APPENDIX E

CONSUMER SURVEY

APPNDIX E
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TABLE OF CONTENTS

List of Tables

List of Figures

ANNENX

APPENDIX E CONSUMER SURVEY

1 OBJECTIVE OF THE CONSUMER SURVEY

In order to find appropriate solutions for Yangon City water supply, an understanding of the present water supply situation from the viewpoint of the consumer is important. With this in mind, a consumer survey of water customers was planned and completed to provide this understanding. The specific objectives of the survey are:

- to understand the actual status of water usage by domestic consumers and to assess their problems
- to understand the actual amount of water consumed and utilized
- to understand the income and expenditure level of households and thereby to examine willingness-to-pay for water supply service. These information is useful for the reorganization of water tariffs
- to assess the level of consumer satisfaction with regard to City water supply. Such information will be useful to identify problems currently faced by the customers
- to understand water use conditions of non-residential consumers and utilize the results to forecast their water demand. This information will be useful in the establishment of non-domestic water tariffs structure

The consumer survey covered both domestic and non-domestic (industry, commerce, government etc.) consumers spread over the 33 townships in the City. The survey itself was undertaken during the period of May to July 2001.

2 SURVEY METHODOLOGY

2.1 INTERVIEW SURVEY

(1) Survey method and activities

In order to obtain the consumer information mentioned above, domestic and non-domestic consumer surveys were planned separately and interviews to individual consumers such as household, business office, factory, store shop, public office were conducted by selecting survey samples. The following activities were included in the survey:

- Review of existing reports, maps, ledger and relevant data.

- Reconnaissance of the study area
- Formulation of survey questionnaires
- Formulation of survey team
- Pre-test survey operation
- Conduction of survey
- Analysis and reporting

The flow of the survey and survey schedule conducted are shown in Figure E.1 and Figure E.2.

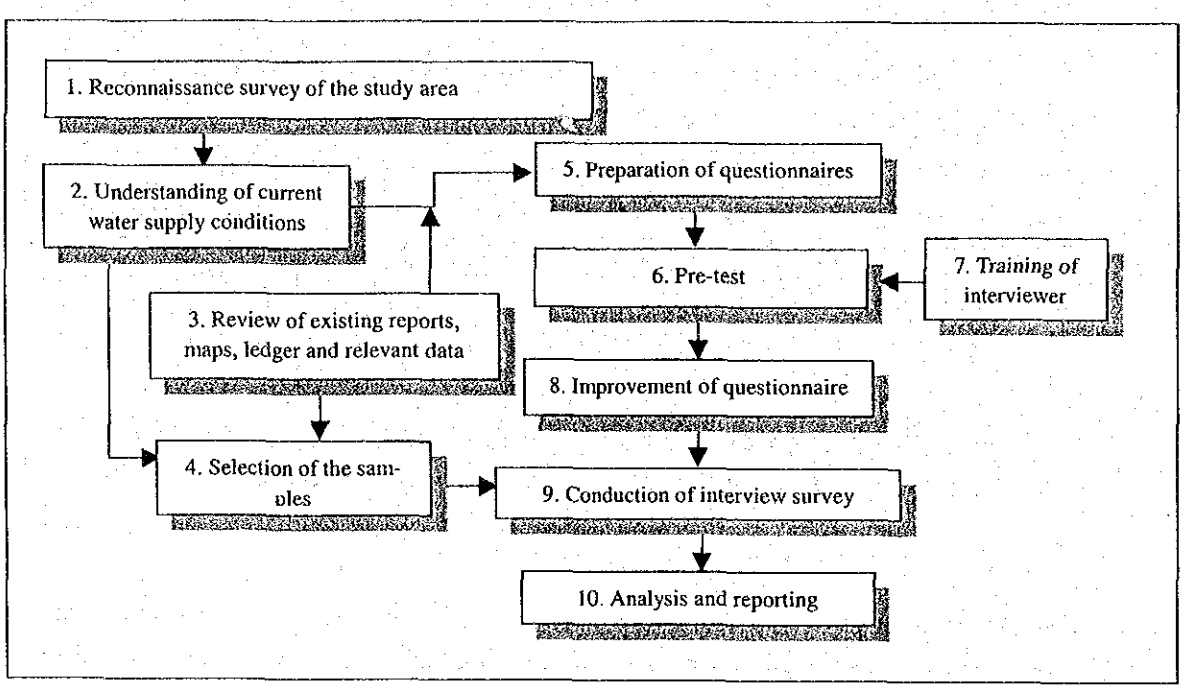


Figure E.1 Flowchart of The Consumer Survey

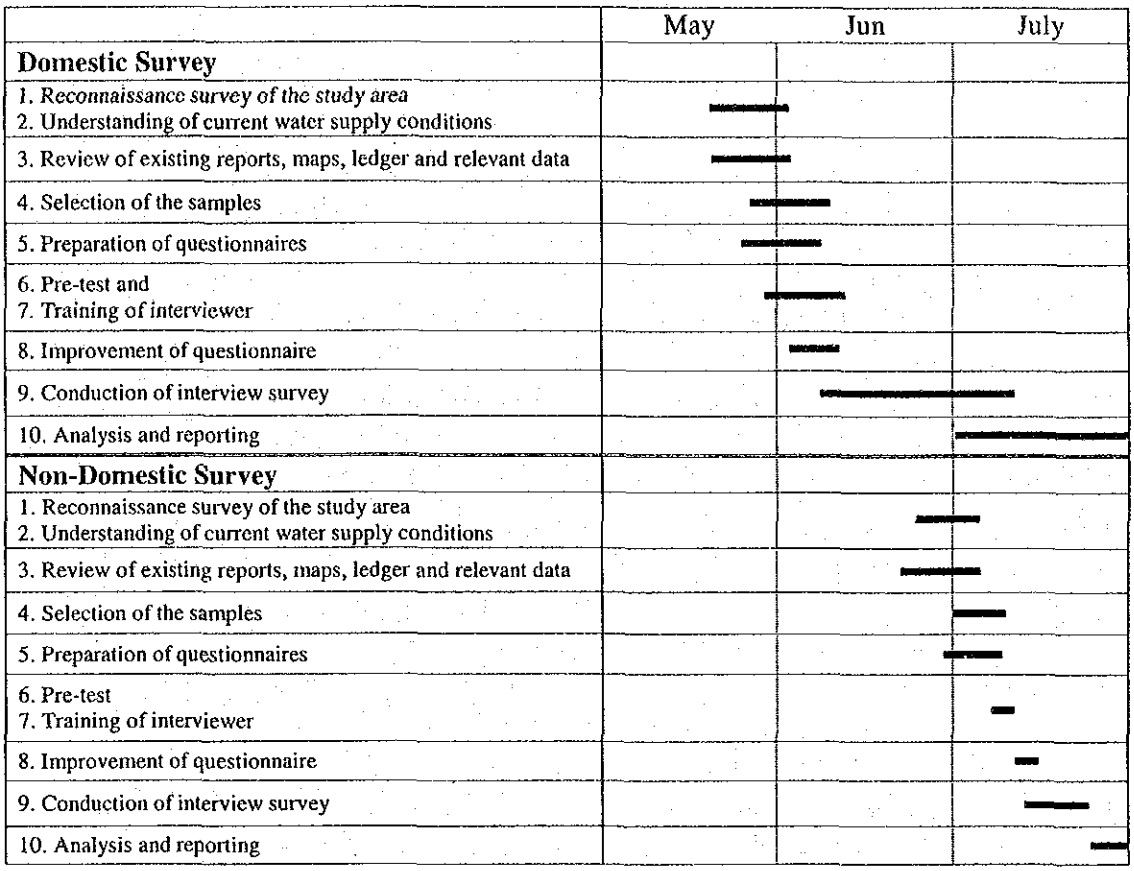


Figure E.2 Survey Schedule for Consumer Survey

(2) Sampling Plan

The sampling methods as outlined in the JICA study proposal on which the consumer survey was based are as follows:

- 600 domestic consumer households using either City water supply or private sources
- 100 non-domestic water users

1) Domestic Consumer Survey

The sample for the domestic consumer survey were selected as follows:

- distribute the total sample number (450 households) over the 33 townships in proportion to the township residential population
- determine the number of domestic consumers for each township
- identify and pick-up on a random basis of the selected number of households from each township using the township street map (Yangon Street Directory 3rd edition, YCDC, 2001) where the location of each residential consumer is shown.

This sample strata includes consumers who are metered as well as nonmetered.

- distribute 150 households over 26 townships proportional to the township population. Note meters are currently installed in 26 out of 33 townships.
- meter-installed households were picked up in consultation with the township Water Supply & Sanitation officer, who knows the location of meter-installed households in the respective township.

The number of samples planned and in turn were interviewed by township are indicated in Table E.1.

Table E.1 The Number of Samples by Township

No.	Township name	Population*	No. of house-holds	Average household size	No. of water connections	No. of domestic meters	No. of samples to be interviewed			Survey results	
							Random sam-pling	Metered house-hold	Total	Household in-terviewed	Household ana-lyzed
1	Ahlone	41,718	7,643	5.46	2221	109	5	2	7	7	7
2	Bahan	81,868	16,337	5.01	5380	1226	11	5	16	16	11
3	Botataung	41,561	8,064	5.15	4682	755	6	2	8	8	8
4	Dagon	38,144	7,087	5.38	1874	207	5	2	7	8	7
5	Dagon Myothit (East)	99,214	13,630	7.28	0	0	9		9	9	9
6	Dagon Myothit (North)	82,721	18,646	4.44	0	0	13		13	13	13
7	Dagon Myothit (Seikkan)	22,922	6,980	3.28	0	0	5		5	5	5
8	Dagon Myothit (South)	200,026	39,551	5.06	00	0	27		27	28	28
9	Dala	80,721	16,275	4.96	408	408	11	5	16	16	16
10	Dawbon	67,228	13,841	4.86	118	40	9	4	13	13	11
11	Hlaing	125,473	*25,095	*5.00	2277	1075	17	7	24	24	23
12	Hlaingthaya	192,430	37,551	5.12	0	0	26		26	26	24
13	Insein	218,402	48,956	4.47	2327	2123	34	15	49	49	46
14	Kamaryut	72,705	14,348	5.07	1493	445	10	4	14	14	14
15	Kyauktada	36,708	6,733	5.45	6052	373	5	2	7	9	6
16	Kyeemyindaing	74,373	15,618	4.76	1924	59	11	5	16	16	16
17	Lanmadaw	41,482	7,384	5.61	5890	1055	5	2	7	9	7
18	Latha	27,000	6,600	4.09	4719	795	5	2	7	8	5
19	Mayangone	139,090	28,974	4.80	3462	1496	20	9	29	29	29
20	Migalardon	135,515	27,590	4.91	961	797	19	8	27	26	24
21	Mingalartaungnyunt	97,465	18,431	5.29	11342	2908	13	5	18	21	16
22	North Okkalapa	242,522	48,773	4.97	7030	1556	33	15	48	48	45
23	Pabedan	39,360	6,505	6.05	6158	637	4	2	6	6	4
24	Pazundaung	31,166	6,806	4.58	5863	1452	5	2	7	7	7
25	Sanchaung	63,161	13,813	4.57	3313	138	9	4	13	13	13
26	Seikkan (port)	0	0	0	0	0	0	0	0	0	0
27	Seikgyikhanaungto	21,106	4,616	4.57	0	0	3	0	3	3	3
28	Shwepyitha	148,620	29,508	5.04	1	1	20	1	21	21	21
29	South Okkalapa	192,977	44,704	4.32	4553	440	31	13	44	48	48
30	Tamwe	98,797	19,925	4.96	14439	3062	14	6	20	23	18
31	Thaketa	213,944	44,084	4.85	2252	227	30	13	43	46	38
32	Thingahgyun	178,673	37,720	4.74	963	78	26	11	37	37	29
33	Yankin	77,585	12,946	6.00	4930	1150	9	4	13	13	12
	Total	3,224,777	654,644	4.93	104,632	22612	450	150	600	619	563

* Population and the number of households are unofficial data of YCDC headquarters.
The number of households in Hling township was lacking in the table and it was estimated from 5 persons per household, which is assumed as the approximate average household size of Yangon City.

2) Non-Domestic Consumer Survey

The sample for non-domestic survey was selected from among the water users in industrial, commercial and public organizations. In total, 40 consumers from commercial establishments and 20

- 40 industrial consumers,
- 40 commercial consumers, and
- 20 public (governmental) consumers.

