hold low productivity jobs, even in the MAA.

The remaining employment categories pertain to employers comprising less than 10% of total labor force, while employees comprise around one–third (152,292 in 1991). Employees in the private sector comprise around 20%, while those in the public sector comprise around 10%.

From 1990 to 1991, total employees declined by around 5%, affecting in general both male and female employees in the private and public sectors. Similarly, the number of employers declined drastically by about 15%. On the other hand, the number of unskilled labor increased by 25%, and that of self–employed by 14%. Presumably, part of the employees who lost their jobs fell into the unskilled labor category, while others became self–employed. One curiosity was the slight decline in self–employed female, while female employers almost doubled from 4,431 to 8,684.

In short, the employment figures for 1990 and 1991 indicate worsening economic conditions nationwide and the high proportion of unskilled and self–employed workers is very disturbing. However, main employments which are heavily concentrated in the MAA are in services, commerce, manufacturing, construction, finance and transportation concludes that economic conditions in the MAA are better than the rest of the country.

Table A.6.2a   EAP in the Metropolitan Area

Category	1990			1991		
	Total	Male	Female	Total	Male	Female
– Total EAP	520,233	306,390	213,843	521,986	309,450	212,536
– Fully Employed	406,140	248,304	157,836	445,896	270,548	175,340
– Under–Employed						
Open	13,881	5,187	8,694	13,984	4,038	9,946
Disguised	66,087	32,592	33,495	35,484	18,272	17,212
– Unemployed	34,125	20,307	13,818	26,622	16,592	10,030

Source :   Indicadores de la Fuerza del Trabajo , Area Metropolitana , STP / DGEEC, Asuncion, 1992.

Table A.6.2b Sectoral Employment in the Metropolitan Area

Economic Activity	1990			1991		
	Total	Male	Female	Total	Male	Female
– Total Employment	486,108	286,083	200,025	495,364	292,858	202,506
– Agriculture	10,353	8,715	1,638	5,824	5,038	786
– Mining	945	945	–	1,072	1,072	–
– Manufacturing	87,192	57,498	29,694	78,100	51,062	27,038
– Electricity & Water	6,279	5,313	966	5,682	4,860	822
– Construction	39,816	39,585	231	45,356	45,356	–
– Commerce	116,151	59,892	56,259	132,178	68,596	63,582
– Transport & Commu-nication	28,098	23,226	4,872	28,074	24,846	3,228
– Finance	26,817	18,648	8,169	33,520	20,000	13,520
– Services	170,457	72,261	98,196	165,558	72,028	93,530

Source :   Indicadores de la Fuerza de Trabajo, Area Metropolitana, STP / DGEEC, Asuncion

Table A.6.2c Employment Categories in the Metropolitan Area

Category	1990			1991		
	Total	Male	Female	Total	Male	Female
Total Employment	486,108	286,083	200,025	517,626	306,734	210,892
– Employee					89,850	62,442
Public Sector	58,191	35,406	22,785	55,508	33,400	22,108
Private Sector	102,501	60,963	41,538	96,784	56,450	40,334
– Unskilled Labor	121,380	101,283	20,097	151,874	124,824	27,050
– Employer	43,134	38,703	4,431	36,104	27,420	8,684
– Self-Employer	108,465	48,237	60,228	123,872	64,104	59,768
– Unpaid Family Labor	1,974	1,491	483	1,346	536	810
– Maid	50,463	–	50,463	52,138	–	52,138

Source :   Indicadores de la Fuerza de Trabajo, Area Metropolitana , STP / DGEEC, Asuncion, 1992.

A.6.3 Income Levels

As previously mentioned, the MAA is the most urbanized area of the country with a high concentration of population and associated economic activities such as commerce, finance, manufacturing and services. This presumably implies a higher income level than the rest of the country.

Table A.6.3 shows the average monthly salary by employment category in the MAA during 1990 and 1991. The overall average monthly salary in 1990 was G.290,000 for male workers and G.164,500 for female workers.

Among male workers, those whose earnings exceeded the overall average monthly salary were employers and employees in the public sector, while those self-employed and employees in the private sector earned slightly less than the average. The unskilled labor earned considerably less than the average. On the other hand, among female workers, only unskilled laborers and domestic staff earned less than the average monthly salary.

Surprisingly in Table A.6.3a it can be seen that for male employees in 1990, the average monthly salary was G.317,200 in the public sector and G.286,800 in the private sector. This defies the common assumption and trend that the salary level in the private sector is higher than in the public sector

From 1990 to 1991, the overall average monthly salary went up by 29% to G.374,400 for male workers, and by 87% to G.308,000 for female workers. The result was a more balanced salary level between the sexes, since the female labor force earned 56% of the male labor force in 1990 and 82% in 1991.

Among the male labor force in 1991, only unskilled and self-employed workers earned less than the average, while among female workers who earned less than the average were employees in the public sector, unskilled and self-employed workers, and domestic staff. For employees in 1991, the average salary level in the private sector was higher than in the public sector, for both male and female workers.

For both male and female workers, those categorized as employers earned the highest salaries. Male employers earned twice as much as the average monthly salary in 1990, and 2.23 times in 1991. Female employers earned 3.2 times the average monthly salary in 1990, and 2.5 times in 1991.

The smallest growth in salary from 1990 to 1991 was seen for those self-employed, especially self-employed male workers. This supports the contention

made earlier that self-employment, rather than a first choice employment, is a last-resort job creation to cope with the scarcity of appropriate employment opportunities in the formal sectors of the economy.

Table A.6.3a   Average Salary in the Metropolitan Area

Unit : 1,000 Gs. / month

Category	1990		1991	
	Male	Female	Male	Female
Total Employment	290.0	164.5	374.4	308.8
Employee				
Public Sector	317.2	198.9	436.6	295.1
Private Sector	286.8	222.5	476.0	315.6
Unskilled Labor	172.2	139.6	242.5	184.0
Employer	596.1	521.1	835.9	774.7
Self-employed	278.2	174.4	289.5	235.9
Unpaid family labor	–	–	–	–
Maid	–	67.7	–	95.2

A.6.4 Industries

The available data from the Census and Statistics Division of MIC (Ministry of Industry and Trade) indicate that the most industrialized zones of the metropolitan Asunción and surroundings, are the south east zone of Asunción, Areguá, Capiatá, Luque and San Lorenzo.

