28.85" N 123° 57' 10.72" E	February 6, 2014	6:00 AM	6:00 AM the following day
12	S12	Senator Marcelo B. Fernan Bridge (New Bridge)	10° 19' 58.20" N 123° 57' 43.02" E	February 13, 2014	6:00 AM	6:00 AM the following day
13	S13	Cebu - Mactan Ferry Terminal	10° 17' 51.02" N 123° 54' 37.16" E	Data Provided by CPA for four days; February 11-13 and March 4, 2014		
14	S14	Mahiga Bridge	10° 20' 27.44" N 123° 54' 42.62" E	February 12, 2014	6:00 AM	6:00 AM the following day
15	S15	Hernan Cortes	10° 20' 03.78" N 123° 55' 24.05" E	February 12, 2014	6:00 AM	6:00 AM the following day
16	S16	M. C. Briones	10° 19' 40.01" N 123° 55' 46.66" E	February 12, 2014	6:00 AM	6:00 AM the following day
17	S17	Ouano Avenue	10° 19' 26.27" N 123° 56' 05.40" E	February 12, 2014	6:00 AM	6:00 AM the following day
18	S18	Cebu North Road	10° 22' 13.55" N 123° 57' 11.62" E	February 13, 2014	6:00 AM	6:00 AM the following day
19	S19	Cansaga Bay Bridge	10° 20' 43.21" N 123° 57' 45.80" E	February 13, 2014	6:00 AM	6:00 AM the following day
20	S20	Cebu South Road	10° 15' 21.34" N 123° 48' 45.18" E	February 12, 2014	6:00 AM	6:00 AM the following day

Source: JICA Study Team.



Source: JICA Study Team.

Figure 3.2.1 Locations of Screen Line Survey Stations

3.12 The vehicular traffic volume every 30 minutes by vehicle type and direction was counted at roadside survey stations. The number of passengers on vehicles chosen at random was recorded for the vehicle occupancy survey. The classification of vehicles follows the ones used for the Cordon Line Survey described earlier.

3.13 The traffic count surveys at roadsides were conducted for 24 hours at 14 stations and 16 hours at five stations. The vehicle occupancy surveys were also conducted for 24 hours at seven stations and 16 hours at five stations simultaneously with the traffic count survey. The survey period was from 6:00 a.m. to 10:00 p.m. at the 16-hour sites and from 6:00 a.m. to 6:00 a.m. the next day at the 24-hour sites.

3.14 For the Cebu–Mactan Ferry, CPA provided the number of departing and arriving passengers by vessel for four days, on February 11–13 and March 4, 2014.

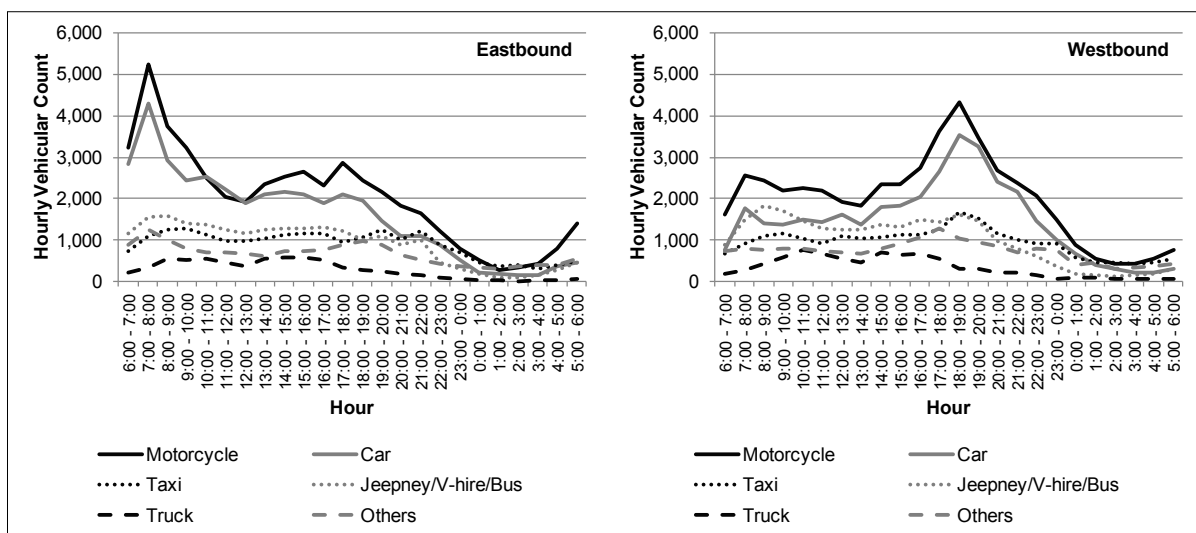
2) Screen Line Survey Results

3.15 The following five screen lines (SLs) are considered in this subsection:

- (i) SL1 composed of survey stations S1 to S10;
- (ii) SL2 composed of survey stations S11 to S13;
- (iii) SL3 composed of survey stations S14 to S17;
- (iv) SL4 composed of survey stations S18 and S19; and
- (v) SL5 composed of survey station S20.

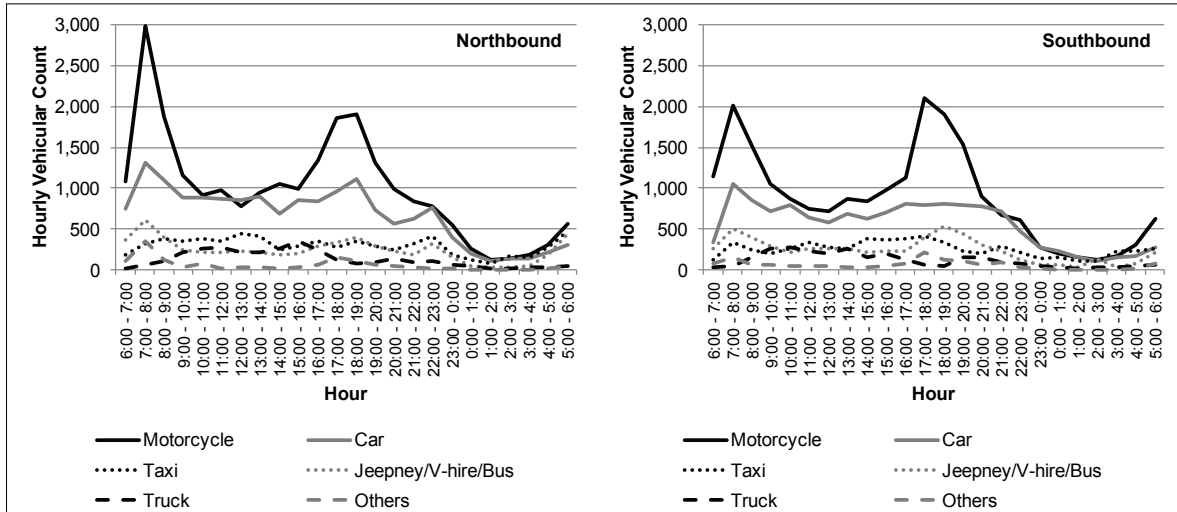
3.16 SL1 and SL2 are the major screen lines used for adjusting person trip data collected in the HIS.

3.17 Figures 3.2.2 to 3.2.6 show hourly vehicular traffic volume across each screen line by direction and vehicle class. The figures show clear morning (between 6:00 and 8:00 a.m.) and evening (between 5:00 and 7:00 p.m.) peaks commonly seen in metropolitan areas. It should be pointed out that the morning peak at SL1, SL2 and SL4 are particularly sharp. A possible traffic demand management measure is the promotion of off-peak commuting to ease road congestion in the morning peak hours.