The selection criteria and the number of consumers selected are shown in Table E.2

Table E.2 Sampling Plan of None-Domestic Water Consumer Survey

A. Industrial Consumer Survey

Samples	No of samples planned	No of samples interviewed
1. Areas partially supplied by YCDC		
(1) North Okkalapa Industrial Zone	20	20
a. YCDC water supply (metered and unmetered)	10	9
b. None-YCDC water supply	10	11
(2) Shewepytha Industrial Zone	5	5
a. YCDC water supply (unmetered only)	2	-
b. None-YCDC water supply	3	5
(3) Mingaladon Industrial Zone	5	5
a. YCDC water supply	2	-
b. None-YCDC water supply	3	5
2. Non-YCDC water supply area		
(4) Hlaingthaya Industrial Zone	5	5
(5) Dagonmyothit (South) Industrial Zone	5	5
Total	40	40

B. Commercial Consumer Survey

Area and Items	No of samples planned	No of samples interviewed
1. The downtown area (Lanmadaw and Latha) meter and unmetered - High water consumed: hotel, guest house/motel, restaurant, tea shop, food production, other high water consumed customer - Low water consumed: food shop, commercial office, private hospital /clinic	20	25
2. Out of the downtown area (Yankin and Mayangon) meter and unmetered - High water consumed: hotel, guest house/motel, restaurant, tea shop, food production, other high water consumed customer - Low water consumed: food shop, commercial office, private hospital /clinic	10	10
3. Out of YCDC water supply area - High water consumed: hotel, guest house/motel, restaurant, tea shop, food production, etc. - Low water consumed: food shop, commercial office, private hospital /clinic	10	10
Total	40	45

C. Departmental (Governmental) Consumer Survey

Samples	No of samples planned	No of samples interviewed
1. Downtown area (10)		
School	2	3
Hospital/clinic	2	2
Public office	4	4
Pagoda (Shwedagon Pagoda and Sule pagoda)	2	2
2. Out of Downtown area (10)		
School	2	4
Hospital/clinic	2	1
Public office	4	-
Pagoda/temple/monastery	2	2
Total	20	19

(3) Conduction of the interview survey

Six interviewers were employed to conduct the survey and they were trained during the pre-test survey period. The actual survey was conducted township-wise and the interviewers were accompanied by the officers of the respective township to be surveyed to obtain information on sample household. In addition to the pretest survey, the Consultant monitored their interviews at the initial stage of the survey and inappropriate interviews were corrected and their interview skills were improved.

The planned average interview speeds of domestic and non-domestic consumer survey were assumed as 7 households per day per interviewer and 10 consumers, respectively.

2.2 COLLECTED DATA AND INFORMATION

The following data and information were collected for the survey to understand socio-economic conditions and water use of the study area.

(1) Socio-economic conditions

- General economic indicators (Selected Monthly Economic Indicators, January to February 2001, Central Statistical Organization)
- Population data by township (collected from YCDC head quarter; unofficial data)
- Household statistics (Report of 1997 Household Income and Expenditure Survey, CSO, 1997)
- Yangon city map and road map (The map of Yangon, Street directly, 3rd edition, YCDC)

(2) Water supply conditions of Yangon City

- YCDC water supply area covered by the water distribution network (Water distribution network drawings of 26 townships, YCDC, 1995)
- Actual water supply conditions (water supply hours and pressure) in the Study area
- YCDC meter reading records and revenue data for the budget year 2000 (Incl. metered

and unmetered consumption and bill)

- Location, water bill and meter reading record of industrial and commercial consumer of non-domestic water consumers in January, 2001 (collected from YCDC Township Offices)

2.3 QUESTIONNAIRS

(1) Domestic Water Consumer Survey

Fifty-one (51) questions regarding the following items were compiled in the questionnaire for domestic water consumer survey.

1) Socio-economic characteristics of household
2) YCDC water connection and bill
3) Water use and water supply condition
4) Satisfaction of the current water use
5) Leakage and wastage
6) Water costs and willingness to pay for water supply service
7) Wastewater disposal, willingness to pay for YCDC sewerage service and water borne disease

(2) Non-Domestic Water Consumer Survey

Twenty-four (24) questions regarding the following items were compiled in the questionnaire for non-domestic water consumer survey.

1) Information on consumer
2) Water use and water supply condition
3) Satisfaction of the current water use
4) Water costs and willingness to pay for water supply service
5) Wastewater disposal and willingness to pay for YCDC sewerage service

The questionnaires for domestic and non-domestic consumer surveys were attached in Annex 1 and Annex 2, respectively.

2.4 DATA PROCESSING AND ANALYSIS

The questionnaire filled in by the interviewers was checked and edited by the JICA Consultant. If lacking data or inappropriate data were found, interviews were redone as far as time is available. After checking, editing, or resurveying, the questionnaires were handed over to the computer operator for entry, editing, processing and database preparation. Thus, the data entry work was done immediately after the completion of the entry. For the data base preparation, Microsoft-Excel was used. During and after the preparation, the Consultant monitored and checked the database for accurate entry.

Data processing was started after the editing of each survey was completed. The data were com-

plied by YCDC and non-YCDC water customer and non-domestic consumers.

3 SURVEY RESULTS, ANALYSIS AND DISCUSSIONS

3.1 SURVEY RESULTS

The results of the domestic consumer survey are tabulated in Annex 3 by categorised into three types of customers: YCDC water supply, non-YCDC and all customers. Similarly the results of the non-domestic consumer survey are tabulated in Annex 4, being categorized into three types of customers: commercial, industrial and departmental (governmental) customers.

In the next section, major results and important issues are further analysed and discussed.

3.2 ANALYSIS AND DISCUSSIONS FOR DOMESTIC CONSUMER SURVEY

(1) Survey coverage

The household consumer survey carried out in the while Yangon City areas covers a total of 619 houses out of 654,000 houses of the City (data from YCDC Headquarter). The survey coverage is approximately 0.1 %. The number of interview results actually used for the analysis is 563 houses. The remaining 56 results are inappropriate for the analysis, most of which result from interviews to non-domestic customers such as commercial customers. Thus these interview results were excluded from the analysis. The detailed survey coverage by township is shown in Table E.1 mentioned before.

(2) Consumer types and characteristics

Out of 563 houses analyzed, YCDC consumers consist of 364 houses (64.7%) and non-YCDC consumers 199 (35.3%). Out of YCDC customers, 189 houses have water meter and 173 houses do not have water meter. The remaining 2 houses are YCDC public tap users.

The average household size is 5.62 persons for all houses, 5.41 for YCDC customers, and 6.01 for non-YCDC customers. According to the 1997 Household Income and Expenditure Survey, the estimated value was 5.12.

Regarding educational background of the most educated in household, 298 households have university background (53%), 211 have high school (37.5%), and 16 have middle school (2.8%). This higher percentage of university background indicates that higher educational background households were selected for the survey.

The average number of income earners is 1.85 persons per household for all households analyzed. The average monthly income is 37,921 Kyats per household and the average

monthly expenditure is 31,911 Kyats per household. In terms of the average values, the income is more than the expenditure. However, if the values of individual household are investigated there are many households that the expenditure is higher than the income. The number of such households is 179 out of 563 households. They possibly misestimate its values.

According to 1997 Household Income and Expenditure Survey, the estimated average monthly expenditure was 16,053 Kyats per household. If the value is adjusted to the present value in 2001 using the consumer price index (151 on February in 2001based on the year 1997), the average expenditure becomes 21,763 Kyats. The average household expenditure (31,911Kyats) of this survey result is 136 % higher than the 1997 survey result. If the previous result is assumed to be correct, it indicates that this survey selected higher expenditure household or higher income households.

Figure E.3 and Figure E.4 show the histograms of household income and household expenditure. The highest frequent range of the income is 10,000 to 20,000 Kyats, So is that of the expenditure. In a typical frequency curve of household income, the curve goes down to zero smoothly as the value goes higher income blankets. However, the income frequency of this survey shows that the frequency increases again in the highest bracket of more than 100,000 Kyats. It indicates that higher income households were selected as the survey samples.

Figure E.5 shows the composition of the household expenditure. Of the total expenditure, the largest expense is food and beverage amounting to 60.2 % followed by education (9.3 %) and transportation (7.6 %). The utility expenses including water, wastewater and solid waste disposal, telephone, gas, electricity and fuel compose of 9.7 %.

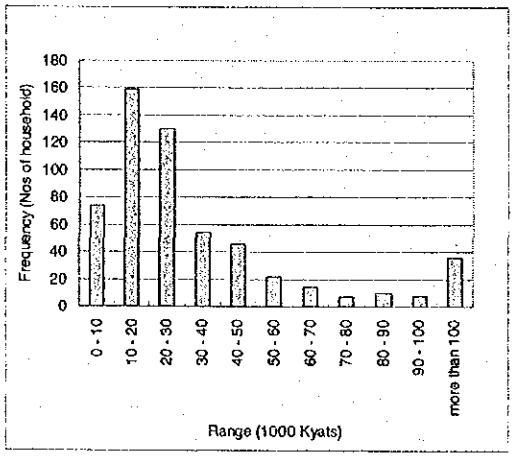


Figure E.3 Histogram of Household Income

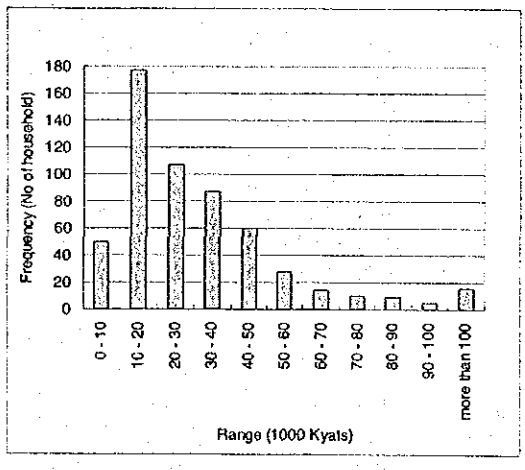


Figure E.4 Histogram of Household Expenditure

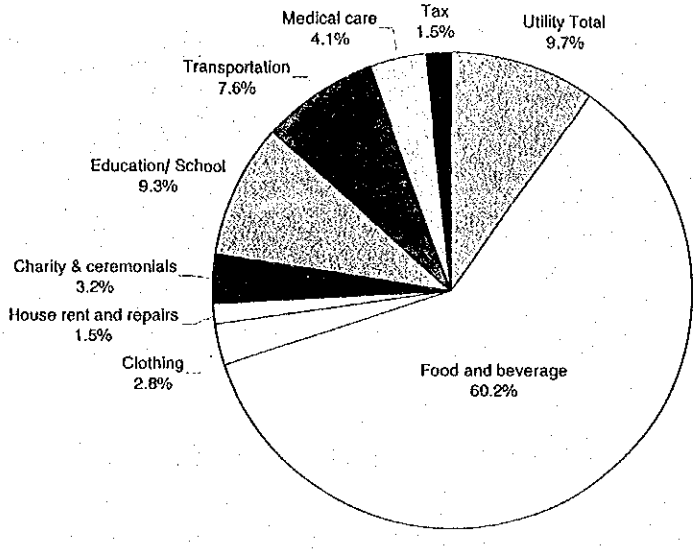


Figure E.5 Composition of Household Expenditure

(3) *Water supply source*

This survey identified 10 water supply sources in the City: YCDC piped water, YCDC public tap, water purchase from private water sources, tube well with electric pump, tube well with hand pump, shallow well, bottled water, YCDC tanker, pond water and rain water. Many households use several water sources. The average number of water sources is 1.5 per household for all samples, 1.2 for YCDC customer sample and 1.9 for non-YCDC customer sample. Non-YCDC customers rely on more water sources than YCDC customers.

Figure E.6 shows type of YCDC water supply. 45 % of customers have in-house tap, 24 % yard tap and 25 % both in-house and yard taps.

Figure E.7 shows water sources of non-YCDC customer, including major or minor sources. The most popular source is own tube well (49.8 %) followed by water purchase from private water sources (17.1 %) and rainwater (12.4 %).

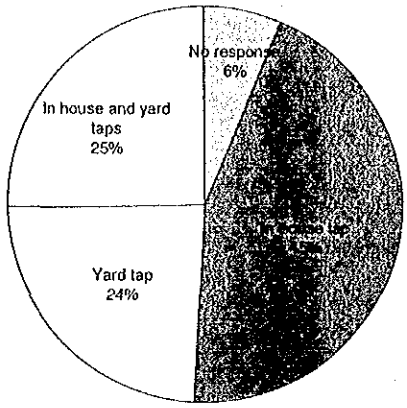


Figure E.6 Location of YCDC Water Tap

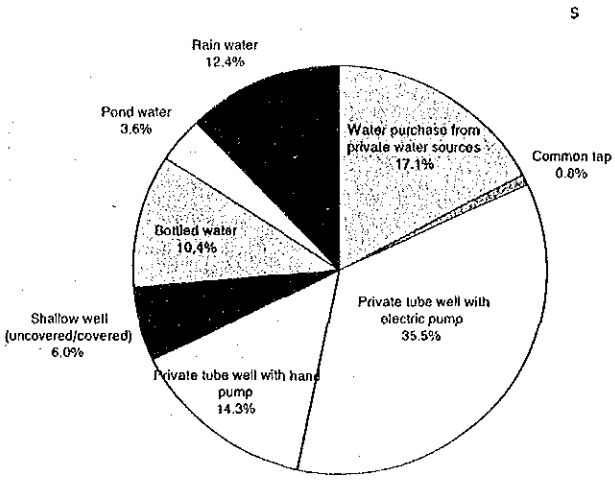


Figure E.7 Water Sources for Non-YCDC Customers

Regarding main water source of non-YCDC customer, the most popular main water source is own tube well, which is used by 125 households (62.6 %), followed by water purchase from private sources (21.1 %). While 98.3 % of YCDC water supply households use YCDC piped water as the main water source.

During the rainy season, 55 of 562 households have to fetch water from remote sources, comprising of 42 of non-YCDC households and 13 for YCDC households. 45 households spend less than 5 minutes for fetching water and 10 households more than 10 minutes. The fetching person is mostly adult man or woman.