In Asunción city, small industrial establishments are located, however, since 1976, the industrial development within the city were regulated under Decree No. 25,029/76, therefore, establishment of diversified industries were banned within a 20 km radius of Asuncion, especially along the coastal and watershed areas.

Since the promulgation of the regulation, the encouragement of the promotions and investments in new industrial establishment outside the urban core, and the difference in the cost of land prices between the urban center lands and the surroundings areas, has caused many factories to abandon its narrow lands in the city to establish in areas more suitable and cheaper for industrial development outside the urban cores.

The government objective of industrial decentralization not only encouraged the industrial sector but facilities like the central market, bus terminal, including the new City Hall, were established outside the urban core.

Of the industries, 90% of the factories are considered small with 1 to 5 workers, 10% are medium size with 5 to 20 persons.

According to the study on solid wastes from industrial sources (Annex L), the concentration of factories in Asuncion and the Central Department is overwhelming, accounting for nearly 3,000 establishments, while each of the other Departments accounts for less than 500 factories (1988 data). Moreover, Asuncion houses 2,263 factories, while each of the Municipalities in the MAA accounts for less than 200 factories (164 in San Lorenzo, 146 in Fernando de la Mora, 78 in Luque, 77 in Capiata, 47 in Lambare).

The types of factories which are most frequently found in the MAA can be classified as follows.

Group	Type	Number of factories
More than 100 factories	Bakery	312
	Foodstuff	147
	Apparel	236
	Shoe (leather)	104
	Non-metal furniture	244
	Printing	197
	Ceramics	122
	Metal products	103
	Construction	177
	Sub-total	1,642(56%)
Between 50 and 100 factories	Lumber mill	61
	Pharmaceuticals	60
	Plastics	81
	Machinery (non-electric)	87
	Machinery (electric)	93
	Sub-total	382(13%)
Less than 50 factories	51 types (e.g. hide tannery, tobacco, paper, chemicals, fertilizer, paint, oil derivatives, iron/steel, metal furniture, electric equipment, shipyard)	
	Sub-total	905(31%)

It can be seen that 69% of all factories in the MAA are classified into only 14 types of industries, while the remaining 31% of factories are classified into 51 types.

The relative distribution of employees in the industry by factory size (classified in terms of the number of employees) are shown in Table A.6.4a and Figure A.6.4a, and summarized below.

Table A.6.4a   Number of Employees by Size of Factory

	0-9	10-49	50-100	> 100	Total
Asuncion	6,065	8,578	3,934	10,290	28,867
F. Mora	377	935	445	441	2,198
Lambare	111	140	212	1,016	463
San Lorenzo	398	1110	495	1,686	3,019
Capiata	160	621	188	865	2,655
Luque	164	552	419	234	2,000
M.R.Alonso	33	225	0	420	492
Villa Elisa	35	151	0	713	606
Nemby	43	246	0	152	1,002
Ita	71	0	0	232	223
Aregua	41	25	0	509	298
Limpio	61	48	65	1,778	683
Villa Hayes	30	86	71	223	1,965
B.Aceval	44	0	70	0	337
Total	7633	12,717	5,899	18,559	44,808

Legend
0 - 9
10 - 49
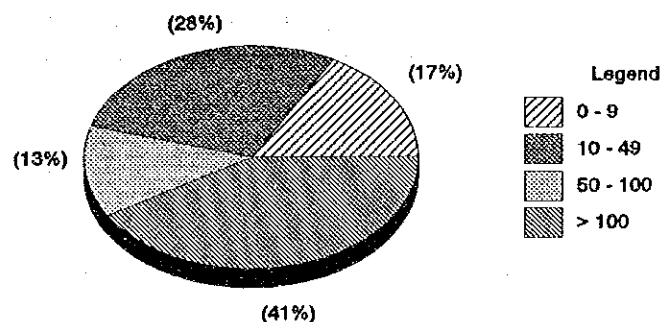50 - 100
> 100

(28%)
(17%)
(13%)
(41%)

Figure A.6.4a   Relative Distribution of Total Employee by Size of Factory

Table A.6.4b   Relative Distribution of Total Employee by Size of Factory

Factory size (by number of employees)	Distribution of employees	
	MAA(%)	Asuncion(%)
< 10 employees	17.0	13.5
10 – 49 "	28.4	19.1
50 – 100 "	13.2	8.8
> 100 "	41.4	23.0

It can be seen that in the MAA, the group of factories employing less than 50 persons each accounted for 45% of the total number of employees in the industry, while the group of factories employing 50 workers or more each accounted for 55% of the total number of employees in the industry. More importantly, it can be

seen that Asuncion accounted for between 55% and 80% of the number of employees under each category of factory size.

The types of industries do not seem to change much with the size of the factory, when factory size is classified in terms of the number of employees. Processing of agricultural products and foodstuff appear to be pervasive in all factory sizes. However, as the factory size increases, there appears to be a rise in manufacturing of furniture, chemicals, pharmaceuticals, machinery and equipments. The types of factories, excluding factory size, employing over 100 employees include cement and non-metallic minerals, structural metals, industrial machinery, shipyard, professional and scientific equipments.

A.6.5   Municipal Finance

The financial situation of Municipalities are presented as summaries of their 1993 budgets. Incomes and expenses are presented in separate tables, to highlight the main sources of income and the major expense items for three groups of Municipalities which are classified according to the degree of urbanization. The figures refer to the planned budget, not the executed budget, whereby most Municipalities show either a balance or a surplus.

Tables A.6.5a to 5c summarize the municipal incomes for highly urbanized, urbanized, and less urbanized Municipalities, respectively. Likewise, Tables A.6.5d to 5f summarize the municipal expenses for highly urbanized, urbanized, and less urbanized Municipalities, respectively. The purpose was to find an intra-group pattern of income and expenditure within each group of Municipalities.

Although municipal budgets contain basically the same items, some inconsistencies were found in the classification of these items. A case noted was the "fees" paid by beneficiaries of services rendered by Municipalities. "Fees" were classified as "tax income" by some Municipalities and as "non-tax income" by others. Taking into consideration that "fees" are paid for services received, Tables A.6.5a to 5c classify "fees" as "non-tax income".