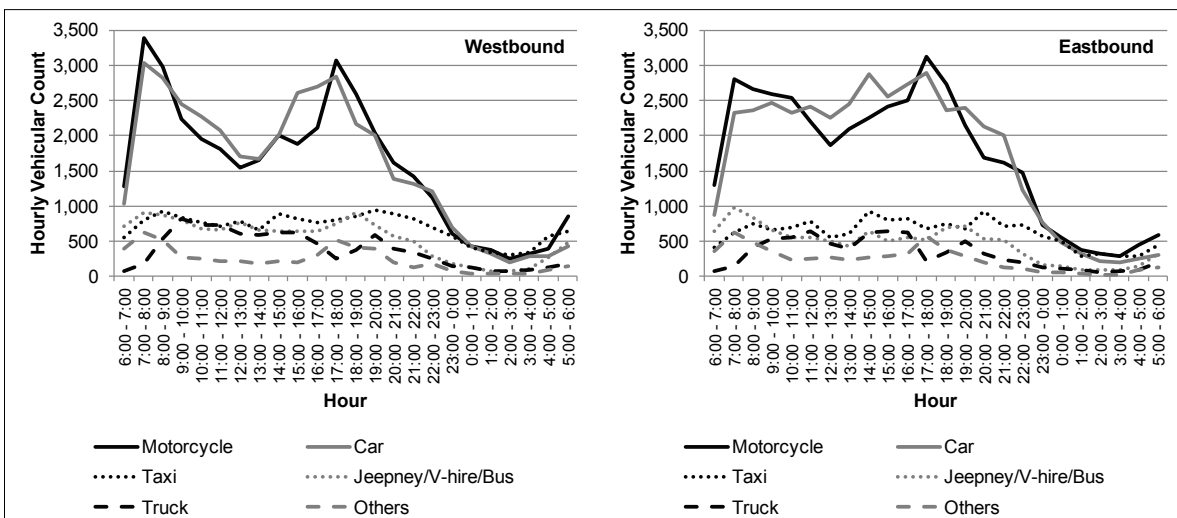
Source: JICA Study Team.

Figure 3.2.2 Hourly Vehicular Traffic Volume Across SL1



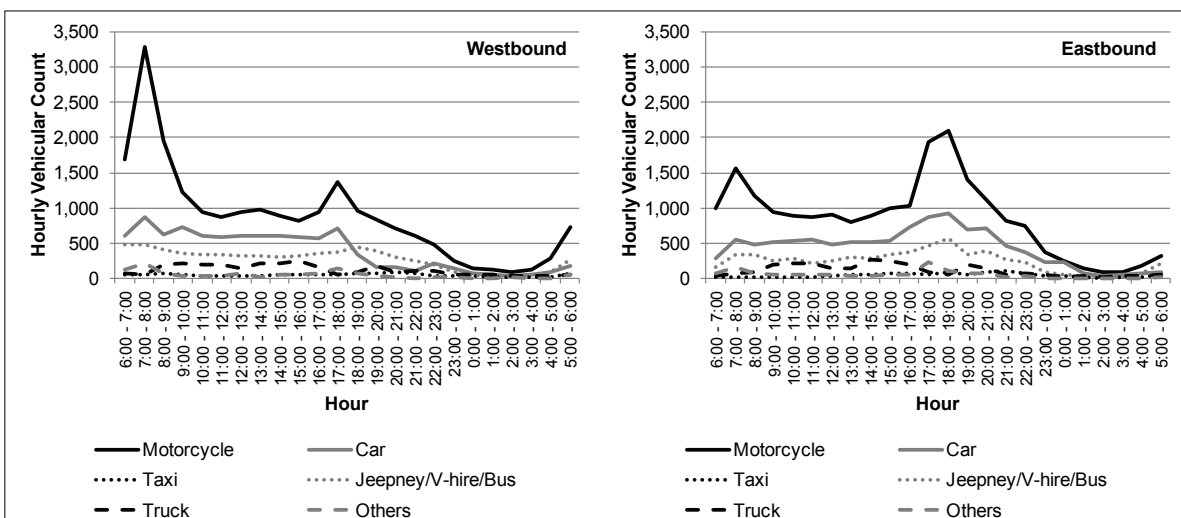
Source: JICA Study Team.
 Note: Traffic volume of ferries (i.e., survey station S13) is excluded.

Figure 3.2.3 Hourly Vehicular Traffic Volume Across SL2



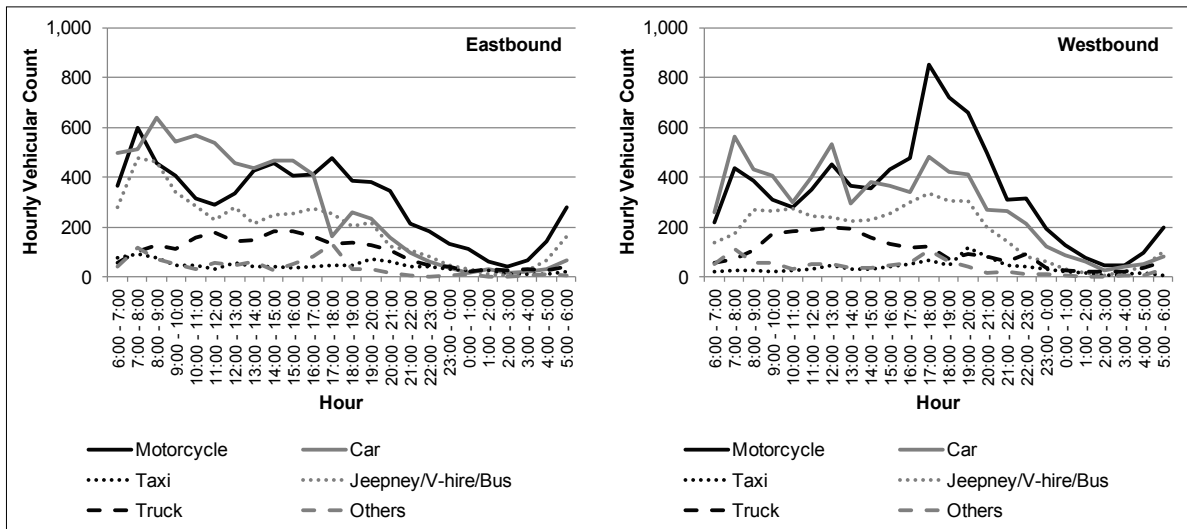
Source: JICA Study Team.

Figure 3.2.4 Hourly Vehicular Traffic Volume Across SL3



Source: JICA Study Team.