550 of 563 households need to store water. 37 % of households store water in drum, followed by on-ground tank (35 %), and overhead tank (25 %). Total storage capacity per household is 358 gallons: 396 gallons for YCDC households, 287 gallons for non-YCDC households. Average times of cleaning of storage facilities are 2.3 per month.

Out of 358 YCDC piped water households, 216 households need electric/fuel pump to take water from piped water system and average pumping hours are 0.6 hours per day. 2 households use hand pump and 142 households do not use any pump. 137 households use own tube well. 73 % of 137 households use electric pump and 27 % use hand pump.

(4) Water usage and water supply conditions

52 % of YCDC customers have water meters and almost all are functioning. Last 3 months' average water consumption per household according to meter reading records is 36 m^3 per month. The average per capita consumption is 222 liters per person. 146 out of 173 households without water meter have willingness to install a water meter.

The survey estimated the average daily household water consumption at 228 gallons: 261 gallons for YCDC customer and 167 gallons for non-YCDC customer. Average per capita consumption per day is 184 liters: 220 liters for YCDC customer and 126 liters for non-YCDC customer. The consumption of YCDC customer is larger than that of non-YCDC customer in both average daily household and average per capita.

Most of all the households use water for daily use: drinking, cooking/dish washing, bathing, cloth washing, cleaning house and toilet flush. 81 households use water for car washing, 49 for watering garden and 11 for watering garden.

Figure E.8 and E.9 show the adequacy of water supply for YCDC customers and non-YCDC customers. 45.8 % of YCDC customers have supplied water sufficiently, while 52.8% have felt insufficient sometimes. On the other hands, 82.7% non-YCDC customers have supplied water sufficiently. 95 % of all household use right quantity of water, only 2 % use below desired quantity. 48 households (9 %) answered average necessary quantity of water is 2 times more than the current quantity used.

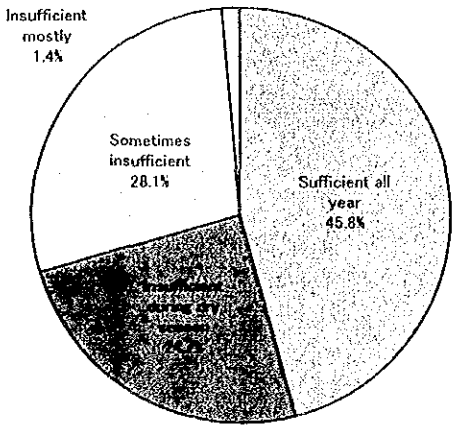


Figure E.8 Adequacy of Water (YCDC Customers)

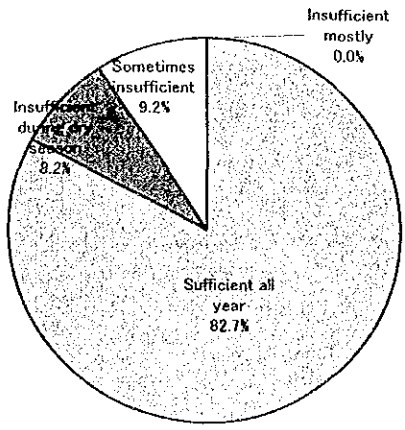


Figure E.9 Adequacy of Water (Non-YCDC Customers)

The Figure E.10 shows the quality of water. 86.5 % of household answered there is no color, 88.8% no smell, and 90% no taste.

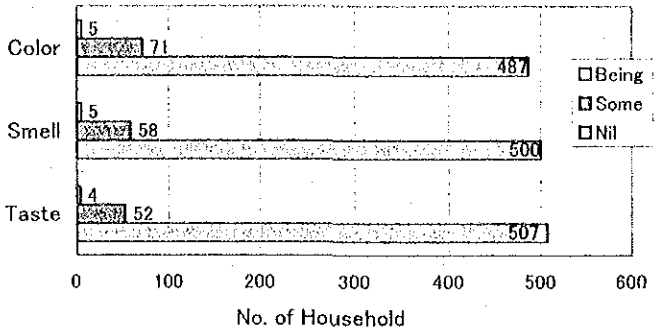


Figure E.10 Quality of Water Supplied

However, Figure E.11 and E.12 show that no household use water for drinking without treatment. For YCDC customers, 39 % take boiled and filtered water for drinking, 36 % filtered water, 21 % boiled water and 4 % bottled water purchased. For non-YCDC customers, 54 % take filtered water, 31 % boiled and filtered water, 10 % bottled water purchased and 5 % boiled water.

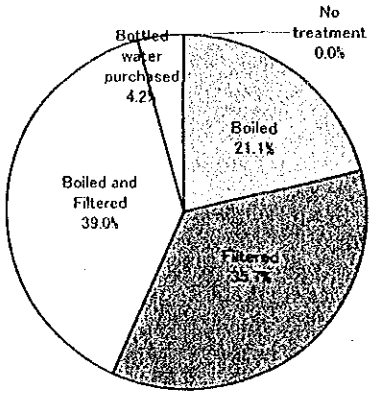


Figure E.11 Water Treatment for Drinking (YCDC Customers)

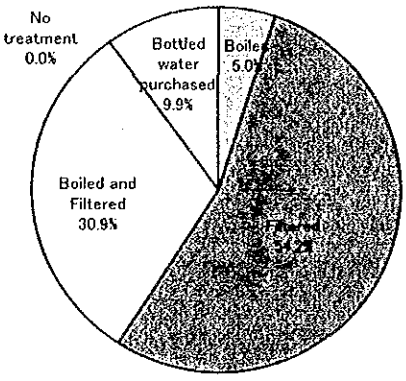


Figure E.12 Water Treatment for Drinking (Non-YCDC Customers)

As to the water availability, in rainy season, 94 % of YCDC customers receive the water supply system every day, but the availability decrease from rainy to dry season, 68 % everyday. 10 % receive water from piped water less than 2 days per week.

Figure E.13 shows the average hours of water supply when electricity for pump is available and Figure E.14 not available. When a pump is used to take water from pipeline, 51.2 % of

YCDC customers can obtain 24 hours' water, 37.2% can less than 12 hours. On the other hand, when a pump is not used to take water from the pipeline, the percentage of 24 hours availability decrease to 36.5 %, while less than 12 hours increase to 53.8%.

The water supply pressure of 56 % households is sometimes low with pump use, 16 % every time low, very low and no water. When the pump is not used, the percentage of every time low, very low and no water increase to 28 %. 9 % have no water without pump because of the low water supply pressure.

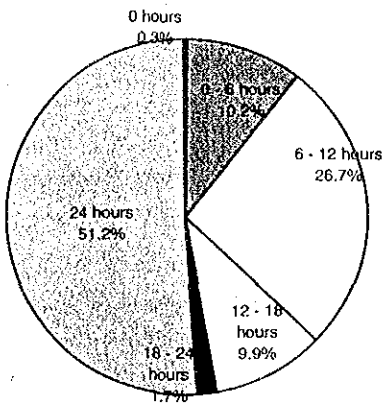


Figure E.13 Supply Hours of YCDC Water
(If a pump is used to take water from pipeline)

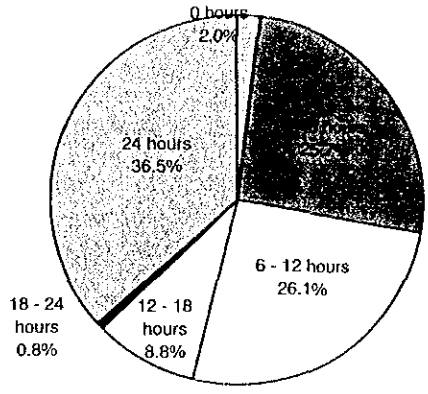


Figure E.14 Supply Hours of YCDC Water
(if a pump is not used to take water from pipeline)

(5) Satisfaction and suggestions for the city water supply

94.6 % of all households satisfy water quality of main water source, for YCDC customers 98.5 % and non-YCDC customers 87.8 %.

Figure E.15 and E.16 show the suggestion of YCDC and non-YCDC customers for water supply. The common suggestion is to provide 24 hours' water supply, 38.5 % and 37.6 % for YCDC and non-YCDC customers, respectively. For YCDC customers, other suggestions are to increase water pressure (22.2 %) and provide drinkable water (19.9%). For non-YCDC customers, the major suggestion is to provide a house connection.

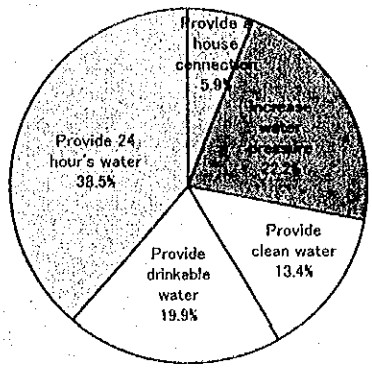


Figure E.15 The Suggestion for Water Supply Service (YCDC Customers)

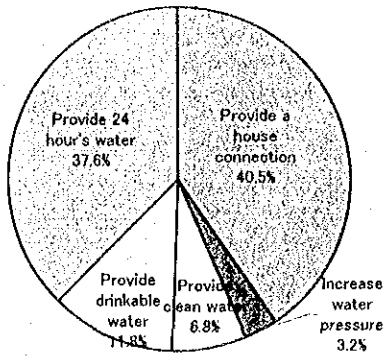


Figure E.16 The Suggestion for Water Supply Service (Non-YCDC Customers)

Almost all the households think it important not to let water run away unused through leaks and wastage, because water is important resources and should not be wasted unnecessarily (95 %), followed by that wastage is expensive due to fines and penalties imposed by the authorities (3%). When using a water tap, 88 % of all households turn off all taps after use, 9% turn off any pump immediately when the storage tank is full and starts to overflow.

(6) Water bill

Figure E.17 show the number of households and average monthly water bill by types of water bill. There are four types of water bill. For YCDC customers, two flat rate (120 and 202 Kyats per month) and metered rate are used. 168 households out of YCDC customers take flat rate of 120 Kyats per month. 9 households take flat rate of 202 Kyats (large lot size user). 185 households take metered rate, 6.6 Kyats per 1,000 m^3, and their average monthly water bill is 234 Kyats.

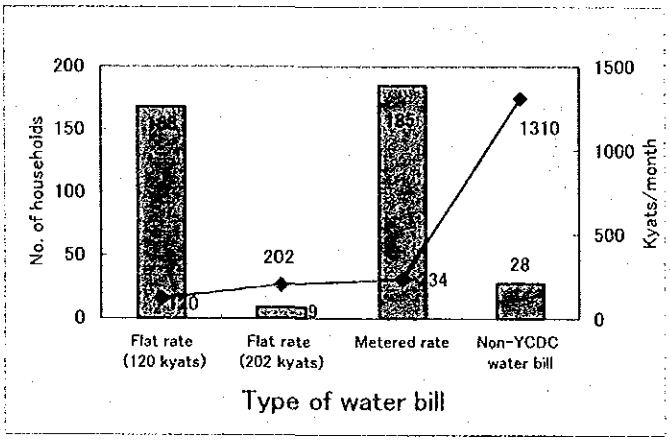


Figure E.17 Types of Water Bill

For non-YCDC customers, 28 households pay average 1,310 Kyats for common tube well, private water vender, etc. Non-YCDC customers pay six times as large as YCDC customers.

As to the opinion on current YCDC water bill, only 3 households think it is very expensive, expensive or above right amount. 292 households think it right amount, 64 think it cheap.

(7) Water costs

As to the average monthly water costs, YCDC customers pay 181 Kyats for YCDC water bill, 74 Kyats for pumping from YCDC piped water and 816 kyats for bottled water. Estimated average electricity costs for working pump for withdrawing water from YCDC water pipeline is 74 Kyats and for withdrawing water from tube well is 168 Kyats. The average water costs for all user type is 246 kyats per month without electricity costs, 293 kyats with estimated electricity costs. The average costs range from 35 kyats to 3,800 kyats.

For non-YCDC customers, 34 households pay 1,379 kyats for neighbor's tap/well on average, 88 households pay 1,052 kyats for bottled water, 172 Kyats for private tube well maintenance. Estimated average electricity costs for working pump for withdrawing water from tube well is 145 Kyats. The average water costs for all user type is 512 kyats without electricity costs, 579 kyats with estimated electricity costs, about 2 times as large as YCDC customers.

Figure E.18 and E.19 show the histogram of percentage of water costs to income and expenditure. The average percentage of water costs to household income is 1.9 %, 2 % for YCDC customers and 2.3 % for non-YCDC customers. To household expenditure, the average percentage is 1.5 %, 1.2 % for YCDC customers and 1.9 % for non-YCDC customers. The highest frequent range of the percentage to income is 0 to 0.5 %, so is that of the expenditure.