Another confusing item was the treatment of the "real estate tax" or land tax. Up to 1992, real estate tax used to be collected by the central government, which had to transfer back to each Municipality 30% of the collected real estate tax levied on the land of the District. A Constitutional amendment in effect since 1993 gave each Municipality the right to collect the real estate tax levied on the land of the District. Some Municipalities included "real estate tax" as a new income source,

while others kept it as a "transfer" from the central government.

Municipal budgets can be characterized as follows.

a. Income

aa. Highly Urbanized Municipalities

The size of the budget of Asuncion is in a different scale from the other Municipalities.

In Fernando de la Mora, current income comprises around 80% of the total income. Moreover, a large share is under the tax income, in which four taxes account for 53% of total income (profession, commerce and industry, automobiles, real estate, construction). The fee for waste collection comprises less than 1%, since the service is provided by a private company.

ab. Urbanized Municipalities

No uniform pattern can be seen among the municipal budgets in this group. The budget of Lambare is nearly 12 times larger than that of Capiata. Except for Lambare, current income comprises around 90%. Tax income comprises more than half of total income, except for Lambare and San Lorenzo. Non-tax income accounts for 52% of total income in San Lorenzo, which shows the highest share of waste collection fees: 10.2% of total income. The high share of capital income in Lambare (42%) is partly due to 14% of total income coming from loans.

ac. Less Urbanized Municipalities

It is the most uniform group of Municipalities in terms of the size of their budgets. Nemby and Villa Elisa show capital incomes of around 30%, but only Nemby shows loans for 13% of total income.

Non-tax income comprises more than half the total income only in Ita. The fee for waste collection is the highest in Villa Elisa with 5.1%. In Villa Hayes, the tax on profession, commerce and industry comprises 56% of total income, and 26% in Villa Elisa. In Limpio, two taxes (real estate and mass transit) comprise 42% of total income. Other than the preceding cases, there are no specific taxes dominat-ing.

For Municipalities in general, current income is more important than capital .

income. Within current income, tax income is more important than non-tax income. Taxes that serve as main sources of municipal income are on profession, commerce and industry, automobiles, construction, mass transit, publicity, shows and gambling. The real estate tax is expected to become an increasingly important income source for Municipalities beginning in 1993. There are other locally important municipal taxes, such as that on cattle slaughtering for Municipalities where stockyards are located.

b.   Expenses

ba.   Highly Urbanized Municipalities

In Fernando de la Mora, there is a good balance between current and capital expenses, 64% and 36%, respectively. Most of current expenses are for personnel, and most of capital expenses are for physical investments consisting mainly of construction and repair. Contribution to AMUAM amounts to 0.3%.

bb.   Urbanized Municipalities

Capital expenses comprise less than 20% of total expenses only in Capiata, and are devoted mostly to physical investments of construction and repair. Only in Luque, construction and repair is less than the acquisition of land, machinery and equipments.

Again in this group of Municipalities, personnel services account for most of the current expenses. Contribution to AMUAM comprises between 0.1% and 0.5% of total expenses.

bc.   Less Urbanized Municipalities

Capital expenses comprise less than 20% of total only in Villa Elisa and Benjamin Aceval. Capital expenses are devoted mostly to physical investments of construction and repair, except in Ita and Villa Hayes where acquisition of land, machinery and equipments is higher.

As expected, personnel services again account for most of current expenses. Contribution to AMUAM comprises between 0% in Limpio to 3.3% in Benjamin Aceval.

It appears in general that expenses are low on non-personnel services, and materials and supplies. Human resources, as good as they might be, are unable to

produce without adequate tools and materials. Also, capital expenses seem to be low, but this may be a reflection on unwillingness to incur public debt or unavailability of financing at the level of Municipalities. The contribution to AMUAM, although reportedly a percentage of current income, seems to be low.

Table A.6.5a   Municipal Income, 1993 Budget (Highly Urbanized Municipalities)

Unit:1000GS

Items	Asuncion	F. Mora
CURRENT INCOME	43,031,200	1,698,050
Tax Income	25,857,000	1,344,600
− Specific Taxes	24,968,300	1,237,000
. Profession, Commerce, Industry	3,922,400	420,000
. Automobiles	2,000,000	250,000
. Real estate	15,500,000	325,000
. Mass transit	640,000	50,000
. Construction	1,786,400	130,000
. Cattle slaughtering	19,500	30,000
. Land transfer	350,000	8,000
. Shows and gambling	500,000	7,000
. Publicity	250,000	17,000
− Other Taxes	888,700	107,600
Non-Tax Income	17,174,200	353,300
− Fees	11,364,500	177,000
. Waste collect., cleaning	7,000,000	20,000
. Sanitation service	1,102,000	40,000
. Pest control service	690,000	60,000
. Automobile inspection	600,000	40,000
. Facilities inspection	60,000	12,000
. Others	2,182,500	5,000
− Sale of goods & services	0	107,000
. License plates	0	25,000
. Electricity and/or water	0	0
. Others	0	82,000
− Income from fixed assets	3,154,700	25,000
. Municipal land	85,000	10,000
. Cemetery	450,000	5,000
. Municipal facilities	410,000	10,000
. Others	2,209,700	0
− Income from financial assets	0	0
− Fines & concessions	0	32,000
− Other non-tax incomes	1,185,000	12,300
Transfers (Real estate tax)	1,200,000	0
Donations	0	150
CAPITAL INCOME	7,672,100	427,684
Loans	3,342,700	20,000
Sale of Fixed Assets	370,000	26,500
Donations	0	150
Others	3,959,400	381,034
TOTAL INCOME	50,703,300	2,125,734

Table A.6.5b   Municipal Income, 1993 Budget (Urbanized Municipalities)