Figure 3.2.5 Hourly Vehicular Traffic Volume Across SL4

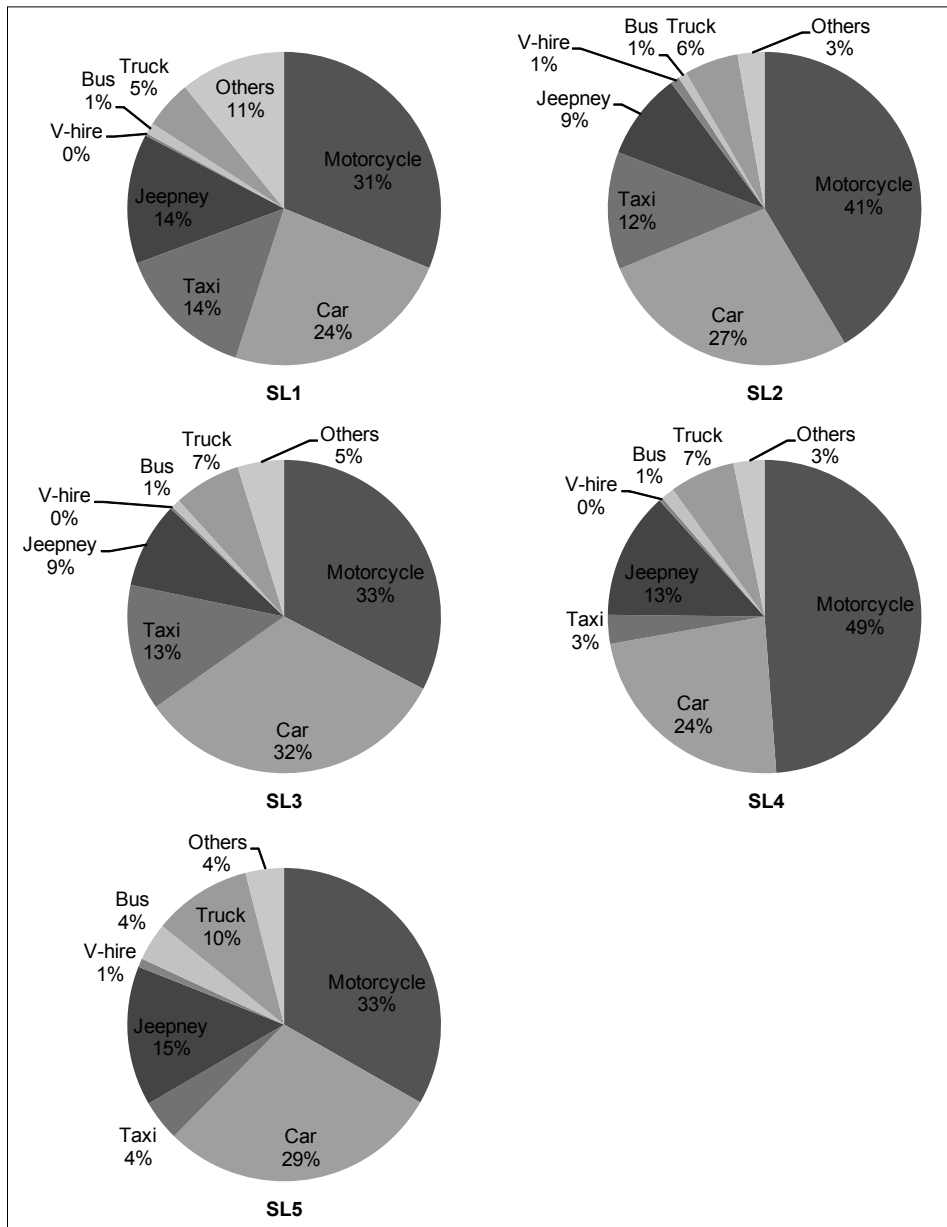


Source: JICA Study Team.

Figure 3.2.6 Hourly Vehicular Traffic Volume Across SL5

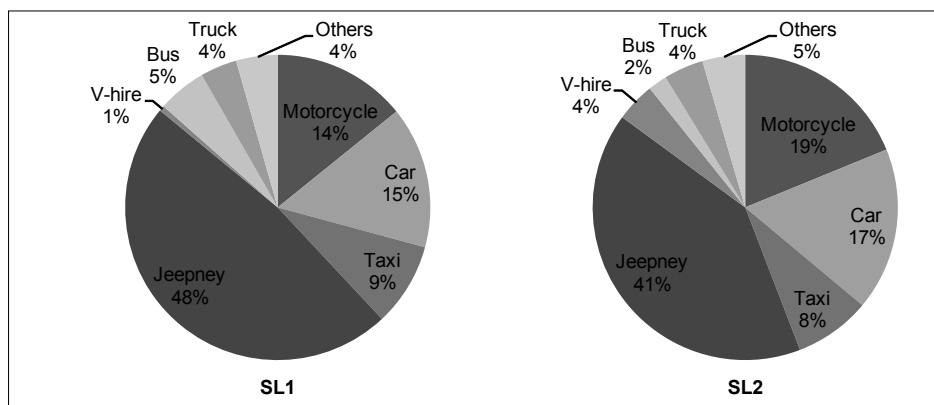
3.18 Figures 3.2.7 and Figure 3.2.8 show the modal share at each screen line on the vehicular traffic volume basis and the passenger traffic volume basis, respectively. While there are relatively more motorcycles, cars and taxis on the road, more or less 50% of passengers use high-occupancy vehicles (HOVs) such as jeepneys, v-hires and buses in the most urbanized areas. It just goes to show that public transport vehicles occupy a smaller portion of the road compared to private vehicles but carry the most number of passengers. It is the more efficient way of road space usage. Under the current situation of complete dependence on road transport system, greater use of public transport would have to be encouraged. As such, higher occupancy modes such as urban railway will play an important role in the future.

3.19 The survey results show that around 968 thousand and 318 thousand passengers are crossing SL1 (i.e., Guadalupe River) and SL2 (i.e., Opon Channel), respectively, everyday. There is, therefore, enough demand for the introduction of a mass rapid transit services such as urban railway and BRT.



Source: JICA Study Team.
 Note: Traffic volume of ferries (i.e., survey station S13) is excluded.

Figure 3.2.7 Modal Share on the Vehicular Traffic Volume Basis



Source: JICA Study Team.
 Note: No results are available for SL3, SL4 and SL5 because vehicle occupancy surveys have been omitted for those survey stations.

Figure 3.2.8 Modal Share on the Passenger Traffic Volume Basis

3.3 Public Transport Passenger Interview Survey

1) Survey Methodology

3.20 The Public Transport Passenger Interview Survey aims to know passengers' trip purpose, trip frequency, and perceptions on existing public transport services as well as their socio-economic characteristics such as age, gender, car ownership and income class. Development directions for public transport services and terminals are provided with the data collected in this survey.

3.21 There were a total of nine survey stations, as listed in Table 3.3.1, with their locations indicated in Figure 3.3.1. The surveys were done for 16 hours from 6 a.m. to 10 p.m. at the Cebu–Mactan Ferry Terminal and for 14 hours from 6 a.m. to 8 p.m. at the other stations. The surveys were performed on weekdays, but not on a holiday or a day with special activities or bad weather.

3.22 Passengers waiting for their travel departure were interviewed at random according to the survey form shown in Appendix 3A. The survey form includes the following items:

- (i) Perceptions on the level of present public transport services;
- (ii) Willingness-to-pay for a planned mass rapid transit service;
- (iii) Trip information, access mode and alternative modal choice; and
- (iv) Socio-economic characteristics of the passenger.

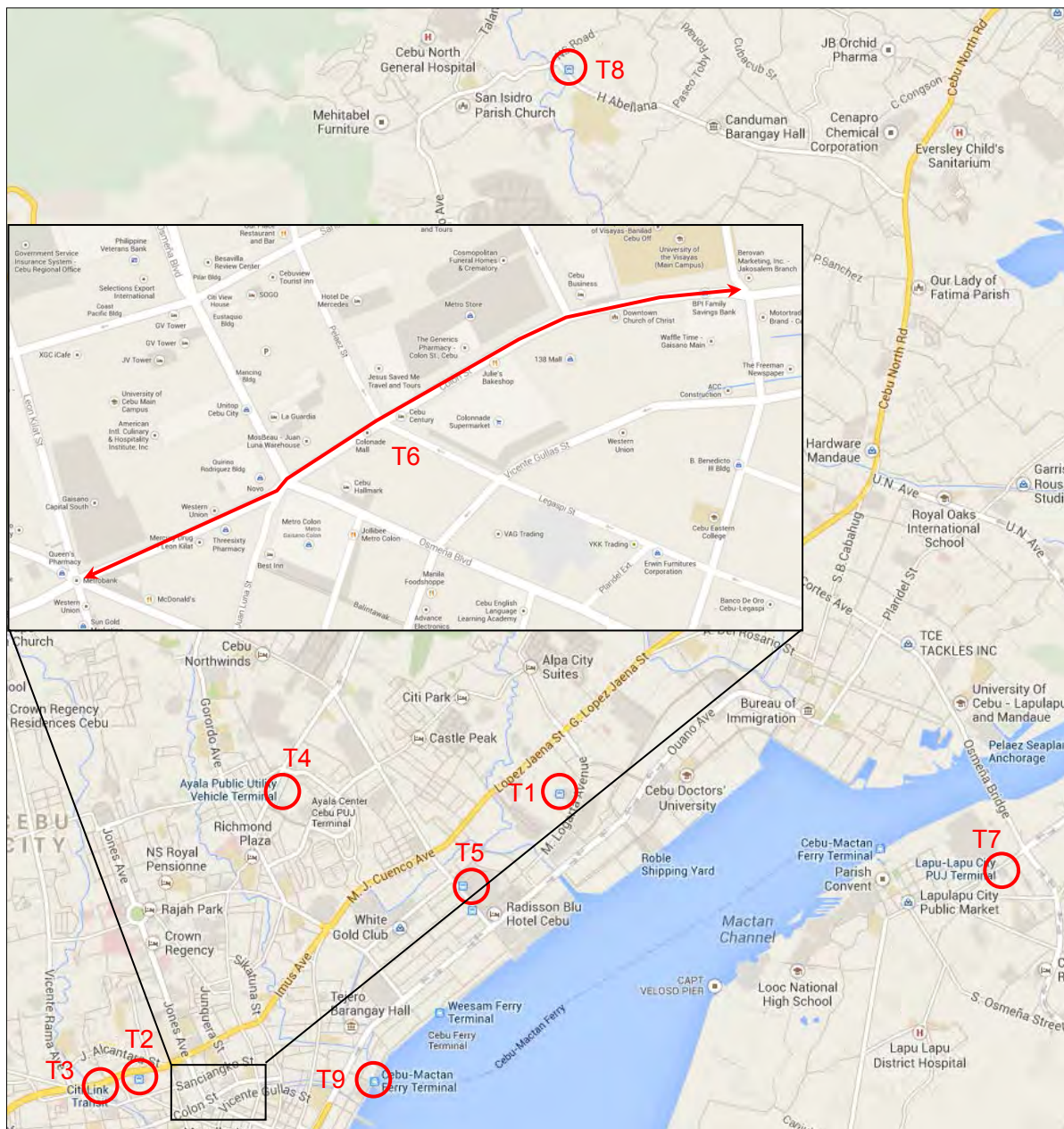
Table 3.3.1 List of Public Transport Passenger Interview Survey Stations