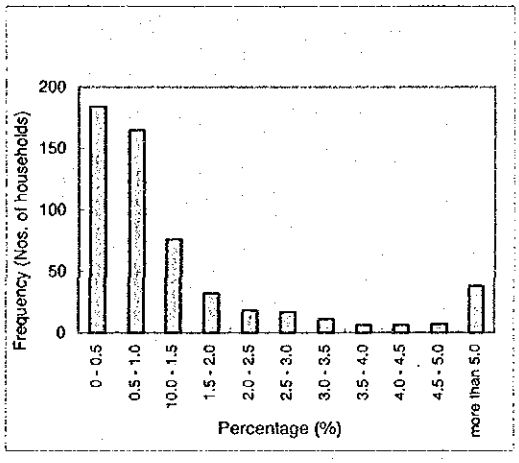


Figure E.18 Percentage Water Costs to Income

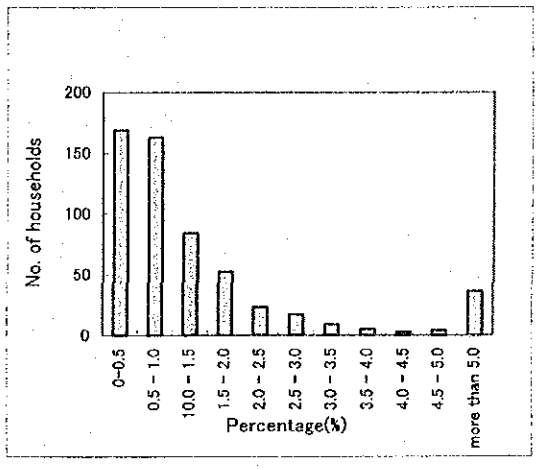


Figure E.19 Percentage Water Costs to Expenditure

Figure E.20 and E.21 show the opinion on current water costs. For YCDC customers, 77.4% answered the right amount, 20% cheap. For non-YCDC customers, 19 % answered expensive, on the other hands, 34.5 % cheap and very cheap.

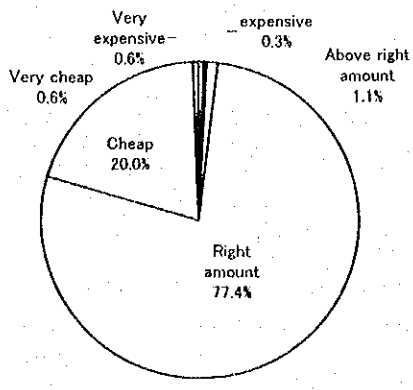


Figure E.20 Opinion on Current Water Costs (YCDC Customers)

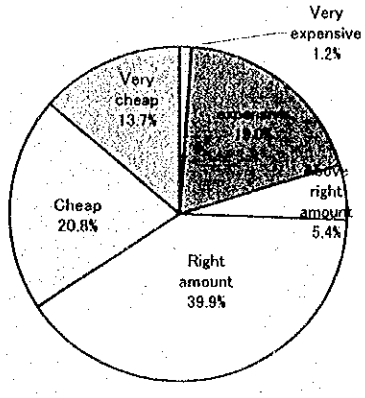


Figure E.21 Opinion on Current Water Costs (Non-YCDC Customers)

(8) Willingness to pay

For YCDC customers, 275 households (75.5%) said "No" to pay more for current YCDC water supply services. The 89 households' average willingness to pay for the current services is 220 kyats per month. For the improved YCDC water supply service, 83.4 % of the current YCDC customers have willingness to pay more.

Figure E.22 shows that the willingness to pay for 24 hours' clean water supply, 35 % of households have willingness to pay 150 to 250 kyats per month, 23 % for 250 to 350 kyats. The average willingness to pay for 24 hours' clean water supply is 321 kyats per month. Figure E.23 shows the willingness to pay for 24 hours' drinkable water supply, 43 % of households have willingness to pay 150 – 250 kyats per month, 14 % 450-550 kyats. 20% have willingness to pay more than450 kyats per month. The average willingness to pay for 24 hours' drinkable water is 383 kyats.

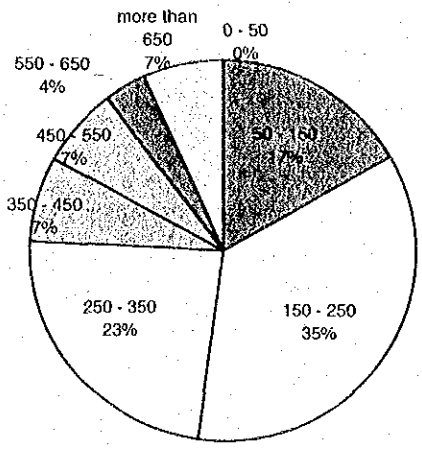


Figure E.22 Willingness to Pay for 24 Hours' Clean Water Supply (kyats/month)

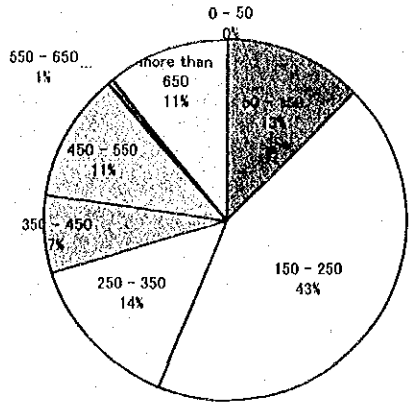


Figure E.23 Willingness to Pay for 24 Hours' Drinkable Water Supply (kyats/month)

60 households (16.6 %) answered "No" for the improved YCDC water supply service. The current average monthly water bills of metered customers who answered to be unwilling to pay more for the improved water service is 274 kyats.

Out of 198 households of non-YCDC customers, 168 households (85 %) have willingness to connect YCDC water supply system and willingness to pay for clean and necessary amount of water supply is 559 Kyats, for drinkable and necessary amount of water supply is 797 Kyats. The willingness to pay for the improved YCDC water supply of non-YCDC customers is two times as higher as YCDC customers'. The average monthly water cost of 29 households who have unwillingness to connect to YCDC water supply system is 237 kyats.

(9) Waste water disposal and willingness to pay

For grey water disposal, 89.4 % of all households discharge into open drain or river, 3.8 % sew water on the ground. For human wastewater disposal, 92.4 % use septic tank, 7 % of YCDC customers use YCDC sewer.

Fro current YCDC sewerage customers, all households have the willingness to pay for YCDC sewerage service. The average willingness to pay for the current YCDC sewerage service is 161 kyats per month. For non-YCDC sewerage customers 87.9 % of households have the willingness to connect YCDC sewerage service, the average willingness to pay is 134 kyats per month. 548 households out of 553 households think there is no relation between the quality of water and the illness, only 5 households answered yes.

3.3 ANALYSIS AND DICUSSIONS FOR NON-DOMESTIC CONSUMER SURVEY

(1) Survey coverage

The non-domestic consumer survey covers a total of 103 companies.

(2) Consumer types and characteristics

Out of 103 non-domestic consumers analyzed, industrial consumers consist of 40 consumers (39%), commercial consumers 45 (44%), and public (governmental) consumers 18 (17%). The average company size is 130 persons for industrial company, 25 persons for commercial, and 783 for public. 23 % of industrial companies are YCDC consumers, for commercial 78 %, and for public 100 %.

(3) Water supply source

There are several water supply sources: YCDC water, communal owned tube well, private owned tube well, dug well, bottled water, private water tanker, rain water and others. Figure E.24 shows the water supply source of non-domestic water consumer, 33.7 % use YCDC water, followed by dug well 25.3 %, and private owned tube well 21.7%. Many companies use several water sources. The average number of water sources is 1.7 for industrial consumers, 2.1 for commercial consumers, and 1.1 for public. As main water source, 56% of all non-domestic consumers use YCDC water, 42 % use private owned tube well.

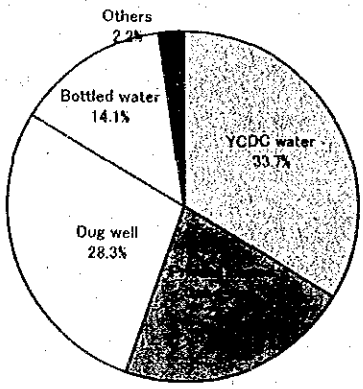


Figure E.24 Water Supply Source

(4) Water consumption and water supply conditions

The average monthly water consumption of all consumers is 598 m^3 per month for industrial, and 296 m^3 per month for commercial consumers. For YCDC customers, total consumption

including YCDC water and other water sources is 130 m^3 for industrial, 338 m^3 for commercial, and 828 m^3 for departmental consumers. For non-YCDC customers, the average water consumption is 738 m^3 for industrial, and 147 m^3 for commercial consumers.

98 consumers need to store water, and average storage capacity is 5,262 gallons, 3,290 gallons and 11,900 gallons respectively. Figure E.25 shows the types of storage facilities. 38.3% of all consumers have on-ground tank, followed by overhead tank (34%).

94 % of all consumers have supplied water sufficiently all year, only 6 % insufficient during dry season and sometimes. 93 % of all consumers have satisfaction of quality of main water source, 87.5% for industrial, 96% for commercial, and 100 % of public consumers. 91 % have satisfaction of quantity of main water source.

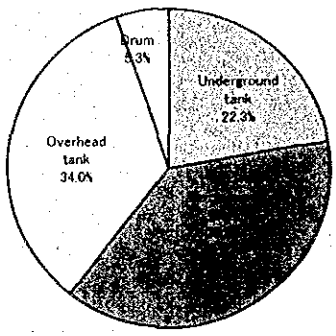


Figure E.25 The Type of Storage Facility

(5) Water costs

For YCDC customers, there are three ways for payment. Out of 62 consumers, 33 have water meters and pay according to the meter. All 9 industrial and 23 commercial customers take metered rate, 29.7 kyats per m^3, 1 commercial customer takes metered rate, 0.88 US$ per m^3.

The total average water costs including electricity costs for pumping of all consumers is 11,073 kyats for industrial and 11,429 kyats for commercial consumers. For YCDC customers, industrial consumers pay 7,591 kyats and commercial 12,831 kyats. For non-YCDC customers, industrial consumers pay 12,154 kyats and commercial 5,378 kyats.

(6) Willingness to pay

Out of 62 YCDC customers, 92% have no willingness to pay more for current YCDC water

supply service. While, if the current YCDC water supply service is improved into 24 hours' drinkable water, 96% have willingness to pay more, the average payment for 24 hours' drinkable water supply is 4,778 kyats for industrial consumers, 9,219 for commercial, and 2,169 for public.

Figure E.26 shows the distribution of the willingness to pay, 31.9 % is willing to pay below 2,000 kyats, while21.3 % above 10,000 kyats. The commercial consumers tend to pay higher, the public lower.

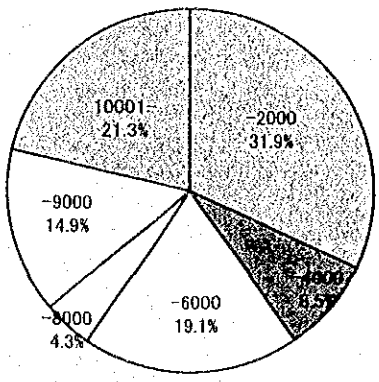


Figure E.26 Willingness to Pay for 24 Hours' Drinkable Water Supply

Out of 42 non-YCDC customers, 90% have willingness to connect YCDC water supply, and the average monthly payment is 7,750 kyats for industrial, and 3,870 for commercial.

(7) Waste water disposal and willingness to pay

Figure 27 and 28 show that the way of wastewater disposal. For human wastewater disposal, 87% of non-domestic consumers use septic tank, for other wastewater disposal, 88% discharge into open drain or river. Only 6.5% of non-domestic consumers use YCDC sewer for wastewater disposal.

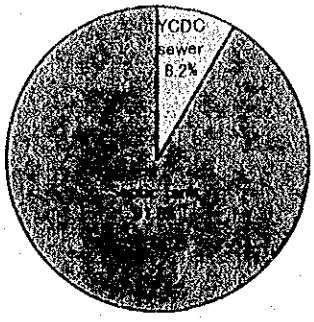


Figure E.27 Human Wastewater Disposal

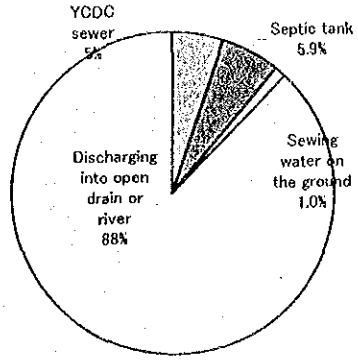


Figure E.28 Other Wastewater Disposal

For YCDC sewerage system users, 26 commercial consumers and 3 public consumers have willingness to pay and the maximum monthly payment is 888 and 350 kyats respectively. For non-YCDC sewerage system users, 36 industrial, 19 commercial and 11 public consumers have willingness to connect YCDC sewerage service and the average payment is 741 for industrial and 1989 kyats for commercial consumers.