Unit:100GS

Items	Capiata	Lambare	Luque	M.R.Alonso	San Lorenzo	V.Elisa
CURRENT INCOME	316,100	2,363,650	1,353,200	854,100	1,200,000	201,637
Tax Income	196,900	1,136,342	1,050,100	633,500	518,510	164,976
− Specific Taxes	182,700	1,017,020	996,400	528,000	440,000	134,522
· Profession, Commerce, Industry	90,000	205,000	197,400	65,000	185,000	73,330
· Automobiles	20,300	260,000	175,000	60,000	85,000	17,850
· Real estate	0	0	400,000	130,000	0	0
· Mass transit	25,000	42,000	90,000	35,000	30,000	15,000
· Construction	12,000	380,000	60,000	40,000	80,000	14,414
· Cattle slaughtering	20,000	20	36,000	180,000	15,000	5,400
· Land transfer	3,400	20,000	8,000	5,000	10,000	5,045
· Shows and gambling	5,000	60,000	15,000	3,000	10,000	600
· Publicity	7,000	50,000	15,000	10,000	25,000	2,883
− Other Taxes	14,200	119,322	53,700	105,500	78,510	30,454
Non-Tax Income	114,200	930,408	303,100	220,600	651,490	60,570
− Fees	25,100	465,000	51,400	87,700	279,000	24,990
· Waste collect., cleaning	1,500	367,000	15,000	50,000	127,000	14,415
· Sanitation service	6,000	15,000	7,000	4,500	35,000	0
· Pest control service	4,300	20,000	10,000	5,000	40,000	5,290
· Automobile inspection	3,500	15,000	10,000	7,500	20,000	2,402
· Facilities inspection	3,900	20,000	5,000	3,500	20,000	
· Others	5,900	28,000	4,400	17,200	37,000	2,883
− Sale of goods & services	18,550	197,458	116,200	82,700	117,000	30,367
· License plates	7,500	40,000	27,000	25,000	35,000	15,333
· Electricity and/or water	0	458	24,000	0	16,000	8,408
· Others	11,050	157,000	65,200	57,700	66,000	6,625
− Income from fixed assets	59,550	172,500	89,000	31,700	191,490	3,713
· Municipal land	7,000	16,000	15,000	7,200	10,000	2,162
· Cemetery	10,000	34,000	7,000	15,000	2,000	1,201
· Municipal facilities	42,550	2,000	51,000	9,500	157,490	0
· Others	0	120,500	16,000	0	22,000	350
− Income from financial assets	0	0	8,500	0	0	0
− Fines & concessions	11,000	80,450	34,000	3,000	17,000	1,500
− Other non-tax incomes	0	15,000	4,000	15,500	47,000	0
Transfers (Real estate tax)	5,000	275,000	0	0	30,000	1,081
Donations	4,500	0	0	15,000	0	0
CAPITAL INCOME	34,000	1,740,000	70,000	65,000	50,000	81,813
Loans	15,000	600,000	15,000	50,000	0	0
Sale of Fixed Assets	10,000	160,000	40,000	15,000	10,000	34,611
Donations	0	0	0	0	0	0
Others	9,000	15,000	15,000	0	40,000	47,202
TOTAL INCOME	354,600	4,103,650	1,423,200	919,100	1,250,000	283,450

Table A.6.5c   Municipal Income, 1993 Budget (Less Urbanized Municipalities)

Items	Arequa	Ita	Limpio	Nemby	J.A.Saldivar	B.Aceval	V.Hayes
CURRENT INCOME	213,770	472,450	388,660	206,550	41,000	104,140	391,600
Tax Income							
– Specific Taxes	135,470	225,100	312,460	155,150	33,260	73,020	342,700
	123,100	198,400	280,160	146,000	30,400	69,000	337,500
. Profession, Commerce, Industry	50,000	50,000	37,000	35,000	10,000	18,000	225,000
. Automobiles	35,000	30,000	25,000	35,000	7,000	15,000	40,000
. Real estate	0	49,000	90,700	34,000	0	0	50,000
. Mass transit	26,000	20,000	80,960	16,000	9,000	24,000	7,000
. Construction	2,000	10,000	10,000	10,000	3,000	300	5,000
. Cattle slaughtering	6,500	15,000	30,000	1,000	300	1,000	6,000
. Land transfer	1,000	4,000	2,000	1,500	0	0	1,500
. Shows and gambling	2,000	18,000	2,000	9,500	500	500	1,500
. Publicity	600	2,400	2,500	4,000	600	200	1,500
– Other Taxes	12,370	26,700	32,300	9,150	2,860	4,020	5,200
Non-Tax Income	36,300	247,350	76,200	51,400	5,600	21,040	58,900
– Fees	4,600	18,900	12,900	35,000	4,500	5,350	10,100
. Waste collect., cleaning	100	12,000	1,000	3,000	200	150	6,000
. Sanitation service	700	500	1,500	4,000	900	1,000	3,000
. Pest control service	100	2,500	2,000	0	500	100	0
. Automobile inspection	1,500	2,000	3,500	5,000	900	2,500	300
. Facilities inspection	900	300	1,500	2,500	500	300	300
. Others	1,300	1,600	3,400	500	1,500	1,300	500
– Sale of goods & services	4,500	22,900	41,000	20,500	1,100	5,600	6,200
. License plates	2,000	3,500	11,000	16,300	1,000	4,500	4,000
. Electricity and/or water	0	6,700	3,000	7,000	0	50	500
. Others	2,500	12,700	27,000	0	100	1,050	1,700
– Income from fixed assets	27,000	173,550	21,000	9,300	200	7,940	13,600
. Municipal land	6,000	40,000	5,000	0	200	3,500	12,000
. Cemetery	2,000	2,000	4,000	0	0	1,000	200
. Municipal facilities	19,000	128,550	6,000	0	0	3,340	1,200
. Others	0	3,000	6,000	0	0	100	200
– Income from financial assets	0	0	0	0	0	0	0
– Fines & concessions	200	3,000	800	100	240	150	9,000
– Other non-tax incomes	0	8,000	500	0	1,700	2,000	5,000
Transfers (Real estate tax)	40,000	21,000	0	0	0	10,000	0
Concessions	2,000	0	0	0	0	0	0
Donations	0	0	0	0	0	80	0
CAPITAL INCOME	52,379	11,000	20,000	97,745	1,000	15,671	10,000
Loans	2,300	1,000	0	40,000	0	0	0
Sale of Fixed Assets	49,839	10,000	20,000	54,245	1,000	15,000	10,000
Donations	240	0	0	0	0	100	0
Others	0	0	0	3,500	0	571	0
TOTAL INCOME	266,149	483,450	408,660	304,295	42,000	119,811	401,600

