

## **IV. Appendix**

**Table 21 Socio-Economic Projection****I. Population**

Year	Male' (incl. Villingili)		Villingili Island		Male' Island	
	Population	Growth*	Population	Growth*	Population	Growth*
1998	69,080	-	1,844	-	67,236	-
1999	71,417	3.383%	2,106	14.234%	69,311	3.086%
2000	73,833	3.383%	2,406	14.234%	71,427	3.053%
2001	76,049	3.002%	2,749	14.234%	73,300	2.622%
2002	78,332	3.002%	3,140	14.234%	75,192	2.581%
2003	80,684	3.002%	3,587	14.234%	77,097	2.534%
2004	83,106	3.002%	4,098	14.234%	79,008	2.479%
2005	85,601	3.002%	4,681	14.234%	80,920	2.420%
2006	87,936	2.727%	5,347	14.234%	82,589	2.063%
2007	90,334	2.727%	6,109	14.234%	84,225	1.981%
2008	92,797	2.727%	6,978	14.234%	85,819	1.893%
2009	95,328	2.727%	7,971	14.234%	87,357	1.792%
2010	97,928	2.727%	9,106	14.234%	88,822	1.694%

Method of calculation:

Male' (incl. Villingili island):

1995 to 2000:  $62,519 * \text{EXP}(0.033267 * n)$ 2000 to 2005:  $73,833 * \text{EXP}(0.029578 * n)$ 2005 to 2010:  $85,601 * \text{EXP}(0.026907 * n)$ 

Villingili island:

1998 to 2010:  $1,844 * \text{EXP}(0.133083 * n)$ 

Year	Atolls	
	Population	Growth*
1998	201,427	-
1999	208,240	3.383%
2000	215,284	3.383%
2001	221,747	3.002%
2002	228,404	3.002%
2003	235,261	3.002%
2004	242,323	3.002%
2005	249,598	3.002%
2006	256,405	2.727%
2007	263,398	2.727%
2008	270,582	2.727%
2009	277,962	2.727%
2010	285,543	2.727%

Method of calculation:

1995 to 2000:  $182,295 * \text{EXP}(0.033267 * n)$ 2000 to 2005:  $215,284 * \text{EXP}(0.029578 * n)$ 2005 to 2010:  $249,598 * \text{EXP}(0.026907 * n)$

Note: \*=Growth rate compared with previous year

Sources: Ministry of Planning, Human Resources and Environment; Maldives;  
Housing and Urban Development Board; JICA Study Team

## 2. Economy of Maldives (GDP and Per Capita GDP)

Year	GDP at 1985 Prices (Rf. million)	Growth*	Population	Growth*	Per Capita GDP at 1985 Prices (Rf.)	Growth*
1998	1,629.8	-	270,507	-	6,025	-
1999	1,727.6	6.0%	279,657	3.383%	6,178	2.5%
2000	1,834.7	6.2%	289,117	3.383%	6,346	2.7%
2001	1,954.0	6.5%	297,796	3.002%	6,562	3.4%
2002	2,081.0	6.5%	306,736	3.002%	6,784	3.4%
2003	2,214.1	6.4%	315,945	3.002%	7,008	3.3%
2004	2,351.4	6.2%	325,429	3.002%	7,226	3.1%
2005	2,492.5	6.0%	335,199	3.002%	7,436	2.9%
2006	2,639.6	5.9%	344,341	2.727%	7,666	3.1%
2007	2,792.7	5.8%	353,732	2.727%	7,895	3.0%
2008	2,951.8	5.7%	363,379	2.727%	8,123	2.9%
2009	3,117.1	5.6%	373,290	2.727%	8,350	2.8%
2010	3,288.6	5.5%	383,471	2.727%	8,576	2.7%

Note: \*=Growth rate compared with previous year

Sources: Ministry of Planning, Human Resources and Environment;  
JICA Study Team

## 3. Tourists

Year	Low Projection		High Projection		Medium Projection	
	Number	Growth*	Number	Growth*	Number	Growth*
1998	378,651	-	414,534	-	396,593	-
1999	399,910	5.61%	452,671	9.2%	426,291	7.49%
2000	421,169	5.32%	493,411	9.0%	457,290	7.27%
2001	442,428	5.05%	536,832	8.8%	489,630	7.07%
2002	463,687	4.81%	582,999	8.6%	523,343	6.89%
2003	484,946	4.58%	631,971	8.4%	558,459	6.71%
2004	506,205	4.38%	683,792	8.2%	594,999	6.54%
2005	527,464	4.20%	738,496	8.0%	632,980	6.38%
2006	548,723	4.03%	796,099	7.8%	672,411	6.23%
2007	569,982	3.87%	856,602	7.6%	713,292	6.08%
2008	591,241	3.73%	919,991	7.4%	755,616	5.93%
2009	612,500	3.60%	986,230	7.2%	799,365	5.79%
2010	633,759	3.47%	1,055,267	7.0%	844,513	5.65%

Note: \*=Growth rate compared with previous year

Sources: Statistical Yearbook of Maldives 1997; Tourism Master Plan 1996-2005;  
JICA Study Team

## (1) Low Projection

$$Y = 102,284 + 21,259 \times T$$

Where Y: Number of tourists  
T: Year (1998 = 13)

Period of data: 1986 to 1995 (10 years)

T-value = 16.8243 ; R = 0.9862

## (2) High Projection

Average annual growth rate: 1995-2000: 10%-9%  
2000-2005: 9%-8%  
2005-2010: 8%-7%

Period of data: 1986 to 1995 (10 years)

## (3) Medium Projection

((Low Projection) + (High Projection)) / 2

**Medium Projection was adopted.**

**GDP and Population in the Past**

Year	GDP at 1985 Prices		Population of Maldives		Population of Male <sup>7</sup>	
	GDP (Rf. million)	Growth*	Population	Growth*	Population	Growth*
1993	1,190.2	6.2%	231,646	2.803%	59,451	2.547%
1994	1,268.6	6.6%	238,140	2.803%	60,966	2.547%
1995	1,359.4	7.2%	244,814	2.803%	62,519	2.547%
1996	1,447.7	6.5%	253,095	3.383%	64,634	3.383%
1997	1,537.5	6.2%	261,656	3.383%	66,820	3.383%
1998	1,629.8	6.0%	270,507	3.383%	69,080	3.383%

Note: \* = Growth rate compared with previous year

Sources: Annual Report 1996, Maldives Monetary Authority; Fifth National Development Plan; Ministry of Planning, Human Resources and Environment; JICA Study Team

Table 22(1) Imports of Maldives, 1995

Code	Description	Unit	Quantity	CIF (Rf.)
1	Live animals	No.	4,227	126,644
2	Meat and edible meat offal	kg	2,296,729	62,131,439
3	Fish & crustaceans, molluscs & other aquatic invertebrates	kg	111,745	11,045,759
4	Dairy produce, birds' eggs, natural honey, edible products of animal origin not elsewhere specified or included	kg	2,362,302	105,832,457
5	Products of animal origin not elsewhere specified or included	kg	1,749	27,138
6	Live trees & other plants, bulb, root and the like, cut flowers and ornamental foliage	kg	13,609	2,380,546
7	Edible vegetables and certain roots and tubers	kg	8,639,512	70,766,407
8	Edible fruit and nuts, peel of citrus fruit or melon	kg	4,349,716	52,973,831
9	Coffee, tea, mate and spices	kg	862,785	22,678,038
10	Cereals	kg	11,622,733	45,223,902
11	Products of the milling industry, malt, starches, insulin, wheat gluten	kg	12,576,429	39,312,489
12	Oil seeds, oleaginous fruit, miscellaneous grains, seeds & fruit, industrial or medicinal plants, straw & fodder	kg	36,165	967,468
13	Lac, gums, resins & other vegetable saps & extracts	kg	5,360	626,188
14	Vegetable plaiting materials, vegetable products not elsewhere specified or included	kg	25,112	328,180
15	Animal or vegetable fats & oils & their cleavage products, prepared edible fats, animal or vegetable waxes	ltr	3,953,298	33,576,477
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	kg	199,888	5,970,135
17	Sugars and sugar confectionery	kg	10,654,175	62,197,024
18	Cocoa and cocoa preparations	kg	337,660	12,976,389
19	Preparations of cereal, flour, starch or milk, pastrycooks' products	kg	813,815	39,286,742
20	Preparations of vegetables, fruit, nuts or other parts of plants	kg	2,538,235	39,586,862
21	Miscellaneous edible preparations	kg	721,416	15,864,240
22	Beverages, spirits and vinegar	ltr	6,510,696	82,809,199
23	Residues & waste from food industries, prepared animal fodder	kg	2,017	63,002
24	Tobacco and manufactured tobacco substitutes	No.	235,240,017	52,544,393
25	Salt, sulphur, earth & stone, plastering materials, lime & cement	kg	178,283,772	117,745,652
26	Ores, slag and ash	kg	72,000	113,762
27	Mineral fuels, mineral oils & products of their distillation, bituminous substances, mineral waxes	kg	200,172,844	358,904,140
28	Inorganic chemicals, organic or inorganic compounds of precious metals, rare-earth metals of radioactive elements or of isotopes	kg	355,155	4,889,837
29	Organic chemicals	kg	73,608	1,673,511
30	Pharmaceutical products	kg	1,797,310	36,749,884
31	Fertilisers	kg	850,955	1,684,552
32	Tanning or dyeing extract, tanning & derivatives, dyes, pigments and other colouring matter, paints & varnishes, putty & other mastics, inks	kg	1,345,482	29,246,450
33	essential oils & resinoids, perfumery, cosmetic or toilet preparations	kg	397,801	37,859,020
34	Soap, organic surface-active agents, washing preparation, lubricating preparations, artificial waxes, prepared waxes polishing or scouring preparations, candle & similar articles, modelling pastes, "dental waxes" & dental preparation with a basis of plaster	kg	2,359,237	22,977,195
35	Albuminoidal substances, modified starches, glues, enzymes	kg	111,191	5,023,880
36	Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations	kg	227,386	1,045,167
37	photographic or cinematographic goods	No.	60,046	4,815,514
38	Miscellaneous chemical products	kg	1,452,587	10,348,747
39	Plastics and articles thereof	kg	4,485,559	64,284,069

Table 22(2) Imports of Maldives, 1995

Code	Description	Unit	Quantity	CIF (Rf.)
40	Rubber and articles thereof	No.	2,735,700	11,069,029
41	Raw hides and skins (other than furskins) and leather	No.	345	36,845
42	Articles of leather, saddlery/harness, travel goods, hand bags and similar containers, articles of animal gut (other than silk-worm gut)	No.	501,884	6,692,876
44	Wood and articles of wood, wood charcoal	kg	28,908,024	103,774,809
45	Cork and articles of cork	No.	281,433	1,646,323
46	Manufactures of straw of esparto or of other plaiting materials, basketware and wickerwork	No.	35,790	1,519,099
48	Paper and paperboard, articles of paper pulp, of paper or of paperboard	kg	3,009,915	50,877,662
49	Printed books, newspapers, pictures & other products of the printing industry, manuscripts, typescripts and plans	No.	8,826,876	22,026,671
50	Silk	No.	15,112	32,913
51	Wool, fine or coarse animal hair, horsehair yarn & woven fabric	No.	130,414	368,409
52	Cotton	m <sup>2</sup>	8,653,161	109,281,289
53	Other vegetable textile fibres, paper yarn & woven fabrics of paper yarn	kg	341,460	505,808
54	Man-made filaments	kg	1,144,667	17,820,541
56	Wadding, felt & nonwovens, special yarns, twine, cordage, ropes & cables and articles thereof	kg	330,872	3,374,359
57	Carpets and other textile floor coverings	m <sup>2</sup>	16,665	1,861,381
58	Special woven fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery	No.	55,665,890	9,714,277
59	Impregnated, coated, covered or laminated textile fabrics, textile articles of a kind suitable for industrial use	m <sup>2</sup>	275,451	2,768,623
61	Articles of apparel & clothing accessories, knitted or crocheted	No.	3,418,999	38,396,263
62	Articles of apparel & clothing accessories, not knitted or crocheted	No.	1,480,902	15,516,184
63	Other made up textile articles, sets, worn clothing & worn textile articles, rags	No.	6,351,251	19,972,495
64	Footwear, gaiters and the like, parts of such articles	pair	1,020,970	15,002,809
65	Headgear and parts thereof	No.	170,077	1,067,320
66	Umbrellas, sun umbrellas, walking sticks, seat-sticks, whips, riding crops and parts thereof	No.	58,716	1,308,461
67	Prepared feathers & down & articles made of feathers or of down, artificial flowers, articles of human hair	No.	58,412	212,192
68	Articles of stone, plaster, cement, asbestos, mica or similar materials	m <sup>2</sup>	2,115,162	26,526,011
69	Ceramic products	m <sup>2</sup>	1,797,161	26,308,381
70	Glass and glassware	No.	2,254,677	11,722,083
71	Natural or cultured pearls, precious or semi precious stones, precious metals, metals clad with precious metal and articles thereof, imitation jewellery coin	g	20,775	3,381,282
72	Iron and steel	kg	13,825,411	89,969,268
73	Articles of iron and steel	kg	3,252,506	52,777,761
74	Copper and articles thereof	kg	821,728	11,302,064
75	Nickel and articles thereof	kg	772	80,142
76	Aluminium and articles thereof	kg	729,007	21,261,416
78	Lead and articles thereof	kg	22,983	209,573
79	Zinc and articles thereof	kg	542,761	780,137
80	Tin and articles thereof	kg	3,543	381,128
81	Other base metals, cermets, and articles thereof	No.	2,003	7,795
82	Tools, implements, cutlery, spoons & forks, of base metal, parts thereof	No.	3,290,569	13,342,674
83	Miscellaneous base metal	kg	566,404	16,415,850
84	Nuclear reactors, boilers, machinery & mechanical appliances, parts thereof	No.	722,823	311,474,822

Table 22(3) Imports of Maldives, 1995

Code	Description	Unit	Quantity	CIF (Rf)
85	Electrical machinery & equipment & parts thereof, sound recorders & reproducers, television image & sound recorders & reproducers, & parts & accessories of such articles	No.	8,503,708	360,929,545
86	Railway or tramway locomotives, rolling-stock & parts thereof, railway or tramway track fixtures & fittings & parts thereof, mechanical (including electro-mechanical) traffic signalling equipment of all kinds	No.	137	2,902,814
87	Vehicles other than railway or tramway rolling-stock, and parts & accessories thereof	No.	691,554	55,560,393
88	Aircraft, spacecraft, and parts thereof	No.	64,824	22,386,743
89	Ships, boats and floating structures	No.	6,629	78,305,241
90	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments & apparatus, parts & accessories thereof	No.	1,483,060	37,823,041
91	Diagnostic scanner parts	No.	141,165	11,671,225
92	Musical instruments, parts and accessories of such articles	No.	7,476	1,722,810
93	Arms and ammunition, parts and accessories thereof	No.	202	1,667
94	Furniture, bedding, mattress, mattress supports, cushions & similar stuffed furnishings, lamps & lighting fittings, not elsewhere specified or included, illuminated signs, illuminated name-plates & the like, prefabricated buildings	No.	867,902	63,794,306
95	Toys, games & sports requisites, parts & accessories thereof	No.	6,259,251	21,807,328
96	Miscellaneous manufactured articles	No.	16,000,983	18,656,784
97	Works of arts, collectors' pieces and antiques	No.	909,839	329,041
	Total	kg	970,516,693	3,153,334,292

Note: 1) The numbers under the "Code" column signify official Chapter Numbers.

2) The unit under a certain Chapter Number is a representative unit in the said Chapter Number.

3) The total quantity in kg, 970,516,693 is estimated from the relation between the quantity in kg and its corresponding amount in CIF.

**Table 23 Simulations on the Extent of Solid Waste Charge to be Borne by Beneficiaries under Different Financial Conditions (Male' and Vicinities Project, Masterplan)**

**1. Overall Conditions:**

1) Lending terms of fund for initial cost: interest rate: 6%, grace period: 3 years, repayment period: 15 years

2) Project evaluation period: 30 years from the start of project implementation

**2. Schematic presentation of income statement over years**

	2000	...	2010	...	2020	...	2029
<b>Expenditures</b>							
Depreciation							
Interest							
O & M cost							
Collection							
Transportation							
Disposal							
<b>Revenues</b>							
Solid waste charge							
Public budget							

**Explanation:**

- a. Depreciation will start in 2003 and continue up to 2054.  
Payment of interest will start in 2002 and last up to 2023.  
The cost for collection and transportation of solid waste will be incurred every year, starting in 2003 up to 2054.  
The cost for disposal of solid waste will be incurred, starting in 2001 up to 2010. From 2011 on, disposal of solid waste will go on elsewhere up to 2054.
- b. To meet the above-mentioned costs, solid waste charge will be collected from beneficiaries and government budget will be allocated from 2003 up to 2054.
- c. For the sake of financial analysis, it was assumed that the project life be 30 years, beginning in 2000 and ending in 2029.



### 3. Summary of Simulation Results

#### Solid Waste Charge/Month/House and Its Ratio to Income (1998 Level in Male')

Item	Alternative A	Alternative B	Alternative C	Alternative D
Conditions				
Initial Cost	Loaned	Loaned	Not Specified	Not Specified
O & M cost	Beneficiaries	Beneficiaries	Beneficiaries	Beneficiaries
Depreciation	Beneficiaries	Government	Beneficiaries	Government
Repayment	Beneficiaries	Beneficiaries	(Government)	(Government)
Case 1: No other conditions	Rf. 335 (3.0%)	Rf. 223 (2.0%)	Rf. 245 (2.2%)	Rf. 128 (1.15%)
Case 2: No reinforcement of Thilafushi 1	Rf. 323 (2.9%)	Rf. 212 (1.9%)	Rf. 234 (2.1%)	-
Case 3: Case 1 + No construction of Thilafushi 3	Rf. 268 (2.4%)	Rf. 167 (1.5%)	Rf. 223 (2.0%)	-
Case 4: Case 2 + No revetment & protection of waste in Thilafushi 2, and no office bldg. in transfer station	Rf. 234 (2.1%)	Rf. 123 (1.1%)	Rf. 212 (1.9%)	-

#### 4. Alternative A: Initial cost is financed by loans, and O & M cost, depreciation and repayment cost are borne by the beneficiaries.

Case 1

#### Additional Conditions

No.

#### Results of Financial Analysis (Male' Island)

#### Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 434	-
Per Tonne	-	Rf. 241

#### Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	335 (3.0% of Income)	2.25

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	335	B/A	3.0
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	2,051	E/A	18.4

## Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
17.9%	5.0%	6.3%

## Case 2

Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out.

Results of Financial Analysis (Male' Island)

## Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 419	-
Per Tonne	-	Rf. 232

## Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	323 (2.9% of Income)	2.17

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	323	B/A	2.9
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	2,039	E/A	18.3

## Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
16.5%	3.7%	6.5%

## Case 3

Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out. At the same time, Thilafushi 3 is not constructed That is to say, construction of Thilafushi 2 is continued up to 2010.

#### Results of Financial Analysis (Male' Island)

##### Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 348	-
Per Tonne	-	Rf. 193

##### Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	268 (2.4% of Income)	1.80

##### Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A	B	C/A	D/A
Average Income per House	11,152	-	-	-
Solid Waste Charge	268	B/A	2.4	
Water Charge	452	C/A	4.1	
Electricity Charge	1,264	D/A	11.3	
Total Charge	1,984	E/A	17.8	

##### Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
11.1%	3.8%	12.6%

#### Case 4

##### Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out. At the same time, Thilafushi 3 is not constructed That is to say, construction of Thilafushi 2 is continued up to 2010. Further, Works for revetment and protection of waste in Thilafushi 2 as well as works for office building at the transfer station in Male' are omitted.

#### Results of Financial Analysis (Male' Island)

##### Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 301	-
Per Tonne	-	Rf. 168

## Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	234 (2.1% of Income)	1.57

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A			
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	234	B/A	2.1
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,950	E/A	17.5

## Resultant Projected Management Indice

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
8.6%	5.0%	10.8%

5. Alternative B: Initial cost is financed by loans, and O & M cost and repayment cost are borne by the beneficiaries. But, depreciation is borne by the government.

## Case I

Additional Conditions

No.

Results of Financial Analysis (Male' Island)

## Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 289	-
Per Tonne	-	Rf. 160

## Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	223 (2.0% of Income)	1.50

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A			
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	223	B/A	2.0
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,939	E/A	17.4

**Resultant Projected Management Indices**

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
19.0%	6.3%	6.1%

**Case 2****Additional Conditions**

The works for reinforcement of Thilafushi 1 are not carried out.

**Results of Financial Analysis (Male' Island)****Solid Waste Charge (2003 to 2010 Average)**

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 275	-
Per Tonne	-	Rf. 152

**Comparison with Willingness to Pay (1998 Level, Rf.)**

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	212 (1.9% of Income)	1.42

**Utility Charge Analysis (1998 Level)**

Item	Amount (Rf./Month)		Percentage (%)	
	A	B	C/A	D/A
Average Income per House	11,152	-	-	-
Solid Waste Charge	212	B/A	1.9	
Water Charge	452	C/A	4.1	
Electricity Charge	1,264	D/A	11.3	
Total Charge	E=B+C+D	1,928	E/A	17.3

**Resultant Projected Management Indices**

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
17.6%	5.1%	6.3%

**Case 3****Additional Conditions**

The works for reinforcement of Thilafushi 1 are not carried out. At the same time, Thilafushi 3 is not constructed. That is to say, construction of Thilafushi 2 is continued up to 2010.

**Results of Financial Analysis (Male' Island)****Solid Waste Charge (2003 to 2010 Average)**

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 217	-
Per Tonne	-	Rf. 120

Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	167 (1.5% of Income)	1.12

Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A			
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	167	B/A	1.5
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,883	E/A	16.9

Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
15.6%	8.7%	7.7%

Case 4

Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out. At the same time, Thilafushi 3 is not constructed. That is to say, construction of Thilafushi 2 is continued up to 2010. Further, Works for revetment and protection of waste in Thilafushi 2 as well as works for office building at the transfer station in Male' are omitted.

Results of Financial Analysis (Male' Island)

Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 160	-
Per Tonne	-	Rf. 88

Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	123 (1.1% of Income)	0.83

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A			
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	123	B/A	1.1
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,839	E/A	16.5

## Resultant Projected Management Indice

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
10.3%	6.9%	8.6%

6. Alternative C: Initial cost is borne by the government, irrespective of how it will be financed. On the other hand, O & M cost and depreciation are borne by the beneficiaries.

Case I

Additional Conditions

No.

Results of Financial Analysis (Male' Island)Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 318	-
Per Tonne	-	Rf. 176

Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	245 (2.2% of Income)	1.64

Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A			
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	245	B/A	2.2
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,961	E/A	17.6

## Resultant Projected Management Indice

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
8.5%	28.6%	0.7%

## Case 2

Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out.

Results of Financial Analysis (Male' Island)Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 303	-
Per Tonne	-	Rf. 168

Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	234 (2.1% of Income)	1.57

Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A	B	C/A	D/A
Average Income per House	11,152	-	-	-
Solid Waste Charge	234	B/A	2.1	
Water Charge	452	C/A	4.1	
Electricity Charge	1,264	D/A	11.3	
Total Charge	E=B+C+D	1,950	E/A	17.5

Resultant Projected Management Indice

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
5.4%	25.7%	0.4%

## Case 3

Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out. At the same time, Thilafushi 3 is not constructed That is to say, construction of Thilafushi 2 is continued up to 2010.

Results of Financial Analysis (Male' Island)Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 289	-
Per Tonne	-	Rf. 160

Comparison with Willingness to Pay (1998 Level, Rf.)



Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	223 (2.0% of Income)	1.50

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	223	B/A	2.0
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,939	E/A	17.4

## Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
6.5%	22.5%	0.8%

## Case 4

Additional Conditions

The works for reinforcement of Thilafushi 1 are not carried out. At the same time, Thilafushi 3 is not constructed. That is to say, construction of Thilafushi 2 is continued up to 2010. Further, Works for revetment and protection of waste in Thilafushi 2 as well as works for office building at the transfer station in Male' are omitted.

Results of Financial Analysis (Male' Island)

## Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 275	-
Per Tonne	-	Rf. 152

## Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	212 (1.9% of Income)	1.42

## Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	212	B/A	1.9
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,928	E/A	17.3

## Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
7.1%	19.0%	1.3%

**7. Alternative D: Initial cost is borne by the government, irrespective of how it will be financed. Also, depreciation is borne by the government. But, O & M cost is borne by the beneficiaries.**

Case 1

Additional Conditions

No.

Results of Financial Analysis (Male' Island)

Solid Waste Charge (2003 to 2010 Average)

Solid Waste Charges	Domestic Beneficiaries	Non-Domestic Beneficiaries
Per Month per House	Rf. 166	-
Per Tonne	-	Rf. 92

Comparison with Willingness to Pay (1998 Level, Rf.)

Willingness to Pay	Solid Waste Charge	Comparison
A	B	C=B/A
149 (1.3% of Income)	128 (1.15 of Income)	0.86

Utility Charge Analysis (1998 Level)

Item	Amount (Rf./Month)		Percentage (%)	
	A			
Average Income per House	A	11,152	-	-
Solid Waste Charge	B	128	B/A	1.2
Water Charge	C	452	C/A	4.1
Electricity Charge	D	1,264	D/A	11.3
Total Charge	E=B+C+D	1,844	E/A	16.5

Resultant Projected Management Indices

Profit to Revenue Ratio	Working Capital to Revenue Ratio	Profit to Total Capital Ratio
8.4%	28.6%	0.7%

## *H. Public Awareness*

## **II. Public Awareness of Solid Waste Management**

### **1. Public Awareness Survey**

#### **1.1 Objectives and Scope of the Survey**

The objectives of the public awareness survey in connection with the Study is;

- To research sanitary condition level in the town,
- To research into the needs of better collection services,
- To research possibility of introduction of separate collection system,
- To research willingness to pay for improved collection services

#### **1.2 Background**

Male' Municipality is a capital of the Maldives which is densely populated in recent years due to, migration of population from local islands and overseas following to the development of the municipality. Increase of population brought up several problems on urbanisation and solid waste management is one of them.

Waste collection and disposal services are carried out by Male' Municipality, Ministry of Construction and Public Works (MCPW), private collection service providers and resident. In fact, the major part of waste collection is carried out by the efforts of the residents and private vehicles to carry waste to the sites of Micro Bins and/or to the Transfer Station.

Residential house in Male' is small and built closely to the next door's facing along with narrow street, which is not convenient to store large amount of waste in house or to allow collection vehicles entering to the narrow streets for door to door collection services.

In order to improve waste collection services, it is important to know the awareness of the people who have to remove waste from house every day under the inconvenient condition of housing, streets, town and the society. Public awareness survey was conducted to withdraw key issues among the people & society for consideration in planning.

#### **1.3 Conditions of Public Awareness Survey**

##### **1.3.1 Scope of Survey**

The survey was conducted through interview survey for about 166 samples in total consist of 94 residential houses in Male', 10 residential homes in Villingili and Thulusdhoo respectively and 52 business establishment in Male'.

### 1.3.2 Contents of Questionnaires

Prior to the survey, the JICA Study Team and Ministry of Planning and Human Resources held a meeting over the questionnaires and consent each other to have 54 items for residential house and 30 items for business establishment as categorised in the followings.

**a. General**

- Number of People per House
- House Style, Income,
- Public Services Charge,

**b. Waste Discharge**

- Sanitation,
- Type of Container,
- Means of Waste Discharge,
- Frequency of Discharging

**c. Collection Service**

- Frequency of Collection,
- Collection Fee,
- Service Provider

**d. Source Separation**

- Hazardous Wastes,
- Recyclable Items,
- Awareness of Separation

**e. Public Awareness**

- Awareness of SWM

**f. Improvement of Collection Services**

- Collection Frequency,
- Items to be Separated ,
- Willingness to Pay,
- Waste Charge Rate

### 1.3.3 Selection of Samples

#### (1) Residential House

There are about 6000 households in Male'. The Survey Team set a target to have more than one(1)% of the numbers of the households which is effective for social survey.

Male' City is divided into 4Wards and subdivided further into 405 blocks. Out of 405 blocks, 337blocks are allotted for residential areas.

Number of samples for selection was determined based on the population size in Wards and the residential blocks. Finally, 94 households were picked out form 85 blocks considering probable refuse to the questionnaire survey by some house owners. Among 94 numbers of the samples, 3 households form the Flat and the Terrace houses of the National Security Quarter are included respectively. The numbers of households for the questionnaire survey were summarised in Table 1.1, and Figure 1.1 shows the residential blocks selected for the Public Awareness Survey in Male'.

Table 1.1 Number of Samples in Male' Municipality

Inhabited Island	Wards	Population	Percentage	Blocks (sample)	Notes
Male'	MAFANNU	20,005	33.3%	28(30)	2 reserve
	MACANGOLI	11,857	19.8%	17(18)	1 reserve
	GALOLHU	12,241	20.4%	17(23)	2 reserve, Flat, Terrace
	HENVIRU	15,867	26.5%	23(23)	
<b>(TOTAL)</b>				<b>(94)</b>	

Ten samples were added to Villingili and Thulusdhoo Island respectively, and the interview survey was conducted for 114 samples in total for residential houses.