Seq.	Code	Survey Station	Survey Date	Time Started	Time Completed
1	T1	North Bus Terminal	February 19, 2014	6:00 AM	8:00 PM
2	T2	South Bus Terminal	February 18, 2014	6:00 AM	8:00 PM
3	T3	Citilink Terminal	February 21, 2014	6:00 AM	8:00 PM
4	T4	Ayala Center Cebu	February 28, 2014	6:00 AM	8:00 PM
5	T5	SM City Cebu	February 28, 2014	6:00 AM	8:00 PM
6	T6	Colon St. (From D. Jakosalem cor. to L. Kilat cor.)	February 21, 2014	6:00 AM	8:00 PM
7	T7	Lapu-Lapu PUJ Terminal	March 3, 2014	6:00 AM	8:00 PM
8	T8	Tintay Jeepney Terminal (H. Abellana)	February 19, 2014	6:00 AM	8:00 PM
9	T9	Cebu –Mactan Ferry Terminal (Pier 3)	March 3, 2014	6:00 AM	10:00 PM

Source: JICA Study Team.

2) Survey Results

3.23 The survey collected a total of 3,457 samples. Table 3.3.2 shows the sample breakdown by survey station and mode and Figure 3.3.2 shows the number of respondents by gender and age class.



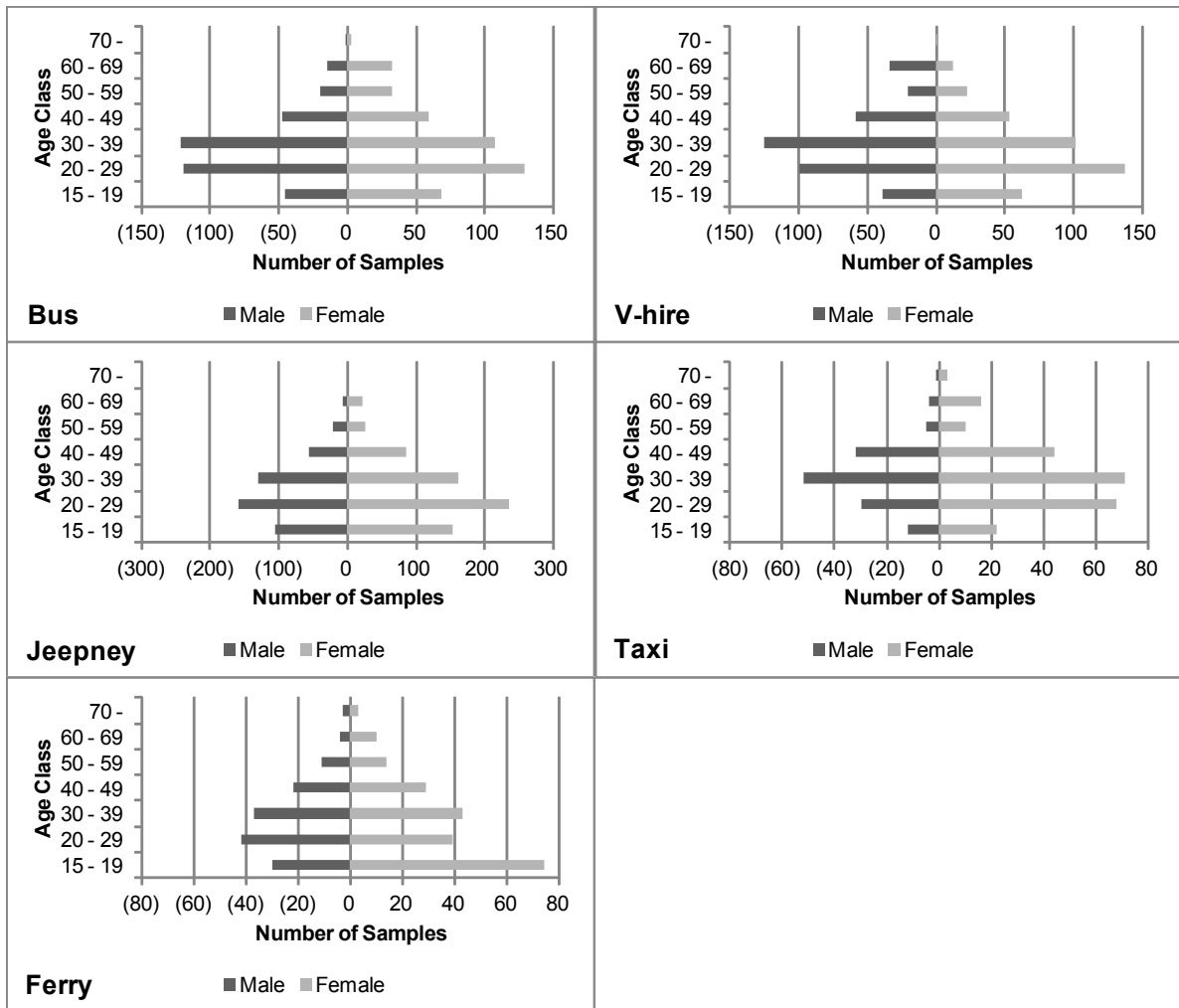
Source: JICA Study Team.

Figure 3.3.1 Locations of Public Transport Passenger Interview Survey Stations

Table 3.3.2 Number of Collected Samples by Survey Station and Mode

Seq.	Code	Survey Station	Number of Samples by Mode					Total
			Bus	V-hire	Jeepney	Taxi	Ferry	
1	T1	North Bus Terminal	320	165	-	-	-	485
2	T2	South Bus Terminal	480	-	60	61	-	601
3	T3	Citilink Terminal	-	271	59	60	-	390
4	T4	Ayala Center Cebu	-	166	226	59	-	451
5	T5	SM City Cebu	-	165	224	70	-	459
6	T6	Colon St. (From D. Jakosalem cor. to L. Kilat cor.)	-	-	240	60	-	300
7	T7	Lapu-Lapu PUJ Terminal	-	-	241	60	-	301
8	T8	Tintay Jeepney Terminal (H. Abellana)	-	-	110	-	-	110
9	T9	Cebu-Mactan Ferry Terminal (Pier 3)	-	-	-	-	360	360
Total			800	767	1,160	370	360	3,457

Source: JICA Study Team.

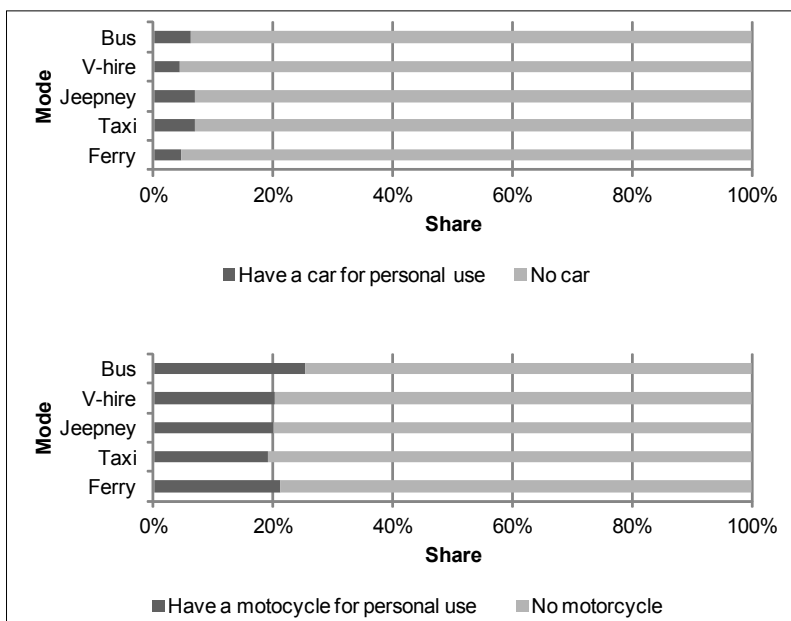


Source: JICA Study Team.