Table A.6.5d   Municipal Expenses, 1993 Budget (Highly Urbanized Municipal-
               ities)

Unit:1000GS

Items	Asuncion	F.Mora
CURRENT EXPENSES	33,632,560	1,358,820
Operation	30,480,055	1,181,229
-- Personal Services	25,491,291	923,853
-- Non--Personal Services	3,280,435	149,050
- Materials and Supplies	1,708,330	108,326
Financial	1,599,368	1,800
Transfers	1,508,136	162,172
- To Public Sector	1,432,052	154,442
. Decentralized Entities	1,432,052	56,941
. OPACI	0	16,980
. IDM	0	33,961
. AMUAM	0	6,000
-- To Private Sector	76,084	7,300
- Others	45,000	14,050
CAPITAL EXPENSES	17,070,740	766,914
Investments (Physical)	13,523,740	754,759
- Land, machinery,equipment	4,989,790	252,800
-- Construction and repair	6,958,950	496,000
- Others	1,575,000	5,959
Payment of Public Debt	2,342,000	12,155
Reserves for Capital Expenses	0	0
Investments (financial)	0	0
Transfers	1,250,000	0
TOTAL EXPENSES	50,703,300	2,125,734

Table A.6.5e   Municipal Expenses, 1993 Budget (Urbanized Municipalities)

Unit:1000GS

Items	Capiata	Lambare	Luque	M.R.Alonso	San Lorenzo	V.Elisa
CURRENT EXPENSES	292,191	2,184,484	951,490	723,710	787,072	246,120
Operation	225,193	1,792,825	785,649	624,575	707,300	230,948
- Personal Services	173,622	1,325,221	639,449	485,195	607,100	168,436
- Non-Personal Services	30,271	331,479	99,900	71,380	33,700	24,740
- Materials and Supplies	21,300	136,125	46,300	68,000	66,500	37,772
Financial	41,793	183,198	0	0	1,972	817
Transfers	23,705	161,027	150,341	72,285	75,800	13,895
- To Public Sector	17,505	135,227	73,329	63,285	57,600	12,045
. Decentralized Entities	15,805	31,527	41,629	33,285	56,000	10,485
. OPACI	3,161	23,636	13,532	9,190	12,000	3,025
. IDM	6,322	0	27,064	0	24,000	4,033
. AMUAM	1,580	7,891	1,033	4,595	2,000	403
- To Private Sector	6,200	25,800	82,013	9,000	18,200	1,850
- Others	1,500	47,433	15,500	26,850	2,000	461
CAPITAL EXPENSES	62,409	1,919,166	471,701	195,389	426,928	37,330
Investments (Physical)	36,728	1,664,832	311,710	161,500	451,706	30,703
- Land, machinery,equipment	16,000	379,000	164,613	59,500	114,700	0
- Construction and repair	20,723	1,285,832	147,097	102,000	337,006	30,703
- Others	0	0	0	0	0	0
Payment of Public Debt	25,685	254,333	0	33,889	6,222	1,238
Reserves for Capital Expenses	0	0	0	0	0	0
Investments (financial)	0	0	0	0	5,000	5,389
Transfers	0	0	160,000	0	0	0
TOTAL EXPENSES	354,600	4,103,650	1,423,200	919,100	1,250,000	283,450

Table A.6.5f　　Municipal Expenses, 1993 Budget (Less Urbanized Municipali-
ties)　　　　　　　　　　　　　　　　　　　　　　Unit:1000GS

Items	Aregua	Ita	Limpio	Nemby	J.A.Saldi var	B.Aceval	V.Hayes
CURRENT EXPENSES	182,450	318,505	286,160	177,295	36,308	101,832	298,522
Operation	123,180	269,968	208,296	135,195	32,100	87,662	243,464
- Personnel Services	105,280	208,518	175,896	112,095	23,045	66,332	210,004
- Non-Personnel Services	9,900	36,600	16,900	4,100	5,480	7,980	18,400
- Materials and Supplies	8,000	24,850	15,500	19,000	3,575	13,350	15,060
Financial	0	1,800	0	0	360	5,493	0
Transfers	55,770	43,237	50,210	39,400	3,548	5,911	44,259
- To Public Sector	26,433	29,177	37,710	29,100	3,548	5,561	38,295
. Decentralized Entities	12,333	6,677	0	6,000	1,848	5,041	30,959
. OPACI	2,138	4,451	0	2,000	410	1,041	3,416
. IDM	4,275	0	0	0	820	0	6,832
. AMUAM	2,500	2,226	0	4,000	618	4,000	5,711
- Private Sector	29,337	14,060	12,500	10,300	700	350	6,000
- Others	3,500	3,500	11,549	2,000	300	2,765	10,799
CAPITAL EXPENSES	83,700	164,945	122,500	129,300	5,692	17,979	103,078
Investments (physical)	3,700	164,445	122,500	129,300	5,692	12,627	97,562
- Land, machinery, equipments	13,100	147,500	22,000	16,000	0	1,627	74,140
- Construction and repair	70,600	16,945	100,500	113,300	5,692	11,000	18,700
- Others	0	0	0	0	0	0	4,722
Payment of Public Debt	0	500	0	0	0	4,953	5,517
Reserves for Capital Expenses	0	0	0	0	0	0	0
Investments (financial)	0	0	0	0	0	150	0
Transfers	0	0	0	0	0	250	0
TOTAL EXPENSES	266,150	483,450	408,660	306,595	42,600	119,811	401,600

The main types of municipal tax were itemized as specific taxes in Tables A.6.5a to 15c relating to municipal incomes pertaining to Municipalities with different levels of urbanization. In general, municipal income has traditionally depended on a few taxes, such as those levied on the practice of professions, commerce and industry, as well as on automobiles, mass transit and construction.

Municipal income had a large increase in 1993, due to a Constitutional amendment whereby the collection of real estate tax was changed from the jurisdiction of the Central Government to that of each Municipality. Up to 1992, the Central Government collected the real estate tax, and each Municipality received as transfer from the Central Government 30% of the tax levied on the land of the District. Beginning in 1993, each Municipality collected the tax levied on all the land of the District. However, the Municipality transferred 15% of the land tax to the newly created Office of the Governor of the Department, and an additional 15% to the financially weak Municipalities within the Department.