**(2) Business Establishment**

The survey team carried out interview survey for the commercial, business and institutional waste generators in Male'. Fifty two (52) samples were selected for the waste generation sources including hotels, restaurants, hospitals, clinics, workshops, schools, offices, and general stores. Table 1.2 shows the details of the number of samples for the survey to the business establishments.

Table 1.2 Business Establishment in Male' City

	Total	Selected
Hotel	69	3
Restaurant	80	3
Local Tea shop		5
Government Office	104	3
Commercial Office	242	4
Hospital	2	2
Clinic	27	2
Workshops(Industry)		
Car Repair Shop	86	1
Parts Shop (Bolt, Nut)	1	1
Timber (Carpenter) Shop	28	2
Aluminum Shop	2	1
Smoke Fish Shop	16	2
Bakery	5	1
Fuel Shop	7	1
Market (Fish, Vegetable)	2	2
Schools		
Primary	4	1
Secondary	9	1
Technical	2	1
Nursing	1	1
Management	2	1
Other Shops	942	14
Total	1631	52



### (3) Implementation

The interview survey was conducted from 17 June to 28 June 1998 in the period of the first field survey. Prior to commencement of the public awareness survey, it was publicised on TV, Radio, and Newspaper in order to urge cooperation of the residents to the interview survey.

#### 1.4 Result and Findings of Public Awareness Survey

All the questions were analysed and presented in Public Awareness Survey, Supporting Report H.

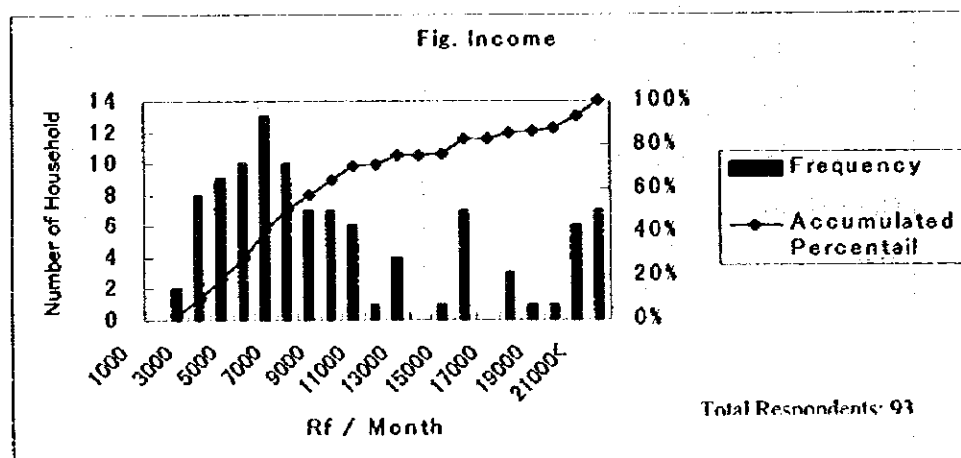
Major Items in the questionnaires were picked out and shown in the following sections for the key factors in formulation of the SWM plan. In the descriptions in the following sections, actual numbers of respondents were in percentage. In Villingili and Thulusdhoo, the number of the respondents are 10 respectively and the results of the questionnaires are expressed in percentage accordingly.

##### 1.4.1 Residential House in Male' Municipality

###### (1) Numbers of Resident and Income per House

The housing situation is getting worse in Male' and 14 persons reside per house in average. The houses are small and 6 to 7 persons share a room in some case. However, about 62% (58 out of 94 answers) of respondent live in Male' more than 20 years.

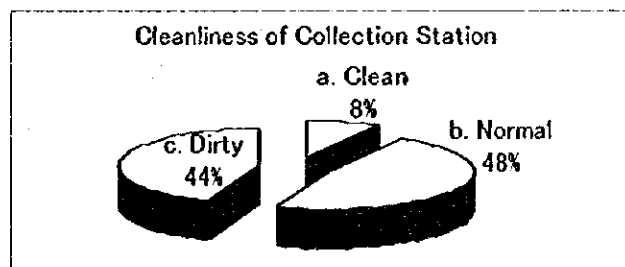
Household expenses is shared by 2 to 3 people of the family in general. House income ranges widely and the most of high-income households earn it from renting a house or running a business. Total income per house reach at 11,152 Rf/Month in average and more than 50% of the sampled houses earn income in the range of 7,000 to 8000 Rf/Month. The income distribution, or the relation between the income level and the numbers of houses, was presented as follows.



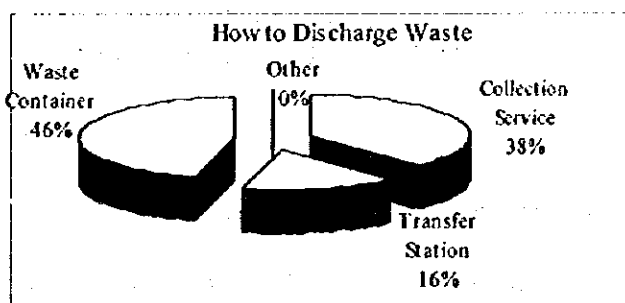
The residents in Male' bear the public service charges for water supply and electricity. Water supply charge is about 4% of total income and many houses equip with a rainwater storage system. An average electric charge is about 1,264 Rf/Month per house. The electricity charge to total house income ranges between 11 and 15 % depending on difference of electricity consumption in each house.

**(2) The State of Waste Discharge from House**

About 38%(36 answers) of respondents have waste collection services through municipality or private collectors and 16%(15) of houses carry waste to the transfer station directly. The remaining 46%(43) of houses discharge waste at the containers nearby house. About a half of respondents use plastic bucket and a half of them use plastic bag for a liner of the container. Due to generation of odour easily from kitchen waste under the high temperature and humidity in Male', about 90%(86) of resident discharge waste every day to keep sanitation in the house. However, because of no collection system provided for hazardous wastes and bulky waste, the resident mix all the waste and discharge together and separation of waste is not conducted at house. About 75%(71) of house discharge waste regularly at the time fixed and the largest numbers of respondents discharge waste from evening to midnight. With regard to the sanitary condition of transfer station and micro bins, about half of the respondent think that the condition is dirty and the rest of them think it



Total Respondents : 84



Total Respondents : 94

normal condition.

### (3) Collection Services

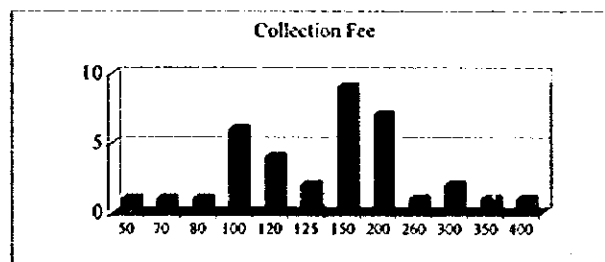
Thirty six (36 out of 94 respondents) houses which is 38 % of the respondents answered to have waste collection services in Male'. Among 36 houses, 13 houses are provided with collection services by the municipality, 21 houses use individual collection service by hand cart, and 2 houses make use of the services by private sector.

Male' municipality provides solid waste collection services by two units of collection vehicles operated exclusively and alternately. The residents receiving the collection services pay the fee at the Municipality Hall.

Charging rate of collection services by hand cart is different and a clear answer was not obtained for the service charge. In addition to the collection by hand cart, there are some collection services carried out by using bicycle or by foot. Most of the case, the payment to the services is made directly to the service provider once in a month but there is a few case pay service charge every time when receiving the collection services.

On the other hand, only two houses are collected by the private service provider operated by a ordinary truck.

Charging rate of collection services is different but most of the rate ranges between 100 and 200 Rfs/month and an average charging rate of the respondents was about 164 Rfs/month. The customers can select the service level in terms of waste amount and frequency and almost all respondents think that the rate is reasonable. Expenses of solid waste collection fee is about 1.5% to average income of the respondents.

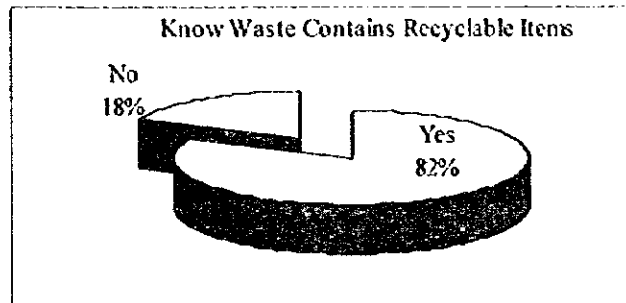


Total Respondents : 36

### (4) Separation of Recyclable Items

About 82%(77 answers) of respondents are interested in recycling, and they know the recyclable items very well. On the contrarily, Male' Municipality does not carry out resource recovery and collection service for the recyclable items and so they do not separate those materials at home. It

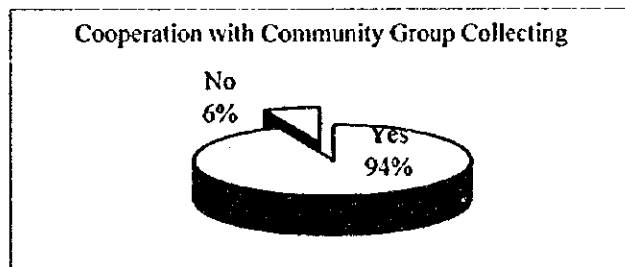
was found through the survey that one company recover plastic bottles for re-use of own products and schools club activities for recycling of materials.



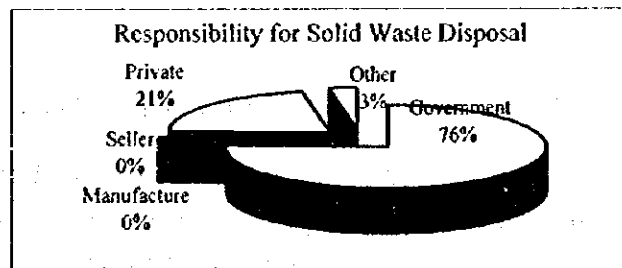
Total Respondents : 94

**(5) Public Awareness and Social Consideration**

Most of the residents in Male' are interested in solid waste management. About 87%(82) of respondents wish to know more about waste management and related activities. In spite of high public awareness of the residents for waste management and sanitation, there is no participation of residents or organised activities carried out by the community groups. According to the result of the interview survey, about 94%(87) of respondents wishes to participate to the regional activities. Meanwhile, 76%(79) of respondents think that the government is responsible for waste disposal.



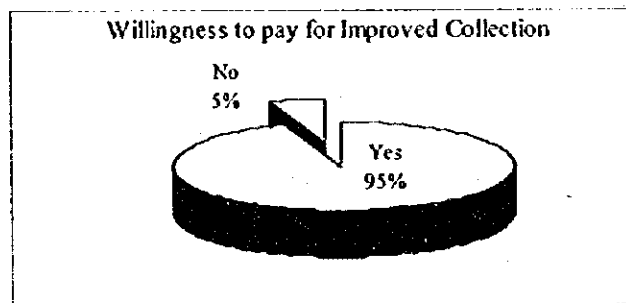
Total Respondents : 93



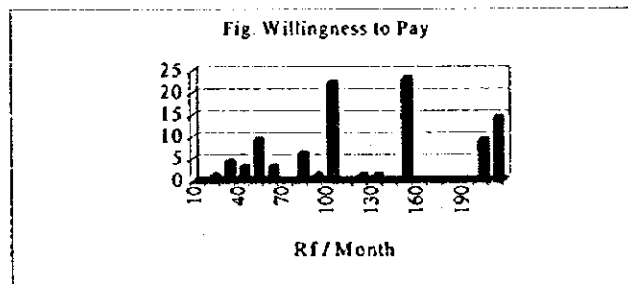
Total Respondents : 104

## (6) Improved Collection Services in Future

About 98%(92 out of 94 answers) of respondents agreed with separation of solid waste in future. Total numbers of respondents for separation of two kinds (kitchen waste and others) or three kinds (kitchen waste, others, and recyclable items) reached at more than 90%(total 91 respondents). They expect daily collection of kitchen waste and four times in a week for other type of wastes. Meanwhile, frequency of 1 to 2 times is desired for collection of recyclable materials in a week. They prefer to use plastic bucket with cover and 80%(88) of households wish to have door to door collection service. It was found that 9 a.m. or 8 p.m. is convenient for the resident for collection of wastes. With regard to waste charge, about 94% of the residents agreed payment of collection service charge and the willingness to pay reached at 149 Rf/month which account for about 1.3% of average income of the house



Total Respondents : 94



Total Respondents : 88

### 1.4.2 Residential House in Villingili Island

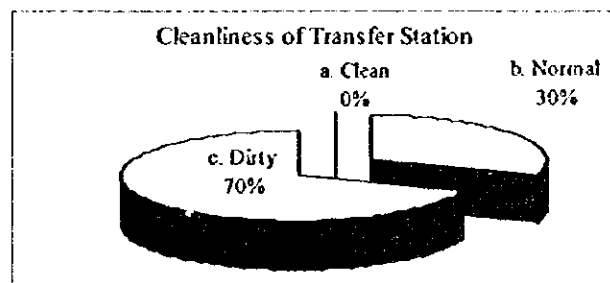
#### (1) Numbers of Resident and Income per House

Villingili Island was developed as a resort island until 1989. Afterwards, the Government has been developed the island for an inhabited island, and so most of the residents in Villingili live there less than five years. The population per house is about 12 person which is a little better condition as compared with the condition in Male' although the resident population per house is still too high. An average income per house is 7,500 Rf/month

and the difference of income level of 10 sample houses are relatively within a narrow range. The resident bear the electricity charge with 679 Rf/month in average which is equivalent to about 9 % of total income of the average house in Villingili Island. Water supply facilities is under construction now.

## (2) The State of Waste Discharge from House

Solid waste collection service is not provided in Villingili Island. The residents carry wastes to the transfer station located in the south of the island where the waste is stored to have transportation services by MCPW's barge twice in a week at present. Almost all of the respondents use plastic bags as a liner of waste container and/or put waste directly into the plastic bags. About 80% of respondents discharge waste twice in a day and 70% of the respondents do fix the time for discharging waste. Nevertheless, most of the houses answered to discharge waste in the morning or in the evening. Only a few people have ever discharged bulky waste since the bulky waste has not yet generated due to short living period in the island. With regard to sanitation of the transfer station, 70% of the respondents feel that the transfer station is dirty and unsanitary condition.

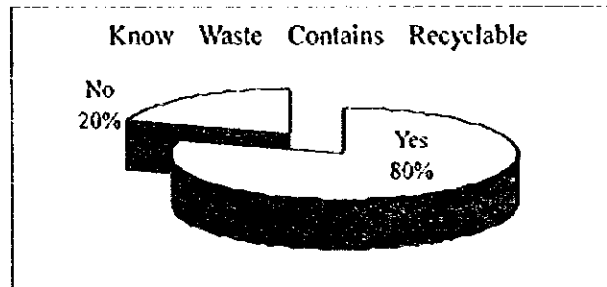


## (3) Collection Services

Solid waste collection services is not provided by the Housing and Urban Development Board and the resident carry waste to the transfer station directly.

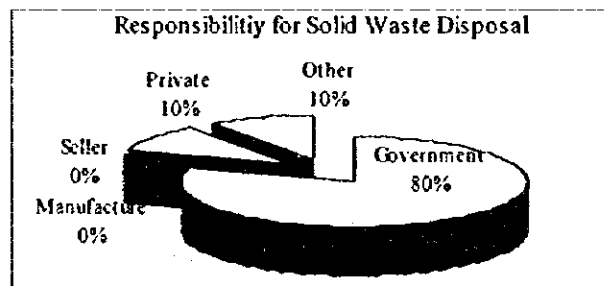
## (4) Separation of Recyclable Items

More than 80% of the respondents are interested in recycling and they know the types of recyclable materials commingled in municipal solid waste. However, the administration body do not provide services for solid waste collection nor recovery of recyclable materials, and so separation of valuable materials is not conducted in Villingili Island.



**(5) Public Awareness and Social Consideration**

An awareness of the people on solid waste management is high and they wish to know about recycling of solid waste. There is no community group activities for improvement of sanitary condition in the island but 90% of the respondent professed support for the community activities on waste management as implemented. According to the survey, 80% of the respondents think that the Government is responsible for solid waste disposal.



**(6) Improved Collection Services in Future**

Plastic bucket with cover was selected by 70 % of the respondents for the most convenient waste container in future. All the sample houses hopes to have door to door services or stationary collection service and expressed willingness to pay for the service charge at 43 Rf/month in average, which is about 0.5% of total income of the house in Villingili Island. Almost all houses answered to support separation of waste at source. They prefer to have daily collection of kitchen waste, 4-5 times for collection of other type of wastes and 1-2 times for collection of recyclable materials per week.

Frequency of Collection Service	Average
Food (Week)	7.0

Other (Week)	5.1
Recyclable (Week)	1.9

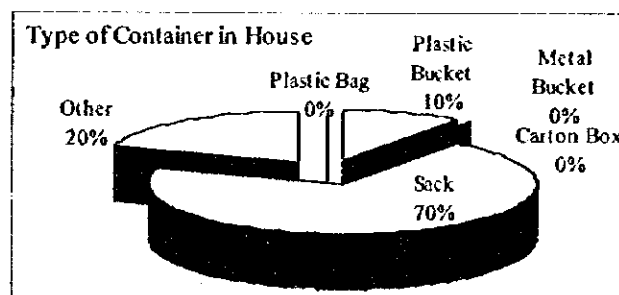
### 1.4.3 Residential House in Thulusdhoo Island

#### (1) Numbers of Resident and Income per House

In average, about 12 person reside in one house in Thulusdhoo Island. They earn approximately 5,200 Rf. per month and pay for the electricity about 952 Rf. per month which is equivalent to 18% of the average income of 10 houses sampled in connection with implementation of the public awareness survey.

#### (2) The State of Waste Discharge from House

Collection service is not carried out by the administration body in Thulusdhoo Island. The resident have to carry waste by themselves to the disposal site designated by the Island Committee. All the respondents separate kitchen waste from other waste because of the guidance by the Island Office to discharge kitchen waste into the deep sea. However, it is not always convenient for all the residents who do not have own boat for discharging kitchen waste into the sea and they discharge the mixtures of waste at the disposal site. Almost all the houses, 90 % of the respondents, discharge kitchen waste everyday but the time is not fixed for discharging waste. Sacks are utilised for discharging solid waste by 70 % of the respondents for convenience to put in fallen leaves and there was no house answered to use plastic bags usually for discharging waste at present. Bulky waste is not discharged by the residents in recent years. With regard to the disposal site, about 70 % of the respondent feel the site is dirty and unsanitary condition.



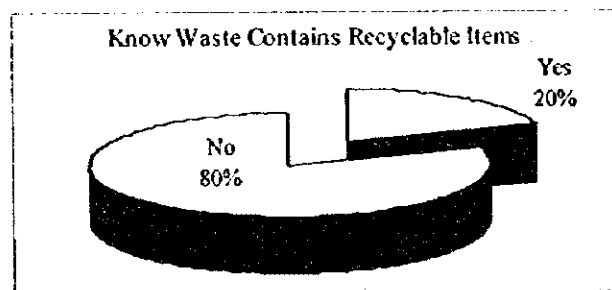


**(3) Collection Services**

Solid waste collection services is not provided by the Island Office and the residents carry waste by themselves to the disposal site designated by the Island Committee.

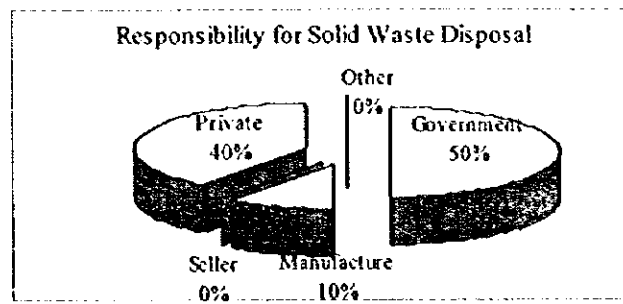
**(4) Separation of Recyclable Items**

Most of the respondents are not aware that the waste contain recyclable items and they could did not answer the type of recyclable items. It seems that the residents are not aware of overall idea of recycling and they are not interested in recycling activities.



**(5) Public Awareness and Social Consideration**

The residents are interested in waste management and sanitation because of the problems of the existing disposal site and all respondents wish to know more about solid waste management. There is no community group activities for sanitation except for the cleaning day implemented by the Island Committee under the guidance of Island Office. However, all the respondents have the opinion to join community activities as implemented with regard to the responsibility of solid waste management. The opinion was split into two. A half of the residents think that individual person is responsible for waste disposal and the other half of the residents think that the government is responsible for waste disposal.



#### (6) Improved Collection Services in Future

More than 70 % of respondents wish to use plastic bucket with cover and all the respondents expect to have solid waste collection services by some means. Ninety (90) % of the respondents agreed with payment of collection service charge. Their willingness to pay amounted to 86 Rf/month per house, which is 1.6% of average income of 10 sample houses in Thulusdhoo Island. All respondents agreed with separation of solid waste and preferred to have three type (kitchen waste, others, and recyclable items) separation. They wish to have daily collection of kitchen waste, 4-5 times collection for the other type of wastes and 1 time collection for recyclable materials.

#### 1.4.4 Business Wastes Survey in Male' City

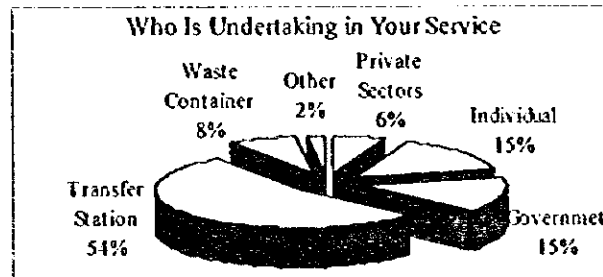
##### (1) Types of Business Establishments Selected for the Survey

The business establishments categorised by institutional, commercial and industrial activities such as government offices, hospitals, clinics, schools, stores, workshops, market, hotels, restaurants, etc. amount to 1,631 places in Male' Municipality. The public awareness survey was conducted with 52 samples selected for the typical types such as hotels, restaurants, offices, hospitals, clinics, workshops, markets, and general stores.

##### (2) Waste Discharge from Business Establishment

About 25%(13 out of 52 answers) of respondents separate business wastes from general domestic wastes and some respondents generates or discharge only business wastes. Office regarding hazardous wastes, about 25%(23) of the respondents separate hazardous waste to take it to the transfer station. Twenty (20) places have waste collection services. Eight (8) places have collection services by the Male' Municipality and 4 places have contracted with the private service provider and collection services by hand carts are provided for 8 places. The answers for collection frequency, waste charge

and collection time are different in each place and specific feature was not observed.



Total Respondents : 52

### (3) Quality and Quantity of Solid Waste

In general, waste composition depend on the types of business activities and the typical wastes from business activities in Male' consist of concrete debris, sand, demolition waste, carton box, paper, saw dust, iron scraps, food waste, medical waste, waste oil, etc. A large amount of kitchen waste commingle where the building is used for resident and business activities.

### (4) Medical Waste from Hospital and Clinic

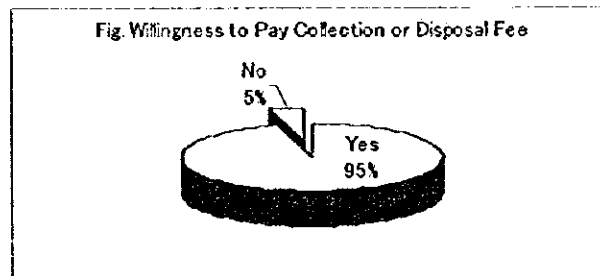
There are two hospitals in Male' City. Indhira Gandhi Memorial Hospital having 200 beds is equipped with an incinerator and treat infectious wastes by them selves. Other general solid waste is transported to the Transfer Station. Incinerator of ADK hospital, private hospital having 40 beds, is out of order now and the hospital plans to replace new incinerators for infectious waste and general incineration purposes. Accordingly, waste from ADK is transported to the Transfer Station for incineration in drum cans. Replies from these two hospitals says that medical waste is treated by themselves even in future. There are 27 clinics in Male'. Two clinics surveyed transport medical waste to the Transfer Station for incineration by drum cans at site.

### (5) Recycling

Because of no effective collection and recycling measures in Male', most of the business establishments do not separate waste for materials recovery. One workshop store aluminum scraps for exporting purpose but it is difficult due to high transportation cost. Ameiniya School collects waste paper for transporting to Germany through cooperation of Luft Hansa Airline with free of charge.

### (6) Improved Collection Services for Business Wastes

About a half of the respondents expect to have waste collection services and the other half answered to carry waste to the Transfer Station by themselves. More than 90 % of the respondents agree to pay for the improved waste collection services as long as the waste charge is set at a reasonable level. However, the replies for willingness to pay for the improved collection services from 18 places indicate 683 Rf. per month in average ranging from 200 to 3,000 Rf. per month. Likewise, they are willing to pay disposal fee but the numbers of replies are only 9 and the average disposal fee answered by them was only 318 Rf. per month.



Total Respondents : 38

### 1.5 Summary of Public Awareness Survey

Results of public awareness survey are summarised in the following tables for the key issues closely related with improvement of SWM services in future.

#### 1.5.1 Preferable Waste Container

Plastic bags, plastic buckets or sacks are used for storing and discharging waste at present. The residents in Male, Villingili and Thulusdhoo islands chose the plastic buckets for the most preferable type for waste containers. It is worth to note that plastic bucket was chosen by more than 80 % of the resident in Male'.

Type of Container

Inhabited Island	Current Container	%(Number of Answer)	Preferable Container	%(Number of Answer)
Male' City	Plastic Bag	36.8% (42)	Plastic Bucket	82.4% (81)
	Plastic Bucket	44.7% (51)		
Villingili Island	Plastic Bag	42.9% (6)	Plastic Bucket	69.2% (9)

	Plastic Bucket	35.7% (5)		
Thulusdhoo Island	Sack	70% (7)	Plastic Bucket	58.3% (7)
			Sack	41.7% (5)

### 1.5.2 Type of Collection Services

Door to door collection services in Male' is provided by the Municipality, two private companies and about 30 hand carts. The coverage ratio of door to door at present is estimated less than 20 % and most of the residents carry waste and discharge wastes at the micro bins or at the Transfer Station. However, more than 87 % of the residents in Male' wish to have door to door collection services in future. Also the door to door collection services is expected by more than 60 % of the residents in Villingili and Thulusdhoo.

#### Type of Collection Service

Inhabited Island	Preferable Collection Service	%(Number of Answer)
Male' City	Door to Door	87.1%(88)
	Stationary Collection	12.9%(13)
Villingili Island	Door to Door	61.5%(8)
	Stationary Collection	38.5%(5)
Thulusdhoo Island	Door to Door	69.2%(9)
	Stationary Collection	30.8%(4)

### 1.5.3 Recycling of Wastes

The terms of recycling or reuse or materials recovery were not clearly defined in the questionnaire survey but it shows that the residents are interested about recycling of waste. Almost all of the respondents in three islands professed support to waste separation at generation source.

#### Recycling and Separation of Waste

Inhabited Island	Interest to Recycling (Number of respondents)	Participation to Waste Separation
Male' City	81.9%(77)	97.9%(92)
Villingili Island	80%(8)	100%(10)

Thulusdhoo Island	20%(2)	100%(10)
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#### 1.5.4 Waste Collection Time

Currently, two time zones are observed for discharging waste in the morning and the evening times. With reflection to the current waste discharging time, the opinion of the residents have split into two time zones in the morning and evening times. However, each time zone is a little higher than 20 % and it is not so remarkable in percentage.

#### Collection Time

Inhabited Island	Current Discharging Time	% (Respondent)	Preferable Collection Time	% (Respondent)
Male' City	9-12	17.3%(19)	9-11	23.4%(20)
	18-21	23.6%(26)	19-21	22.3%(21)
	21-24	29.1%(32)		
Villingili Island	6-9	42.9%(6)	7-9	40%(4)
	9-12	21.4%(3)	17-18	30%(3)
	15-18	21.4%(3)		
Thulusdhoo Island	6-9	26.7%(4)	15-17	50%(5)
	12-15	26.7%(4)		
	15-18	33.3%(5)		

#### 1.5.5 Frequency of Waste Collection Services

More than 85 % of the houses in Male discharge waste every day. Meanwhile, most of the residents, more than 70 %, in Villingili and Thulusdhoo discharge waste twice in a day. The respondents hope to have daily collection services for food waste and 4-5 times collection for other types of wastes.