Note: This result does not have to be the same as actual passengers' profile since the survey can be biased by survey locations.

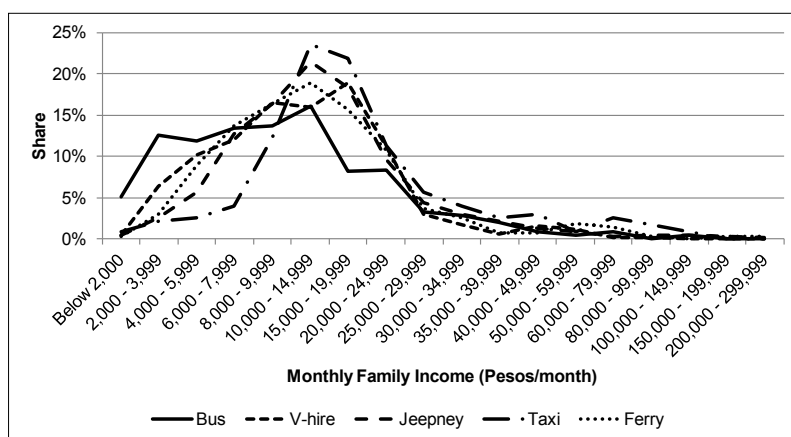
Figure 3.3.2 Number of Collected Samples by Respondent's Gender and Age Class and Mode

3.24 Figure 3.3.3 shows the patronage of the public transport system by car- and motorcycle-owning respondents. Around 6% and 21% of interviewees have a car and a motorcycle for his/her own use, respectively. The passenger survey results show that people with their own private vehicles still intend to use the public transport. It is recommended that the public transport system should provide more comfortable and quality services to attract these passengers. At the same time, public transport is also an important infrastructure for the lower income citizens as shown in Figure 3.3.4. Passengers with a monthly family income of less than PHP6,000 account for 15% of public transport passengers. These point to the need for the public transport system to retain affordable fare rates to protect the citizens' free movement.



Source: JICA Study Team.

Figure 3.3.3 Car / Motorcycle Ownership

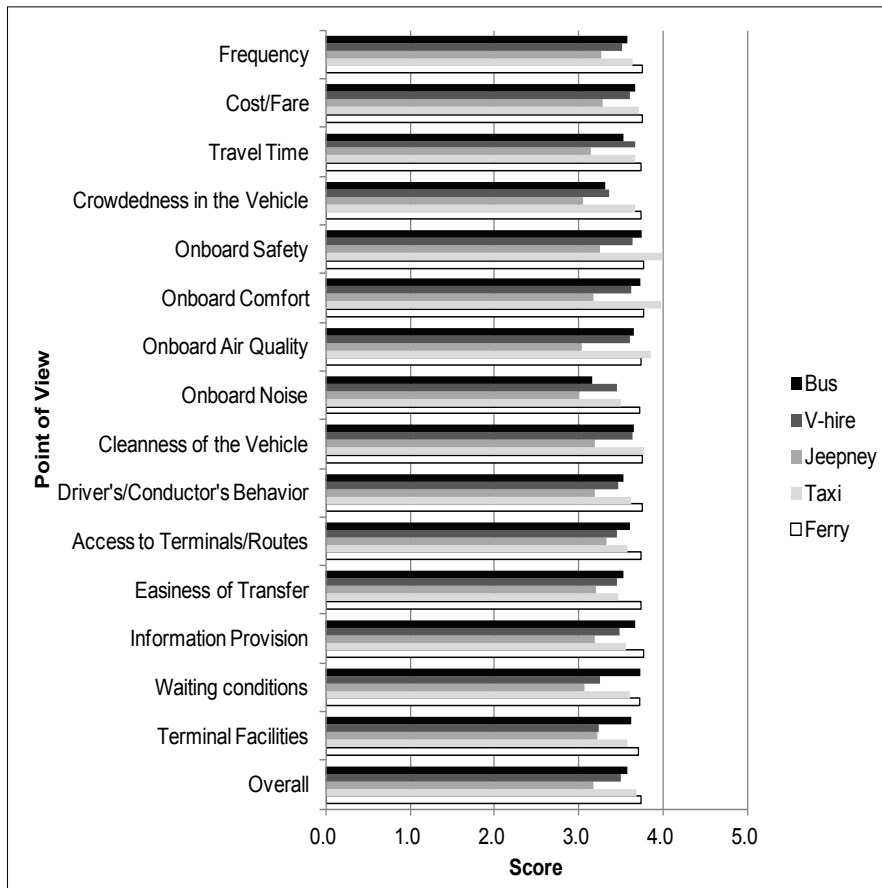


Source: JICA Study Team.

Figure 3.3.4 Distribution of Monthly Family Income

3.25 The survey asked passengers' opinions on the current level of public transport services based on 15 criteria, using a five-point rating scale with 1 as the lowest and 5 as the highest. The average score by mode is shown in Figure 3.3.5. The results suggest the following points:

- (a) **Bus:** In-vehicle crowdedness and noise need to be improved;
- (b) **V-hire:** In-vehicle crowdedness, waiting conditions, and terminal facilities need to be improved; and
- (c) **Jeepney:** Passengers are not satisfied with the current level of service in all aspects. It is particularly suggested to modernize vehicles because the worst points are in-vehicle crowdedness, air quality and noise.

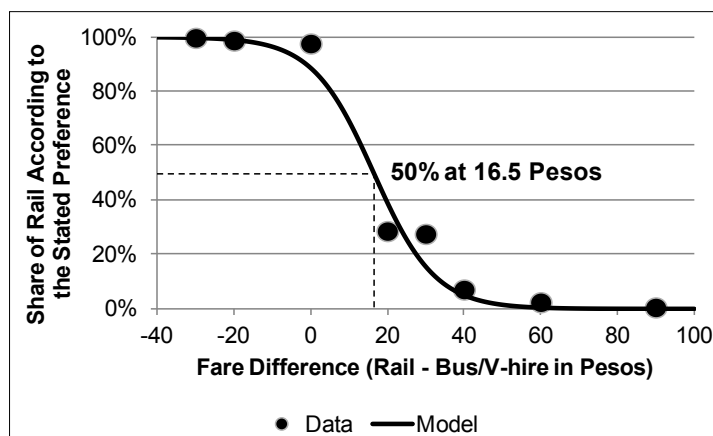


Source: JICA Study Team.

Note: The score is the average of the five-point-scale assessment. The "overall" score is the average of the scores for the 15 service areas.

Figure 3.3.5 Assessment on Current Level of Service

3.26 The survey included willingness-to-pay questions to predict demand for a future rail service. Half of passengers would choose the rail service assuming the rail service is faster by 10 minutes and more expensive by PHP16.50 than bus or v-hire, as shown in Figure 3.3.6. Therefore, the value of time (VOT) of public transport users in the study area is PHP1.65/ minute based on this stated preference data.

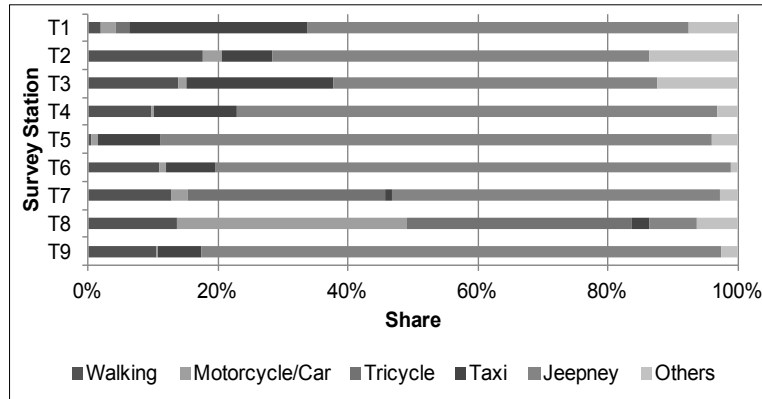


Source: JICA Study Team.