The tax system for Municipalities of First, Second and Third Categories is established in Law No. 62/76. Asuncion Municipality has its own tax system promulgated in Law 881/81.

Law No. 62/76   Tax System for Municipalities of First, Second and Third Categories

Art. 110. The Municipality shall charge fees for services rendered on waste collection, street sweeping and clean up of cemeteries, if the services are effectively realized. The fees should not exceed the real cost of the service plus administrative expenses. The amount of the fee and the payment schedule shall be set every year.

Art. 111. Late payments shall be penalized with a fine from 4% during the first month of delay, 8% during the second month, 12% during the third month, 20% during the fourth month and 30% during the fifth month. The fine shall not exceed 30% of the fee corresponding to the semester.

Law No. 881/81   Tax System for Asuncion Municipality

Art. 123. Owners and renters of land located on roads/streets which are paved with asphalt/cement, or stone laid, shall pay annual fees for cleaning of streets,

collection and treatment of waste, if the service is effectively realized. The yearly fee is to be paid by March 31 of the current year.

(The fee is set per square meter of construction, having a minimum and a maximum, with due consideration for land without or incomplete construction, types of street pavement, location in urban or suburban areas, and residential or business use of the land).

Art. 124. Businesses shall have a surcharge ranging between 20% and 80%, if the line of activity generates excessive waste such as in the case of bars, restaurants, supermarkets, bakeries, hotels and hospitals. The surcharge shall be set every year according to the volume of waste generated and the line of business activity.

Art. 125. Upon request, the Municipality shall provide the following services.

- Collection of industrial or accumulated wastes
- Collection of carcasses
- Cleaning of empty land and tree pruning

The fee shall be set every year depending on location, weight, volume and distance.

Art. 128. Households with working trash compactors shall be granted a 30% reduction in fees.

According to the legal provisions mentioned above, the municipal tax and fees are to be paid at the Municipality by the tax or fee payer. Some Municipalities may have their own bill collectors as a measure to increase collection rate. As for other utilities, direct debit may become the preferred way of collection.

The fee for cleaning of public places and management of solid wastes in Asuncion is to be paid by March 31 of each year. If this is a one-time payment, the concern is the financial burden this payment may impose on some segments of the population. Other Municipalities seem to be more flexible, not only in terms of fees but also in the payment schedule.

One point to keep in mind is that the solid wastes management is regarded as public utilities. As such, the legislation is clear in that the fee should not exceed the real cost of service plus administrative expenses.

A.6.7 Tax System and Utilities Charging System

Taxes in Paraguay are imposed by the National Government and the Municipal Governments. Utilities are also charged either by the National or Municipal Governments, according to which agency is providing the services.

a. National Government Taxes

The national taxation system in Paraguay is based on three deferent groups of taxes; income tax, tax on capital, and tax on consumption, all defined and regulated by the Law No 125/91.

- Income tax charges all the non-personal earnings from the agricultural, commercial, industrial and services activities.

- Capital tax, is a tax corresponding to property tax which, from last year was transferred to the municipalities. This tax is imposed to all the property owners, be it individuals or corporations.

- Consumption taxes include many different types of taxes, most important of them being the IVA – the aggregate value tax (Impuesto al Valor Agregado), applied to all products produced or imported and rendering of services in the formal economy, with a flat value of 10%. Public servants and employees earning salaries less than Gs$ 23,400,000.00 per year are exempt.

Some imported products like cigarettes, soft drinks, liquors, wines, petroleum derived fuels, and alcohol also pay the ISC – Selective Consumption Tax (Impuesto Seletivo al Consumo), with rates ranging from 7% to 50% Internal trade of cattle is also subject to a specific tax of 2%.

b. Municipal Government Taxes

Municipalities have the right to tax building construction, vehicle patents (licenses), slaughterhouses, commercial, industrial and professional activities, (usually the main source of municipal income), advertising and other less important issues. Also, from last year, municipalities can impose taxes for properties, in general the second most significant amount in the municipalities. In municipalities with adequate capacity to collect tax, like Asuncion, the property tax, being the most important, accounts for a half of all the other taxes put together, being the most

important one.

Besides taxes, municipalities impose fees for waste management, weight and mea-
sures inspection, vehicles inspection, sanitation services, pavement maintenance,
fire control, etc.[5]

Small municipalities usually face great difficulty in collecting some taxes, like the
property tax. The municipal cadastre is often very outdated and they seldom use
mail billing, relying only on municipal collectors or on voluntary payments.
Furthermore, usually these payments can only be made in the city hall, not enabling
the taxpayers to pay it by mail or through banks.

c. Public Utilities Charging

Public utilities provided on network schemes are electricity, telephone, water,
sewerage and drainage. They are charged, where they are provided, based on the
following schemes:

- **Electricity** – a monthly fee, issued by ANDE – National Electricity
  Administration (Administracion Nacional de Eletricidad) based on metered
  consumption.

- **Telephone**– a monthly fee issued by ANTEL – National Telephone
  Administration (Administracion Nacional de Telefonos)

- **Drinking water, sewerage and urban drainage** – When provided by
  CORPOSANA, a monthly fee is send to the user, on an amount based on
  metered or assumed consumption of water, and a percentage of the amount
  to be paid, in Guaranies, for water, for the maintenance or construction of
  sewerage and another percentage for the drainage system maintenance.
  In several cities of the Asuncion Metropolitan Region like in F. Mora, Luque,
  M.R.Alonso, Ñemby, Villa Elisa and Aregua, there is a widespread private
  trade of drinking water from artisan wells, serving 200 to 300 customers
  each, which is a totally unregulated business, but, in some cases the water
  quality is controlled by SENASA. In this case, consumers pay a fixed fee
  monthly, charged by the well owner.

- **Solid Waste Management** – many different ways of charging the users of

[5]Ordenanza General de Tributos Municipales – Municipalidad de Asuncion, Direccion General de Administración
Interna, 1992

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collection and street sweeping are used, from a tax charged jointly with the property tax to direct billing, by the municipality or by the service provider, as described in the next chapter.

ANNEX B

WASTE AMOUNT AND COMPOSITION SURVEY

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B.1   Objectives and Definitions

B.1.1   Objectives of the Survey

Basic information such as the quantity of solid waste generated in the survey area, the population covered with the collection services, collection area map, etc., is the key for formulation of a successful and workable solid waste management plan.