## Frequency of Waste Collection Services

		Answer	Effective Count	Respondent	%
Male' City	Food Waste	Everyday	91	88	96.7
	Other Waste	Everyday	91	40	43.9
	Recyclable Waste	Once in a Week	37	28	75.7
Villingili Island	Food Waste	Everyday	10	10	-
	Other Waste	Everyday	7	4	-
	Recyclable Waste	Once in a Week	9	6	-
Thulusdhoo	Food Waste	Everyday	9	6	-
	Other Waste	5 times in a Week	8	3	-
	Recyclable Waste	Everyday	8	5	-

## 1.5.6 Income and Waste Collection Fee

The monthly income of the residents in Male' is a little higher than 11,000 Rufias and bearing about 164 Rufias in average. The ratio of waste collection charge to total income is accounted for about 1.5 %. The average income of the residents in Villingili and Thulusdhoo amounted to 7,500 and 5,200 Rufias respectively.

## Current Income and Collection Service Charge

	Income (Rf/month )	Respondent s	Collection Fee (% of total income)
Male' City	11,152	93	164 (1.5%)
Villingili Island	7,500	10	-
Thulusdhoo Island	5,200	10	-

## 1.5.7 Willingness to Pay and Waste Charge

Most of the resident in three islands agree to pay waste charge for the improved collection services in future. About 95 % of the residents in Male' approved for payment of the waste charge as enforced. Willingness to pay given by the residents in Male' amounted to 149 Rufias which is about 1.3 % against total income of the house. Meanwhile, the residents in Villingili and Thulusdhoo agreed to pay 43 and 86 Rufias per month respectively for waste collection services when implemented.

## Willingness to Pay for Improved Services

	Participation to Community Collection	Agreed to Pay (Respondent)	Waste Charge (Rfs/month) (% to income)	Respondents
Male' City	93.5%(87)	94.7%(89)	149 (1.3%)	88
Villingili Island	100%	90%(9)	43 (0.5%)	9
Thulusdhoo Island	100%	77.8%(7)	86 (1.6%)	7



## **1.6 Cleaning Activities and Public Education**

Involvement of government sectors and non-governmental organisations to the activities on solid waste management and/or public education is reported in the following subsections.

### **1.6.1 Male' Municipality**

Male' Municipality install 22 units of micro bins at 9 stations to receive wastes generated from the neighbouring houses and carry to the Transfer Stations for emptying 3 times in a day. In addition, Male' Municipality provides door to door waste collection services to 417 residential and/or office buildings, stores, workshops and other waste generation sources on the base of charging service fee, which is accounted for about 6 % of buildings in Male' Municipality. Meanwhile, by-law of Male Municipality prescribes responsibility of the resident to clean street in front of the building. The by-law also state about the man who violate the regulation to be punished severely.

### **1.6.2 Ministry of Trade, Industry and Labours**

Almost all workers engaged in solid waste collection and disposal operation are expatriates from Bangladesh and/or Sri Lanka who are permitted to stay and work in Maldives through obtaining work permits from the Ministry of Trade, Industry and Labours (MTIL). According to the Ministry, about 9,000 expatriates are working in Male out of 17,000 foreigners working in the whole country. In the field of solid waste management, about 50 foreign workers are working for waste collection, disposal and related works. The information says that there is not an air of discrimination to the workers engaged in solid waste management work.

### **1.6.3 Ministry of Education**

#### **(1) School Education**

The Ministry of Education (MOE) is conducting environmental education actively at schools. The environment class is learned from 1st to fifth grades focusing about variety of the subjects such as health, sanitation, science, food hygiene, population problems, and tourism. The fifth grade student have a class to visit the field work sites at Waste Management Section, Transfer Station and Thilafushi Disposal site to learn actual operation of solid waste management. The grade six and seven students lean more detail about environment through sociology and science. Moreover, the eight grade students learn about oceanographic environment, coral reef environment and fisheries around Maldives in the fisheries science class.

It is prohibited to bring plastic bags to the school for practising waste reduction activities at all the schools. There is no class to learn about waste recycling at schools. However, waste recycling is practised individually by the activities of environmental club in each school. PTA of the school open the market for reusable items from time to time in the occasion of schools holiday.

**(2) Public Education**

Non-formal Education Center (NFEC), MOE is responsible for raising awareness of the people and for public education. Workshops are opened, although nonregular, to educate for how to discharge waste and keep sanitation of the living places by means of the leaflets distributed free of charge by the NFEC. In addition, NFEC have a weekly radio program for the public information including environmental sanitation and solid waste management.

**1.6.4 Non-Governmental Organisation (NGO)**

The three groups, Blue Peace, VESII and FASHAN are known as NGOs in Male'. According to Blue Peace, the environmental NGO, was established less than 10 years ago and they consider that their activities have not yet permeated into the society. However, they are working actively by such a way to participate in formulation of the National Environment Action Plan. They are working for the activities for cleaning seaside, raising public awareness activities through the radio and TV programs, and opening waste recycling market at schools from time to time. They consider that the NGO's are not supported well enough by the society and the government bodies. They consider that materials recovery by the resident and forming market in Maldives will be difficult. Although the situation is hard but Blue Peace hope to promote the activities of waste reduction and recycling from now on by raising awareness of the residents and public education.

## Male' City (1-1 ~ 1-55)

General Questions

Table 1-1 Type of Building		%
a. Detached	51	54.3%
b. Complex	43	45.7%
c. Commercial and Living Space	0	0.0%
Total	94	

Table 1-2 Respondent		%
a. The Master or Husband	43	45.7%
b. Housewife	20	21.3%
c. Other Home Member	31	33.0%
d. Other	0	0.0%
Total	94	

Table 1-3 Number of House Members	Average
Adult	10.00
Child (<12)	4.32
Number of Person Per House Families	14.32
	1.67

Table 1-5&1-6 Family Income	Average	Total Respondent
Number of Shearing	2.95	
Total Income (Rf / Month)	11151.83	93

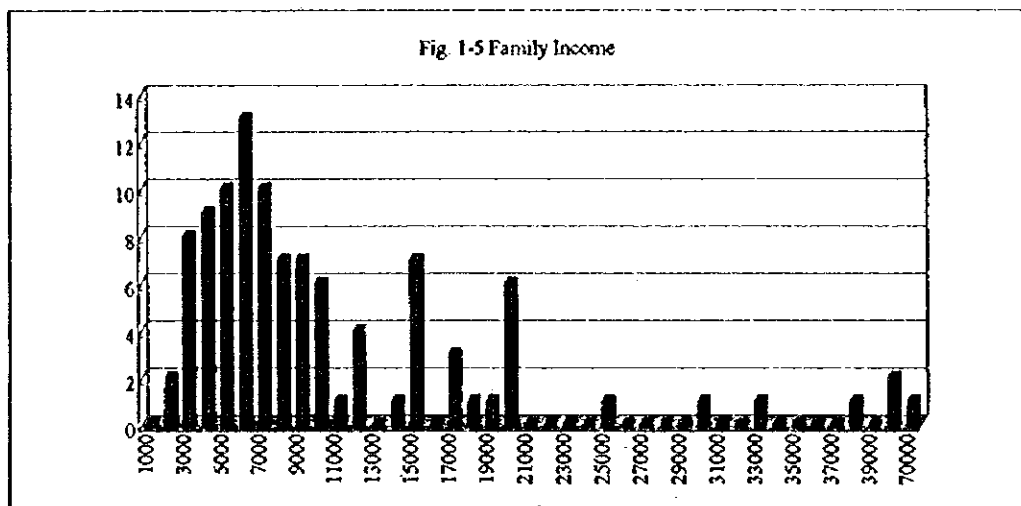


Table 1-6 Length of Time Lived in House		%
a. Less than 5 years	9	9.6%
b. 5 to 9 years	9	9.6%
c. 10 to 19 years	18	19.1%
d. 20 years or more	58	61.7%
Total	94	

Table 1-7 Public Service Fee	Average
a. Water Service (Rf/Month)	451.97
b. Electricity Service (Rf/Month)	1263.98

**Waste Question from House**

Table 1-8 Where to Discharge Waste from House		%
a. Government or Private Collection Service	36	38.3%
b. Transfer Station	15	16.0%
c. Waste Container	43	45.7%
d. Other	0	0.0%
Total	94	

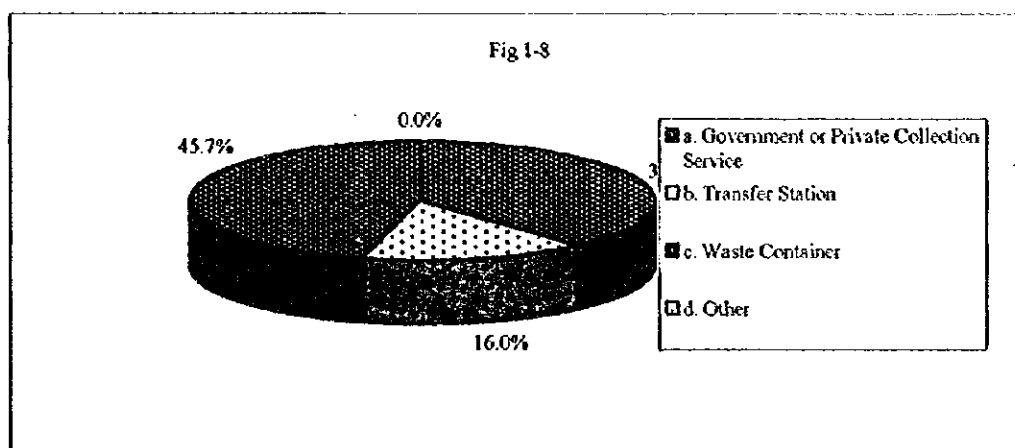


Table 1-9 Type of Container in House		%
a. Plastic Bag	42	36.8%
b. Plastic Bucket	51	44.7%
c. Metal Bucket	3	2.6%
d. Carton Box	1	0.9%
e. Sack	16	14.0%
f. Other	1	0.9%
Total	114	

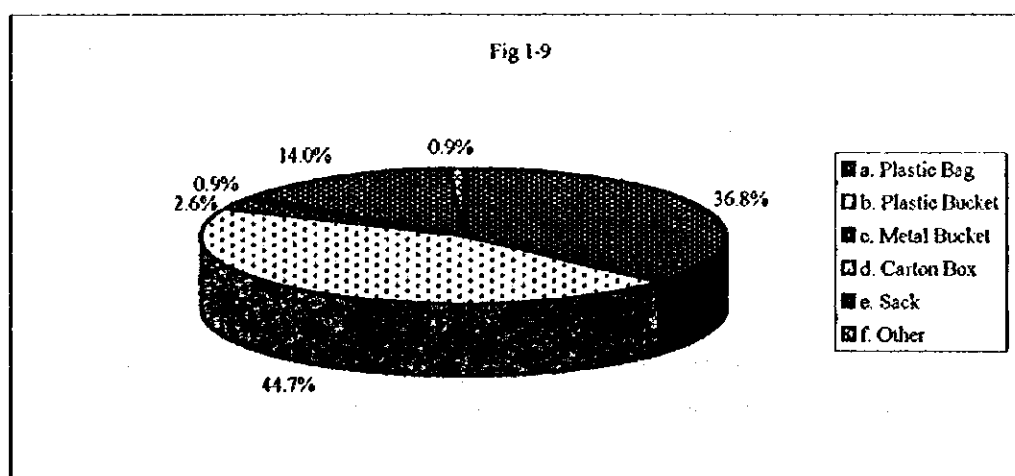


Table 1-10 Using Liner When Discharge Waste

		%
Yes	47	50.0%
No	47	50.0%
Total	94	

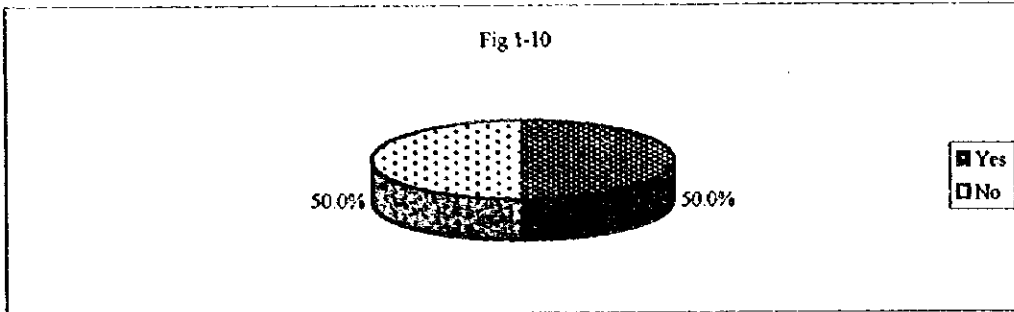


Table 1-11 Reason to Use 1-9's Container

		%
a. Clean	34	25.6%
b. Prevents Foul Odor	24	18.0%
c. Manageable	72	54.1%
d. Keep away from Flies	2	1.5%
e. Other	1	0.8%
Total	133	

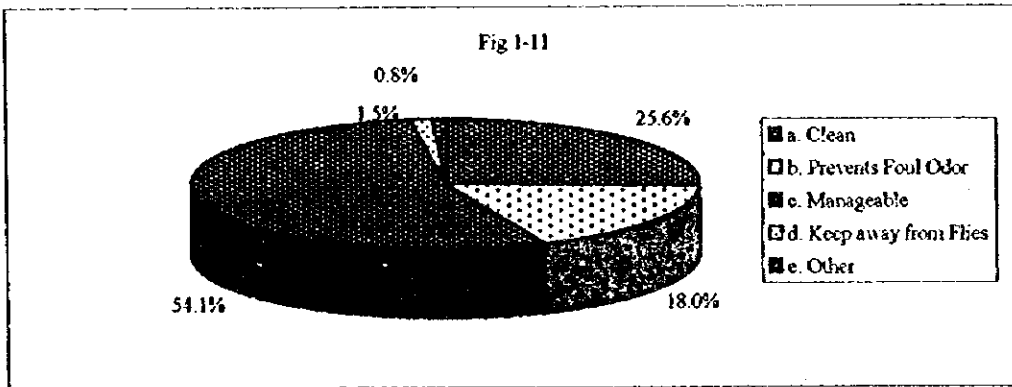


Table 1-12 Position of Waste Container in House

		%
a. In front of the house	27	26.7%
b. Back yard or behind the house	54	53.5%
c. In the kitchen	17	16.8%
d. Other	3	3.0%
Total	101	

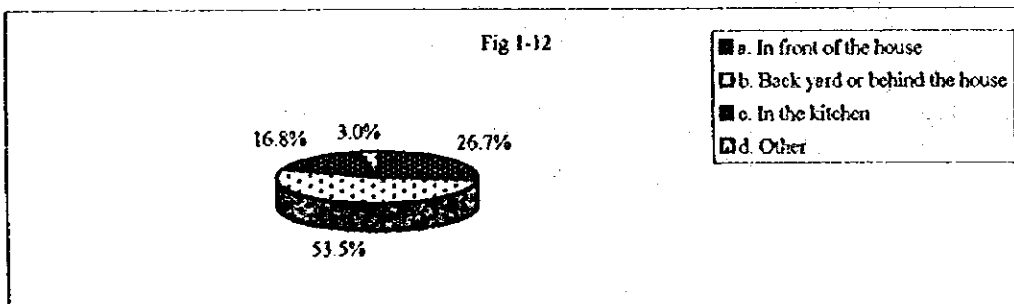


Table 1-13 Frequency of discharging Waste

		%
a. Twice a day	3	3.1%
b. Once a day	83	85.6%
c. Six times a week	0	0.0%
d. Five times a week	0	0.0%
e. Four times a week	2	2.1%
f. Three times a week	3	3.1%
g. Two times a week	0	0.0%
h. Once a week	5	5.2%
i. Once a month	1	1.0%
<b>Total</b>	<b>97</b>	

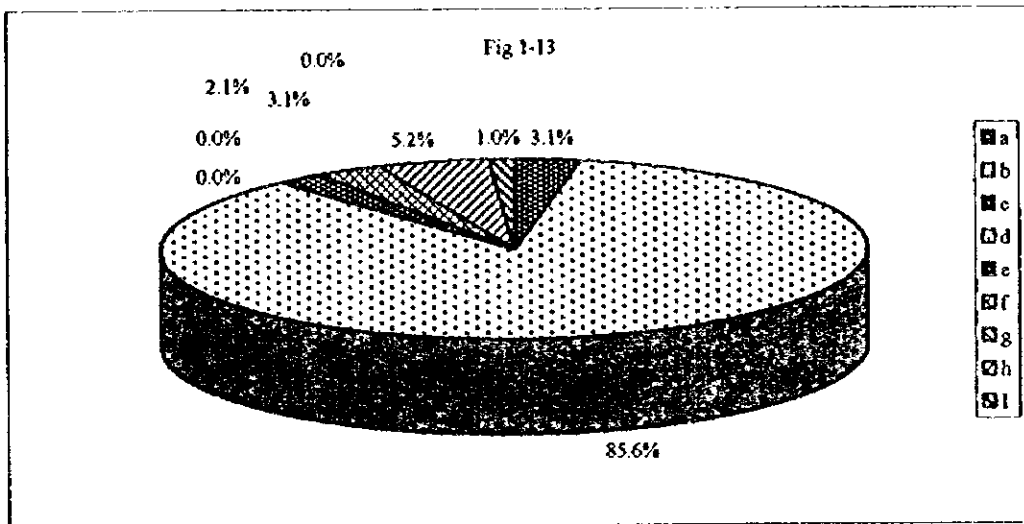


Table 1-14 Discharge Waste at Fixed Time

		%
Yes	71	75.5%
No	23	24.5%
<b>Total</b>	<b>94</b>	

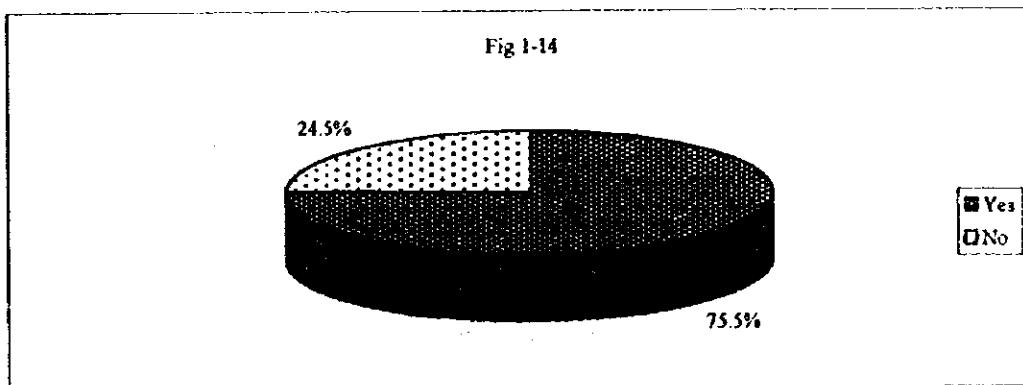


Table 1-15 Time of Discharge Waste from House

		%
a. 1:00-2:59	0	0.0%
b. 3:00-5:59	4	3.6%
c. 6:00-8:59	16	14.5%
d. 9:00-11:59	19	17.3%
e. 12:00-14:59	6	5.5%
f. 15:00-17:59	7	6.4%
g. 18:00-20:59	26	23.6%
h. 21:00-23:59	32	29.1%
Total	110	

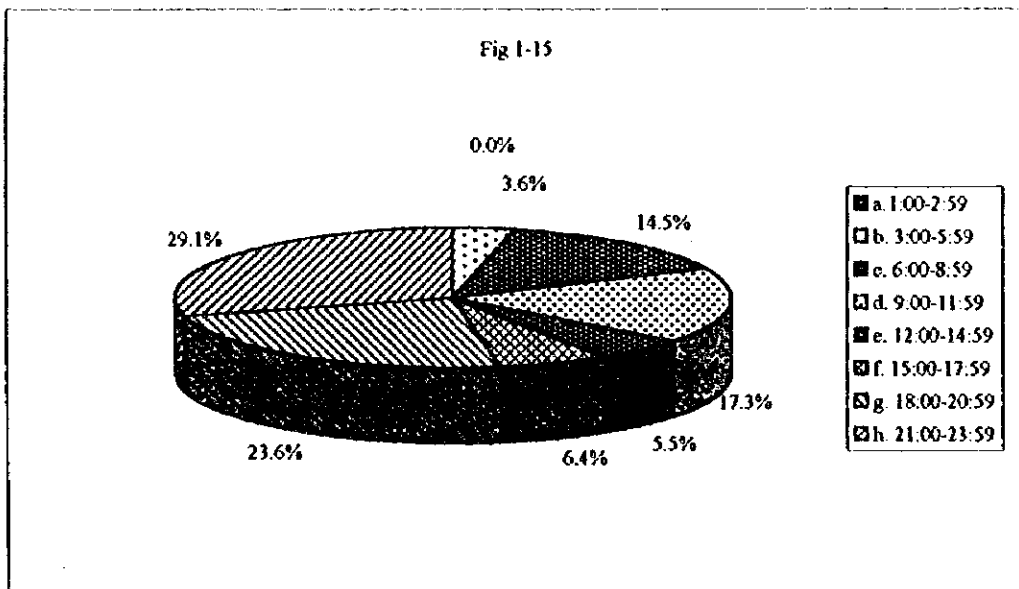


Table 1-16 Segregated Hazardous Waste

		%
a. Separate from others	13	13.8%
b. Mixed with other waste	80	85.1%
C. Other	1	1.1%
Total	94	

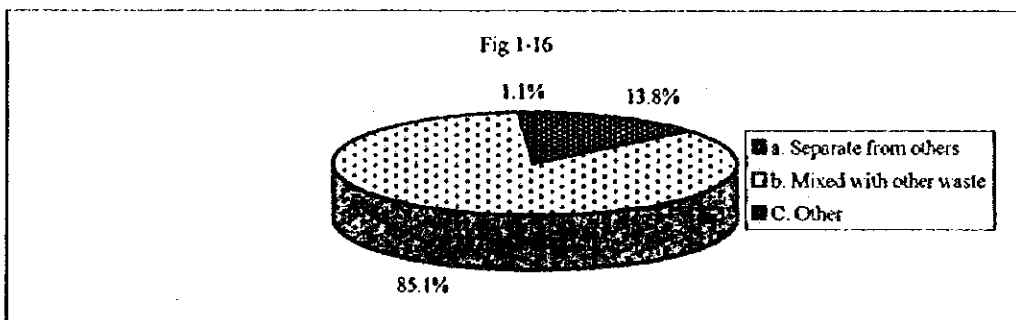


Table 1-17 How to Discharge Hazardous Waste

		%
a. Collection Service	0	0.0%
b. Transfer Station	9	69.2%
c. Waste Container	3	23.1%
d. Other	1	7.7%
Total	13	

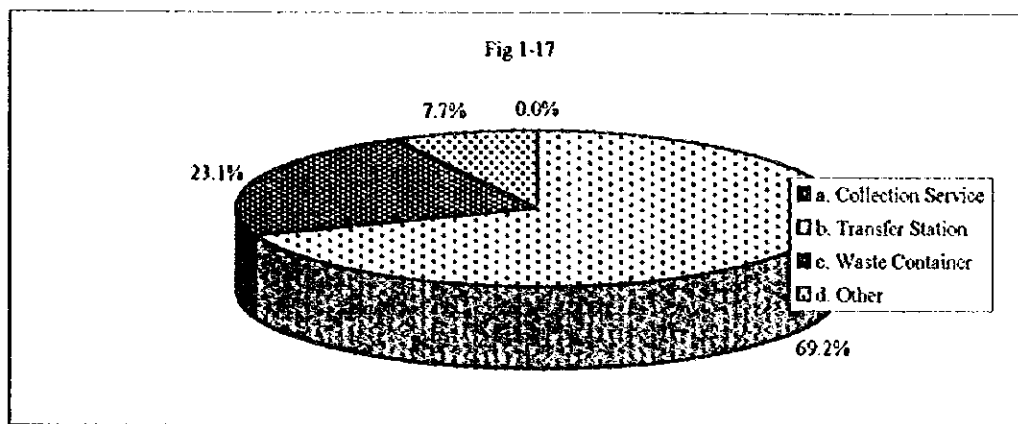


Table 1-18 What Kinds of Bulky Wastes

		%
a. Television (TV)	2	3.6%
b. Refrigerator	4	7.3%
c. Other electrical appliances	11	20.0%
d. Furniture	7	12.7%
e. Bicycle	10	18.2%
f. Construction Waste	15	27.3%
g. Other	6	10.9%
<b>Total</b>	<b>55</b>	

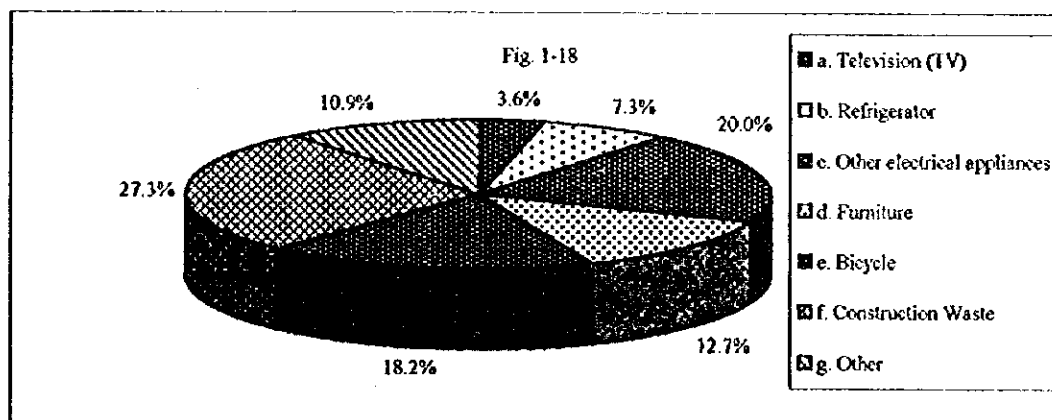


Table 1-19 Where to Discharge Bulky Waste

		%
a. Collection Service	3	7.7%
b. Sell to a dealer	0	0.0%
c. Discharge by oneself	4	10.3%
d. Carry to transfer station directly	25	64.1%
e. Other	6	15.4%
f. Workshop	1	2.6%
<b>Total</b>	<b>39</b>	



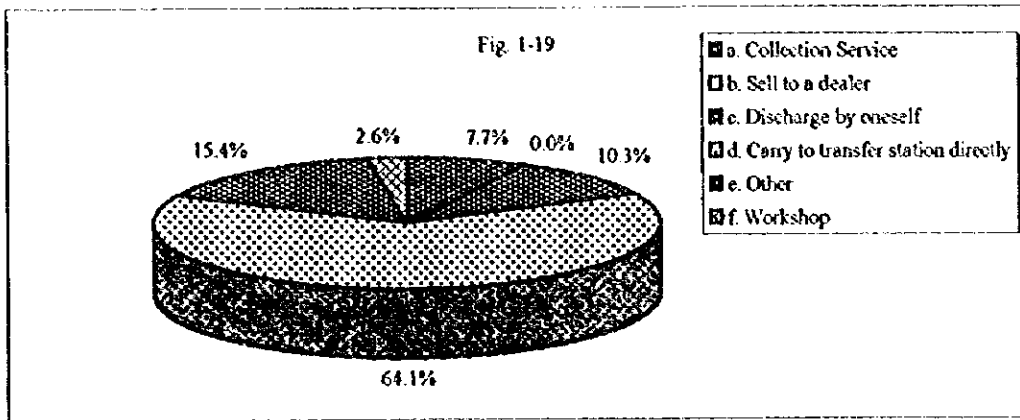


Table 1-20 Not Use (Misunderstanding Question)

Collection Service Question

Table 1-21 Who Is Undertaking the Collection Service

		%
a. Individual	21	22.3%
b. Private	2	2.1%
c. Government	13	13.8%
d. Transfer Station by Oneself	15	16.0%
e. Waste Container by Oneself	43	45.7%
f. Other	0	0.0%
Total	94	