Figure 3.3.6 Stated Share of a Rail Service as a Function of the Fare Difference

3.27 Figure 3.3.7 shows the share of the representative travel mode used to get to the public transport terminal. With an existing convenient jeepney network, 65% of the

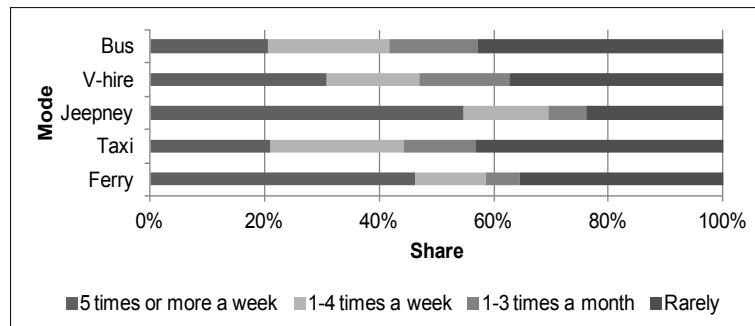
respondents answered they took a jeepney for the terminal access. At terminals located in suburban areas (i.e., stations T7 and T8), however, motorcycle, car and tricycle obviously have a larger share. This suggests that a suburban public transport terminal should carefully plan enough parking and turnaround space for motorcycles, cars and tricycles as well as taxis. Otherwise, development of a terminal would affect the traffic flow around the site.



Source: JICA Study Team.

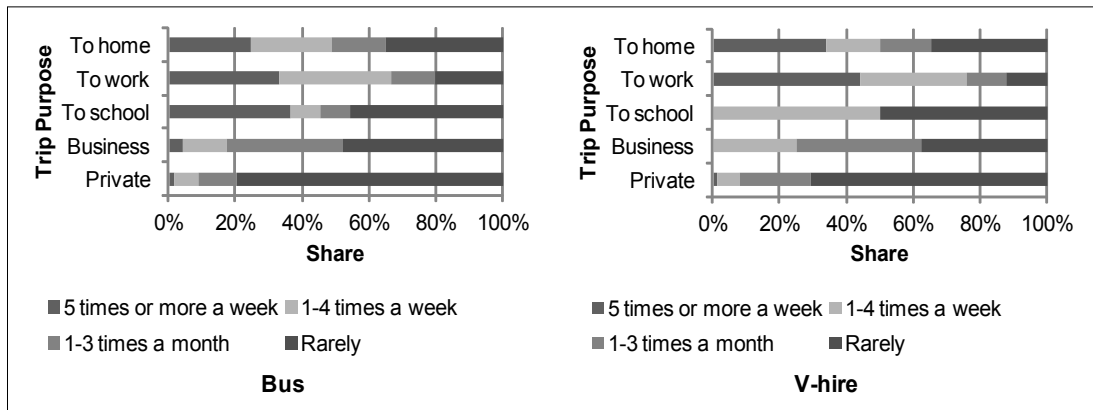
Figure 3.3.7 Share of Representative Travel Mode for Terminal Access

3.28 Figure 3.3.8 shows the percentage of frequency of use by mode. Jeepneys and the Cebu–Mactan Ferry service are thought to be convenient traffic modes for daily use. Also, more than 40% of bus and v-hire passengers use the service regularly (i.e., at least once a week). Those people are considered to make long trips from their homes to Cebu or their homes in Cebu to provinces mainly for work, as shown in Figure 3.3.9. It is suggested to develop economic sub-centers in other cities/municipalities to ease overconcentration in Cebu City.



Source: JICA Study Team.

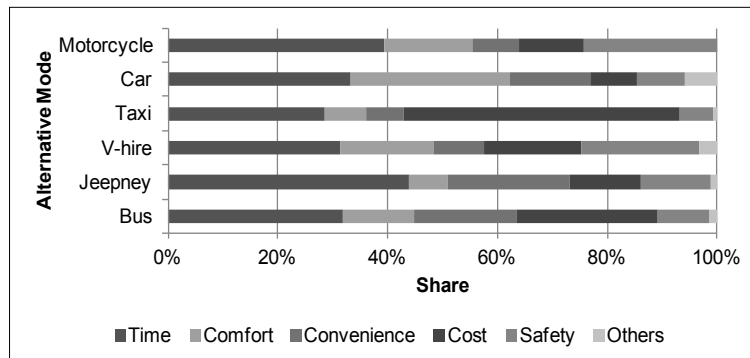
Figure 3.3.8 Frequency of Use by Mode



Source: JICA Study Team.

Figure 3.3.9 Frequency of Use by Trip Purpose for Bus and V-hire Users

3.29 As shown in Figure 3.3.10, travel time is the major reason not to use a potential alternative travel mode. Interestingly, passengers think it would take longer to travel using a motorcycle or a car as well as the other public transport modes. It is also worth noting that about 24% of respondents who chose a motorcycle as the major alternative mode have safety concerns in driving a motorcycle. This is understandable because motorcycles have the highest rate of traffic accident per passenger-kilometer. It is necessary to develop more accessible public transport network and to restrict motorcycle use for a safer and sustainable urban transportation environment.



Source: JICA Study Team.

Figure 3.3.10 Major Reason Not to Use Potential Alternative Mode

3.4 Travel Speed Survey

1) Survey Methodology

3.30 This survey aims to obtain driving data of taxis to measure travel speed at major road sections by time period and direction. The survey provides an easy way to identify bottlenecks in the road network in Metro Cebu, especially those in busy areas in Cebu City and Mandaue City.

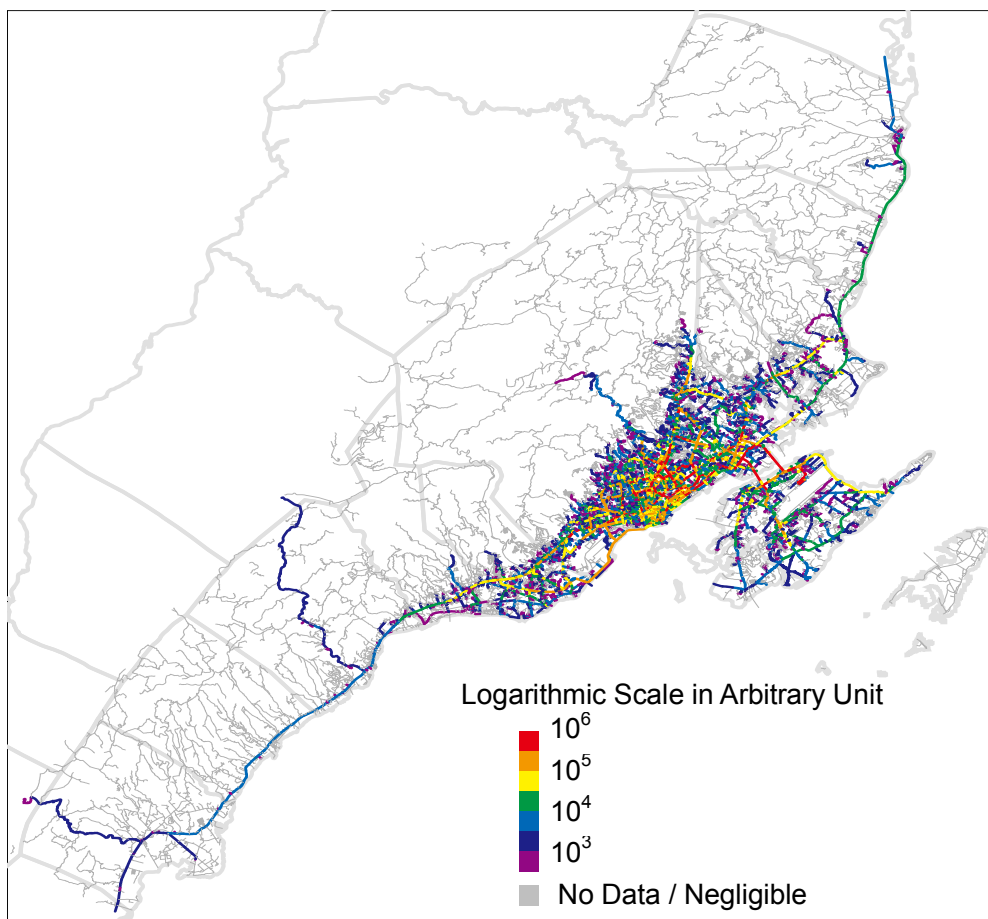
3.31 Driving data (i.e., longitude, latitude, date, time and speed) of each sampled taxi was recorded every 5 seconds with a GPS logger (HOLUX m-241). The survey did not restrict the taxi's usual operation at all. The survey was conducted from February 23, 2014 to April 16, 2014.