A WACS (Waste Amount and Composition Survey) was carried out in order to obtain basic information on waste generation ratio, discharge and recycling amount, amount of self-disposal and collection, and finally to clarify the waste stream in the study area.

The WACS was carried out twice in July, 1993 and February, 1994 in order to get the waste data of both winter and summer. **The average data was determined by both data.**

B.1.2   Definitions of the Wastes

In order to make the contents of the WACS and the waste stream clearly understood, the definitions of words used in the study are as follows:

a.   Household waste

Waste generated in or discharged from households including waste in shops. However, those generated through commercial activities are excluded.

b.   Commercial waste

Only refers to wastes generated and discharged from shops through their commercial activities. Shops include restaurants, hotels, drug stores, grocery shops, printing shops, private offices, etc..

c.   Market waste

Waste generated in or discharged from markets both for wholesale and retailing.

d.   Institutional waste

As for the institutional waste, government office waste is examined in the Study.

e.   Street sweeping waste

Street sweeping waste include all wastes generated by the following cleansing services:

- Street sweeping waste; and
- Public area cleansing waste, which is generated from parks and green area cleansing and cleaning-up operation of illegal dumping sites.

f.   Hospital waste

Hospital waste in this study includes non-infectious waste generated in hospitals and excludes infectious waste.

g.   Bulky waste

Abandoned bulky items (such as furniture and vehicles), which are discharged from the above-mentioned categories, is considered as bulky waste in the Study.

h.   Other waste

Other wastes in the Study are the wastes which are disposed of at the present disposal sites in the Study area and are not classified as MSW (item a. to g.).

B.2   Method of the Survey

B.2.1   Method of the Waste Amount Survey

Waste amount survey used in this study is divided into the following three methods:

- Generation ratio survey at generation sources;
- Final disposal amount survey at the present landfills, in the study area; and
- Interview survey at the generation sources.

In addition, the results of the POS (Public Opinion Survey) was referred to for the final determination of the amount. The method applied to the WACS is tabulated in Table B.2.1a.

Table B.2.1a   Method of Waste Amount Survey

Category	Generation Ratio Survey	Disposal Amount Survey	Interview Survey
MSW (Total)		X	
Household Waste	X		X
Commercial	X		
Market Waste	X		X
Institutional	X		
Street Sweeping	X		
Hospital Waste			X
Bulky Waste		X	
Others (Total)		X	
Industrial Waste		X	X
Others		X	

Note: The item given "X" was surveyed in the Study.

B.2.2   Selection of Sampling Points for the Generation Ratio and Composition Survey

a.   Category of Waste, Generation Sources and Sampling Quantity

In order to obtain the representative generation ratio of each category of waste, the category of waste, generation sources and sampling quantity for the WACS is summarized in Table B.2.2a. Regarding bulky and other wastes, only their amount were studied by means of observation at the present landfills.

Table B.2.2a   Category of Wastes, Generation Sources and Sampling Quantity for WACS

Category of Waste	Generation Sources	In Winter			In Summer		
		(1) Sampling Area (Nos.)	(2) Sampling Area (Nos.)	(1)x(2) Number of Samples (Nos.)	(3) Sampling Area (Nos.)	(4) Sampling Numbers per Area (Nos.)	(3)X(4) Number of Samples (Nos.)
Household Waste	Residential Area (High Income)	4	5	20	6	5	30
	Residential Area (Middle Income)	4	5	20	6	5	30
	Residential Area (Low Income)	4	5	20	6	5	30
Commercial Waste	Commercial Area (Restaurants)	2	2 or 3	5	2	5	10
	Commercial Area (Other Shops)	2	2 or 3	5	2	5	10
Market Waste	Markets	1	2	2	1	2	2
Institutional Waste	Institutions (Government Offices)	1	5	5	1	5	5
Street Sweeping Waste	Street Sweeping	1	2	2	1	2	2
Total		19	———	79	25	———	119

aa.   Household Waste

Household waste generated at residential areas, was classified into the three categories as follows:

—   household waste generated at high income residential area
—   household waste generated at middle income residential area
—   household waste generated at low income residential area

As for the above mentioned three generation sources, 2 sampling areas from Asuncion, one from San Lorenzo and one from Ñemby were selected for each category, in winter. In order to obtain a more reliable data in San Lorenzo and Ñemby, additional 2 sampling areas for each category were selected from San Lorenzo and Ñemby in the summer.

Characteristics of sampling areas of three municipalities are described as follows:

– Asuncion Municipality	High, middle and low income area, is clearly distinguished and each has a certain amount of area.
– San Lorenzo Municipality	Each area can be distinguished. But each area is scattered.
– Ñemby Municipality	It is difficult to distinguish each area and all types of income household is mixed together.

ab. Commercial Waste

The composition of waste generated between restaurants and other shops was quite different. Therefore, commercial waste was classified into two categories, i.e. waste from restaurants and that of other shops.

The sampling areas for commercial waste were selected from commercial areas in the city of Asuncion. In order to obtain a more accurate data, the number of samples for both restaurants and other shops was increased from 5 to 10 respectively to obtain reliable data in summer.

ac. Market Waste

Two sampling areas for market waste were selected from the city of Asuncion in consideration with the following points, regarding collection of their wastes:

– Amount of waste generated at one market should be less than one truck.

– Composition of waste generated at one market should not be mixed with other waste.

ad. Institutional Waste

The sampling areas for the institutional waste were selected from public offices in the city of Asuncion.

ae. Street Sweeping Waste

Two streets as sampling points were selected in Asuncion. One is a street in a

commercial area and the other is a street in a residential area.

b.   Sampling Points

List of sampling points for waste amount and composition survey is shown in Table B.2.2b and the location of sampling points in Asuncion Municipality is shown in Figure B.2.2a.