ANNEX

Annex 1 Questionnaire of Domestic Survey

Annex 2 Questionnaire of Non-Domestic Survey

Annex 3 Survey Result of Domestic Survey

Annex 4 Survey Result of Non-Domestic Survey

ANNEX 1

QUESTIONNAIRE OF DOMESTIC SURVEY

Domestic Water Use Consumer Survey in Yangon City (June- July 2001)

1. Sample serial No.: _____

2. Grade of dwelling (identify from the appearance of dwelling)

	High	Middle	Low
Check box			

3. Name of interviewer: _____

   Signature: _____

4. First survey date (month / day) _____

   Interview result [1] Completed [2] Not completed

5. Second survey date (month / day) _____

   Interview result [1] Completed [2] Not completed

6. Checking of the survey result

   [1] Accepted [2] Rejected

_____ _____

Checked Date (year / month / day)

Signature of Hirotaka Sato
Consumer Survey Specialist,
JICA Study Team

APPEAL TO THE RESIDENTS IN YANGON CITY ON DOMESTIC WATER USE CONSUMER SURVEY FOR THE STUDY ON IMPROVEMENT OF WATER SUPPLY SYSTEM IN YANGON CITY IN THE UNION OF MYANMAR

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
YANGON CITY DEVELOPMENT COMMITTEE (YCDC)

Japan International Cooperation Agency and Yangon City Development Committee are executing the Study on Improvement of Water Supply System in Yangon City. In the process of improvement of the water supply situation of Yangon City, a Consumer Survey is being conducted through the questionnaire to collect information on household characteristics and water supply in the City during period of May, June and July 2001. For the survey, six hundreds households in the City are selected by random sampling.

To accomplish this task, the residents are kindly requested to provide information on related field and show necessary materials such as their consumer cards or bill-paid receipts to the Interviewer. It may be difficult to answer some of the questions but please make the best effort to answer the all questions. It is important that you answer questions as honestly and truthfully as you can so that the Study Team can understand the actual status of water supply and use which is essential to improve the water supply system of Yangon City.

The information collected from each household will be treated confidentially with utmost and used only for the Study purpose - improvement of the water supply situation of the City.

JICA and YCDC sincerely request all residents for their kind cooperation to make survey a success.

Questionnaire for Household Consumer Survey in Yangon in 2001

Note: Check (√) against the appropriate number, check appropriate box or write down answer blank spare.

Name of township: _____

Name of ward: _____

Address: _____

Name of respondent: _____

This questionnaire is administered to:

[1] Head of household, please indicate ( ) man or ( ) woman

[2] Adult member of household, please indicate ( ) man or ( ) woman

[3] Others (Specify) _____

1 Socio-economic Characteristics of the Household

1.1 Type of dwelling (if your dwelling type is apartment, please indicate the floor) :

	Independent house		Apartment		Other (Specify)
	Owned	Rent	Owned	Rent	
Check box					

1.2 Type of dwelling structure:

	Concrete	Wooden	Bamboo	Others (Specify)
Check box				

1.3 Number of rooms of your dwelling:

a. Kitchen and dining ( )

b. Bath room ( )

c. Living and bed room ( )

d. Total ( )

1.4 How many persons live in your household?

a. Infants (less than 1 years old) ( ) persons

b. Children (2 – 15 years old) ( ) persons

c. Adults (more than 15 years old) ( ) persons

d. Total ( ) persons

1.5 What is the education qualification of the most educated of your household?

	No education	Primary school	Middle school	High school	Technical, agricultural, vocational school	University, institute, college	Other (Specify)
Check box							

1.6 How many family members in your household work for wages and salary, and obtain income from self-employment and pension?

Persons	1	2	3	4	5	More than 5 (Specify the number)
Check box						

1.7 Please show average monthly income for each working member of your household. Please answer all working members.

No.	Kind of job	Monthly income (Kyats/month)			
		1st earner	2nd earner	3rd earner	4th earner
1	Agriculture, hunting, foresting and fishing				
2	Manufacturing				
3	Construction				
4	Wholesale and retail trade, restaurant and hotels				
5	Transport, storage and communication				
6	Financial institution				
7	Community, social and personal services				
8	Government				
9	Retired/pensioner				
10	Other (Specify) _____				
11	None				
	Total (calculated by Interviewer)				

1.8 Please indicate the monthly average household expenditure for the following utilities.

No.	Utility item	Amount of money (Kyats/month)	Remarks
1	Waste water disposal		For septic tank cleaning, waste water disposal or treatment
2	Solid waste disposal		For garbage collection and disposal
3	Telephone		
4	Gas		For cooking & lighting.
5	Electricity		For cooking, lighting & electric appliance
6	Fuel		For cooking, lighting.
	Total (calculated by Interviewer)		

1.9 Please indicate the monthly average household expenditure for following items? If you don't know the exact amount of money, please make the best estimate from the expenditure for the last month, the last years, etc.

No.	Expenditure Item	Amount of money (Kyats/month)	Remarks
1	Food and beverage		
2	Clothing		
3	House rent and repairs		Apartment, house & land rental fee, etc.
4	Charity and ceremonials		Donation, marriage, funeral, etc.
5	Education/ School		Incl. public school tuition, private school tuition, books and so on.
6	Transportation		Including tax, bus, and fuel/ oils for your own cars/bikes.
7	Medical care		Fees for hospital/clinic incl. medicine.
8	Tax		If your income is taxable.
	Total (calculated by Interviewer)		

1.10 Does your household own the following items and how many?

No.	Item	No	No.	Item	No.
1	Telephone		9	Electric fan	
2	Radio/cassette tape recorder		10	Air conditioner (water)	
3	Washing machine		11	Air conditioner (non-water)	
4	Sewing machine		12	Microwave or oven	
5	Refrigerator		13	Bicycle	
6	Television		14	Motor cycle	
7	Computer		15	Car	
8	Generator		16	Truck	

2 Information on Water Supply Sources

2.1 What type of water supply source did your household use during the last year? (Multiple answers)

No.	Water source	Yes	No
1	Household taps connected to YCDC piped water supply system [1] Inside-dwelling [2] Outside-dwelling (yard tap) [3] Both		
2	Household taps connected to None YCDC piped water supply system [1] Inside-dwelling [2] Outside-dwelling (yard tap) [3] Both		
3	YCDC Public tap (Stand post)		
4	Communal tap		
5	Private tube well installed with electric/fuel pump If you know the depth, please indicate _____ m or _____ ft		
6	Private well installed with hand pump If you know the depth, please indicate _____ m or _____ ft		
7	Unprotected dug well (open)		
8	Protected dug well (covered)		
9	Bottled water (large and small)		
10	YCDC water tanker		
11	Private water tanker		
12	Pond water		
13	Rain water		
14	Neighbor's tap or neighbor's well		
15	Other (Specify) _____		

2.2 What is the main water supply source of your household? Choose one from the choices in Q2.1.

[ ] .

2.3 Do you need to walk for the water source from your household?

a. Dry season: [1] Yes [2] No

b. Wet season: [1] Yes [2] No

If yes,

2.4 c. How long does it take you to get the water from the source per day?

Hours	Less than 5 minutes	Within 10 minutes	Within 20 minutes	Within 30 minutes	Within 1 hour	More than 1 hour (Specify)
Check box						

2.5 d. Who in your household mainly fetch the water? (Choose answers)

Person	Adult (Men)	Adult (Women)	Children	Other (Specify)
Check box				

2.6 How many taps do you have inside and outside of your house? Inside _____ Outside _____

2.7 Does your household need to store water? [1] Yes [2] No

If yes,

a. What type of storage facility does your household have and how many? (Multiple answer)

Location	Underground *tank*	Tank on *ground*	Overhead *tank*	Drum	Others (Specify)
Number of tanks					

b. What is the total volume?

[ ] m^3 or [ ] Gallons or [ ] Liters

c. How frequently do you clean it?

[ ] times per month or [ ] times per week

2.8 Does your household need an electric/fuel pump to take water from piped water distribution system?

[1] Yes [2] No

If yes,

a. How much is the power of motor? _____ Watts or _____ hp

b. How many hours per day do you use the pump, on average? _____ Hours

2.9 Does your household need an electric/fuel pump to take water from tube well?

[1] Yes [2] No

If yes,

a. How much is the power of motor? _____ Watts or _____ hp

b. How many hours per day do you use the pump, on average? _____ Hours

3 Water Usage and Water Supply Conditions

[Water usage]

3.1 For what purpose does your household use water and what is source of water?

No.	Water use	Check box	Water source (Insert No. from Q2.1)
1	Drinking		
2	Cooking and dish washing		
3	Bathing		
4	Cloth washing		
5	Cleaning house		
6	Toilet flush		
7	Car washing		
8	Watering garden (landscaping)		
9	Watering crops		
10	Livestock watering (type of livestock _____)		
11	Business use		
12	Other (Specify)		

3.2 Please indicate adequacy of water supplied? (Choose one)

Category	Sufficient all year	Insufficient during dry season	Sometimes insufficient	Insufficient mostly
Check				

3.3 Please rate the quantity of water used by your household. (Choose one)

Degree	Over use	Above average	Right quantity	Below desired quantity	Too little
Check					

3.4 If currently you do not get enough quantity of water, how many more times than the current quantity of water supplied does your household need? [ ] Times

[Quality of the water supplied]

3.5 Please rate the quality of the main water source used by your household.

a. Taste

[1] Nil (desired) [2] Some taste [3] Offensive taste (Specify _____)

b. Smell

[1] Nil (desired) [2] Some small [3] Bad smell (Specify _____)

c. Color

[1] Nil (desired) [2] Slight color [3] Color (Specify _____)

3.6 How do you treat water before drinking? (Choose one)

Treatment method	Boiled	Filtered	Boiled and Filtered	Bottled water purchased	No treatment	Others (Specify)
Check box						

3.7 Are you satisfied with the quality of main water source of your household?

[1] Yes [2] No

If no, why? _____

[Quantity and reliability of piped water supply]

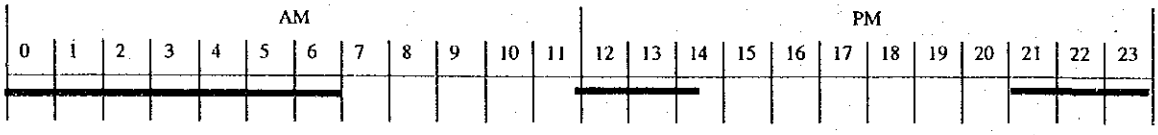
3.8 For the household which has house connection or tube well with <u>electrical/fuel pump</u> for getting water.

a. On average, how frequently per week can your household receive water from the water supply system, if electricity/fuel for pump is available?

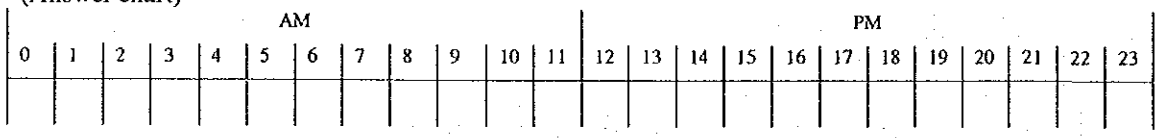
Season	Every day	6 days	5 days	4 days	3 days	2 days	1 day	Other (Specify)	Never
Dry									
Wet									

b. What time during a day can your household obtain water from the water supply system, if electricity/fuel for pump is available? Draw bars on the time chart.

(Example)



(Answer chart)



c. Please indicate the pressure of the water supply system?

Degree	High	Generally	Sometime	Every time	Every time	Every time no

		high	low	low	very low	water
Check						

d. If the pump is not used, how is the pressure of tap water?

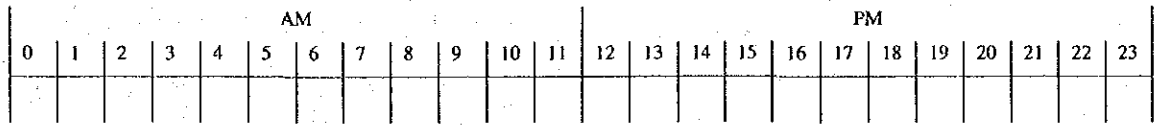
Degree	High	Generally high	Sometime low	Every time low	Every time very low	Every time no water
Check						

3.9 For the household which has house connection <u>without pump</u>.

a. On average, how frequently per week can your household receive water from the water supply system?

Season	Every day	6 days	5 days	4 days	3 days	2 days	1 day	Other (Specify)	Never
Dry									
Wet									

b. What time during a day can your household obtain water from the water supply system? Draw bars on the time chart.



c. Please indicate the pressure of the water supply system?

Degree	High	Generally high	Sometime low	Anytime low	Anytime very low	Anytime no water
Check						

3.10 Does your house have a house connection of water supply? [1] Yes [2] No

If yes, does your house have a water meter? [1] Yes [2] No

If yes,

a. Is the meter functioning? [1] Yes [2] No [3] Don't know

b. If you have meter(s), how much water is consumed per month (in your bill)?

Billing month		Period of meter reading	Metered quantity (m^3)
Last month			
1 month before			
2 months before			

If no and you are YCDC water customer, do you accept to install a water meter in your house and pay for water according to the quantity you consumed?

[1] Yes [2] No

If no, why? _____

3.11 On average, how much water does your household use per day. Please make a careful estimate.

[ ] Gallons/day, or [ ] Liters/day

[Suggestions for water supply service]

3.12 Please indicate suggestions to improve water supply to your household. (Mark all applicable)

No.	Water supply service	Check box
1	Provide house connection	
2	Increase water pressure	
3	Provide clean water supply but not drinkable	
4	Provide drinkable water supply	
5	Provide 24 hours' water supply	

3.13 What do you understand by:

a. clean water _____

_____

b. drinkable water _____

_____

3.14 Do you consider it important not to let water run away unused through leaks and wastage?

[1] Yes [2] No

If yes, you gave this answer because:

	Check box
Water is an important resource and should not be wasted unnecessarily	
Water is expensive for me and I cannot afford to pay for wastage	
It takes a lot of effort to get (fetching, carrying etc)	
Waste is expensive for me due to fines and penalties imposed by the authorities	
Other reason (please specify)	

If no, you gave this answer because:

	Check box
Water is easily available in sufficient quantities	
Water does not cost much money	
Water costs the same no matter how much is used	
Other (please specify)	

3.15 When you use water in or near your household, how do you do normally? Please indicate most accurate answers (Multiple answers).