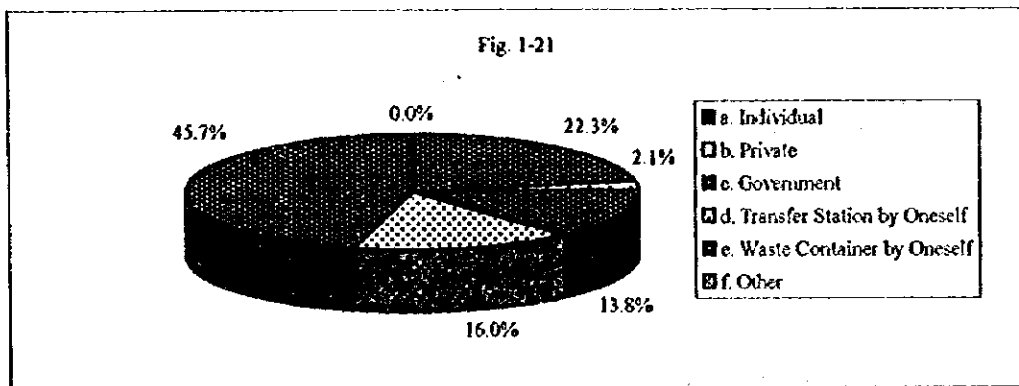


Table 1-22 Collecting at Fixed Time

		%
Yes	30	83.3%
No	6	16.7%
Total	36	

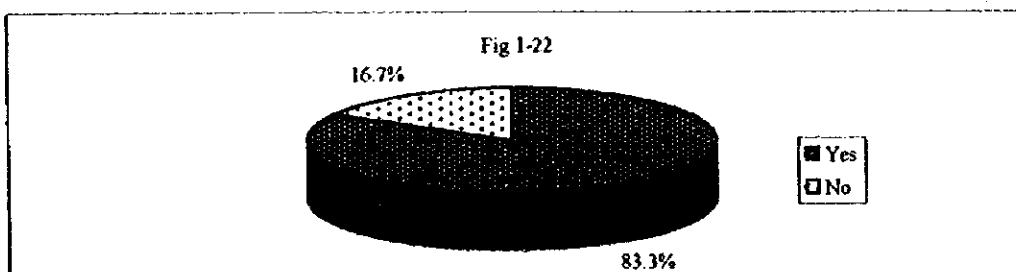


Table 1-23 Collecting Time

		%
a. 1:00-2:59	0	0.0%
b. 3:00-5:59	1	2.0%
c. 6:00-8:59	9	18.0%
d. 9:00-11:59	15	30.0%
e. 12:00-14:59	5	10.0%
f. 15:00-17:59	5	10.0%
g. 18:00-20:59	10	20.0%
h. 21:00-23:59	5	10.0%
<b>Total</b>	<b>50</b>	

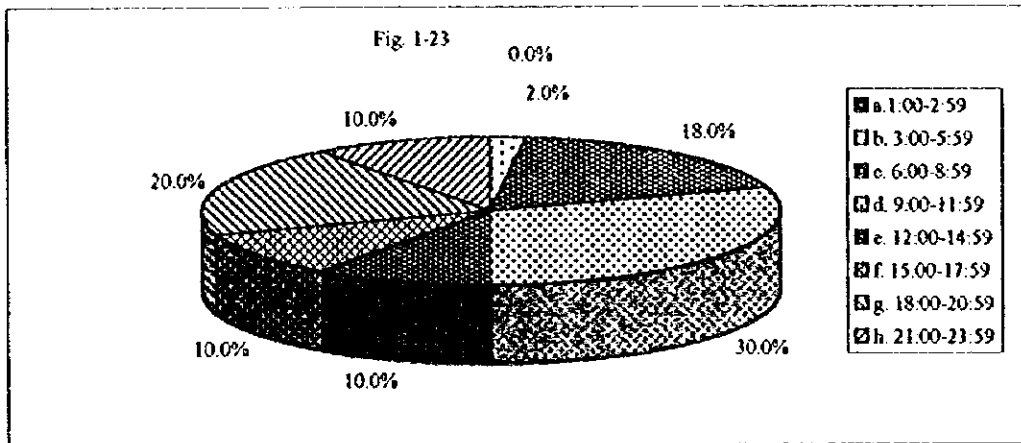


Table 1-24 Collecting Vehicle

		%
a. Collection Vehicle	12	33.3%
b. Container Truck	1	2.8%
c. Pick-Up Truck	1	2.8%
d. Hand Cart	11	30.6%
e. Bicycle	7	19.4%
f. Other	4	11.1%
<b>Total</b>	<b>36</b>	

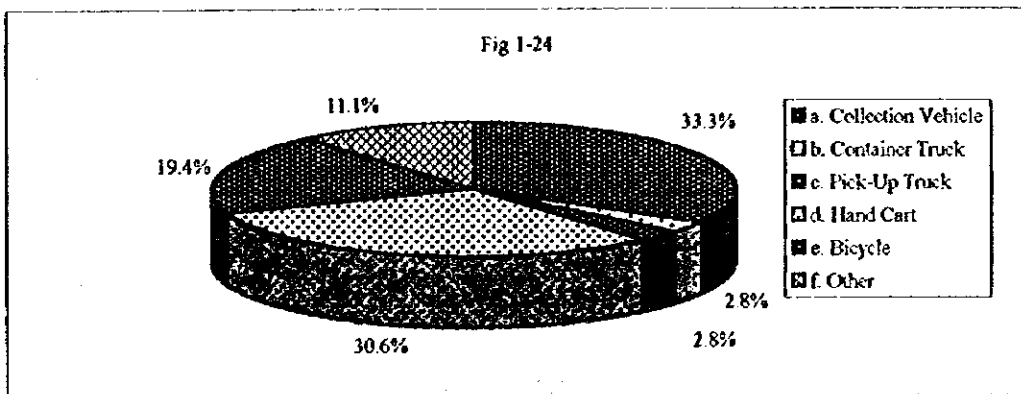


Table 1-25 Satisfaction with collection Service

		%
Yes	35	97.2%
No	1	2.8%
Total	36	

Table 1-26 Reason for Not Satisfied Collection Service

a. Frequency is low	0
b. Collection time is irregular	0
c. Behavior of worker is bad	3
d. Collection work is rough	1
e. Collection fee is expensive	1
f. Other	0

Table 1-27 How to Collect Waste

		%
a. Private Collection by Vehicle	2	2.1%
b. Individual Collection by Hand Cart	21	22.3%
c. Government Collection by Door to Door	13	13.8%
d. Carry to Collection Station by Oneself	57	60.6%
e. Other	1	1.1%
Total	94	

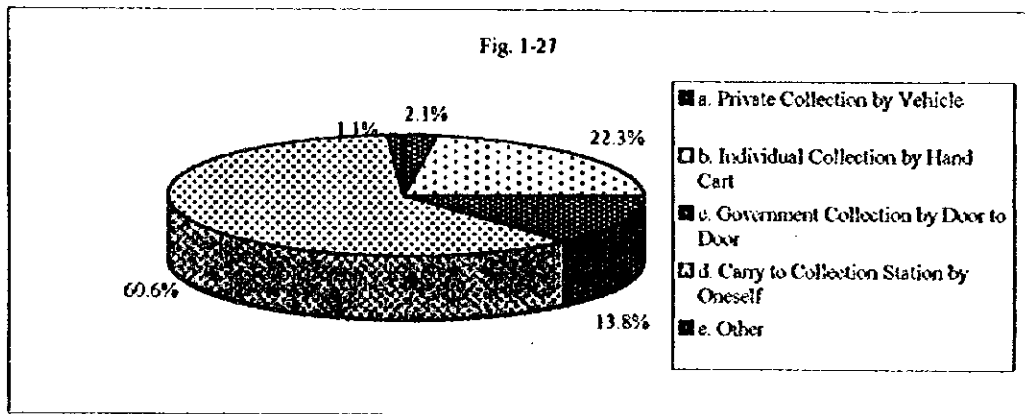


Table 1-28 Distance to Collection Station

		%
a. Less than 10m	0	0.0%
b. 10-29m	1	1.2%
c. 30-49m	3	3.6%
d. 50m or more	79	95.2%
Total	83	

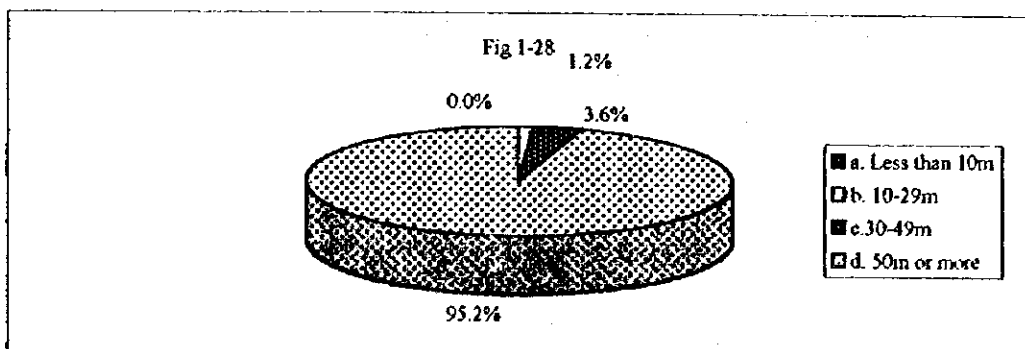


Table 1-29 Cleanliness of Collection Station

		%
a. Clean	7	8.3%
b. Normal	40	47.6%
c. Dirty	37	44.0%
Total	84	

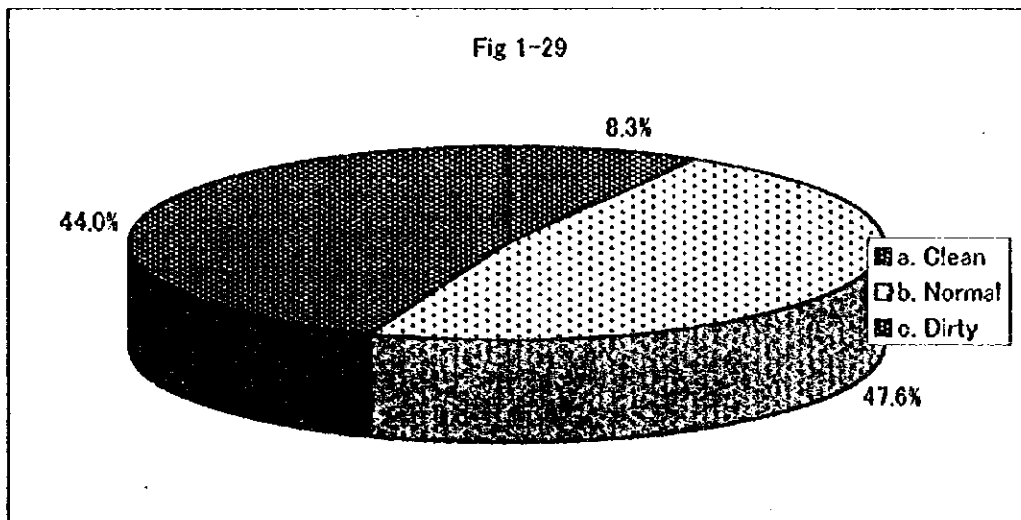


Table 1-30 Pay for The Collection Service

		%
Yes	36	38.3%
No	58	61.7%
Total	94	

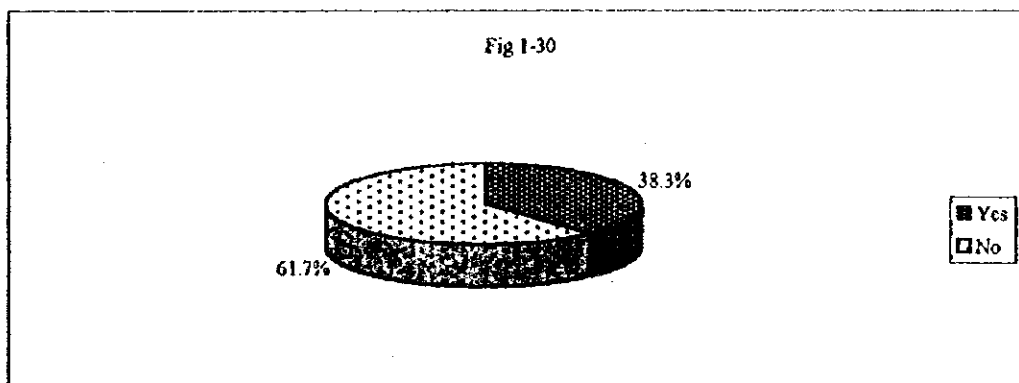


Table 1-31 Collection Fee

Average (Rf / Month)	163.61
Total Respondent	36

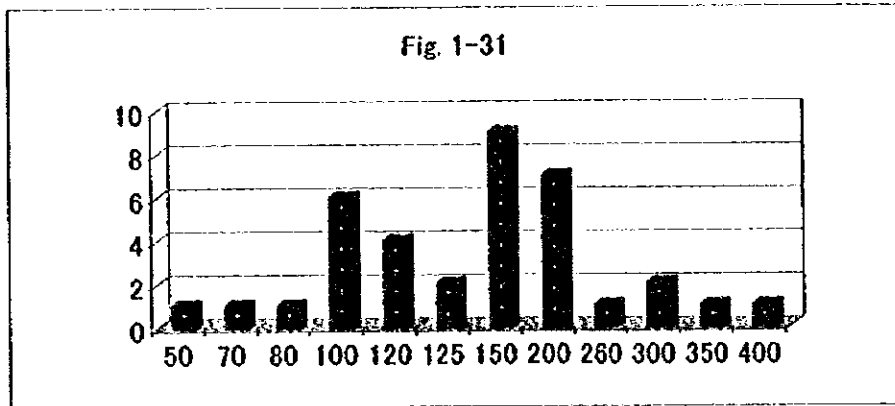


Table 1-32 Collection Fee Rate

		%
a. Too expensive	0	0.0%
b. Expensive	4	11.4%
c. Appropriate	29	82.9%
d. Cheap	2	5.7%
Total	35	

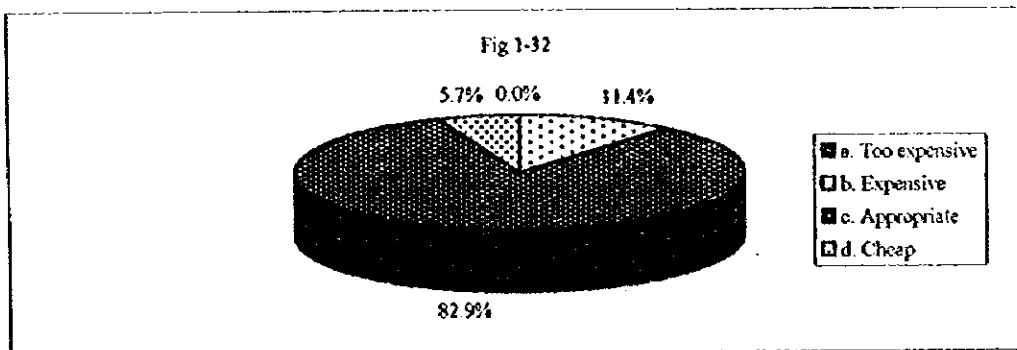
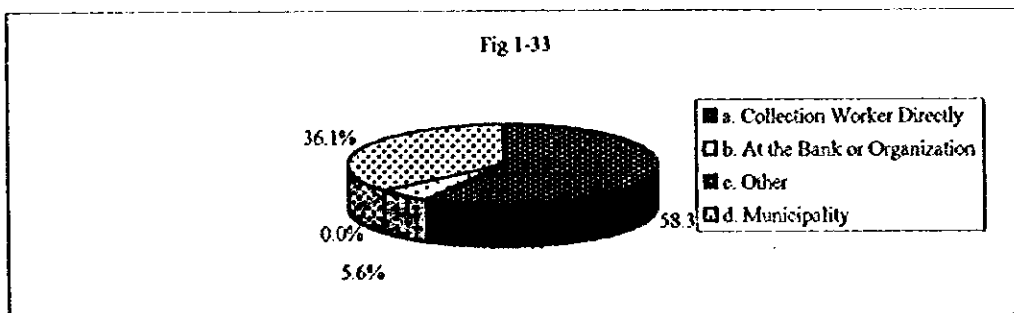


Table 1-33 How to Pay for Collection Fee

		%
a. Collection Worker Directly	21	58.3%
b. At the Bank or Organization	2	5.6%
c. Other	0	0.0%
d. Municipality	13	36.1%
Total	36	



**Recycling Questions**

Table 1-34 Separating Recyclable Items		%
Yes	9	9.6%
No	85	90.4%
<b>Total</b>	<b>94</b>	

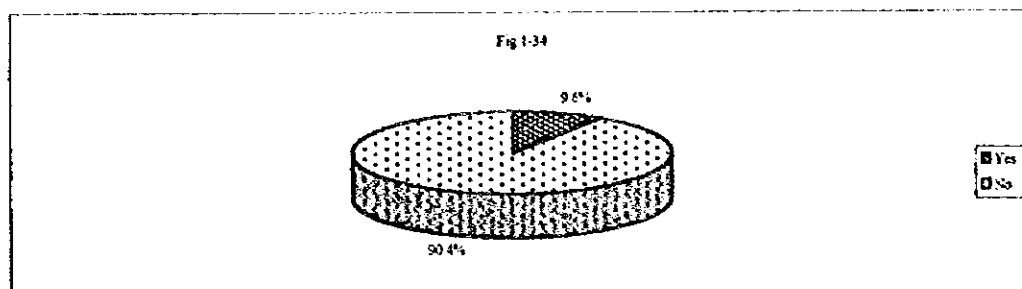


Table 1-35 How to discharge Recyclable Items		%
a. Private Collection with Charge	4	44.4%
b. Private Collection without charge	0	0.0%
c. Sell by Oneself	0	0.0%
d. Other	5	55.6%
<b>Total</b>	<b>9</b>	

Table 1-36 Type of Recyclable Items		%
a. Newspaper	4	30.8%
b. Paper	3	23.1%
c. Glass Bins/Bottles	2	15.4%
d. Steel-cans	1	7.7%
e. Aluminum-cans	0	0.0%
f. Pet-Bottles	3	23.1%
g. Other	0	0.0%
<b>Total</b>	<b>13</b>	

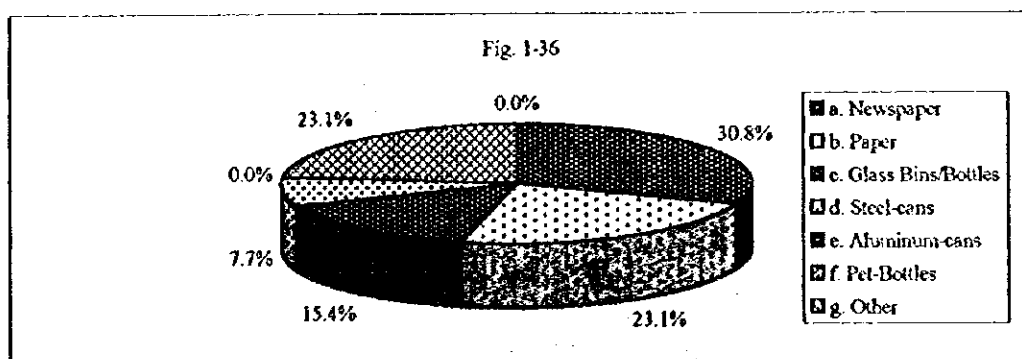


Table 1-37 Community Group Collection		%
Yes	4	4.3%
No	90	95.7%
<b>Total</b>	<b>94</b>	

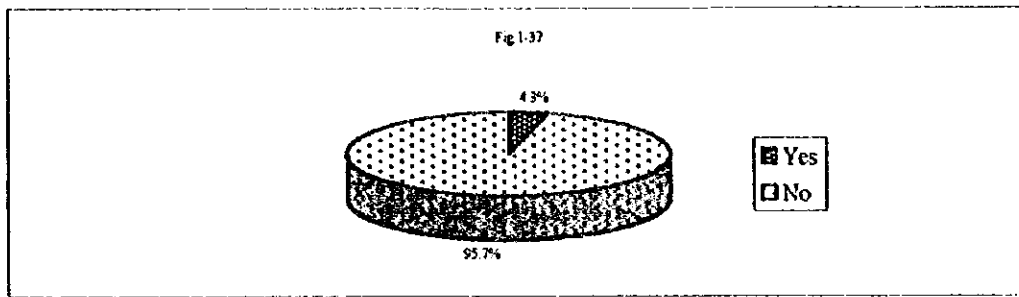


Table 1-38 What Kinds of Community Groups

		%
a. School	0	0.0%
b. Neighborhood Group	1	25.0%
c. Other	3	75.0%
Total	4	

Public Awareness Questions

Table 1-39 Responsibility for Solid Waste Disposal

		%
a. Government	79	76.0%
b. Manufacture	0	0.0%
c. Seller	0	0.0%
d. Private	22	21.2%
e. Other	3	2.9%
Total	104	

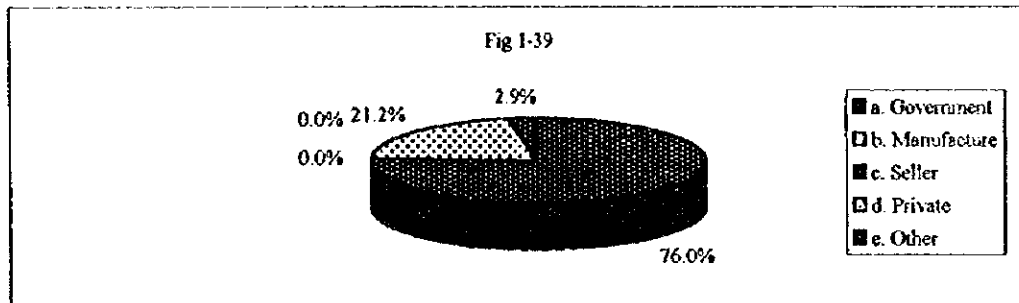


Table 1-40 Know Disposal Point

		%
Yes	89	94.7%
No	5	5.3%
Total	94	

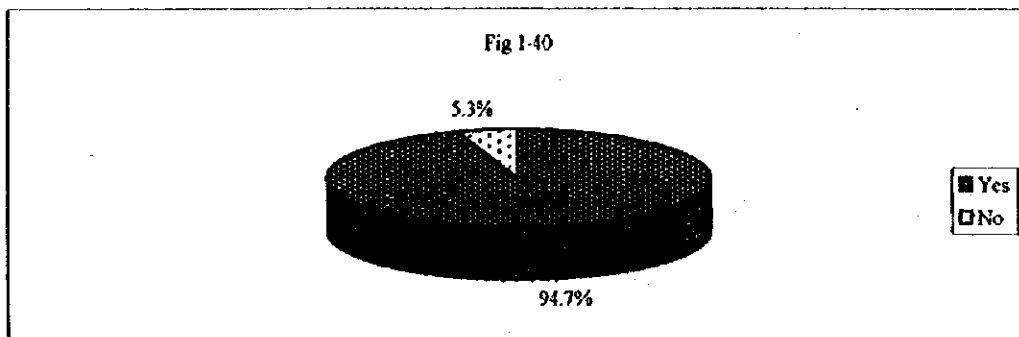


Table 1-41 Know Waste Contains Recyclable Items

		%
Yes	77	81.9%
No	17	18.1%
Total	94	

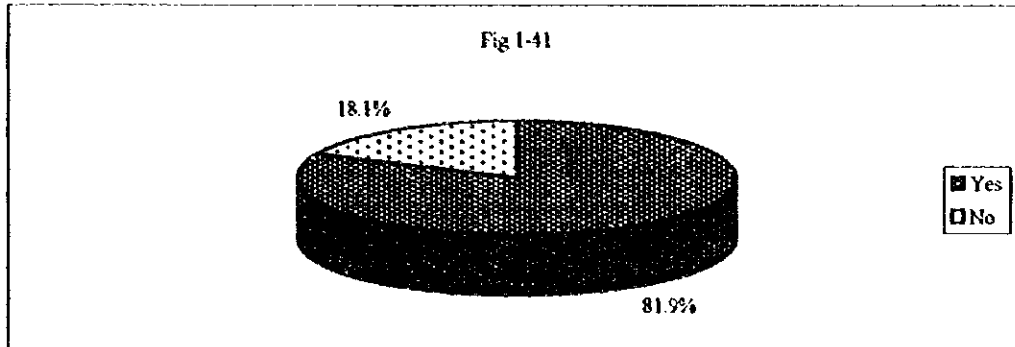


Table 1-42(1) Know a Part of The Waste Is Recycling

		%
Yes	67	71.3%
No	27	28.7%
Total	94	

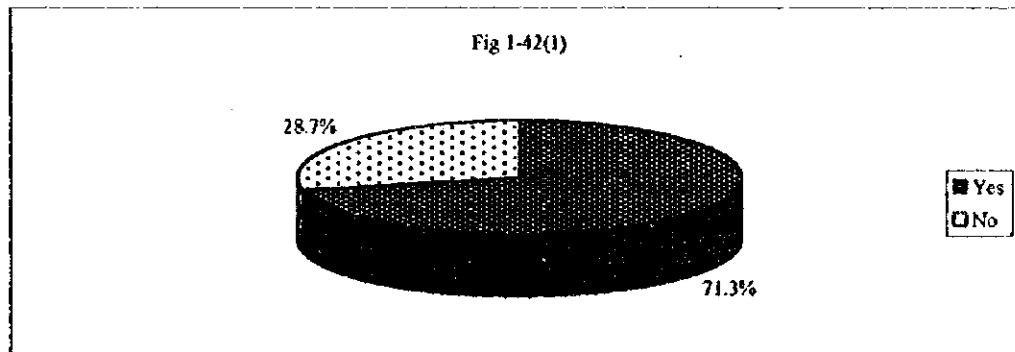


Table 1-42(2) What You Know Recycling Items

		%
Paper	58	34.1%
Bottles	23	13.5%
Plastic	23	13.5%
Rubber	1	0.6%
Pet Bottles	28	16.5%
Cans	13	7.6%
Woods	3	1.8%
Glass	10	5.9%
Tin	11	6.5%
Total	170	



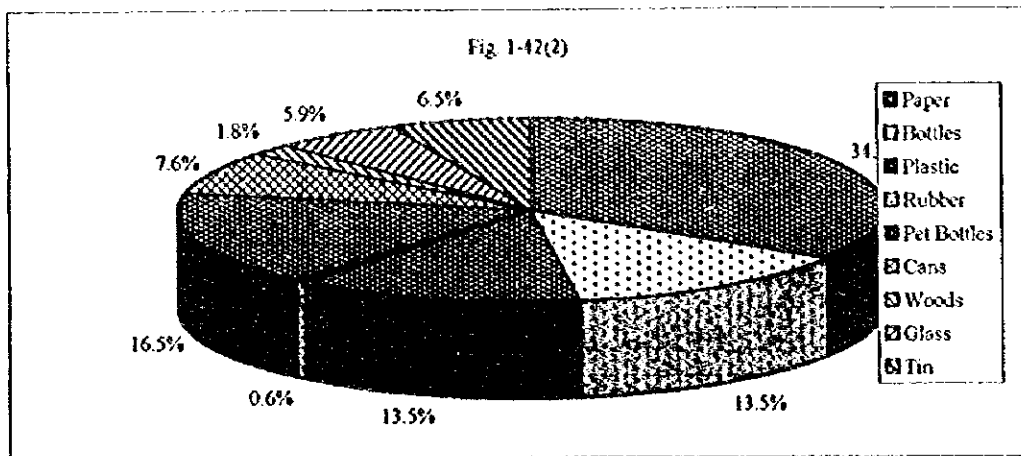
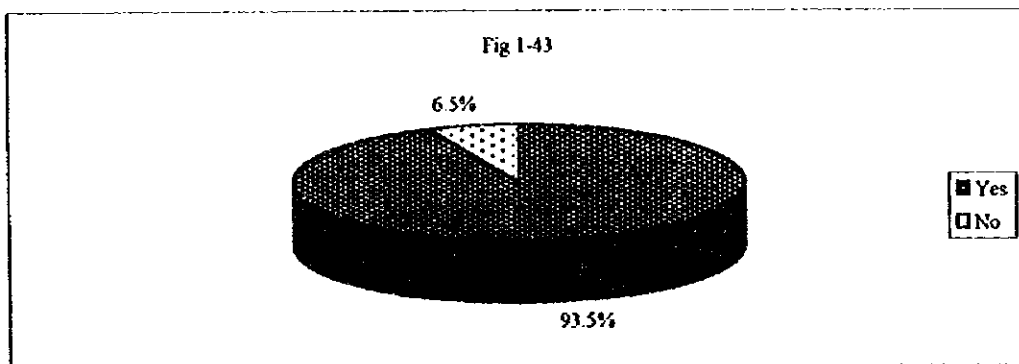