3.32 The survey coordinated with taxi operators in the study area according to a list of operators provided by the Land Transportation Franchising and Regulatory Board Region

VII (LTFRB VII). To achieve a wider coverage, a variety of operators with different office addresses was considered. Six taxi operators anonymously cooperated with the survey, including three in Cebu City, one in Mandaue City, one in Talisay City, and one in Liloan.

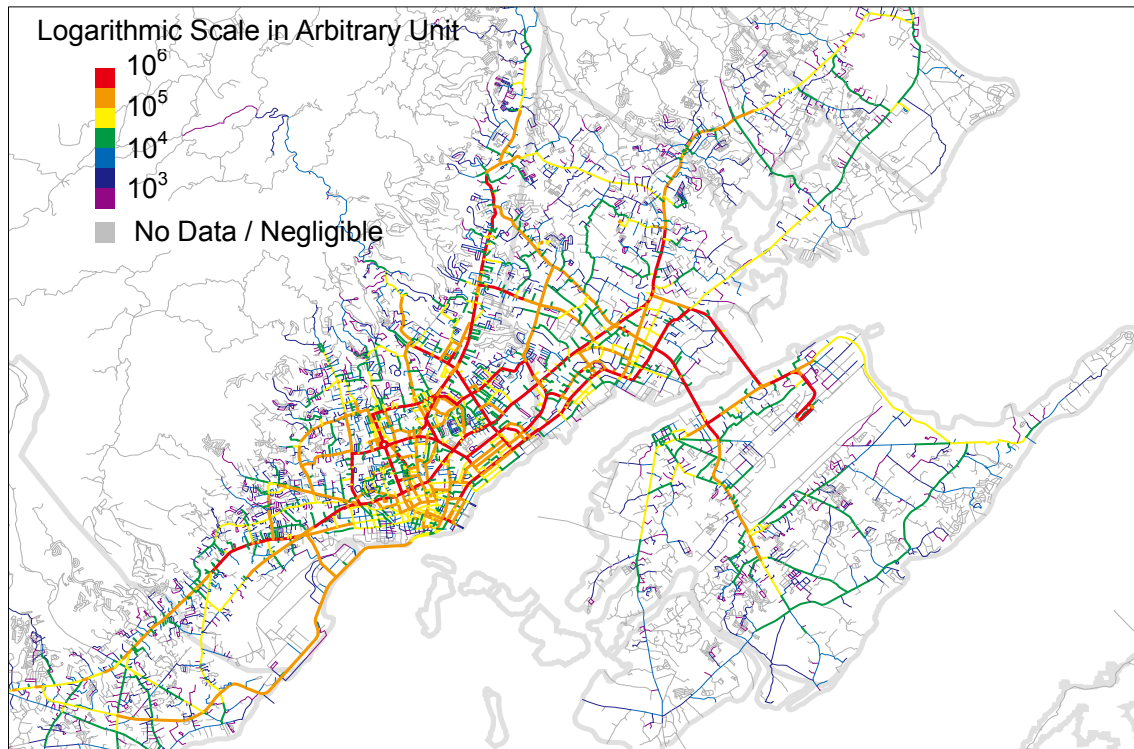
2) Survey Results

3.33 The survey collected driving data for 7,060 hours or 294 days in total including data recorded while parking. Figures 3.4.1 and Figure 3.4.2 show the recorded data volume by road section.



Source: JICA Study Team.

Figure 3.4.1 Cumulative Driving Data Volume for the Whole Study Area



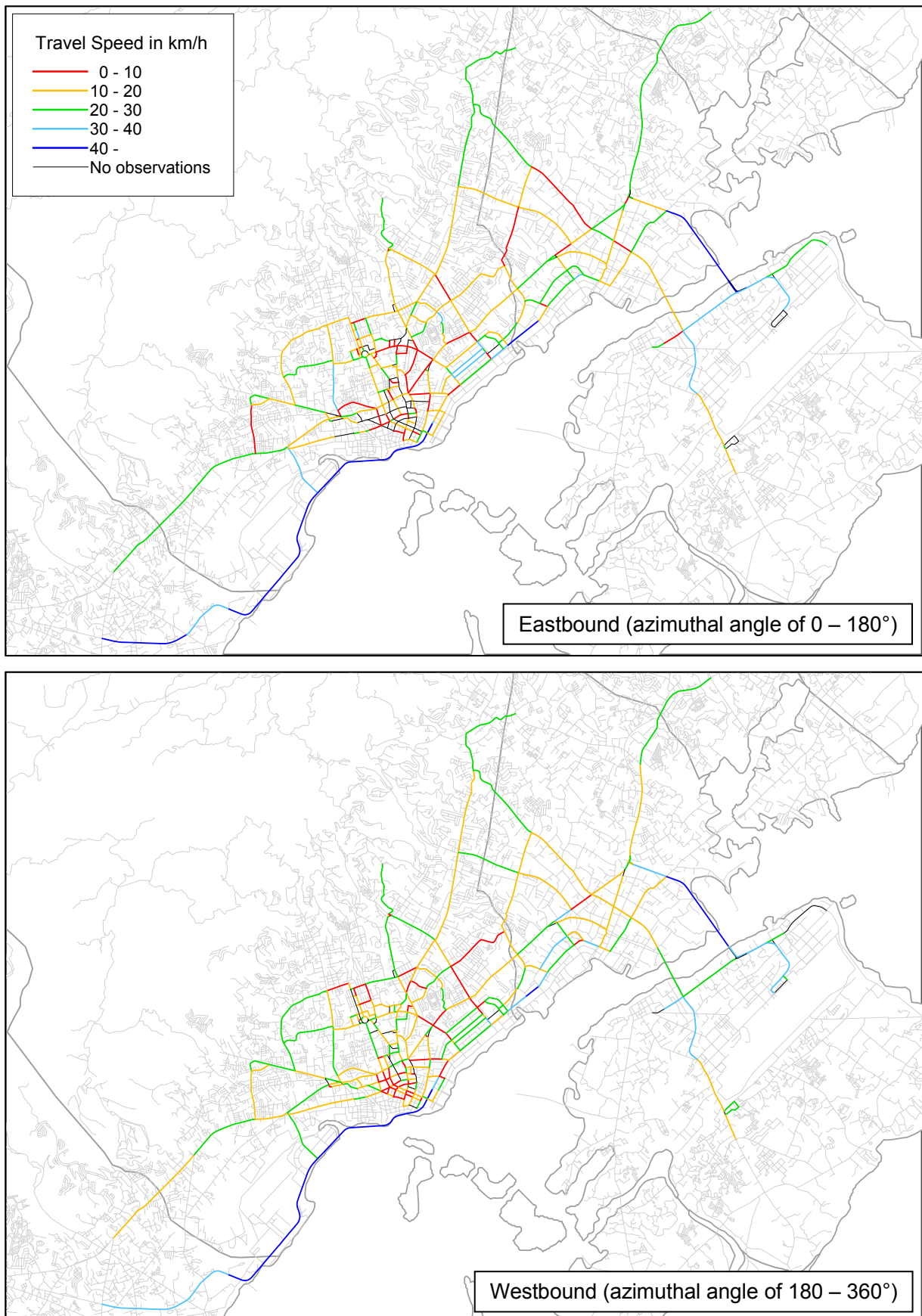
Source: JICA Study Team.