	Check box
Turn off all taps after use	
Leave at least one tap open, to allow storage vessels to fill and overflow, because flow &	

pressure are very low	
Leave at least one tap open, in order to know when water is available, because the water supply is intermittent	
Turn off any pump immediately when the storage tank is full and starts to overflow	
Water is left running	
Other (Specify)	

If a tap or pipe or any part of your water system in the house is leaking or broken,

a. What do you do? Please indicate most representative answer?

	Check box
Immediately repair the fault	
Leave the leak unattended to unless it is causing a major problem or nuisance	
Leave the leak unattended to, because the cost of repairs is too much (unless it is a major problem)	
Leave the leak until it is convenient for it to be repaired	
Other (please specify)	

b. Has this happened in the last twelve months? If so, what was the fault? _____

_____

4 Water Costs and Willingness To Pay for Water Supply Service

4.1 Does your household pay water bill? [1] Yes [2] No

If yes,

a. What tariff rate is applied to your household?

[1] Flat rate [ ] Kyats/month [2] Metered rate [ ] Kyats/1000 m^3

b. How frequently, does your household pay for water bill?

[1] Every month [2] Quarter year [3] Other (Specify _____)

c. Please give the monthly water bills paid?

Bill	Month 2001	Kyats/month
Last month		
One month before		
Two months before		

4.2 Please indicate how much your household pay for water?

No.	Water source	Cost (Kyats/month)
1	Household taps connected to private piped water supply system (non YCDC piped water system)	
2	YCDC Public tap	
3	Communal tap	
4	Private tube well installed with electric pump (Estimate from Q2.7 and Q2.8)	
5	Private well installed with hand pump	
6	Unprotected dug well (open)	
7	Protected dug well	
8	Water vender (water container or bottled water purchased)	
9	YCDC water tanker	
10	Private water tanker	
11	Neighbor's tap or neighbor's well	
12	Other (Specify) _____	

4.3 Interviewer, please calculate total monthly water costs including YCDC water bill.

[ ] Kyats/month

4.4 What is your opinion on the current total water costs paid by your household?

Degree	Very expensive	Expensive	Above right amount	Right amount	Cheap	Very cheap	Other (Specify)
Check box							

Q 4.5 ~ Q 4.9 For YCDC piped water supply consumer

4.5 What is your opinion on the current water bill of YCDC?

Degree	Very expensive	Expensive	Above right amount	Right amount	Cheap	Very cheap	Other (Specify)
Check box							

4.6 Are you willing to pay more money for the current YCDC water supply service?

[1] Yes [2] No

4.7 If yes, how much is the maximum amount of money your household could be willing to pay for in order to continuously use the **current YCDC piped water supply**?

[ ] Kyats/ month

4.8 If your current water supply service is improved, would your household be willing to pay more for

water? [1] Yes [2] No

4.9 If yes, how much is the maximum monthly amount of money your household could be willing to pay for the following **improved water supply service**? Choose necessary services and write down the amount of money for each service. Answer all applicable.

No.	Improved water supply service level	Max. amount (Kyats/month)
1	Clean water supply	
2	Drinkable water supply	
3	Continuous 24 hours' water supply	
4	Continuous 24 hours' clean water supply but not drinkable	
5	Continuous 24 hours' drinkable water supply	

Q 4.10 For YCDC stand post and None-YCDC consumer

4.10 If YCDC house connection will be made available for your household and you can get necessary amount of water, would you be willing to connect?

[1] Yes [2] No [3] Don't know

If no, why. _____

If yes, how much is the maximum monthly amount of money your household would be willing to pay for the following service?

No.	Improved water supply service level	Max. amount (Kyats/month)
1	Clean water supply but not drinkable	
2	Drinkable water supply	

5 Information on Sanitary Conditions and Water Borne Disease

[Wastewater]

5.1 Where do you dispose of grey and human wastewater? Check one for each.

No.	Method of disposal	Grey wastewater (washing/bathing/kitchen)	Human wastewater (Excrete/Urine)
1	YCDC Public sewer		
2	Septic tank		
3	Sewing water on the ground or other		
4	Discharging into open drain or river		
5	Courtyard		
6	Other (Specify)		

5.2 For SEWERAGE system household only

Are you willing to pay monthly bill for the sewerage disposal service?

[1] Yes [2] No

If yes, how much is the maximum monthly amount of money you could pay for the cost of the service? [ ] Kyats/month

If no, why _____

5.3 **For NONE SEWERAGE system household**

If sewerage system will be connected to your house, are you willing to connect?

[1] Yes [2] No

If yes, how much is the maximum monthly amount of money your family could pay for the cost of the service?

[ ] Kyats/month

If no, why, _____

5.4 If you use water from a well, what is the distance between septic tank and the well?

[ ] m or [ ] ft

5.5 Is there any relation between the quality of water and the illness in your household?

[1] Yes [2] No

If yes, what diseases? _____

5.6 Has any of your household members suffered from the following sicknesses during the last 12 months? (Indicate all applicable for your household)

[1] Stomachache [2] Gastroenteritis [3] Diarrhea [4] Dysentery [5] Cholera

[6] Malaria [7] Skin disease related to water [8] Infectious hepatitis

[9] Typhoid or Paratyphoid [10] Others (Specify) ________________

5.7 Did the affected member get any medical treatment during the above period?

[1] Yes [2] No

If yes,

a. How many days did the affected member of your household obtain treatment for?

[1] As an outpatient: [ ] days to go to clinic or hospital

[2] As an inpatient: [ ] days to stay in clinic or hospital

b. How much did your household spend for consultation of doctor/medical specialist in the last year? [ ] Kyats/year

c. How much money did your household spend for medicine for the above diseases in the last year? [ ] Kyats/year

♥♥

♥ **This is the end of the Questionnaire.** ♥

♥ **Thank you very much for your kind cooperation.** ♥

♥♥

ANNEX 2

QUESTIONNAIRE OF NON-DOMESTIC SURVEY

None-Domestic Water Use Consumer Survey in Yangon City (July 2001)

1. Sample serial No.: _____

2. Name of interviewer: _____

   Signature: _____

3. First survey date (month / day) _____

   Interview result [1] Completed [2] Not completed

4. Second survey date (month / day) _____

   Interview result [1] Completed [2] Not completed

5. Checking of the survey result

   [1] Accepted [2] Rejected

_____

1st Checked Date (year / month / day)

_____

2nd Checked Date (year / month / day)

_____

Signature of Hirotaka Sato
Consumer Survey Specialist,
JICA Study Team

APPEAL TO THE RESIDENTS IN YANGON CITY ON NONE-DOMESTIC WATER USE CONSUMER SURVEY FOR THE STUDY ON IMPROVEMENT OF WATER SUPPLY SYSTEM IN YANGON CITY IN THE UNION OF MYANMAR

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
YANGON CITY DEVELOPMENT COMMITTEE (YCDC)

Japan International Cooperation Agency and Yangon City Development Committee are executing the Study on Improvement of Water Supply System in Yangon City. In the process of improvement of the water supply situation of Yangon City, a Consumer Survey is being conducted through the questionnaire to collect information on water supply of none-domestic sector in the City. For the survey, one hundred samples are selected.

To accomplish this task, the respondents are kindly requested to provide information on related field and show necessary materials such as their bill-paid receipts to the Interviewer. It may be difficult to answer some of the questions but please make the best effort to answer the all questions. It is important that you answer questions as honestly and truthfully as you can so that the Study Team can understand the actual status of water supply and use which is essential to improve the water supply system of Yangon City.

The information collected will be treated confidentially in utmost and used only for the Study purpose - improvement of the water supply situation of the City.

JICA and YCDC sincerely request all residents for their kind cooperation to make survey a success.

Questionnaire for None-Domestic Water Consumer Survey in Yangon in 2001

Check (√) against the appropriate number, check appropriate box or write down answer in the blank.

0 Information on the company/office

0.1 Name of township: _____

0.2 Name of ward: _____

0.3 Address: _____

0.4 Name of respondent: _____

0.5 Title/name of company/office: _____

0.6 Type of company/office: _____

0.7 Products of company: _____

0.8 The number of employee/staff: _____

0.9 For what purpose do you use water?

No.	Water use	Specification
1	Use as production input (Specify)	

1 Water Supply

1.1 Are you YCDC water supply customer? [1] Yes [2] No

Q.1.2 to 1.5 are for YCDC water customer

1.2 **If yes,** what is customer type? [1] Commercial [2] Departmental [3] Others

1.3

a. Do you have a water meter? [1] Yes [2] No

b. Do you accept to install a water meter and pay for water according to the quantity you consumed?

[1] Yes [2] No

If no, why? _____

1.4 Do you pay for YCDC water bill? [1] Yes [2] No

If yes,

a. What tariff rate is applied to?

1. Flat rate [ ] Kyats/month 2. Metered rate [ ] Kyats/1000 m^3

b. Please give monthly water consumption and the monthly water bills paid?

Bill	Month 2001	Metered quantity (m^3)	Kyats/month
Last month			
One month before			
Two months before			

1.5 **(For the customer who has a water meter but didn't have it before)**

Please indicate the difference of water use and water bill between before and after installing water meter.

a. Water use

1	Use water more carefully than before	
2	Use water less carefully than before	
3	Same as before	

b. Water bill

1	Water bill is increased	
2	Water bill is decreased	
3	Same as before	

1.6 Do you need to store water? [1] Yes [2] No

If yes,

a. What type of storage facility do you have? (Multiple answer)

Location	Underground tank	Tank on ground	Overhead tank	Drum	Others (Specify)
Number of tanks					

b. What is the total volume?

[ ] m^3 or [ ] Gallons

1.7 Do you need an electric/fuel pump to take water from piped water distribution system?

[1] Yes [2] No

If yes,

a. How much is the power of motor? _____ hp

b. How many hours per day do you use the pump, on average? _____ hours

1.8 Do you need an electric/fuel pump to take water from tube well?

[1] Yes [2] No

If yes,

a. How much is the power of motor? _____ hp

b. How many hours per day do you use the pump, on average? _____ hours

1.9 **(For YCDC flat rate customer and NONE -YCDC water supply user)**

How much water per day do you use? Please make careful estimate from tank capacity, pump working time etc.

[ ] m^3 or [ ] Gallons

1.10 Type of water supply source you use and its costs (Multiple answers)

No.	Water source	Source	Monthly costs (Kyats/month)
1	Taps connected to YCDC piped water supply system		
2	Taps connected to None YCDC piped water supply system		
3	YCDC Public tap (Stand post)		
4	Communal tap (Stand post)		
5	Communal owned tube well /well depth _____m or _____ ft		
6	Private owned tube well /well depth _____m or _____ ft		
7	<Electricity cost for pump working>		
8	Dug well		
9	Bottled water		
10	YCDC water tanker		
11	Private water tanker		
12	Pond water		
13	Rain water		
14	Neighbor's tap or neighbor's well		
15	Other (Specify) _____		
16	Total	----------	

1.11 What is the main water supply source? Choose one from the choices in Q1.10.

[ ] .

1.12 Please indicate adequacy of main water supply source? (Choose one)

Category	Sufficient all year	Insufficient during dry season	Sometimes insufficient	Insufficient mostly
Check				

1.13 Are you satisfied with the quantity of the main water supply source?

[1] Yes [2] No

If no, why? _____

1.14 Are you satisfied with the quality of the main water source?

[1] Yes [2] No

If no, why? _____

1.15 Are you satisfied with the water pressure of YCDC water supply?

[1] Yes [2] No

If no, why? _____

1.16 What is your opinion on the current total water costs paid?

Degree	Very expensive	Expensive	Above right amount	Right amount	Cheap	Very cheap	Other (Specify)
Check							

Q 1.18 ~ Q 1.22: For YCDC water supply consumer

1.17 What is your opinion on the current water tariff of YCDC?

Degree	Very expensive	Expensive	Above right amount	Right amount	Cheap	Very cheap	Other (Specify)
Check							

1.18 Are you willing to pay more money for the current YCDC water supply service?

[1] Yes [2] No

1.19 If the current YCDC water supply service is improved, would you be willing to pay more for water supply? [1] Yes [2] No

If no, why. _____

If yes, how much is the maximum monthly amount of money you could be willing to pay for the following **improved water supply service**? Choose necessary services and write down the amount of money for each service. Answer all applicable.

No	Improved water supply service level	Necessity	Max. amount (Kyats/month)
1	Increase pressure		
2	Continuous 24 hours' clean water supply but not drinkable		
3	Continuous 24 hours' drinkable water supply		

Q 1.20 For None-YCDC consumer

1.20 If a YCDC connection will be made available for you and you can get necessary amount of water, would you be willing to connect?