Table 1-43 Will Cooperate with Community Group Collecting

Yes	87	93.5%
No	6	6.5%
Total	93	



Public Educational Questions

Table 1-44 Do you have Social Activities in Your Area

		%
Yes	2	2.1%
No	92	97.9%
Total	94	

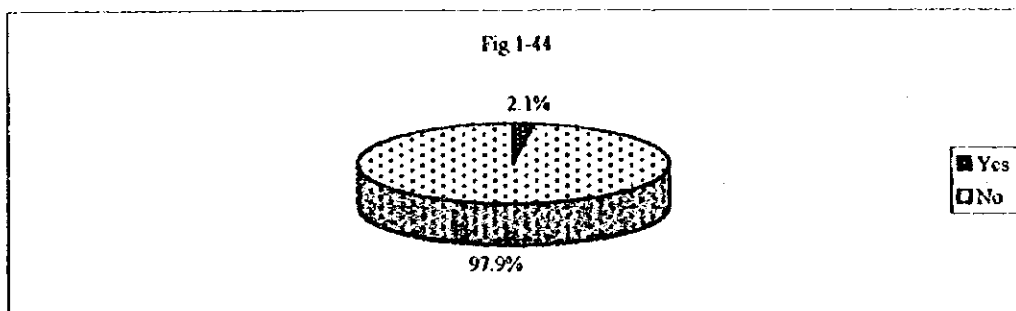


Table 1-45 Do you have Public Awareness Programs in Your Area

		%
Yes	82	87.2%
No	12	12.8%
Total	94	

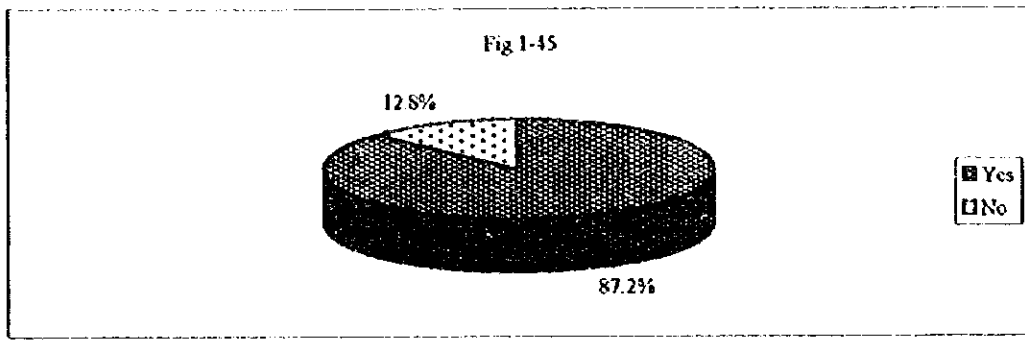


Table 1-46 Do your school have Curriculums		%
Yes	93	98.9%
No	1	1.1%
Total	94	

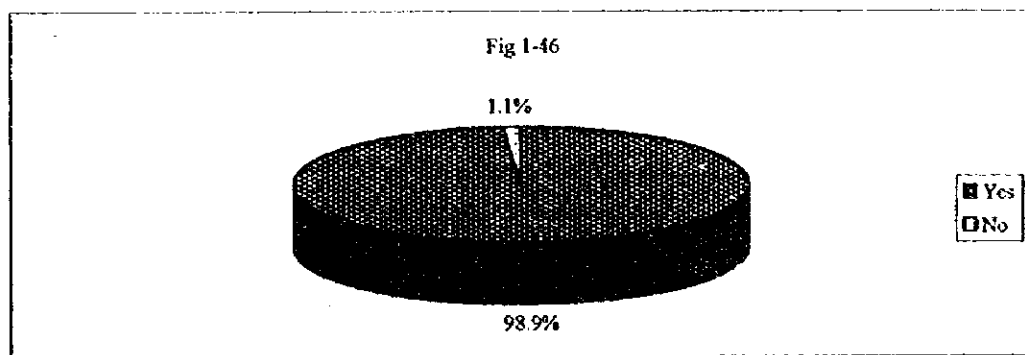


Table 1-47(1) Necessity of Waste Management Studying		%
Yes	82	87.2%
No	12	12.8%
Total	94	

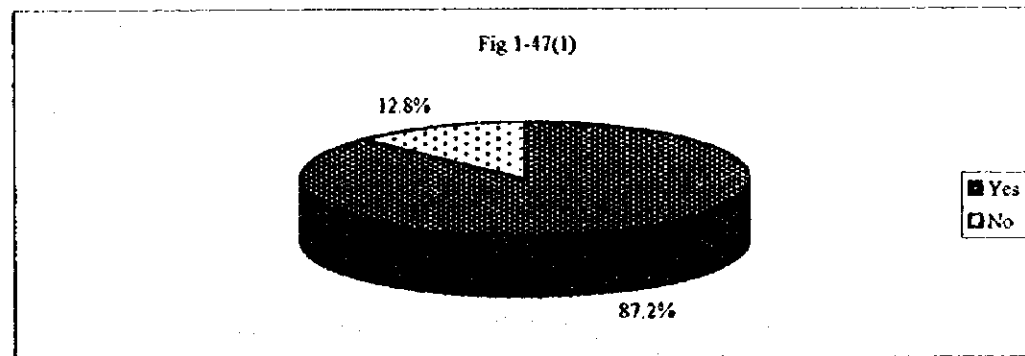
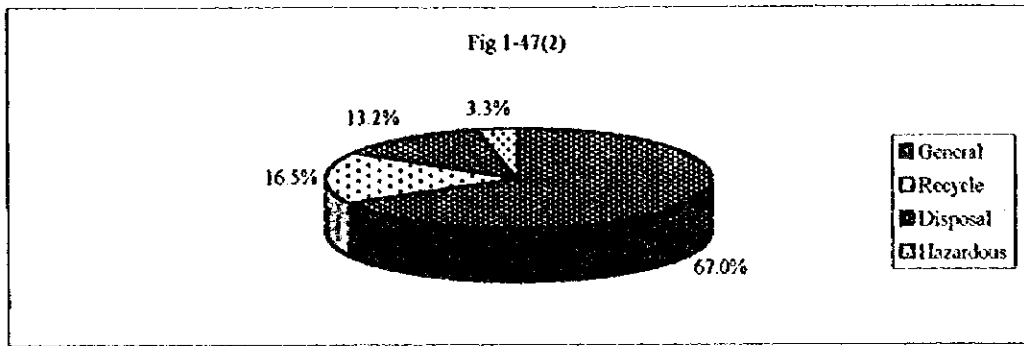


Table 1-47(2) What You Want to Study		%
General	61	67.0%
Recycle	15	16.5%
Disposal	12	13.2%
Hazardous	3	3.3%
Total	91	



**Improved Service Plan Questions**

Table 1-48 Wanted Container type in House		%
a. Plastic Bag	14	13.7%
b. Plastic Bucket	84	82.4%
c. Container	4	3.9%
d. Other	0	0.0%
<b>Total</b>	<b>102</b>	

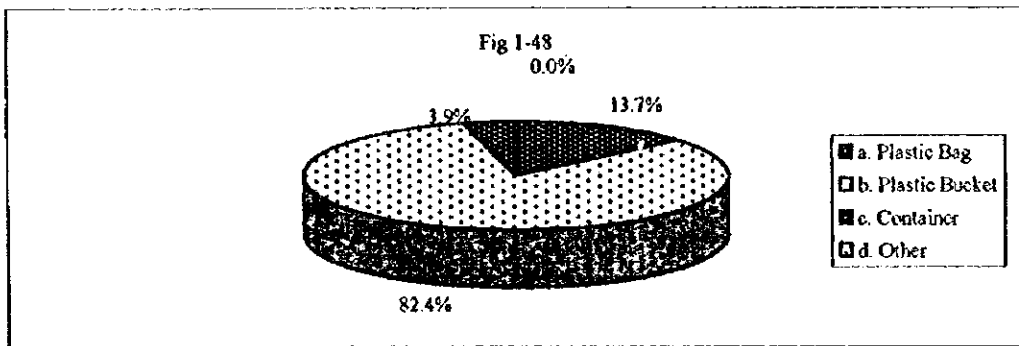


Table 1-49 Convenient Collection Service		%
a. Door to Door Collection	88	87.1%
b. Stationary Collection	13	12.9%
c. I do not know	0	0.0%
<b>Total</b>	<b>101</b>	

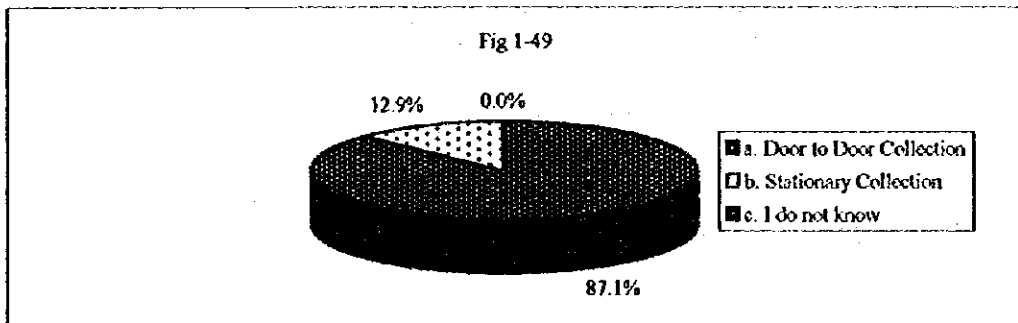


Table 1-50 Willingness to Separate Waste		%
Yes	92	97.9%
No	2	2.1%
<b>Total</b>	<b>94</b>	

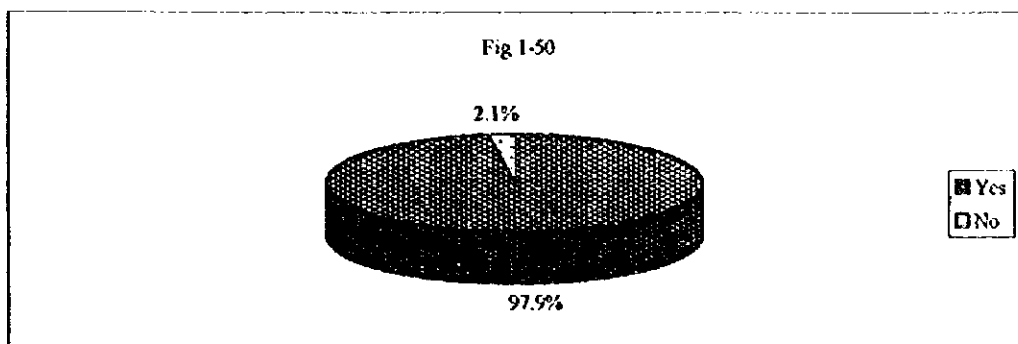


Table 1-51 How many Kinds of separation

		%
a. Two Item (Food and Paper / Others)	40	43.5%
b. Three Items (Food and Paper / Other / Recyclable Item)	51	55.4%
c. Other	1	1.1%
d. I do not know	0	0.0%
Total	92	

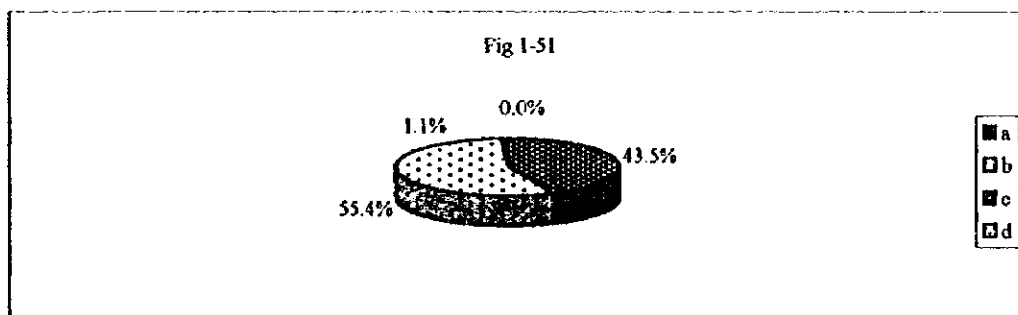


Fig. 1-52 Convenient Time to collection

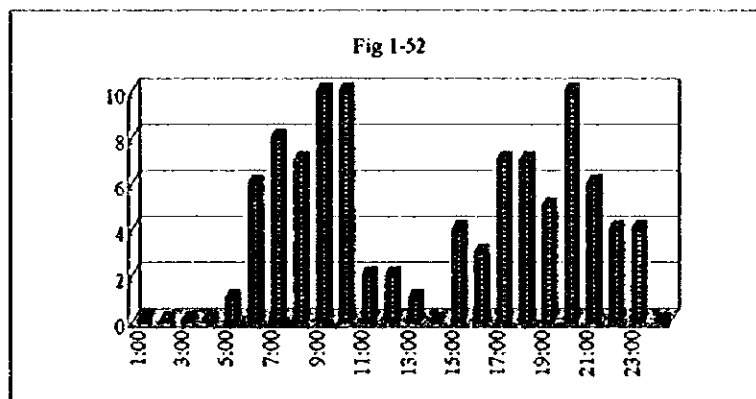


Table 1-53 Frequency of Collection Service

	Average	Total Respondent
a-Food (Week)	6.90	40
Other (Week)	4.35	
b-Food (Week)	6.88	51
Other (Week)	4.47	
Recyclable (Week)	1.31	
c-Waste (Week)	7	1
Recyclable (Week)	1	
d. Mixed (Week)	7	2
e. I do not know	0	0

Table 1-54 Willingness to pay for Improved Collection

		%
Yes	89	94.7%
No	5	5.3%
Total	94	

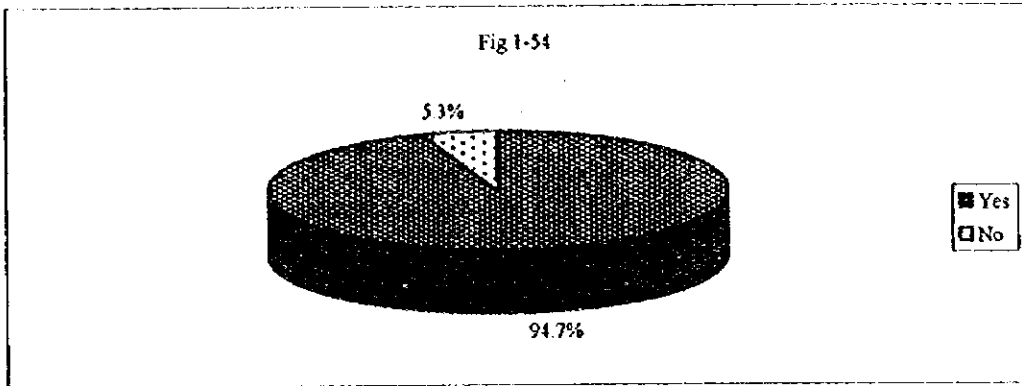
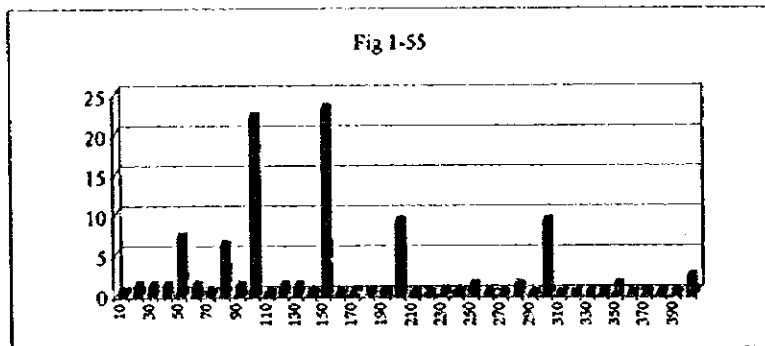


Table 1-55 Appropriate Fee

Average (Rf / Month)	149.15
Total Respondents	88



## Villingili Island (1-56 ~ 1-109)

General Questions

Table 1-56 Type of Building

		%
a. Detached	9	90.0%
b. Complex	1	10.0%
c. Commercial and Living Space	0	0.0%
Total	10	

Table 1-57 Respondent

		%
a. The Master or Husband	7	70.0%
b. Housewife	2	20.0%
c. Other Home Member	1	10.0%
d. Other	0	0.0%
Total	10	

Table 1-58 Number of House Members

	Average
Adult	6.6
Child (<12)	4.90
Number of Person Per House	11.50
Families	1.3

Table 1-59&amp;1-60 Family Income

	Average	Total Respondent
Number of Shearing	1.90	
Total Income (Rf / Month)	7500.00	10

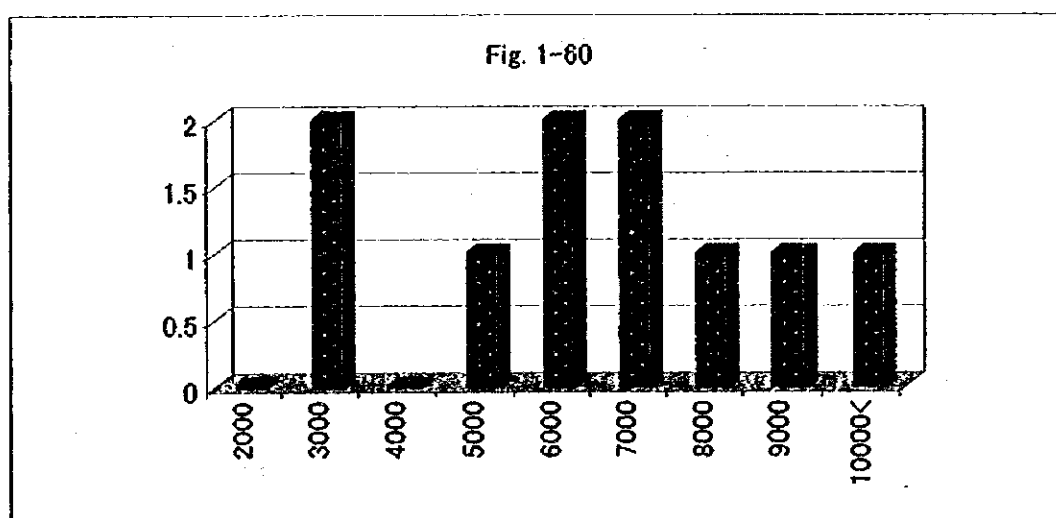


Table 1-61 Length of Time Lived in House

		%
a. Less than 5 years	10	100.0%
b. 5 to 9 years	0	0.0%
c. 10 to 19 years	0	0.0%
d. 20 years or more	0	0.0%
Total	10	

Table 1-62 Public Service Fee	Average
a. Water Service (Rf/ Month)	-
b. Electricity Service (Rf/ Month)	679.00

**Waste Question from House**

Table 1-63 Where to Discharge Waste from House		%
a. Government or Private Collection Service	0	0.0%
b. Transfer Station	10	100.0%
c. Waste Container	0	0.0%
d. Other	0	0.0%
Total	10	

Table 1-64 Type of Container in House		%
a. Plastic Bag	6	42.9%
b. Plastic Bucket	5	35.7%
c. Metal Bucket	1	7.1%
d. Carton Box	0	0.0%
e. Sack	2	14.3%
f. Other	0	0.0%
Total	14	

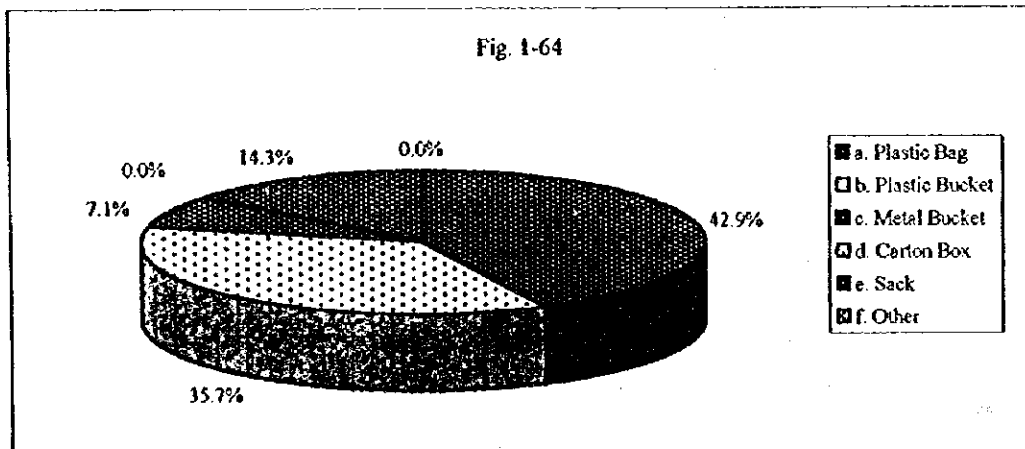


Table 1-65 Using Liner When Discharge Waste		%
Yes	5	50.0%
No	5	50.0%
Total	10	

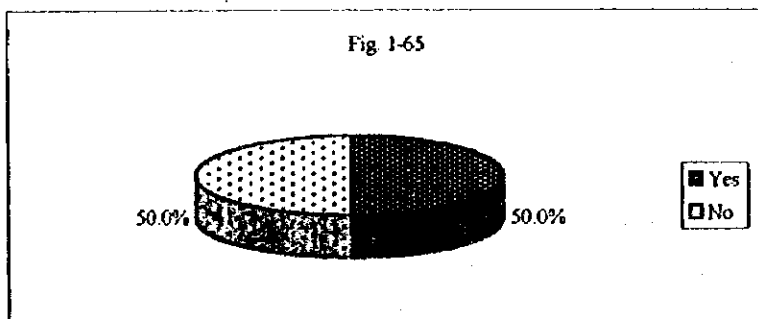


Table 1-66 Reason to Use I-65's Container

		%
a. Clean	3	15.8%
b. Prevents Foul Odor	5	26.3%
c. Manageable	8	42.1%
d. Keep away from Flies	3	15.8%
e. Other	0	0.0%
Total	19	

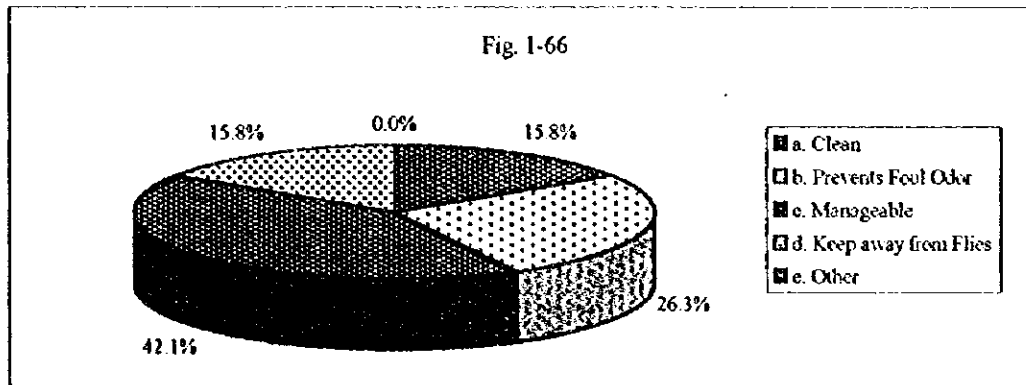


Table 1-67 Position of Waste Container in House

		%
a. In front of the house	5	50.0%
b. Back yard or behind the house	5	50.0%
c. In the kitchen	0	0.0%
d. Other	0	0.0%
Total	10	

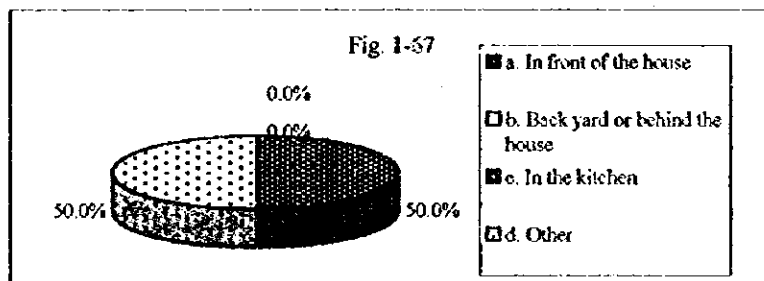


Table 1-68 Frequency of discharging Waste

		%
a. Twice a day	8	72.7%
b. Once a day	2	18.2%
c. Six times a week	0	0.0%
d. Five times a week	0	0.0%
e. Four times a week	0	0.0%
f. Three times a week	0	0.0%
g. Two times a week	0	0.0%
h. Once a week	1	9.1%
i. Once a month	0	0.0%
Total	11	



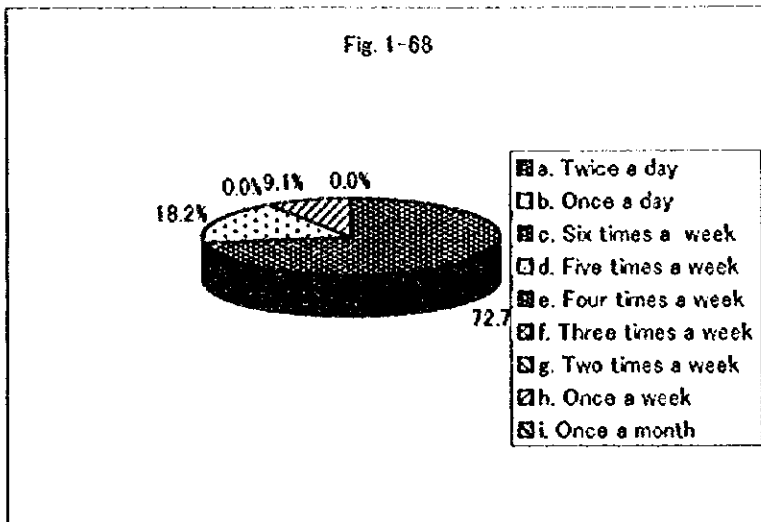


Table 1-69 Discharge Waste at Fixed Time

		%
Yes	3	30.0%
No	7	70.0%
Total	10	

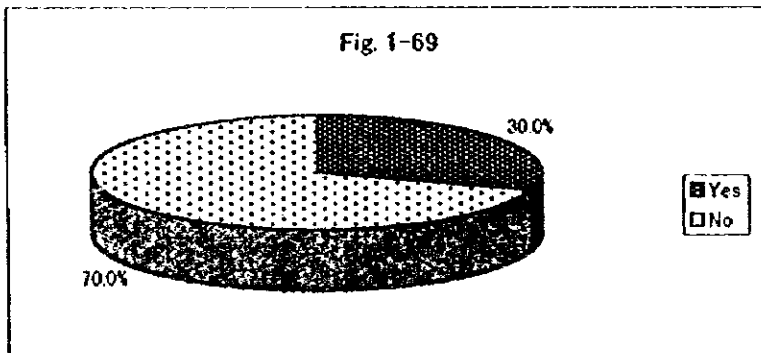


Table 1-70 Time of Discharge Waste from House

		%
a. 1:00-2:59	0	0.0%
b. 3:00-5:59	0	0.0%
c. 6:00-8:59	6	42.9%
d. 9:00-11:59	3	21.4%
e. 12:00-14:59	0	0.0%
f. 15:00-17:59	3	21.4%
g. 18:00-20:59	1	7.1%
h. 21:00-23:59	1	7.1%
Total	14	

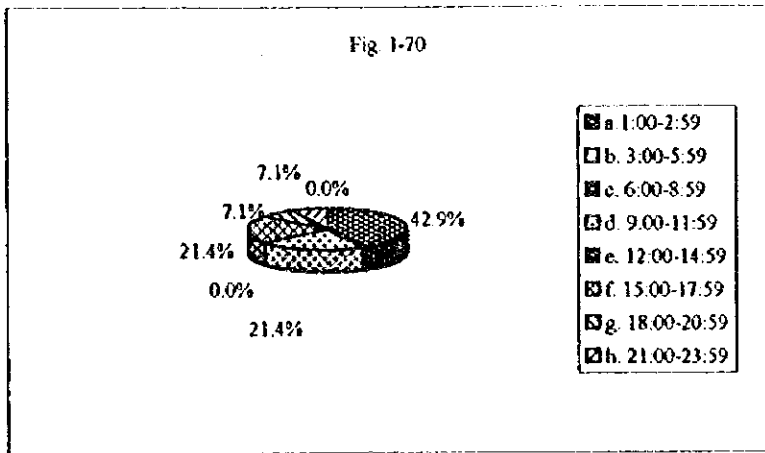


Table 1-71 Segregated Hazardous Waste

		%
a. Separate from others	3	30.0%
b. Mixed with other waste	7	70.0%
C. Other	0	0.0%
Total	10	

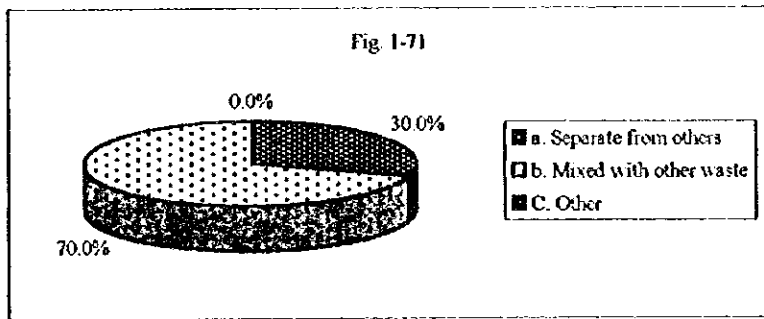


Table 1-72 How to Discharge Hazardous Waste

a. Collection Service	0
b. Transfer Station	3
c. Waste Container	0
d. Other	0
Total	3

Table 1-73 What Kinds of Bulky Wastes

a. Television (TV)	0
b. Refrigerator	0
c. Other electrical appliances	0
d. Furniture	0
e. Bicycle	1
f. Construction Waste	1
g. Other	1
Total	3

Table 1-74 Where to Discharge Bulky Waste

a. Collection Service	0
b. Sell to a dealer	0
c. Discharge by oneself	0
d. Carry to transfer station directly	2
e. Other	0
f. Workshop	0
Total	2

Collection Service Question

Table 1-75 Who Is Undertaking the Collection Service

		%
a. Individual	0	0.0%
b. Private	0	0.0%
c. Government	0	0.0%
d. Transfer Station by Oneself	10	100.0%
e. Waste Container by Oneself	0	0.0%
f. Other	0	0.0%
Total	10	