Figure 3.4.2 Cumulative Driving Data Volume for the Urban Area

3.34 Among road sections with larger amount of data (i.e., sections in red or orange in Figure 3.4.1 and Figure 3.4.2), 343 sections were set to calculate travel speed with the driving data. Then a median of calculated travel speed was obtained by weekdays/holidays, time period, and travel direction for each road section. Figure 3.4.3 shows the median travel speed by direction at 3:00–6:00p.m. on weekdays when the heaviest road congestion is observed. A decrease of travel speed lower than 20 km/h is found at most sections in the urban area during this time period. The analysis particularly shows serious congestion (i.e., travel speed lower than 10 km/h) in Cebu's downtown area. The results for all time periods and directions are shown in Appendix 3A.

3.35 Table 3.4.1 and Figure 3.4.4 show 20 heavily congested intersections within the urban areas, as identified in the travel speed survey. This is due to the high traffic volume and the decrease in speed. Many of these intersections happen to be located in Cebu City and Mandaue City.

3.36 For the suburban areas, the median of travel speed for all dates, time periods and directions were obtained based on limited driving data. As shown in Figure 3.4.5, road congestion is found in the poblacion areas of Talisay City, Cordova, and Carcar City. As observed by the Study Team, this is due to the roadside friction, among other things, caused by tricycles and other kinds of vehicles parked along the roadside.



Source: JICA Study Team.

Figure 3.4.3 Median Travel Speed on 3-5 PM Weekdays

Table 3.4.1 Congested Intersections at Urban Areas

Ranked First in Congestion

Seq	Location
1	A. C. Cortes Ave. cor. Jose L. Briones
2	Juan Luna Ave. cor. Cardinal Rosales Ave.
3	M. J. Cuenco Ave. cor. Juan Luna Ave.
4	Juan Luna Ave. cor. A. Soriano Ave.
5	Gen. Maxilom Ave. cor. M. J. Cuenco Ave.
6	Gen. Maxilom Ave. cor. Gorordo Ave.
7	Gen. Maxilom Ave. cor. M. Gotianuy St.
8	Gen. Maxilom Ave. cor. Juana Osmeña St.
9	Osmeña Blvd. cor. N. Bacalso Ave.
10	V. Sotto St. cor. C. Arellano Blvd.

Ranked Second in Congestion

Seq	Location
11	M. C. Briones St. cor. UN Ave.
12	A. C. Cortes Ave. cor. S. B. Cabahug
13	M. C. Briones St. cor. A. S. Fortuna St.
14	Ouano Ave. cor. Conrado D. Seno
15	Ouano Ave. cor. E. O. Perez St.
16	Archbishop Reyes Ave. cor. Juan Luna Ave.
17	Cardinal Rosales Ave. cor. Mindanao Ave.
18	Gen. Maxilom Ave. cor. Rhmann St.
19	Del Rosario cor. Leon Kilat St.
20	Colon St. cor. Leon Kilat St.

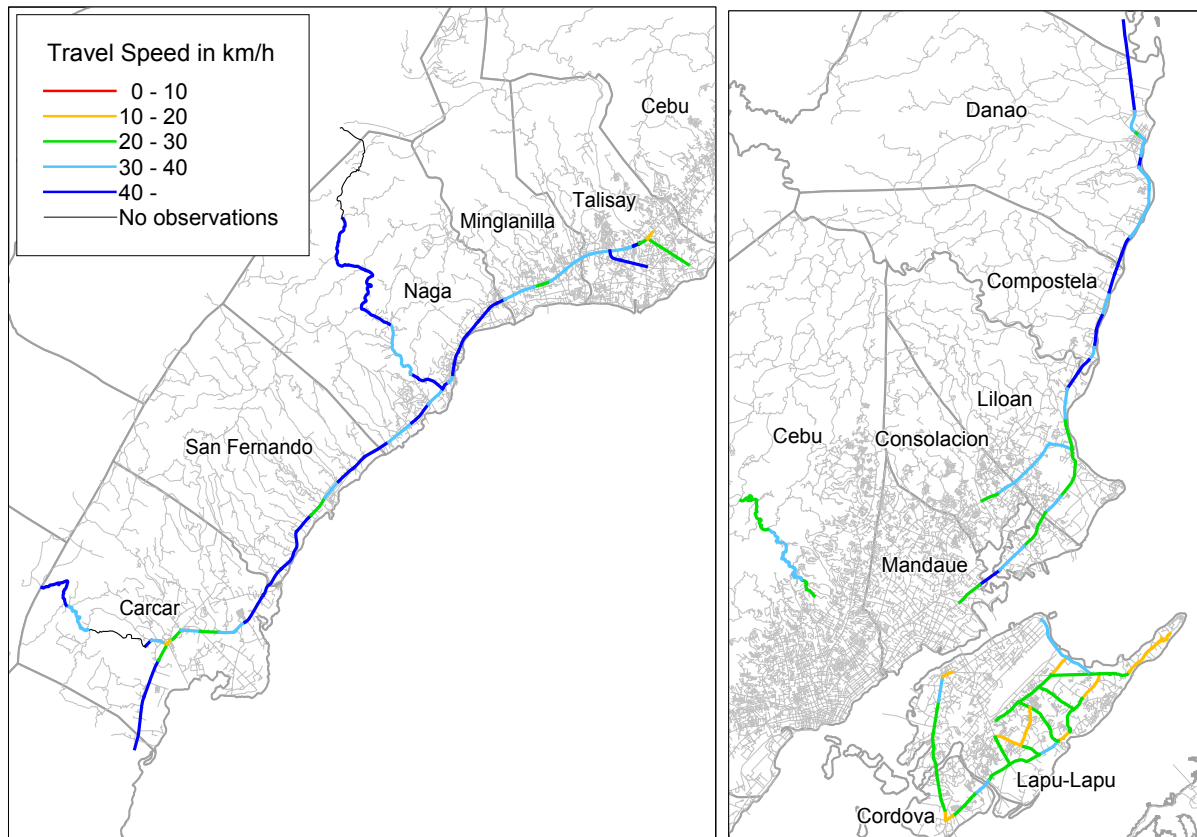
Source: JICA Study Team.



Source: JICA Study Team.

Note: Numbers correspond to the sequential numbers in Table 3.4.1.

Figure 3.4.4 Locations of Congested Intersections at Urban Areas



Source: JICA Study Team.

Figure 3.4.5 Median Travel Speed in Suburban Areas

3.5 Developed Traffic Database

3.37 Table 3.5.1 shows the summary of traffic database developed under this Study. The detailed database structure is described in each data file.

Table 3.5.1 List of Traffic Database

Seq	Survey	Item	Attributes
1	Cordon Line Survey at Roadsides	Vehicular Traffic Volume	Number of vehicles by survey station, direction, time period, and vehicle class
2		Vehicle Occupancy	Number of sampled vehicles and passengers by survey station, direction, time period, and vehicle class
3		Passenger OD Record	Survey station, direction, time, vehicle class, number of occupants, origin, destination, trip purpose, residence, payload capacity, load factor, package, commodity, and expansion factor
4	Cordon Line Survey at Ferry Terminals	Passenger Volume	Vessel name, vessel type, arrival date and time, departure date and time, number of disembarking passengers, number of embarking passengers, and destination
5		Passenger O-D Record	Survey station, direction, time, residence, origin, destination, trip purpose, travel mode for terminal access, and expansion factor
6	Cordon Line Survey at Airport Terminals	Passenger Volume	Flight number, origin/destination, arrival/departure time, and number of arriving/departing passengers
7		Passenger O-D Record	Survey station, direction, time, origin, destination, trip purpose, travel mode for terminal access, residence, and expansion factor
8	Screen Line Survey	Vehicular Traffic Volume	Number of vehicles by survey station, direction, time period, and vehicle class
9		Vehicle Occupancy	Number of sampled vehicles and passengers by survey station, direction, time period, and vehicle class
10		Ferry Passenger Volume	Vessel name, vessel type, arrival date and time, departure date and time, number of disembarking passengers, and number of embarking passengers
11	Public Transport Passenger Interview Survey	Interview Record	Survey station, time, and all answers to questions in the survey form (see Appendix 3A)
12	Travel Speed Survey	Raw Driving Data	Date, time, longitude, latitude, and speed
13		Travel Speed	Calculated median travel speed by selected major road section, direction, weekday / holiday, and time period

Source: JICA Study Team.

Note: Items 1 to 12 are available in Microsoft Excel format and item 13 is available in ESRI ArcGIS and Pitney Bowes MapInfo Professional.