[1] Yes [2] No

If no, why. _____

If yes, how much is the maximum monthly amount of money you would be willing to pay for the service? _____ Kyats

2 Waste Water Disposal

2.1 Where do you dispose of human and other wastewater? Check one for each.

No.	Method of disposal	Human wastewater (Excrete/Urine)	Other wastewater
1	YCDC Public sewer		
2	Septic tank		
3	Sewing water on the ground or other		
4	Discharging into open drain or river		
5	Courtyard		
6	Other (Specify)		

2.2 For YCDC SEWERAGE system users only

Are you willing to pay monthly bill for the sewerage disposal service?

[1] Yes [2] No

If yes, how much is the maximum monthly amount of money you could pay for the cost of the service? [ ] Kyats/month

If no, why _____

2.3 For NON-YCDC SEWERAGE system users only

If sewerage system will be connected to your house, are you willing to connect?

[1] Yes [2] No

If yes, how much is the maximum monthly amount of money your family could pay for the cost of the service?

[ ] Kyats/month

If no, why, _____

ANNEX 3

SURVEY RESULT OF DOMESTIC SURVEY

Annex 3 Preliminary Results of Domestic Water Consumer Survey

No	Items	Analyzed results			Unit	Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
1	**Total number of household interviewed**	619	-	-	households	-	-	-	
	Ineffective data set	56							
2	**Total number of household analyzed**	563	364	199	households				
3	***Type of dwelling***					563	364	199	
	Independent house owned	373	206	167	households				
	Independent house rent	17	6	11	households				
	Apartment owned	156	140	16	households				
	Apartment rent	14	11	3	households				
	No reaponse	3	1	2	households				
4	**Building structure**					563	364	199	
	Concrete	274	200	74	households				
	Wooden	261	158	103	households				
	Bamboo	24	4	20	households				
	Others	2	1	1	households				
	No response	2	1	1	households				
5	**Average number of rooms**	4.54	4.59	4.45	rooms/household	563	364	199	
6	**Average household size**	5.62	5.41	6.01	person/household	563	364	199	5.12 (1997 Household Income and Expenditure Survey)
7	**Educational background of the most educated**					562	363	199	
	No education	1	1	0	households				
	Primary school	4	2	2	households				
	Middle school	43	16	27	households				
	High school	211	133	78	households				
	Technical, agricultural and vocational school	5	2	3	households				
	University	298	209	89	households				
8	**Average number of income earner**	1.85	1.79	1.97	person	559	362	197	
9	**Average monthly income**	37,921	36,867	38,692	kys/month	558	359	199	
10	**Average monthly expenditure**	31,911	31,392	32,862	kys/month	563	364	199	16053 kyats (1997 Household Income and Expenditure Survey), The consumer price index on February in 2001 is 151 based on the year 1997.
	Utilities	3,098	2,813	3,620	kys/month	563	364	199	The adjusted household expenditure of 2001based on the 1997 price is 21763 Kyats.
	Water costs except electricity cost for pump to take water	340	246	512	kys/month	563	364	199	The average expenditure of the households interviewed is 136 % of the 1997 survey result.
	Waste water disposal	96	89	106	kys/month	106	62	44	
	Solid waste disposal	74	80	61	kys/month	463	339	124	
	Telephone	1,411	1,271	1,858	kys/month	184	140	44	
	Gas	1,180	1,075	1,413	kys/month	74	51	23	
	Electricity	1,270	1,255	1,301	kys/month	524	359	165	
	Fuel	1,446	1,222	1,691	kys/month	343	179	164	
	Others	28,813	28,578	29,242	kys/month	563	364	199	
	Food and beverage	19,221	19,154	19,343	kys/month	563	364	199	
	Others	9,592	9,424	9,899	kys/month	563	364	199	

2002/6/18

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
11	**Water source**					563	364	199	
	YCDC piped water	362	362	-	households				
	In house tap	161	161	-	households				
	Yard tap	86	86	-	households				
	In house and yard tap	92	92	-	households				
	No response	23	23	-	households				
	Private piped water, Common TW, Water vender, Neighbors well	46	3	43	households				
	YCDC Public tap and Common tap	4	2	2	households				
	Private TW	139	14	125	households				
	Electric pump	100	11	89	households				
	Hand pump	39	3	36	households				
	Well (uncovered/covered)	17	2	15	households				
	Bottled water	47	21	26	households				
	YCDC tanker	1	1	0	households				
	Pond water	11	2	9	households				
	Rain water	55	24	31	households				
	Total	1183	807	376	sources				
12	**Average number of water sources per household**	2.1	2.2	1.9	sources/household				
13	**Main water source**					563	364	199	
	YCDC piped water	358	358	-	households				
	Private piped water, Common TW, Water vender, and Neighbors well	44	2	42	households				
	YCDC Public tap and Common tap	4	2	2	households				
	Private tube well (TW)	127	2	125	households				
	Well (uncovered/covered)	13	0	13	households				
	Bottled water	0	0	0	households				
	YCDC tanker	0	0	0	households				
	Pond water	0	0	0	households				
	Rain water	7	0	7	households				
	No response	10	0	10	households				

No	Items	Analyzed results: All (YCDC and Non-YCDC) household	Analyzed results: YCDC water supply household	Analyzed results: Non-YCDC water supply household	Unit	Household analyzed (No. of households): All (YCDC and Non-YCDC) household	Household analyzed (No. of households): YCDC water supply household	Household analyzed (No. of households): Non-YCDC water supply household	Remarks
14	**Fetching water**								
	Fetching in the dry season	59	16	43	households	563	364	199	
	Fetching in the rainy season	55	13	42	households	562	364	198	
	Fetching hours					57	15	42	
	< 5 minutes	47	14	33	households				
	5 minutes < > 10 minutes	7	1	6	households				
	10 minutes < > 20 minutes	3	0	3	households				
	Fetching person					64	23	41	
	Adult men	38	11	27	households				
	Adult women	24	12	12	households				
	Children	2	0	2	households				
15	**Water storage facility**					563	364	199	
	Household without water storage facility	13	3	10	households				
	Household with water storage facility	550	361	189	households				
	Underground tank	11	6	5	households				
	On-ground tank	248	190	58	households				
	Overhead tank	178	143	35	households				
	Drum	261	154	107	households				
	Total storage capacity per household	358	396	287	gallons/household				
	Average times per month for storage facility cleaning	2.3	1.8	3.3	times/month				
16	**How to take water**								
	From YCDC water supply system (piped water supply household)	358	358	0	households				
	Electric pump	216	216	0	households				
	Average power of compressor	0.81	0.81	-	HP				
	Average pump working hours	*0.60*	*0.60*	-	*hours*				
	Hand pump	2	2	0	households				
	Without pump	142	142	0	households				
	From tube well (tube well household)	137	13	124	households				
	Electric pump	100	11	89	households				
	Average power of compressor	1.41	1.23	1.43	HP				
	Average pump working hours	0.76	0.81	0.75	hours				
	Hand pump	37	2	35	households				

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
17	**Water usage**					563	364	199	
	Drinking, Cooking/dish washing, Bathing, Cloth washing	563	364	199	households				
	Cleaning house	556	359	197	households				
	Toilet flush	558	361	197	households				
	Car washing	81	49	32	households				
	Watering garden	49	30	19	households				
	Watering crops	11	5	6	households				
	Livestock watering	2	0	2	households				
18	**Adequacy of water supply**					458	360	98	
	Sufficient all year	246	165	81	households				
	Insufficient during dry season	97	89	8	households				
	Sometimes insufficient	110	101	9	households				
	Insufficient mostly	5	5	0	households				
19	**Quantity of water used**					532	363	169	
	Over use	0	0	0	households				
	Above average	14	13	1	households				
	Right quantity	506	345	161	households				
	Below desired quantity	12	5	7	households				
	Too little	0	0	0	households				
20	**Necessity of quantity of water**								
	Household answered	48	46	2	households				
	Average times of water quantity more than the current quantity	2.0	2.0	2.3	times				
21	**Water quality**								
	Taste					563	364	199	
	Nil	507	341	166	households				
	Some	52	23	29	households				
	Taste	4	0	4	households				
	Smell					563	364	199	
	Nil	500	340	160	households				
	Some	58	24	34	households				
	Smell	5	0	5	households				
	Color					563	364	199	
	Nil	487	321	166	households				
	Some	71	40	31	households				
	Color	5	3	2	households				

No	Items	Analyzed results: All (YCDC and Non-YCDC) household	Analyzed results: YCDC water supply household	Analyzed results: Non-YCDC water supply household	Analyzed results: Unit	Household analyzed (No. of households): All (YCDC and Non-YCDC) household	Household analyzed (No. of households): YCDC water supply household	Household analyzed (No. of households): Non-YCDC water supply household	Remarks
22	**Water treatment for drinking**					517	336	181	
	Boiled	80	71	9	households				
	Filtered	218	120	98	households				
	Boiled and Filtered	187	131	56	households				
	Bottled water purchased	32	14	18	households				
	No treatment	0	0	0	households				
23	**Satisfaction of water quality of main water source**					519	330	189	
	Yes	491	325	166	households				
	No	28	5	23	households				
24	**Water availability (Piped water supply**								
	Rainy season						320		
	Every days/week	-	300	-	households				
	6 days/week	-	3	-	households				
	5 days/week	-	6	-	households				
	4 days/week	-	3	-	households				
	3 days/week	-	0	-	households				
	2 days/week	-	1	-	households				
	1 days/week	-	5	-	households				
	Never	-	1	-	households				
	Dry season						321		
	Every days/week	-	213	-	households				
	6 days/week	-	19	-	households				
	5 days/week	-	35	-	households				
	4 days/week	-	8	-	households				
	3 days/week	-	8	-	*households*				
	2 days/week	-	15	-	households				
	1 days/week	-	11	-	households				
	Never	-	4	-	households				

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
25	**YCDC water supply hours**								
	With pump use						303		
	Average hours of water supply	-	17.2	-	hours				
	0 hour	-	1	-	households				
	1 - 6 hours	-	31	-	households				
	7 - 12 hours	-	81	-	households				
	13 - 18 hours	-	30	-	households				
	19 - 23 hours	-	5	-	households				
	24 hours	-	155	-	households				
	Without pump use (directly from the pipeline)						249		
	Average hours of water supply	-	13.7	-	hours				
	0 hour	-	5	-	households				
	1 - 6 hours	-	64	-	households				
	7 - 12 hours	-	65	-	households				
	13 - 18 hours	-	22	-	households				
	19 - 23 hours	-	2	-	households				
	24 hours	-	91	-	households				
26	**Water supply pressure**								
	With pump						342		
	High (Good pressure)	-	8	-	households				
	Generally high	-	88	-	households				
	Sometimes low	-	190	-	households				
	Every time low	-	41	-	households				
	Every time very low	-	11	-	households				
	Every time no water	-	3	-	households				
	Without pump						340		
	High (Good pressure)	-	7	-	households				
	Generally high	-	83	-	households				
	Sometimes low	-	154	-	households				
	Every time low	-	52	-	households				
	Every time very low	-	11	-	households				
	Every time no water	-	32	-	households				
27	**Water meter**					362	362	0	
	Yes	*189*	*189*		*0 households*				
	No	173	173		0 households				
28	**YCDC meter system (meter reading records)**					166	166	0	
	Last 3 months' average water consumption per household	36	36	-	m3/month/household				33.8 m^3/month/bill (Average per monthly per bill consumption during April, May and June in 2000 for all YCDC water supply customers estimated from YCDC
	Average per capita consumption	213	222	-	liter/person				201 liter/person (Average per capita water consumption during April, May and June in 2000 for all YCDC water supply customers estimated from YCDC meter reading
29	**Willingness to install a water meter**					170	169	1	
	Yes	147	146		1 households				
	No	23	23		0 households				

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
30	**Estimation of water consumption**					547	354	193	
	Average daily household water consumption estimated by the interviewee and interviewer	228	261	167	gallon/household				
	Average per capita consumption	184	220	126	liter/person/day				
31	**Suggestion for water supply service**								
	Provide a house connection	196	42	154	households				
	Increase water pressure	169	157	12	households				
	Provide clean water	121	95	26	households				
	Provide drinkable water	186	141	45	households				
	Provide 24 hour's water	415	272	143	households				

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
32	**Wastage and leakage awareness**								
	Why is water important?					536	378	158	
	Water is important resources and should not be wasted unnecessarily	508	354	154	households				
	Water is expansive and I cannot afford to pay for	9	8	1	households				
	It takes a lot of effort to get	3	0	3	households				
	Wastage is expensive due to fines and penalties imposed by the authorities	16	16	0	households				
	How do you use a water tap?					529	384	145	
	Turn off all taps after use	466	348	118	households				
	Leave at least one tap open, in order to know when water is available, because flow & pressure are very low	8	5	3	households				
	Leave at least one tap open, in order to know when water is available, because water supply is intermittent	6	6	0	households				
	Turn off any pump immediately when the storage tank is full and starts to overflow	49	25	24	households				
	Water is left running	0	0	0	households				
33	**Type of water bill**					563	364	199	
	YCDC Flat rate	177	177	-	households				
	120 Kyats/month	168	168	-	households				
	202 Kyats/month	9	9	-	households				
	YCDC Metered rate (6.6 Kyats/1000m^3)	185	185	-	households				
	Non-YCDC water bill payers (common tube well, private water vender, etc)	28	0	28	households				
34	**Average monthly water bill**								
	YCDC Flat rate bill	120	120	-	kyats/month/househo	168	168	0	
	YCDC Flat rate bile (Large compound)	202	202	-	kyats/month/househo	9	9	0	
	YCDC Metered rate bill	234	234	-	kyats/month/househo	185	185	0	
	Non-YCDC water bill	1,310	2	1,404	kyats/month/househo	28	0	28	