Table 1-76 Collecting at Fixed Time

Yes	0
No	0
Total	0

Table 1-77 Collecting Time

a. 1:00-2:59	0
b. 3:00-5:59	0
c. 6:00-8:59	0
d. 9:00-11:59	0
e. 12:00-14:59	0
f. 15:00-17:59	0
g. 18:00-20:59	0
h. 21:00-23:59	0
Total	0

Table 1-78 Collecting Vehicle

a. Collection Vehicle	0
b. Container Truck	0
c. Pick-Up Truck	0
d. Hand Cart	0
e. Bicycle	0
f. Other	0
Total	0

Table 1-79 Satisfaction with collection Service

Yes	0
No	0
Total	0

Table 1-80 Reason for Not Satisfied Collection Service

a. Frequency is low	0
b. Collection time is irregular	0
c. Behavior of worker is bad	0
d. Collection work is rough	0
e. Collection fee is expensive	0
f. Other	0

Table 1-81 How to Collect Waste

		%
a. Private Collection by Vehicle	0	0.0%
b. Individual Collection by Hand Cart	0	0.0%
c. Government Collection by Door to Door	0	0.0%
d. Carry to Collection Station by Oneself	10	100.0%
e. Other	0	0.0%
Total	0	

Table 1-82 Distance to Collection Station

		%
a. Less than 10m	0	0.0%
b. 10-29m	0	0.0%
c. 30-49m	0	0.0%
d. 50m or more	10	100.0%
Total	10	

Table 1-83 Cleanliness of Collection Station

		%
a. Clean	0	0.0%
b. Normal	3	30.0%
c. Dirty	7	70.0%
Total	10	

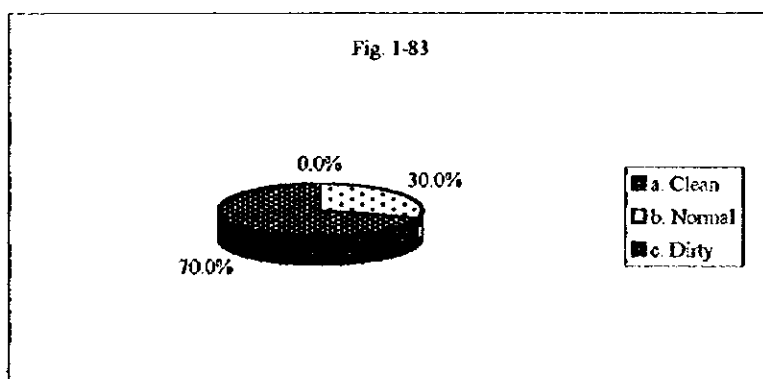


Table 1-84 Pay for The Collection Service

		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-85 Collection Fee

Average (Rf/ Month)	-
Total Respondent	

Table 1-86 Collection Fee Rate

a. Too expensive	0
b. Expensive	0
c. Appropriate	0
d. Cheap	0
Total	0

Table 1-87 How to Pay for Collection Fee

a. Collection Worker Directly	0
b. At the Bank or Organization	0
c. Other	0
d. Municipality	0
Total	0

**Recycling Questions**

Table 1-88 Separating Recyclable Items

		%
Yes	2	20.0%
No	8	80.0%
Total	10	

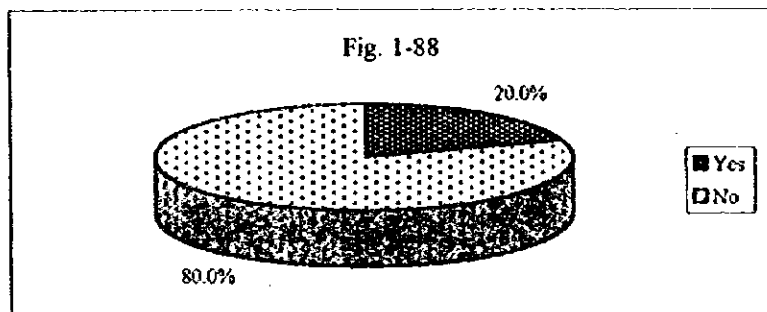


Table 1-89 How to discharge Recyclable Items

a. Private Collection with Charge	0
b. Private Collection without charge	0
c. Sell by Oneself	0
d. Other	2
Total	2

Table 1-90 Type of Recyclable Items

		%
a. Newspaper	2	28.6%
b. Paper	0	0.0%
c. Glass Bins/Bottles	2	28.6%
d. Steel-cans	1	14.3%
e. Aluminum-cans	0	0.0%
f. Pet-Bottles	1	14.3%
g. Other	1	14.3%
Total	7	

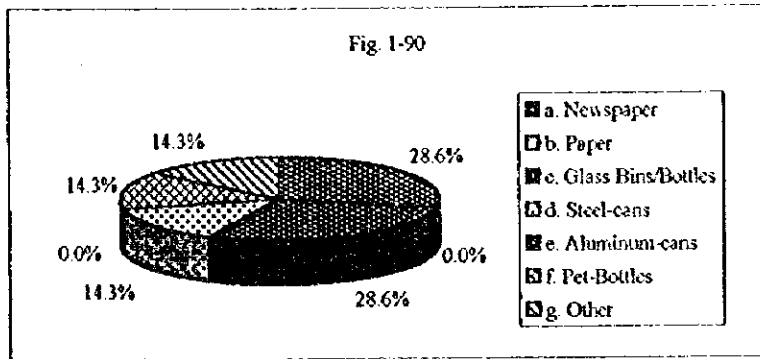


Table 1-91 Community Group Collection

		%
Yes	1	10.0%
No	9	90.0%
Total	10	

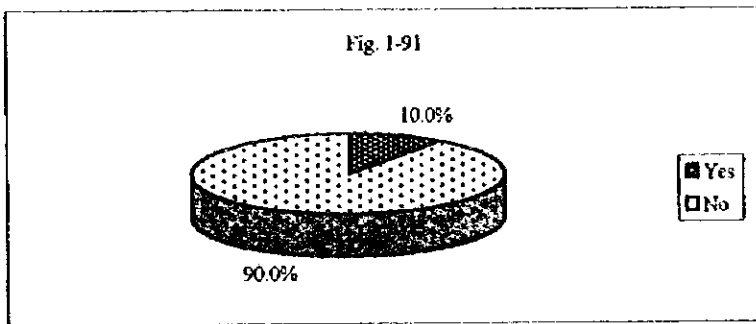


Table 1-92 What Kinds of Community Groups

a. School	0
b. Neighborhood Group	1
c. Other	0
Total	1

**Public Awareness Questions**

Table 1-93 Responsibility for Solid Waste Disposal

		%
a. Government	8	80.0%
b. Manufacture	0	0.0%
c. Seller	0	0.0%
d. Private	1	10.0%
e. Other	1	10.0%
Total	10	

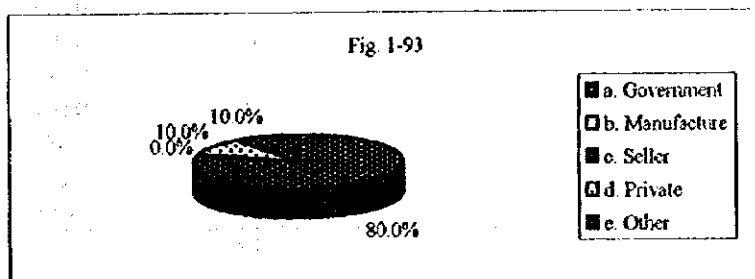


Table 1-94 Know Disposal Point

		%
Yes	10	100.0%
No	0	0.0%
Total	10	

Table 1-95 Know Waste Contains Recyclable Items

		%
Yes	8	80.0%
No	2	20.0%
Total	10	

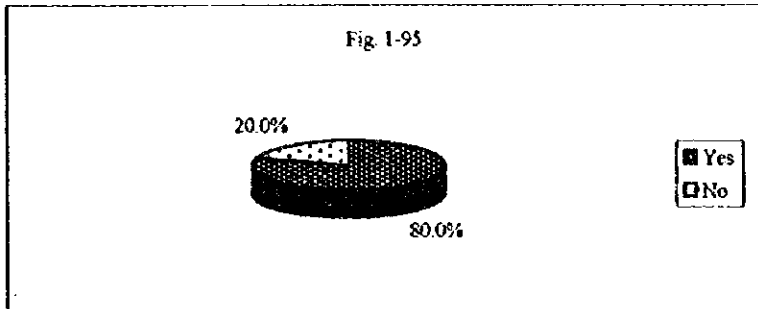


Table 1-96(1) Know a Part of The Waste Is Recycling

		%
Yes	6	60.0%
No	4	40.0%
Total	10	

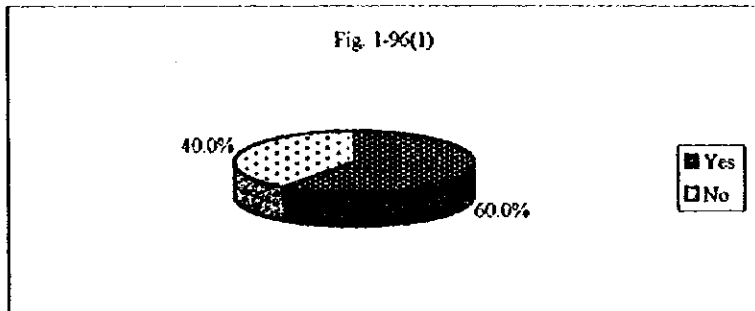


Table 1-96(2) What You Know Recycling Items

		%
Paper	4	30.8%
Bottles	3	23.1%
Plastic	0	0.0%
Rubber	0	0.0%
Pet Bottles	2	15.4%
Cans	0	0.0%
Woods	1	7.7%
Glass	0	0.0%
Tin	3	23.1%
Total	13	

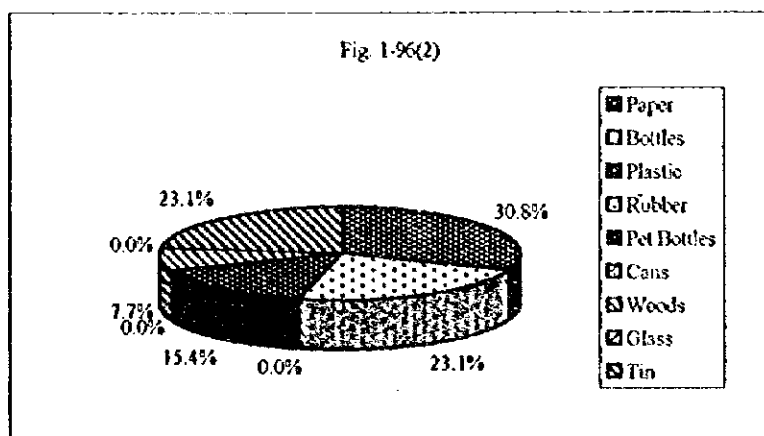


Table 1-97 Will Cooperate with Community Group Collecting

Yes	10	100.0%
No	0	0.0%
Total	10	

**Public Educational Questions**

Table 1-98 Do you have Social Activities in Your Area

		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-99 Do you have Public Awareness Programs in Your Area

		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-100 Do your school have Curriculums

		%
Yes	10	100.0%
No	0	0.0%
Total	10	

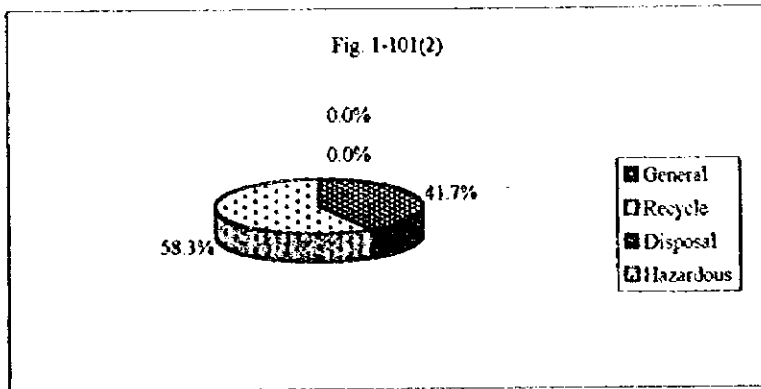
Table 1-101(1) Necessity of Waste Management Studying

		%
Yes	10	100.0%
No	0	0.0%
Total	10	

Table 1-101(2) What You Want to Study

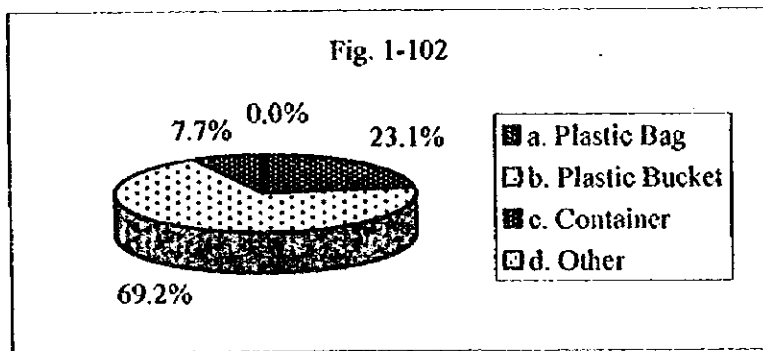
		%
General	5	41.7%
Recycle	7	58.3%
Disposal	0	0.0%
Hazardous	0	0.0%
Total	12	



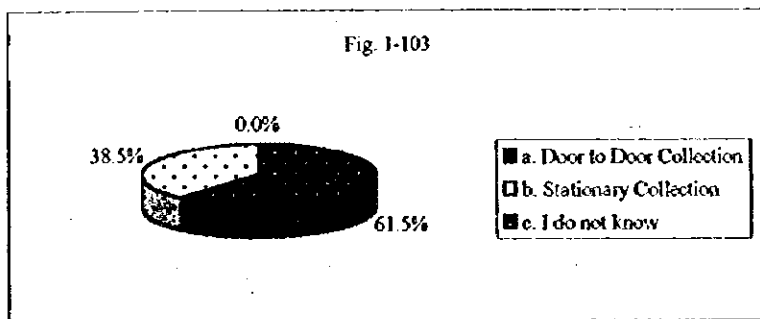


**Improved Service Plan Questions**

Wanted Container type in House		%
a. Plastic Bag	3	23.1%
b. Plastic Bucket	9	69.2%
c. Container	1	7.7%
d. Other	0	0.0%
<b>Total</b>	<b>13</b>	



Convenient Collection Service		%
a. Door to Door Collection	8	61.5%
b. Stationary Collection	5	38.5%
c. I do not know	0	0.0%
<b>Total</b>	<b>13</b>	



		%
Yes	10	100.0%
No	0	0.0%
Total	10	

		%
a. Two Item (Food and Paper / Others)	3	30.0%
b. Three Items (Food and Paper / Other / Recyclable Item)	7	70.0%
c. Other	0	0.0%
d. I do not know	0	0.0%
Total	10	

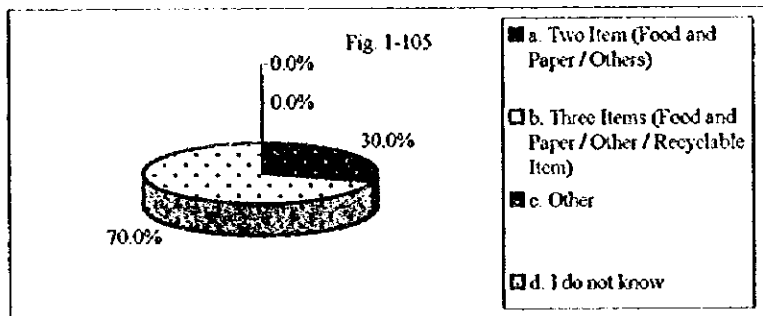
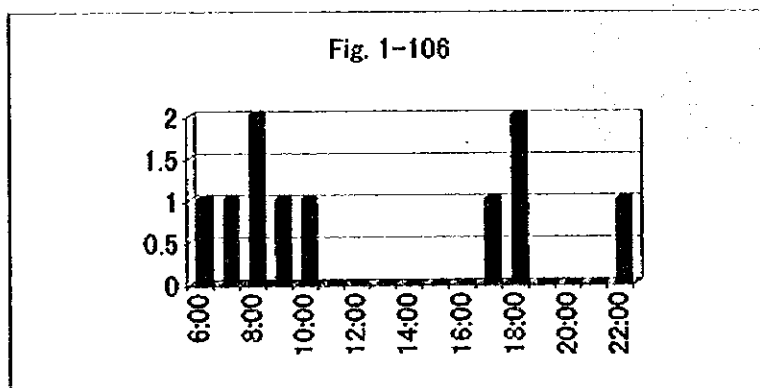


Fig. 1-106 Convenient Time to collection



Total

	Average	Respondent
a-Food (Week)	7.00	3
Other (Week)	1.67	
b-Food (Week)	7.00	7
Other (Week)	5.14	
Recyclable (Week)	1.86	
c-Waste (Week)		0
Recyclable (Week)		
d. Mixed (Week)		0
e. I do not know		

		%
Yes	9	90.0%
No	1	10.0%
Total	10	

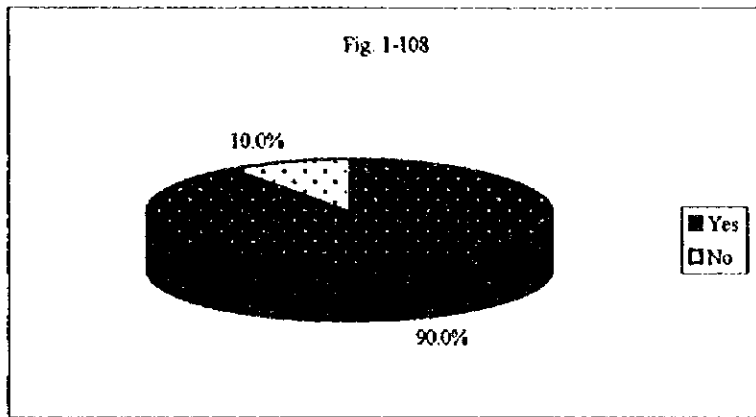
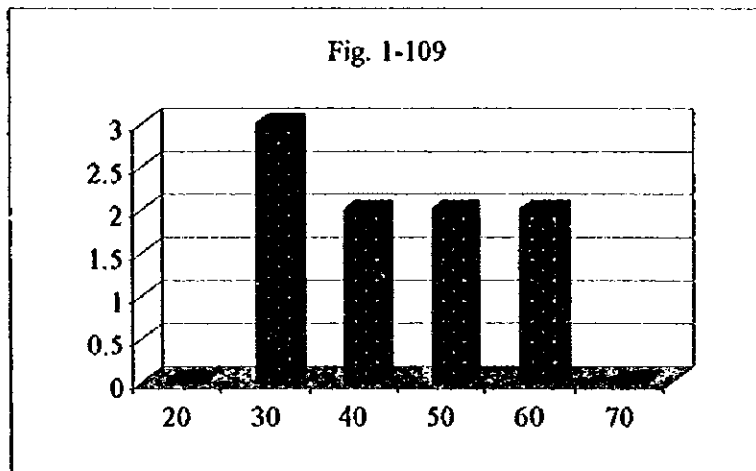


Table 1-109 Appropriate Fee

Average (Rf / Month)	43.33
Total Respondents	9



**Thulusdhool Island (1-110 ~ 1-164)****General Questions**

Table 1-110 Type of Building		%
a. Detached	10	100.0%
b. Complex	0	0.0%
c. Commercial and Living Space	0	0.0%
Total	10	

Table 1-111 Respondent		%
a. The Master or Husband	4	40.0%
b. Housewife	3	30.0%
c. Other Home Member	3	30.0%
d. Other	0	0.0%
Total	10	

Table 1-112 Number of House Members	Average
Adult	7.3
Child (<12)	4.6
Number of Person Per House	11.9
Families	1.5

Table 1-113&1-114 Family Income	Average
Number of Shearing	3.2
Total Income (Rf/ Month)	5200

Table 1-115 Length of Time Lived in House		%
a. Less than 5 years	0	0.0%
b. 5 to 9 years	1	10.0%
c. 10 to 19 years	1	10.0%
d. 20 years or more	8	80.0%
Total	10	

Table 1-116 Public Service Fee	Average
a. Water Service (Rf/ Month)	-
b. Electricity Service (Rf/ Month)	952

**Waste Question from House**

Table 1-117 Where to Discharge Waste from House		%
a. Government or Private Collection Service	0	0.0%
b. Transfer Station	10	100.0%
c. Waste Container	0	0.0%
d. Other	0	0.0%
Total		

Table 1-118 Type of Container in House		%
a. Plastic Bag	0	0.0%
b. Plastic Bucket	1	10.0%
c. Metal Bucket	0	0.0%
d. Carton Box	0	0.0%
e. Sack	7	70.0%
f. Other	2	20.0%
Total	10	

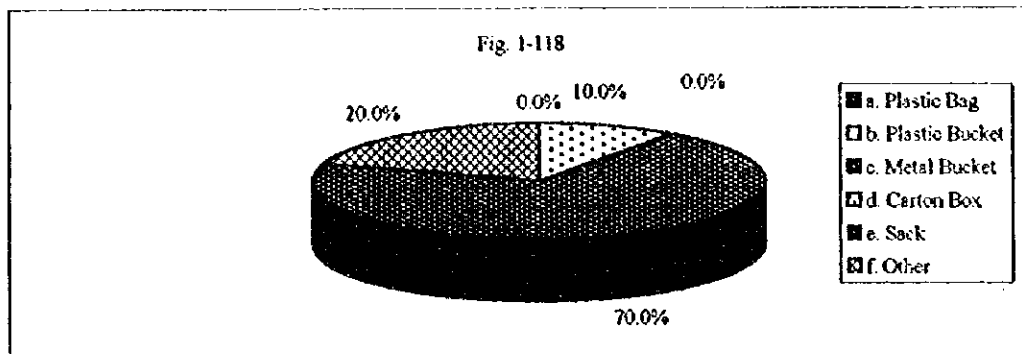


Table 1-119 Using Liner When Discharge Waste		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-120 Reason to Use Container		%
a. Clean	0	0.0%
b. Prevents Foul Odor	0	0.0%
c. Manageable	10	100.0%
d. Keep away from Flies	0	0.0%
e. Other	0	0.0%
Total	10	

Table 1-121 Position of Waste Container in House		%
a. In front of the house	5	50.0%
b. Back yard or behind the house	5	50.0%
c. In the kitchen	0	0.0%
d. Other	0	0.0%
Total	10	

Table 1-122 Frequency of discharging Waste		%
a. Twice a day	7	70.0%
b. Once a day	1	10.0%
c. Six times a week	0	0.0%
d. Five times a week	0	0.0%
e. Four times a week	0	0.0%
f. Three times a week	1	10.0%
g. Two times a week	0	0.0%
h. Once a week	1	10.0%
i. Once a month	0	0.0%
Total	10	

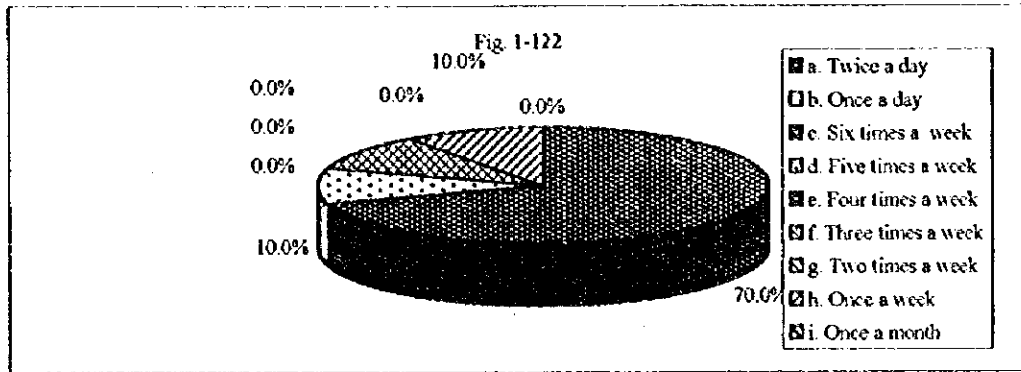


Table 1-123 Discharge Waste at Fixed Time

		%
Yes	1	10.0%
No	9	90.0%
Total	10	

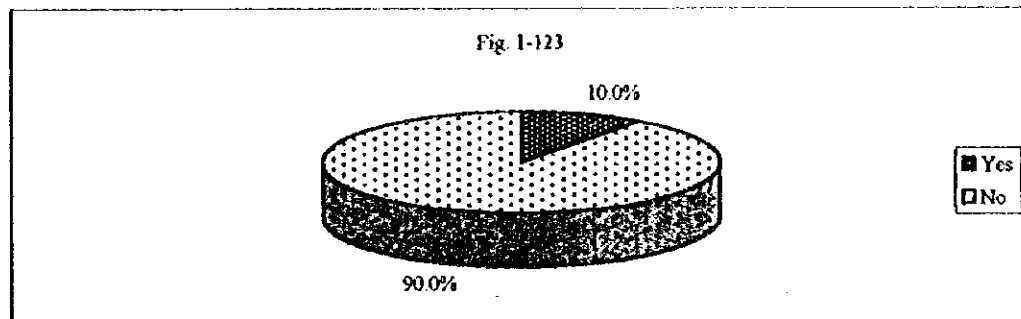


Table 1-124 Time of Discharge Waste from House

		%
a. 1:00-2:59	0	0.0%
b. 3:00-5:59	0	0.0%
c. 6:00-8:59	4	26.7%
d. 9:00-11:59	2	13.3%
e. 12:00-14:59	4	26.7%
f. 15:00-17:59	5	33.3%
g. 18:00-20:59	0	0.0%
h. 21:00-23:59	0	0.0%
Total	15	

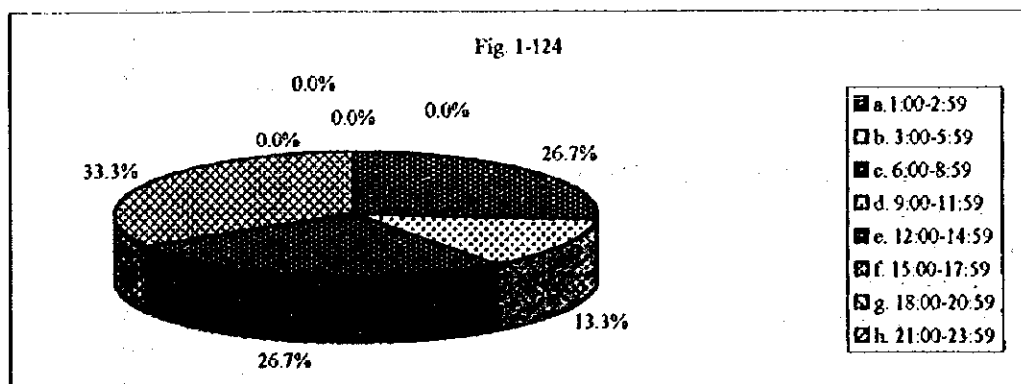


Table 1-125 Separation of Hazardous Waste

		%
a. Separate from others	8	80.0%
b. Mixed with other waste	2	20.0%
C. Other	0	0.0%
Total	10	

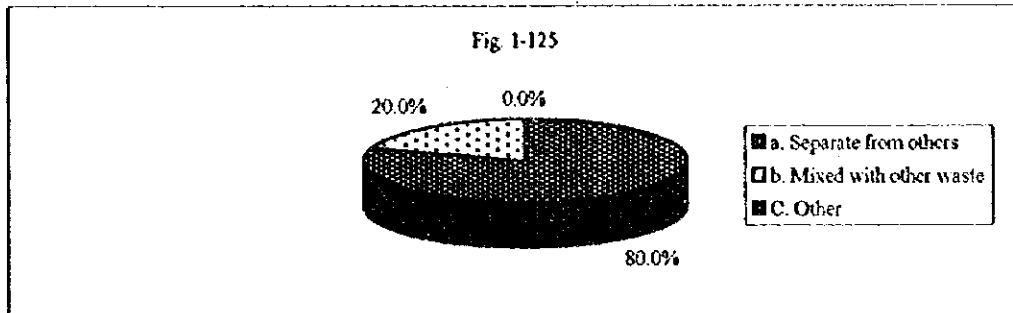


Table 1-126 How to Discharge Hazardous Waste

		%
a. Collection Service	0	0.0%
b. Transfer Station	5	55.6%
c. Waste Container	0	0.0%
d. Other	4	44.4%
Total	9	

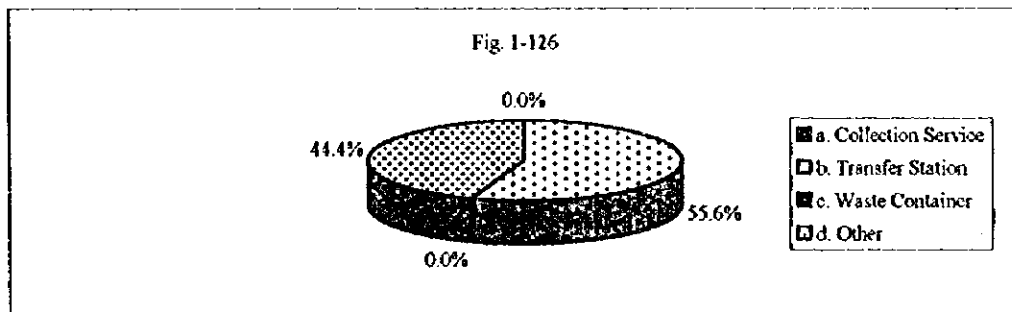


Table 1-127 Kinds of Bulky Wastes

a. Television (TV)	0
b. Refrigerator	0
c. Other electrical appliances	0
d. Furniture	0
e. Bicycle	0
f. Construction Waste	0
g. Other	0
Total	0

Table 1-128 Where to Discharge Bulky Waste

a. Collection Service	0
b. Sell to a dealer	0
c. Discharge by oneself	0
d. Carry to transfer station directly	0
e. Other	0
f. Workshop	0
Total	0

Table 1-129 Not Use (Misunderstanding Question)

Collection Service Question

Table 1-130 Who Is Undertaking the Collection Service

a. Individual	0
b. Private	0
c. Government	0
d. Transfer Station by Oneself	0
e. Waste Container by Oneself	0
f. Other	0
Total	0

Table 1-131 Collecting at Fixed Time

Yes	0
No	0
Total	0

Table 1-132 Collecting Time

a. 1:00-2:59	0
b. 3:00-5:59	0
c. 6:00-8:59	0
d. 9:00-11:59	0
e. 12:00-14:59	0
f. 15:00-17:59	0
g. 18:00-20:59	0
h. 21:00-23:59	0
Total	0

Table 1-133 Collecting Vehicle

a. Collection Vehicle	0
b. Container Truck	0
c. Pick-Up Truck	0
d. Hand Cart	0
e. Bicycle	0
f. Other	0
Total	0

Table 1-134 Satisfied collection Service

Yes	0
No	0
Total	0

Table 1-135 Reason for Not Satisfied Collection Service

a. Frequency is low	0
b. Collection time is irregular	0
c. Behavior of worker is bad	0
d. Collection work is rough	0
e. Collection fee is expensive	0
f. Other	0



**Table 1-136 How to Collect Waste**

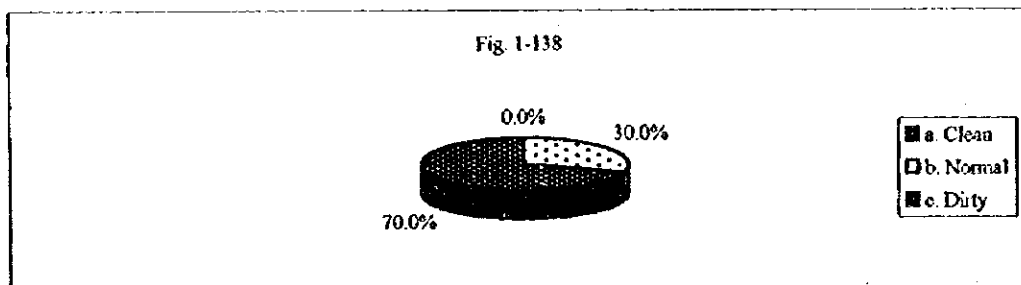
a. Private Collection by Vehicle	0
b. Individual Collection by Hand Cart	0
c. Government Collection by Door to Door	0
d. Carry to Collection Station by Oneself	0
e. Other	0
<b>Total</b>	<b>0</b>

**Table 1-137 Distance to Collection Station**

a. Less than 10m	0
b. 10-29m	0
c. 30-49m	0
d. 50m or more	10
<b>Total</b>	<b>10</b>

**Table 1-138 Cleanliness of Collection Station**

		%
a. Clean	0	0.0%
b. Normal	3	30.0%
c. Dirty	7	70.0%
<b>Total</b>	<b>10</b>	



**Table 1-139 Pay for The Collection Service**

Yes	0
No	10
<b>Total</b>	<b>10</b>

**Table 1-140 Collection Fee**

Average (Rf / Month)	
Total Respondent	

**Table 1-141 Collection Fee Rate**

a. Too expensive	0
b. Expensive	0
c. Appropriate	0
d. Cheap	0
<b>Total</b>	<b>0</b>

Table 1-142 How to Pay for Collection Fee

a. Collection Worker Directly	0
b. At the Bank or Organization	0
c. Other	0
d. Municipality	0
Total	0

**Recycling Questions**

Table 1-143 Separating Recyclable Items

Yes	0
No	10
Total	10

Table 1-144 How to discharge Recyclable Items

a. Private Collection with Charge	0
b. Private Collection without charge	0
c. Sell by Oneself	0
d. Other	0
Total	0

Table 1-145 Type of Recyclable Items

a. Newspaper	0
b. Paper	0
c. Glass Bins/Bottles	0
d. Steel-cans	0
e. Aluminum-cans	0
f. Pet-Bottles	0
g. Other	0
Total	0

Table 1-146 Community Group Collection

		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-147 What Kinds of Community Groups

a. School	0
b. Neighborhood Group	0
c. Other	0
Total	0

**Public Awareness Questions**

Table 1-148 Responsibility for Solid Waste Disposal

		%
a. Government	5	50.0%
b. Manufacture	1	10.0%
c. Seller	0	0.0%
d. Private	4	40.0%
e. Other	0	0.0%
Total	10	

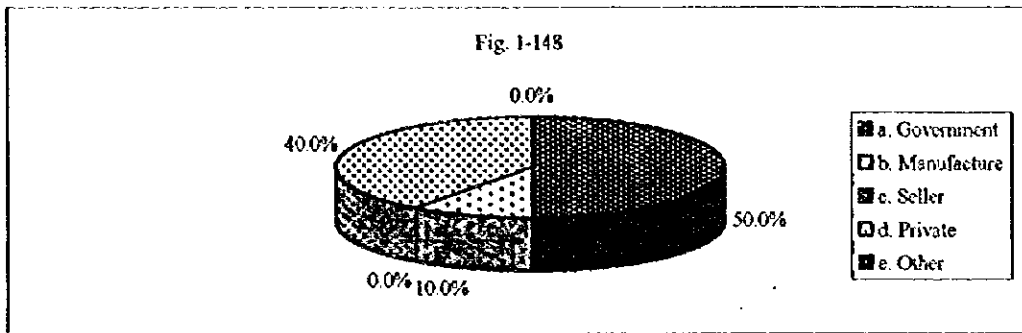


Table 1-149 Know Disposal Point	%	
Yes	10	100.0%
No	0	0.0%
Total	10	

Table 1-150 Know Waste Contains Recyclable Items	%	
Yes	2	20.0%
No	8	80.0%
Total	10	

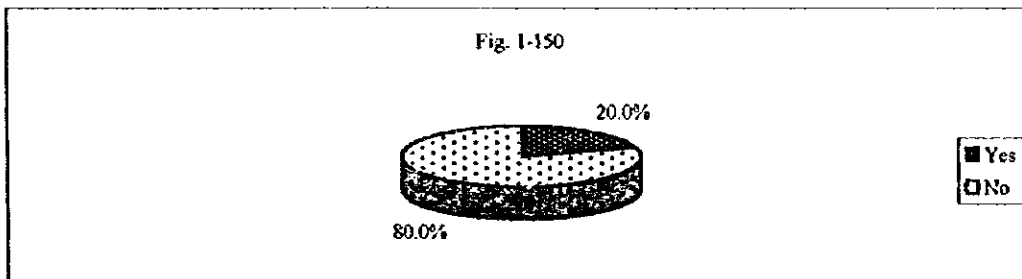


Table 1-151(1) Know a Part of The Waste Is Recycling	%	
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-151(2) What You Know Recycling Items	
Paper	0
Bottles	0
Plastic	0
Rubber	0
Pet Bottles	0
Cans	0
Woods	0
Glass	0
Tin	0

Table 1-152 Will Cooperate with Community Group Collecting	%	
Yes	10	100.0%
No	0	0.0%
Total	10	

**Public Educational Questions**

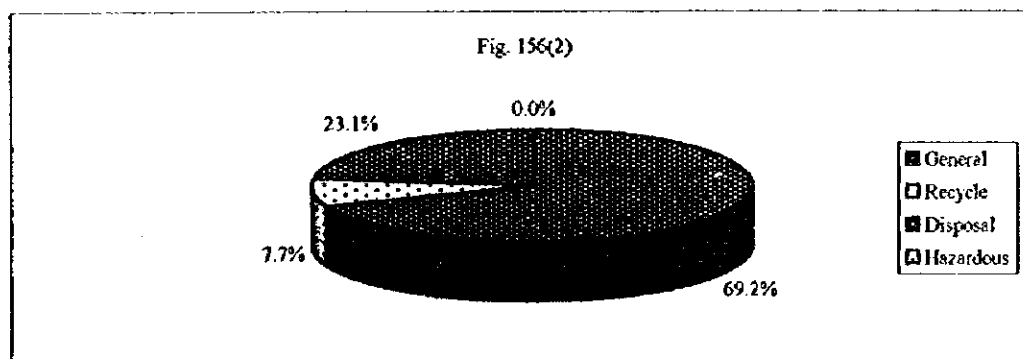
Table 1-153 Do you have Social Activities in Your Area		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-154 Do you have Public Awareness Programs in Your Area		%
Yes	0	0.0%
No	10	100.0%
Total	10	

Table 1-155 Do your school have Curriculums		%
Yes	10	100.0%
No	0	0.0%
Total	10	

Table 1-156(1) Necessity of Waste Management Studying		%
Yes	10	100.0%
No	0	0.0%
Total	10	

Table 1-156(2) What You Want to Study		%
General	9	69.2%
Recycle	1	7.7%
Disposal	3	23.1%
Hazardous	0	0.0%
Total	13	



**Improved Service Plan Questions**

Table 1-157 Wanted Container type		%
a. Plastic Bag	0	0.0%
b. Plastic Bucket	7	58.3%
c. Container	0	0.0%
d. Other	5	41.7%
Total	12	

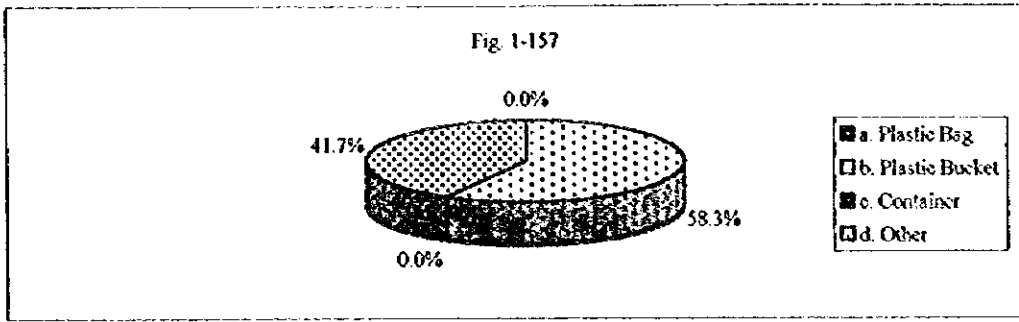


Table 1-158 Convenient Collection Service		%
a. Door to Door Collection	9	69.2%
b. Stationary Collection	4	30.8%
c. I do not know	0	0.0%
<b>Total</b>	<b>13</b>	

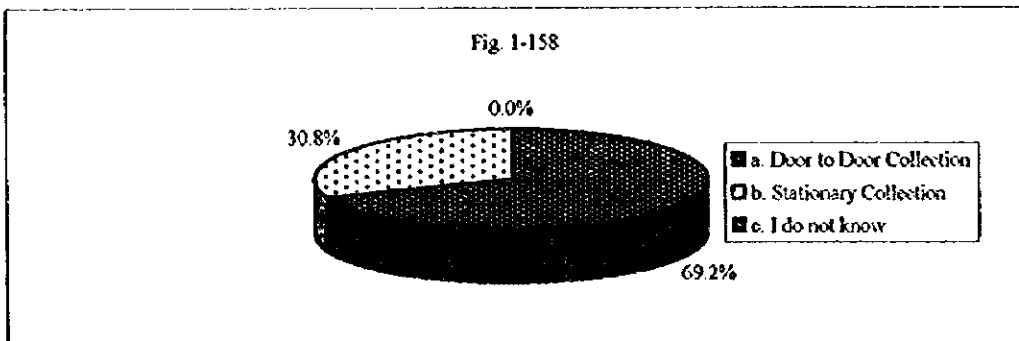


Table 1-159 Willingness to Separate Waste		%
Yes	10	100.0%
No	0	0.0%
<b>Total</b>	<b>10</b>	

Table 1-160 Kinds of separation		%
a. Two Item (Food and Paper / Others)	5	50.0%
b. Three Items (Food and Paper / Other / Recyclable Item)	5	50.0%
c. Other	0	0.0%
d. I do not know	0	0.0%
<b>Total</b>	<b>10</b>	

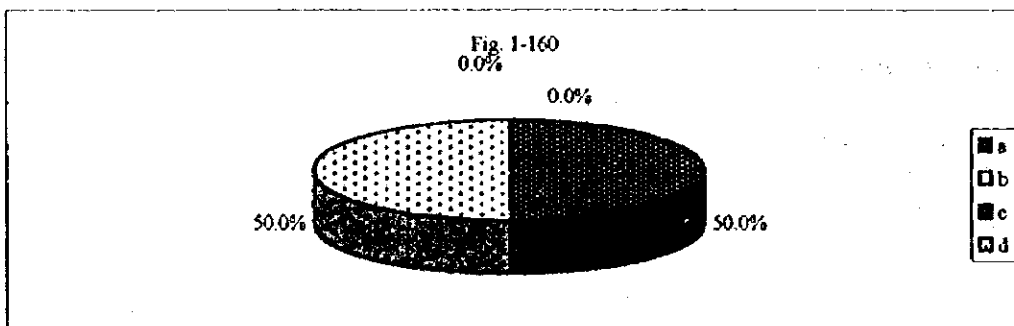


Fig. 1-161 Convenient Time to collection

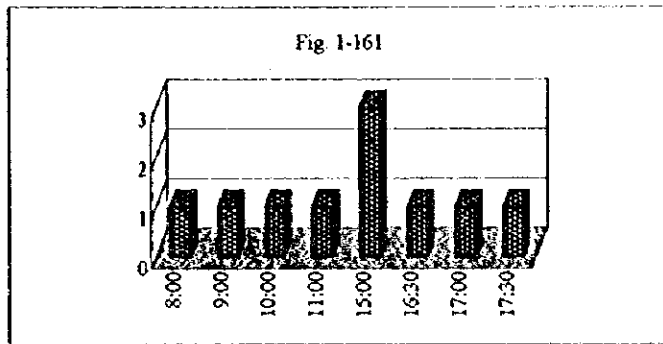


Table 1-162 Frequency of Collection Service

a-Food (Week)	5.8
Other (Week)	5
b-Food (Week)	7
Other (Week)	4.6
Recyclable (Week)	1
c-Waste (Week)	0
Recyclable (Week)	0
d. Mixed (Week)	0
e. I do not know	0

Table 1-163 Willingness to pay for Improved Collection

		%
Yes	7	77.8%
No	2	22.2%
Total	9	

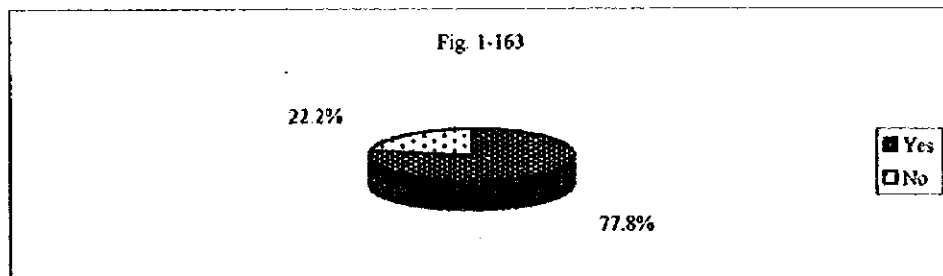
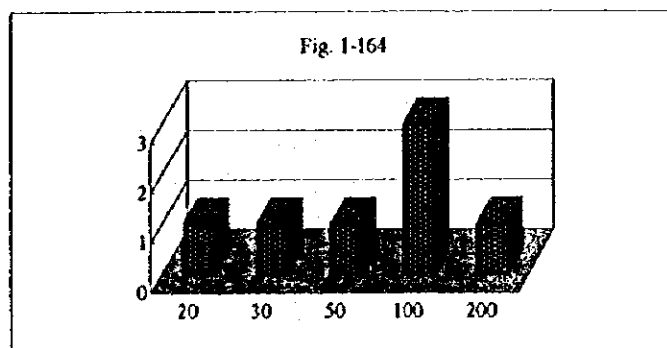


Table 1-164 Appropriate Fee

Average (Rf / Month)	85.71
Total Respondents	



## Business Establishment in Male' City (1-165 ~ 1-194)

General Questions

		%
a. Residential Area	37	71.2%
b. Commercial Area	14	26.9%
c. Industrial Area	1	1.9%
Total	52	

		%
a. Office Building (Detached)	9	17.3%
b. Office Building (Complex)	19	36.5%
c. Commercial Space	22	42.3%
d. Industry	2	3.8%
Total	52	

Table 1-167 Basic Data

Ministry

Officers or Employees	110	35	20
Floor Space	15000	2500	2400
Total Respondents			3

Hotel

Employees	85	25	11
Room (Single)			
(Twin)	31	15	12
(Other)			
Guests (Year)	12000	6570	3700
Total Respondents			3

Hospital

		Clinic	Clinic
Employees	680	153	20
Beds	200	46	
Patients (Month)	1327	9000	700
Total Respondents			4

School

	P. School	S. School	Health	Managemer	Technical
Teacher and Officer	102	164	42	45	51
Students	1582	3338	138	375	205
Total Respondents					5

Restaurant & Tea Shop

	Total	Average
Employees	226	28.25
Floor Space	11590	1931.67
Capital	1523000	304600
Sales(Output) (Rf/ Month)	2415000	345000
Total Respondents		8

Other Shop	Total	Average
Employees	304	10.48
Floor Space	38997.31	1559.89
Capital	99865000	4755476
Sales(Output) (Rf / Month)	4.44E+08	16441281
Total Respondents		29

### Waste Questions from Business

		%
Yes	13	25.0%
No	39	75.0%
Total	52	

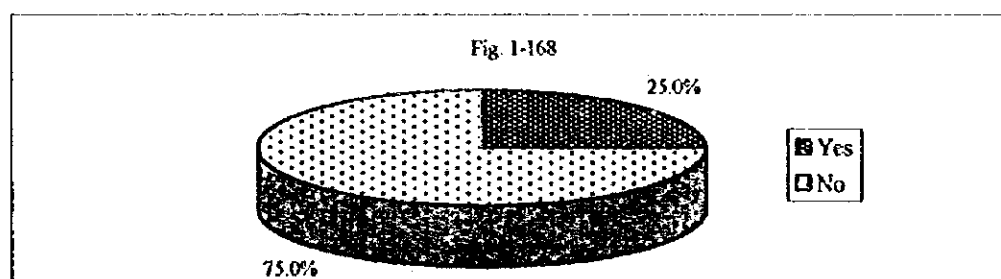


Table I-169 Type of Waste and Quantity

Ministry	Total	Average	Respondent
Paper (Kg / Month)	108	36	3

Hotel	Total	Average	Respondent
Paper (Kg / Month)	90	45	2
Food (Kg / Month)	2400	2400	1

Hospital			Clinic
Paper (Kg / Month)		60	
Bio-Hazard Waste (Kg / Month)	960	900	10
Other Waste (Kg / Month)	9750		40

School	Total	Average	Respondent
Paper (Kg / Month)	2580	516	5
Other Waste (Kg / Month)	185	92.5	2

Restaurant & Tea Shop	Total	Average	Respondent
Paper (Kg / Month)	18	9	2
Food (Kg / Month)	23700	3385.71	7
Can (Kg / Month)	150	150	1



Other Shop	Total	Average	Respondent
Paper (Kg / Month)	11066	614.78	18
Food (Kg / Month)	1697	424.25	4
Parts (Kg / Month)	4000	4000	1
Saw dust, Wood (Kg / Month)	3500	1166.67	3
Glass (Kg / Month)	950	475	2
Aluminium (Kg / Month)	3100	1550	2
Other Waste (Kg / Month)	25	25	1

Table 1-170 How to Discharge Waste

		%
a. Collection Service	20	37.0%
b. Transfer Station	27	50.0%
c. Waste Container	5	9.3%
d. Discharge by oneself	1	1.9%
e. Other	1	1.9%
Total	54	

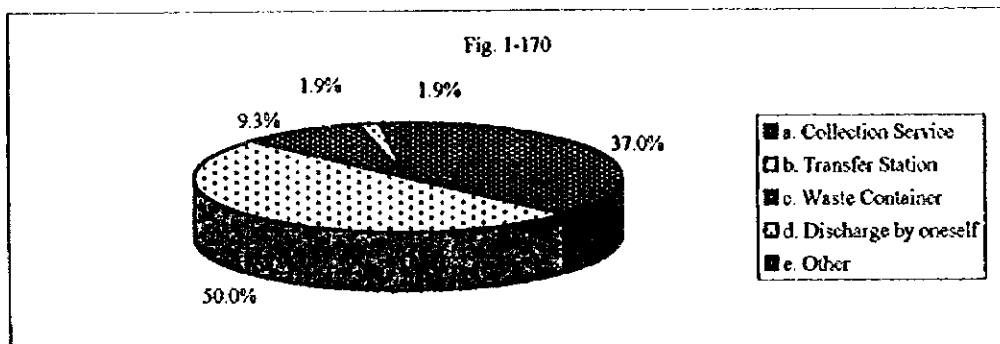


Table 1-171 Type of Container in Office

		%
a. Plastic Bag	12	20.0%
b. Plastic Bucket / Dustbin	27	45.0%
c. Metal Bucket / Dustbin	2	3.3%
d. Carton Box	11	18.3%
e. Other	8	13.3%
Total	60	

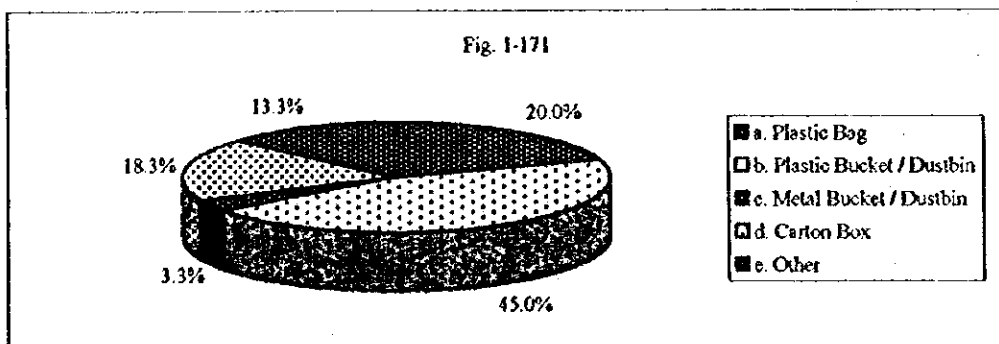


Table 1-172 Reason to Use 1-7's Container

		%
a. Clean	25	26.0%
b. Prevents Foul Odor	14	14.6%
c. Manageable	46	47.9%
d. Keep away from Flies	10	10.4%
e. Other	1	1.0%
Total	96	

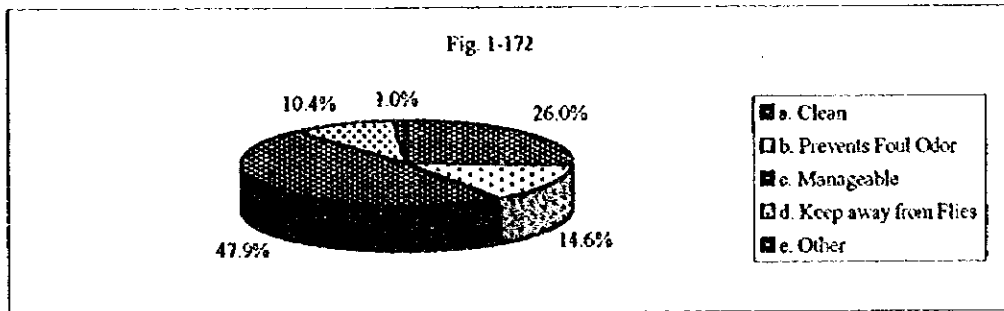


Table 1-173 Place to Hold Waste in Office

		%
a. In the Office	17	31.5%
b. Back Yard	21	38.9%
c. Other	16	29.6%
Total	54	

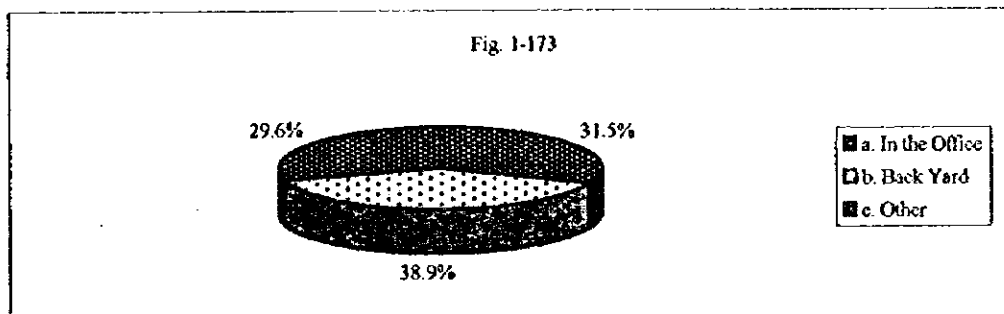


Table 1-174 Frequency of discharging Waste

		%
a. Everyday	35	67.3%
b. Six times a Week	0	0.0%
c. Five Times a Week	1	1.9%
d. Four Times a Week	1	1.9%
e. Three Times a Week	5	9.6%
f. Two Times a Week	3	5.8%
g. Once a Week	7	13.5%
Total	52	

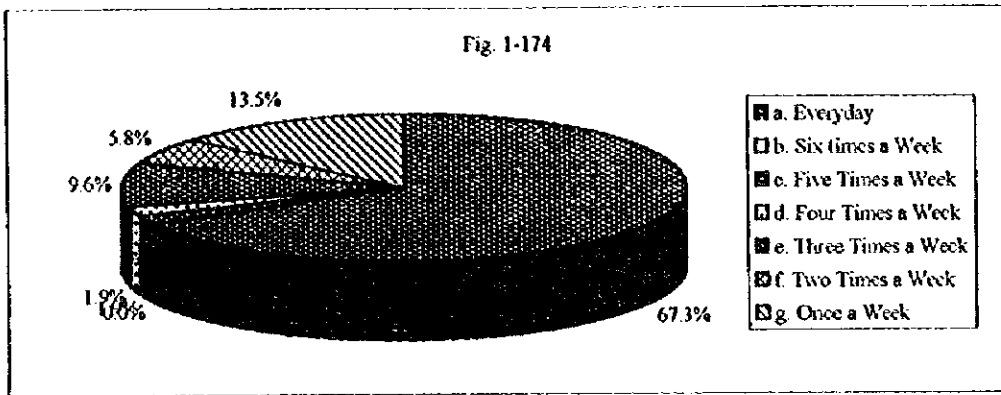


Table 1-175 Separation of Hazardous Waste

		%
a. Separate from others	13	25.0%
b. Mixed with other waste	36	69.2%
C. Other	3	5.8%
Total	52	

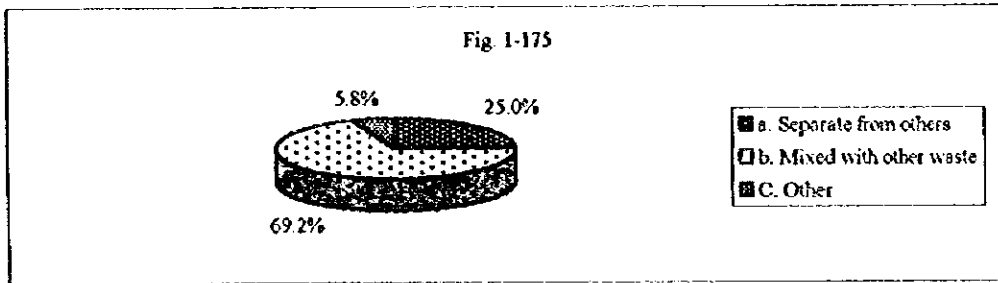


Table 1-176 How to Discharge Separated Hazardous Waste

		%
a. Private or Government Collection	3	17.6%
b. Discharge to the Transfer Station	12	70.6%
c. Discharge to the Waste Container	0	0.0%
d. Dispose by oneself	0	0.0%
e. Other	2	11.8%
f. I Do Not Know	0	0.0%
Total	17	