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
35	**Average monthly water costs**								
	YCDC water bill	181	181	-	kyats/month/househo	361	361	0	
	Private piped water	841	-	841	kyats/month/househo	6	0	6	
	YCDC Public tap	2	2	0	kyats/month/househo	3	2	1	
	Common TW	676	-	676	kyats/month/househo	11	0	11	
	Private water tanker	1,025	-	1,025	kyats/month/househo	2	0	2	
	Neighbor's tap/well	1,462	2,400	1,379	kyats/month/househo	37	3	34	
	Pumping from YCDC piped water	76	74	162	kyats/month/househo	213	208	5	
	Bottled water	951	816	1,052	kyats/month/househo	42	18	24	
	Private tube well maintenance	170	155	172	kyats/month/househo	102	14	88	
36	**Estimated average electricity costs for working pump**								
	For withdrawing water from YCDC water pipeline	76	74	162	kyats/month/househo	213	208	5	
	For withdrawing water from tube well	147	168	145	kyats/month/househo	96	10	86	
37	**Average water costs for all user type**								
	Without electricity costs	340	246	512	kyats/month/househo	563	364	199	
	With estimated electricity costs	394	293	579	kyats/month/househo	563	364	199	
38	**Average percentage of water costs**								
	To household income	1.9	2.0	2.3	%				
	To household total expenditure	1.5	1.2	1.9	%				
	To household utilities expenditure	16.6	21.5	17.7	%				

No	Items	Analyzed results: All (YCDC and Non-YCDC) household	Analyzed results: YCDC water supply household	Analyzed results: Non-YCDC water supply household	Unit	Household analyzed (No. of households): All (YCDC and Non-YCDC) household	Household analyzed (No. of households): YCDC water supply household	Household analyzed (No. of households): Non-YCDC water supply household	Remarks
39	**Opinion on current water costs**					528	360	168	
	Very expensive	4	2	2	households				
	Expensive	33	1	32	households				
	Above right amount	13	4	9	households				
	Right amount	346	279	67	households				
	Cheap	107	72	35	households				
	Very cheap	25	2	23	households				
40	**Opinion on current YCDC water bill**					361	360	0	
	Very expensive	1	1	-	households				
	Expensive	1	1	-	households				
	Above right amount	1	1	-	households				
	Right amount	293	292	-	households				
	Cheap	64	64	-	households				
	Very cheap	1	1	-	households				
41	**Willingness to pay more for current water YCDC water supply services**					364	364	0	
	Yes	89	89	-	households				
	No	275	275	-	households				
	Average willingness to pay for the current YCDC water supply service (89 households' average)	220	220	-	kyats/month/househo	86	86	0	
42	**Willingness to pay for improved YCDC water supply service (current YCDC customers)**					362	362	0	
	Yes	302	302	-	households				
	No	60	60	-	households				
	Flat rate (120 kyats/month) bill household		4	-	households		168		
	Metered bill household		54	-	households		185		
	Average amount of metered bill		274	-	kyats/month/househo		54		
	Average willingness to pay (302 households' average)								
	24 hours' water supply	222	222	-	kyats/month/househo	72	72		
	24 hours' clean water	321	321	-	kyats/month/househo	241	241		
	24 hours' drinkable	383	383	-	kyats/month/househo	175	175		
43	**Willingness to connect YCDC water supply system (Non-YCDC customers)**					200	2	198	
	Yes	170	2	168	households				
	No	29	0	29	households				
	Average water cost (29 households)	-	-	237	kyats/month/household				
	Average willingness to pay for connection of YCDC water supply service								
	Clean and necessary amount of water supply	553	150	559	kyats/month/househo	123	2	121	
	Drinkable and necessary amount of water supply	791	300	797	kyats/month/househo	169	2	167	

No	Items	Analyzed results				Household analyzed (No. of households)			Remarks
		All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	Unit	All (YCDC and Non-YCDC) household	YCDC water supply household	Non-YCDC water supply household	
44	**Wastewater disposal**								
	Grey water disposal					555	361	194	
	YCDC sewer	16	16	0	households				
	Septic tank	11	7	4	households				
	Sewing water on the ground	21	13	8	households				
	Discharging into open drain or river	496	321	175	households				
	Courtyard	10	3	7	households				
	Others	1	1	0	households				
	Human wastewater disposal (Excrete/urine)					555	360	195	
	YCDC sewer	26	26	-	households				
	Septic tank	513	329	184	households				
	Sewing water on the ground	2	0	2	households				
	Discharging into open drain or river	4	0	4	households				
	Courtyard	9	4	5	households				
	Others	1	1	0	households				
45	**Willingness to pay for YCDC sewerage service (Current YCDC sewerage customers)**					26	26	0	
	Yes	26	26	-	households				
	No	0	0	-	households				
	Average willingness to pay for the current YCDC sewerage service	161	161	-	kyats/month/househo	23	23	0	
46	**Willingness to connect YCDC sewerage service (Non-YCDC sewerage customers)**					536	338	198	
	Yes	471	289	182	households				
	No	64	49	15	households				
	Average willingness to pay for YCDC sewerage	134	119	157	kyats/month/househo	462	281	181	
47	**Relation between the quality of water and the illness**					553	356	197	
	Yes	5	2	3	households				
	No	548	354	194	households				

ANNEX 4

SURVEY RESULT OF NON-DOMESTIC SURVEY

Annex 4 Preliminary Results of Non-domestic Water Consumer Survey

No	Items	Analyzed results				Remarks
		Industry	Commercial	Departmental	Units	
1	**Number of samples interviewed**	40	45	18	samples	
2	**Number of employees/staff/students**					
	Average	130	25	783	persons	
	Maximum	1,500	137	3,000	persons	
	Minimum	3	3	10	persons	
3	**Water supply source**					
	YCDC water	9	35	18	samples	
	Communal owned tube well	0	1	0	samples	
	Private owned tube well	32	8	0	samples	
	Dug well	19	32	1	samples	
	Bottled water	8	18	0	samples	
	Private water tanker	0	1	0	samples	
	Rain water	0	1	0	samples	
	Others	0	1	0	samples	
	Average number of water sources	1.7	2.1	1.1	*sources/sample*	
4	**Main water source**					
	YCDC water	5	35	18	samples	
	Communal owned tube well	0	1	0	samples	
	Private owned tube well	35	8	0	samples	
	Others	0	1	0	samples	
5	**Adequacy of water supply**					
	Sufficient all year	35	44	18	samples	
	Insufficient during dry season	2	1	0	samples	YCDC water customers in North Okkalappa
	Sometimes insufficient	3	0	0	samples	YCDC water customers in North Okkalappa
	Insufficient mostly	0	0	0	samples	
6	**Satisfaction of quality of main water source**					
	Yes	35	43	18	samples	
	No	5	2	0	samples	Dagon Myothit (South)/Industry, Hlaingthaya-Commercial
7	**Satisfaction of quantity of main water source**					
	Yes	33	43	18	samples	
	No	7	2	0	samples	Dagon Myothis (South) and Mingaladon-Industry, Hlaingthaya-Commercial
8	**Satisfaction of water pressure**					
	Yes	35	43	18	samples	
	No	5	2	0	samples	Dagon Myothis (South)
9	**YCDC water supply customer**					
	Metered customer	9	24	0	samples	
	Water tariff rate (29.7 kyats/m^3)	9	23	18	samples	
	Water tariff rate (0.88 us$/$m^3$)	-	1	-		
	Flat rate customer	0	11	14	samples	
	Acceptance of meter installation for flat rate customers					
	Yes	0	9	9	samples	
	No	0	0	0	samples	
	Free (pagoda and monestry)	-	-	4		Shwedagon Pagoda, Sule Pagoda, 2 monestories

No	Items	Analyzed results				Remarks
		Industry	Commercial	Departmental	Units	
10	**Average monthly water consumption**					
	Average for all customers	598	296	-	m^3/month/sample	
	YCDC customers					
	Total consumption (YCDC water and other water sources)	130	338	828	m^3/month/sample	Department consumption is estimated without Shedagon Pagoda (240,000 m^3/month).
	Metered consumption	64	384	-	m^3/month/sample	
	Non-YCDC customers	738	147	-	m^3/month/sample	
11	**Water storage facility**					
	With storage facility	40	43	15	samples	
	Underground tank	10	5	6	samples	
	On-ground tank	15	15	6	samples	
	Overhead tank	13	19	0	samples	
	Drum	2	1	2	samples	
	Average storage capacity per sample	5,262	3,290	11,900	gallons/sample	*Department storage capacity is estimated without Shedagon* Pagoda.
12	**Water pump use**					
	To take water from YCDC pipeline	8	34	7	samples	
	Average power of compressor	1.06	1.52	2.50	HP	
	Average daily pump working hours	1.53	5.43	2.92	hours	
	To take water from private owned tube well	37	2	1	samples	
	Average power of compressor	5.32	1.25	-	HP	
	Average daily pump working hours	3.89	1.63	-	hours	
13	**Average water costs per samples**					
	YCDC water	1,895	8,131	2,218	kyats/month/sample	
	Communal owned tube well	-	500	-	kyats/month/sample	
	Private owned tube well	-	-	-	kyats/month/sample	
	Dug well	-	-	-	kyats/month/sample	
	Bottled water	7,713	3,576	-	kyats/month/sample	
	Private water tanker	-	30,000	-	kyats/month/sample	
	Rain water	-	-	-	kyats/month/sample	
	Others	-	360	-	kyats/month/sample	
	Total	2,072	9,438	5,004	kyats/month/sample	
	Electricity costs					
	Pumping costs for taking water from YCDC pipeline	962	4,246	-	kyats/month	
	Pumping costs for taking water from tube well	3,360	1,574	-	kyats/month	
	Total water costs					
	All samples	11,073	11,429	-	kyats/month	
	YCDC customers	7,591	12,831	-	kyats/month	
	Non-YCDC customers	12,154	5,378	-	kyats/month	
14	**Average water costs per cubic meter**					
	All samples	36.1	55.7	-	kyats/m^3	
	YCDC customers	68.6	61.4	-	kyats/m^3	
	Unmeter customers	-	92.7	-	kyats/m^3	
	Non-YCDC customer	25.7	30.2	-	kyats/m^3	

No	Items	Analyzed results				Remarks
		Industry	Commercial	Departmental	Units	
15	**Opinion of water costs**					
	Very expensive	0	0	0	samples	
	Expensive	0	0	0	samples	
	Above right amount	5	2	0	samples	
	Right amount	6	24	5	samples	
	Cheap	27	18	9	samples	
	Very cheap	0	0	0		
16	**Opinion of YCDC water rate**					
	Very expensive	0	0	0	samples	
	Expensive	0	0	0	samples	
	Above right amount	0	0	0	samples	
	Right amount	3	25	4	samples	
	Cheap	5	11	10	samples	
	Very cheap	1	0	0		
17	**Willing to pay more for current YCDC water supply service**					
	Yes	0	0	2	samples	
	No	9	35	13	samples	
18	**Necessity of improved YCDC water supply service**					
	Yes	9	35	13	samples	
	No	0	0	2	samples	
	24 hours' clean water	0	0	0	samples	
	24 hours' drinkable water	9	34	13	samples	
	Willingness to pay for 24 hours' clean water supply	-	-	-		
	Willingness to pay for 24 hours' drinkable water supply (WTP(D))	4,778	9,219	2,169	kyats/month	
	WTP(D)/current water costs	0.88	0.85	1.61		
19	**Necessity of YCDC water connection**					
	Yes	27	10	-		
	No	4	0	-		
	Willingness to pay for YCDC water supply service with necessary water quantity	7,750	3,870	-	kyats/month	
	WTP/current water costs	1.19	0.97	-	kyats/month	
20	**Wastewater disposal**					
	Human wastewater disposal (Excrete/urine)					
	YCDC sewer	0	3	5	samples	
	Septic tank	35	41	13	samples	
	Sewing water on the ground	0	0	0	samples	
	Discharging into open drain or river	5	0	0	samples	
	Courtyard	0	0	0	samples	
	Others	0	0	0	samples	
	Other wastewater disposal					
	YCDC sewer	0	3	2	samples	
	Septic tank	5	0	1	samples	
	Sewing water on the ground	0	1	0	samples	
	Discharging into open drain or river	35	40	14	samples	
	Courtyard	0	0	0	samples	
	Others	0	0	0	samples	

No	Items	Analyzed results				Remarks
		Industry	Commercial	Departmental	Units	
21	**Willingness to pay for YCDC sewerage service (Current YCDC sewerage customers)**					
	Yes	0	26	3	samples	
	No	0	0	0	samples	
	Average willingness to pay for the current YCDC sewerage service	#DIV/0!	888	350	kyats/month	
22	**Willingness to connect YCDC sewerage service (Non-YCDC sewerage customers)**					
	Yes	36	19	11	samples	
	No	3	0	1	samples	
	Average willingness to pay for YCDC sewerage connection	741	1,989	-	kyats/month	