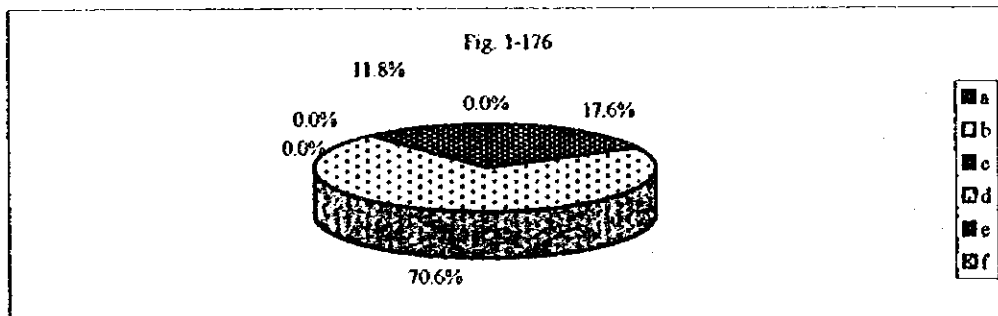


Table 1-177 Type of Hazardous Waste and Quantity	Total	Respondent
Bio-Hazardous Waste (Kg / Month)	1360	2
Glass (Kg / Month)	800	1
Woods (Kg / Month)	50	1
Fluorescent lump (Per Year)	6	1

**Collection Service Questions**

Table 1-178 Who Is Undertaking in Your Service		%
a. Private Sectors	3	5.8%
b. Individual	8	15.4%
c. Government	8	15.4%
d. Transfer Station	28	53.8%
e. Waste Container	4	7.7%
f. Other	1	1.9%
Total	52	

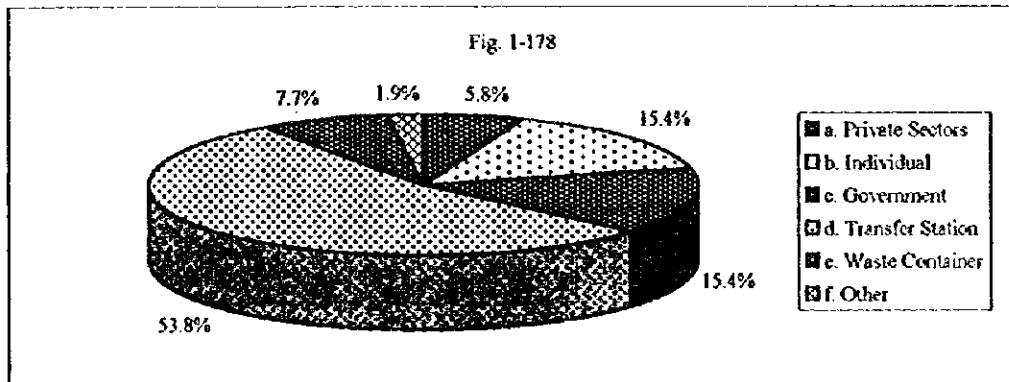


Table 1-179 What Kind of Vehicle to Use for Collecting		%
a. Collecting Vehicle	8	40.0%
b. Container Truck	1	5.0%
c. Pick-Up Truck	3	15.0%
d. Hand Cart	5	25.0%
e. Other	3	15.0%
Total	20	

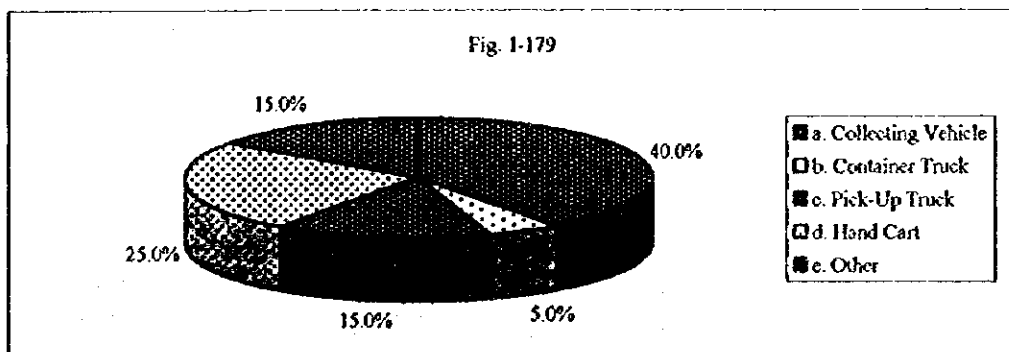


Table 1-180 Satisfaction of Collection Service		%
Yes	17	85.0%
No	3	15.0%
Total	20	

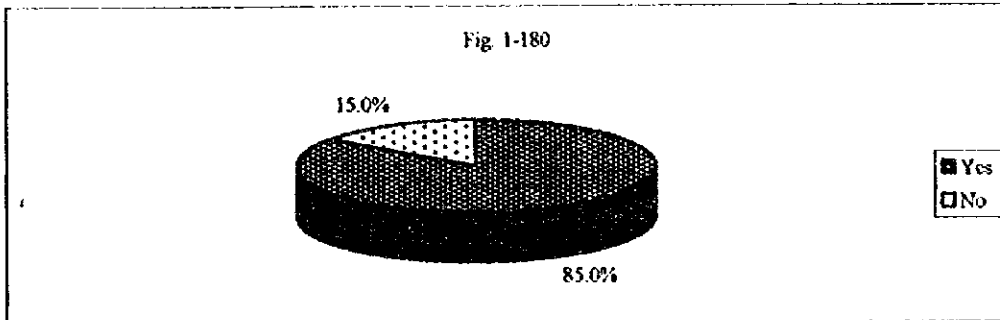


Table 1-181 Reason of Not Satisfied		%
a. Frequency of Collection Service Is Low	3	33.3%
b. Collection Time Is Irregular	1	11.1%
c. Behavior of Worker Is Bad	1	11.1%
d. Collection Work Is Rough	2	22.2%
e. Collection Fee Is Expensive	2	22.2%
f. Other	0	0.0%
Total	9	

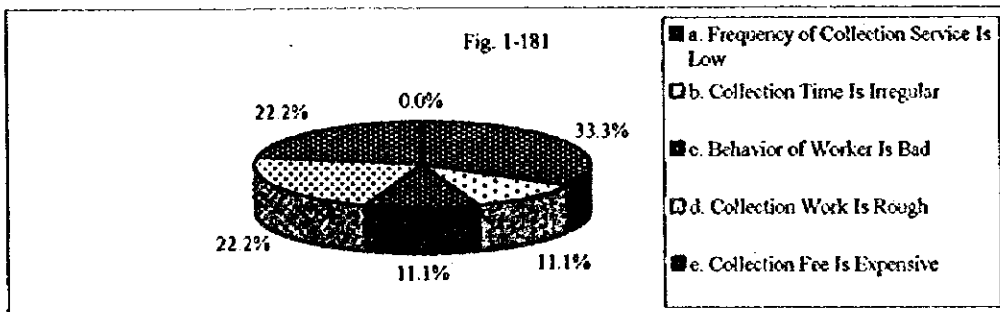
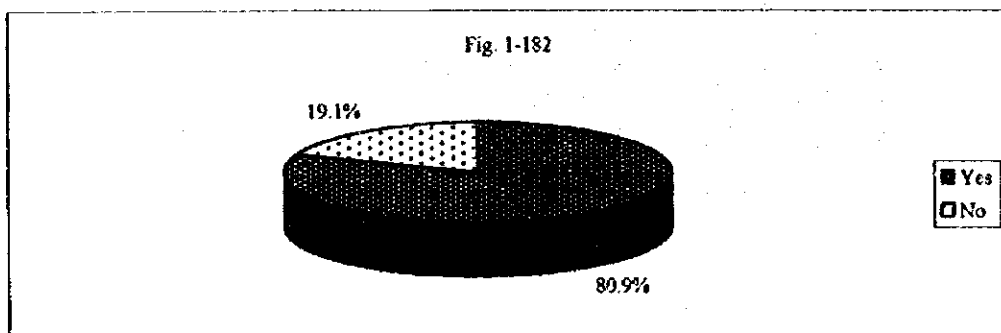
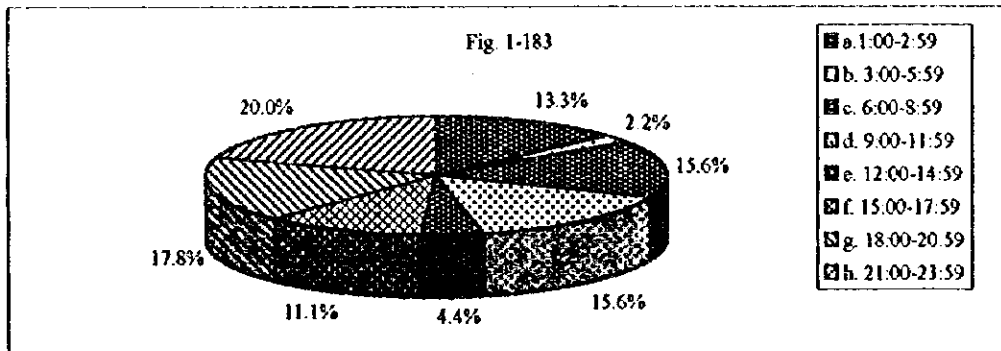


Table 1-182 Collecting (Discharging) at Fixed Time		%
Yes	38	80.9%
No	9	19.1%
Total	47	



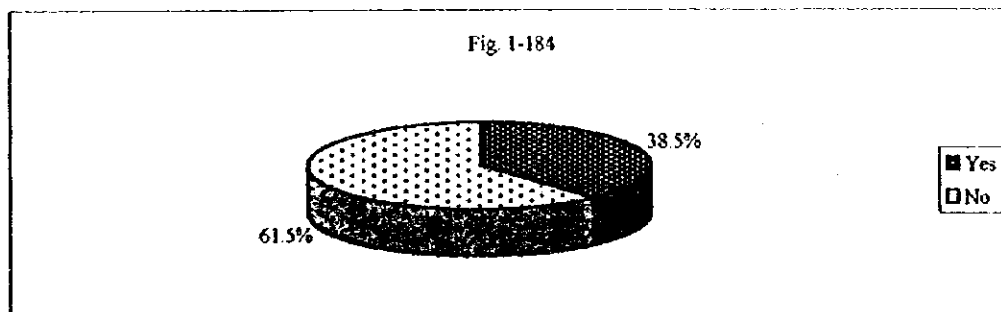
**Table 1-183 Collection (Discharge) Time**

		%
a. 1:00-2:59	6	13.3%
b. 3:00-5:59	1	2.2%
c. 6:00-8:59	7	15.6%
d. 9:00-11:59	7	15.6%
e. 12:00-14:59	2	4.4%
f. 15:00-17:59	5	11.1%
g. 18:00-20:59	8	17.8%
h. 21:00-23:59	9	20.0%
Total	45	



**Table 1-184 Pay for Collection Fee**

		%
Yes	20	38.5%
No	32	61.5%
Total	52	



**Table 1-185 How much do you pay for Collection Service**

Average (R\$/month)	569.26
Total Respondents	19

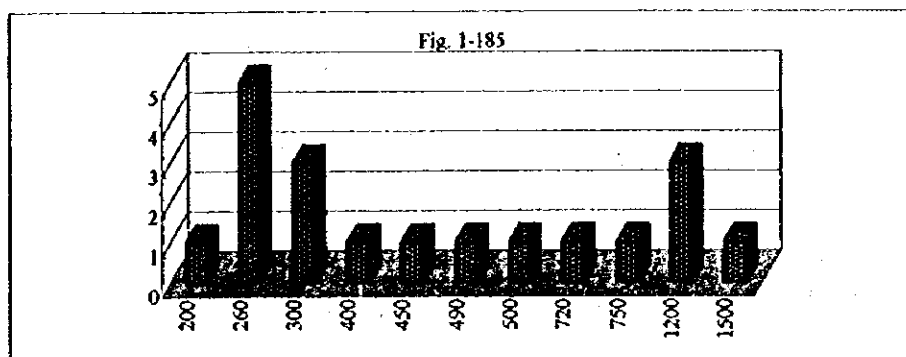
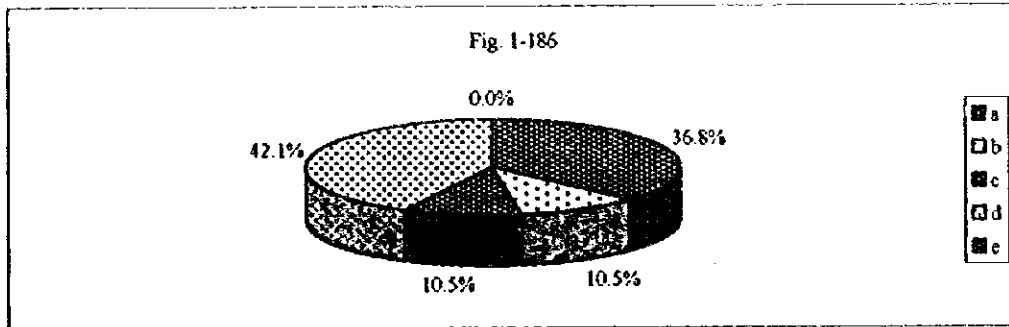


Table 1-186 How to Pay Collection Fee

		%
a. Pay to Collection Worker (Monthly)	7	36.8%
b. Pay to Collection Worker (Daily)	2	10.5%
c. Pay at Bank or Organization	2	10.5%
d. Municipality	8	42.1%
e. Other	0	0.0%
	19	



Recycling Questions

Table 1-187 Separation of Recyclable Items

		%
Yes	4	7.7%
No	48	92.3%
Total	52	

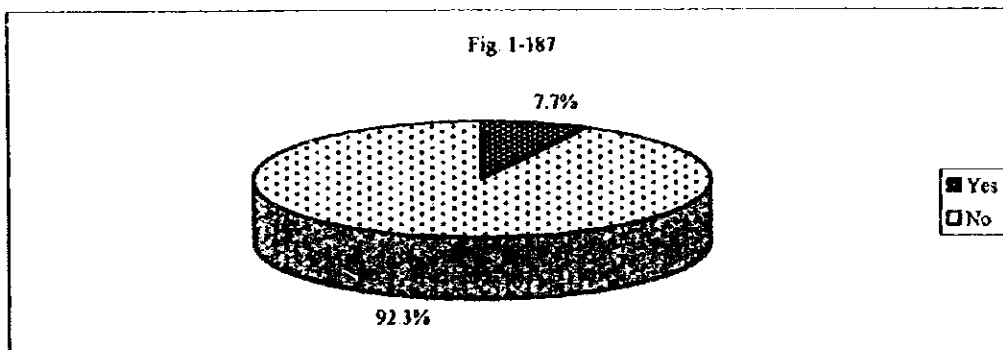


Table 1-188 How to Discharge Recyclable Items

a. Private Collection with Charge	0
b. Private Collection without Charge	1
c. Sell it by oneself	0
d. Other (Re-Using, Re-export)	3
Total	4

Table 1-189 Type of Recyclable Items

Mineral Bottles (Kg / Month)	2
Carton Box (Re-Using)	-
Paper (Export without Charge)	-
Aluminum (Kg / Month)	3000

**Improved Service Plan Questions**

Table 1-190 Which Prefer, Collection Service or Discharge by Oneself		%
a. Prefer to Collection Service	28	54.9%
b. Go to container by oneself	21	41.2%
c. Dispose by oneself	2	3.9%
Total	51	

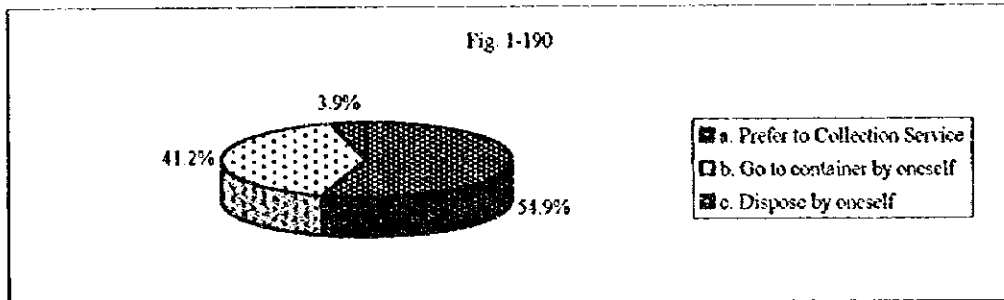


Table 1-191 Willingness to Pay for Better Collection Service		%
Yes	27	96.4%
No	1	3.6%
Total	28	

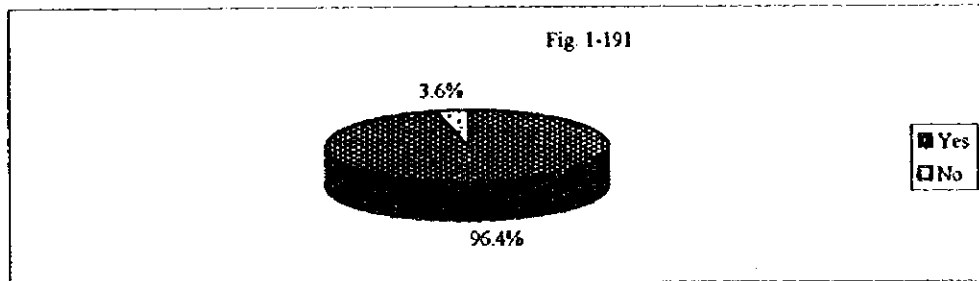


Table 1-192 Appropriate Collection Fee	
Average (Rf / Month)	683.33
Total Respondent	18

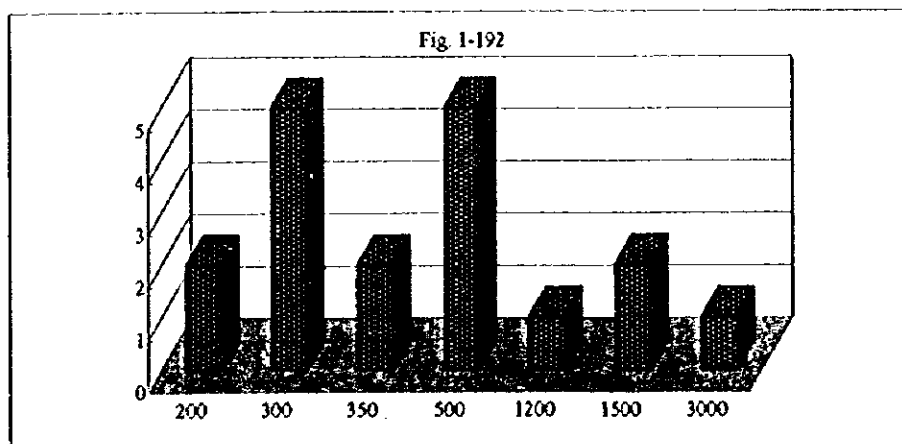




Table 1-193 Willingness to Pay for Disposal Fee

		%
Yes	36	94.7%
No	2	5.3%
Total	38	

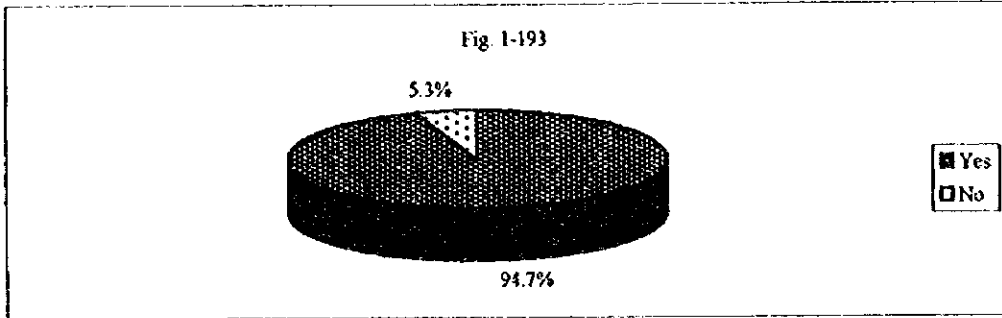
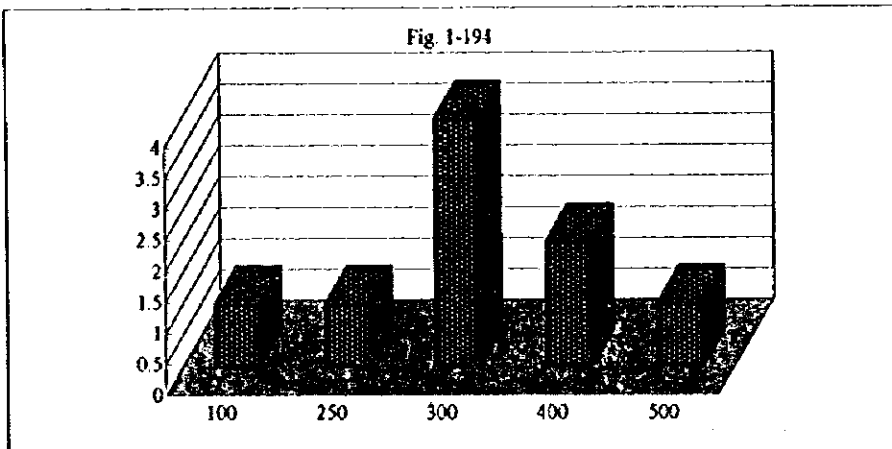


Table 1-194 Appropriate Disposal Fee

Average (Rf / Month)	316.67
Total Respondent	9



## **2. Plan for Raising Public Awareness and Participation**

### **2.1 Findings through the Surveys**

The major findings obtained through the Public Awareness Survey and interview survey conducted in connection with execution of the SWM study are summarised as follows:

- ① Almost all of the respondents are co-operative to the Public Awareness Survey and interested about improvement of SWM system,
- ② Housing problem is one of the major concerned of the residents in Male' due to large housing population to accommodate for 14 persons per house in average in addition to small room space,
- ③ Total income of one house reach at 11,152 Rfs per month. Public service charges to the income is comparatively high, i. e. payment for the electricity is about 11 to 15 % while water supply spend about 4 % to the income in average. In addition, the houses receiving waste collection services from the Municipality or private service providers pay 164 Rfs per month in average which is accounted for about 1.5 % to the income,
- ④ Almost all of the house discharge waste every day collected by the Municipality or private operators or carry waste to the near-by micro bins or to the Transfer Station,
- ⑤ More than 80 % of the respondents are interested in waste recovery and recycling plan and wish to participate to the activities as introduced in Male' and 98 % of the respondent agreed to separate wastes as the plan will be implemented in future,
- ⑥ The residents expect of daily collection of kitchen waste and 3 to 4 times collection for other types of wastes. More than 90 % of the respondent agree to pay for the collection services and their replies to the willingness to pay was 149 Rfs per month in average,
- ⑦ Public education for solid waste is conducted occasionally by the Non-formal Education Centre (NFEC) and SWMS as one of the subject. NFEC has a weekly radio program for public information including the environmental sanitation and SWM,
- ⑧ Activities of NGOs' were not popular in the Maldives up to these years but their activities have extended to the environmental conservation including solid waste management,
- ⑨ Current operation of SWM services are maintained through the efforts of the top management person having the sole authorities and the directions ordered to the staff. Mandating to the key staff will be able to increase efficiency of daily services.

- ⑩ SWMS and/or Male Municipality have not yet implemented regular base public education on SWM although the agencies make announcement to the public through TV and Radio broadcasting as required for operation of the SWM system.

## **2.2 Objective, Planning Policy and Strategy**

### **2.2.1 Objective**

The objectives of public awareness and participation is to raise awareness of the citizens and all the parties concerned for promoting co-operation to the service provider(s) and direct participation to sustain operation of the improved SWM system(s) in Male'.

### **2.2.2 Planning Policy**

The improved SWM system for Male', especially for the waste reduction and recovery/recycling plans and programs, shall be operated and sustained through participation of the citizens and all the parties concerned.

### **2.2.3 Planning Strategy**

Raising public awareness shall be made by means of conducting the regular public education to adult and school education to children and students including visiting the operation sites of SWM services. Thorough understanding of the Master Plan among the staff of the implementation agencies will be essential to have a clear idea to which points are important to ask for co-operation of the society for successful implementation of the plans and programs.

## **2.3 Public Awareness and Education Plan**

The plan for raising public awareness is proposed to carry out the educational programs set out in the following 6 programs.

### **2.3.1 Raising Awareness within MCPW/ SWMS and Male Municipality**

Raising awareness of the implementing agencies, SWMS/MCPW and Male Municipality, is a key issue to have effective and efficient operation of the improved SWM system and for its sustainability. It is strongly recommended to study the proposed SWM Master Plan to understand the objectives, policies, strategies and procedures for implementation of the proposed plans and programs to raise their own awareness for the primary responsibilities and the roles for SWM services.

### **2.3.2 Public Announcement of the SWM Master Plan**

In the process of studying the proposed Master Plan, it may be required to adjust some part of the plans and programs to enable smooth implementation by taking into consideration of the specific needs and features in the society. Following the modification and decision by the official processes, the outline of the improved SWM plan shall be announced to the public to urge interest and participation of the citizens and the society.

### **2.3.3 Public Education**

Raising public awareness shall be made through public education programs assisted by Non-formal Education Centre(NFEC). The Special Task Team (STT) proposed to set up under the Male Municipality shall prepare the pamphlets and schedule for public education at the public centres, offices, mosques, PTA and any other places wherever convenient for the people gathering. In addition, the public education shall be made through the mass media from time to time. The public education plans and programs is targeted to the adult.

### **2.3.4 School Education**

Raising awareness for school children and students shall be made as one of the curriculum for schooling. The Ministry of Education assisted by the STT shall prepare the text for primary schools and for secondary schools. SWMS and Male Municipality take a part in school education to invite them for visiting the sites to see the actual field operation of SWM services.

### **2.3.5 Participation to Cleansing of Public Areas and Reduction of Waste**

The monthly sea cleaning operation has been implemented as the government project called "Clean Maldives, Independent Maldives". It is proposed to expand and enhance this project in the field of SWM services towards implementation of the Waste Reduction Plan at the generation sources. Participation of more people in the project will be the opportunity for the people to aware the importance of SWM services for protecting public health, the environment and maintaining public cleanliness to keep public spaces aesthetically acceptable for citizens and tourists.

### **2.3.6 Participation to Waste Recycling Activities**

The goal of raising public awareness and participation will be reached at successful accomplishment of participation of the people to waste recycling activities and continuous operation of waste reduction at generation sources. The Special Task Team supported by SWMS and Male Municipality prepare the plan for waste reduction and recovery of materials, recycling and marketing the recovered materials from the wastes. The plan shall be supported by all the parties concerned

including, the government, SWM service provides, enterprises, and the most importantly by the residents.

## **2.4 Implementation of Public Awareness and Education Plan**

### **2.4.1 Action Plan and Programs**

#### **(1) Short Term Plan**

- ① "Raising Awareness within SWMS and Male Municipality" shall be initiated to organise a committee to study, discuss, adjust or modify and finalise the most appropriate plans and programs for the SWM Master Plan for Male'. The committee members shall be comprised of the government sector, private sector and from academic sector chaired by MCPW. The first committee shall be opened immediately after hand-over of the Master Plan by JICA
- ② "Public Announcement of the SWM Master Plan" shall be made immediately after approval of the SWM Master Plan by the Government. The proposed STT shall prepare the summary of the SWM Master Plan for public announcement in co-operation with the Ministry of Planning, Human Resources and Environment. The announcement shall be made through the mass media and by the pamphlets distributed through the community groups.
- ③ "Public Education" shall be started following to the public announcement of the SWM Master Plan. The Special Task Team and NFEC prepare the contents of public education and schedule for the purpose to educate the residents, commercial and business establishments, institutionals and all other waste generators including resort islands operators. Contents of the education shall include the specific requirements asking co-operation to the public for implementation of the SWM Master Plan and the general education of the environmental conservation as well.
- ④ "School Education" shall be carried out continuously every year in accordance with the schooling subjects and schedule prepared by the Ministry of Education in co-operation of the STT. The texts have to be prepared visually to have easy understanding of the contents with key topics for discussion in the homeroom. Also it is recommended to prepare the video programs for a effective tool for school education.
- ⑤ "Participation to Cleansing of Public Areas" shall be implemented in co-ordination with the "Clean Maldives, Independent Maldives" project " to raise awareness of the citizens that participation to the public services is essentially required to keep the country clean.

**(2) Middle/Long Term Plan**

- ① "Participation to Waste Recycling Activities" shall be implemented following to the announcement of MCPW to notify commencement of the Waste Recycling Plan and continuous operation of the Waste Reduction Plan. Prior to implementation of the plan, the Special Task Team shall set up all the related activities composing the recycling system including preparation of the materials recovery system, provision of the Buy-back Centre, marketing system involved with the government, citizens, enterprises, domestic and overseas dealers, etc. to enable sustainable operation of waste recycling activities in Male'.







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