Table B.2.2b   List of Sampling Points for Waste Amount and Composition Survey (1)

Generation Sources			Code No	Municipality	Survey Points	
					Address	Name of Family
Residential Area	High Income		RH-A01	Asuncion	Dr. Bestard 436	Quevedo–Aguade
			RH-A02	Asuncion	Dr. Bestard 440	Sra Martha
			RH-A03	Asuncion	Dr. Bestard 494 esq. Ag. Barrios	Mendoza Juan Carlos
			RH-A04	Asuncion	Dr. Bestard 564	Macucheff
			RH-A05	Asuncion	Dr. Bestard esq. Dr. Migonesse	Dr. Bataglia
			RH-A11	Asuncion	El Dorado 199	Duarte–Pallares Benitez
			RH-A12	Asuncion	El Dorado 250	Alfonsi
			RH-A13	Asuncion	NNUU 551 c/ El Dorado	Acevedo
			RH-A14	Asuncion	Tte. Cocco 295 c/ NNUU	Saldivar
			RH-A15	Asuncion	Tte. Cocco 296 c/ NNUU	Calo
			RH-S01	San Lorenzo	Cnel Romero 865	Alarcon–Caballero
			RH-S02	San Lorenzo	Cnel Romero 856	Salomon
			RH-S03	San Lorenzo	Cnel Romero 849	Lezcano
			RH-S04	San Lorenzo	Cnel Romero 835	Baez–Mazacotte
			RH-S05	San Lorenzo	Cnel Romero 827	Torrez
		*	RH-S06	San Lorenzo	Cnel Romero 962	Cabañas de Alon
		*	RH-S07	San Lorenzo	Cnel Romero 980	Aquino Pereira
		*	RH-S08	San Lorenzo	Cnel Romero 881	Benitez
		*	RH-S09	San Lorenzo	Cnel Romero 898	Morales Aguilera
		*	RH-S10	San Lorenzo	Cnel Romero 876	Yegros
		*	RH-N01	Ñemby	Presbitero Molas 201 & R. Yhaguy	Sarubi
			RH-N02	Ñemby	Presbitero Molas 200 & R. Yhaguy	Rivelli
			RH-N03	Ñemby	Avda. Dr. Vasconsellos 112	Achinelli
			RH-N04	Ñemby	Ytororo 706 c/Domingo Comet	Arce Soto
			RH-N05	Ñemby	Tte. Rivas c/Ydoyaga	Morales
		*	RH-N06	Ñemby	Miguel Zarza c/Batalla Ytororo	Pita
		*	RH-N07	Ñemby	Tte. Rivas 320	Fretes
		*	RH-N08	Ñemby	Tte. Rivas 730	Espinola
		*	RH-N09	Ñemby	Sargento Simeon Gomez 290	Chavez
		*	RH-N10	Ñemby	Sarg Simeon Gomez(Next to 290)	Cespedes
	Middle Income		RM-A01	Asuncion	Concordia 775 c/E.S.Lopez	Galeano
			RM-A02	Asuncion	Concordia 809 c/E.S.Lopez	Rios
			RM-A03	Asuncion	Concordia 858 c/Cnel. Argana	Lopez
			RM-A04	Asuncion	Florida 647	Nunez–Gimenez
			RM-A05	Asuncion	Florida 821	Paredes
			RM-A11	Asuncion	Centenario 2499	Mateo–Vera
			RM-A12	Asuncion	Centenario 2426	Miranda
			RM-A13	Asuncion	Carmelo Peralta 2907	Cardenas
			RM-A14	Asuncion	Carmelo Peralta y Tte Pampliega	Martinez
			RM-A15	Asuncion	Mayor Pampliega 2575	Fernandez
			RM-S01	San Lorenzo	Nanawa 281	Fretes
			RM-S02	San Lorenzo	Estero Bellaco 102	Caje–Orue
			RM-S03	San Lorenzo	Estero Bellaco 121	Gonzalez
			RM-S04	San Lorenzo	Nanawa 192 c/Estero Bellaco	Pessolani
		*	RM-S05	San Lorenzo	Nanawa 172	Aguilera
		*	RM-S06	San Lorenzo	Tte. Rojas Silva	Cardozo
		*	RM-S07	San Lorenzo	Tte. Rojas Silva 132 c/Campo Via	Ocampo
		*	RM-S08	San Lorenzo	Tte. Rojas Silva 138	Olmedo
		*	RM-S09	San Lorenzo	Tte. Rojas Silva 144	Navarro
			RM-S10	San Lorenzo	Tte. Rojas Silva 111	Ruiz
		*	RM-N01	Ñemby	Gral. E. Diaz 295	Gonzalez
		*	RM-N02	Ñemby	F. Yegros 202 c/ Pasaje Rivarola	Nuñez
			RM-N03	Ñemby	Ytororo 720	Sanabria
			RM-N04	Ñemby	Domingo Comet 153 c/Ytororo	Galloso
			RM-N05	Ñemby	Paz del Chaco c/ Tte. Rivas	Silva
		*	RM-N06	Ñemby	Batalla de Ytororo 1055	Rey
		*	RM-N07	Ñemby	Batalla de Ytororo 1065	Duarte
		*	RM-N08	Ñemby	Batalla de Ytororo 550	Cabañas
		*	RM-N09	Ñemby	Batalla de Ytororo 545	Villalba
		*	RM-N10	Ñemby	Batalla de Ytororo 535	Bogado

Table B.2.2b   List of sampling Points for Waste Amount and Composition Survey (2)

Generation Sources		Code No	Municipality	Survey Points	
				Address	Name of Family
Residential Area	Low Income	RL-A01	Asuncion	29 ent/Tacuary & Antequera	Araujo
		RL-A02	Asuncion	29 c/Tacuary	Leal
		RL-A03	Asuncion	32P c/Paraguari	Medina
		RL-A04	Asuncion	32P 617 c/Mexico	Gomez
		RL-A05	Asuncion	E.U.A. & Florencia Villamayor	Acosta
		RL-A11	Asuncion	E.U.A. & Florencia Villamayor	Balbuena
		RL-A12	Asuncion	E.U.A.	Maciel
		RL-A13	Asuncion	E.U.A.	Lopez
		RL-A14	Asuncion	E.U.A.	Paniagua, Juliana
		RL-A15	Asuncion	E.U.A.	Ortiz
		RL-S01	San Lorenzo	25 de Agosto & 2da Pyda.	Duarte-Rivera
		RL-S02	San Lorenzo	25 de Agosto & 2da Pyda.	Agueda Colman
		RL-S03	San Lorenzo	2da Pyda.	Bobadilla-Pereira
		RL-S04	San Lorenzo	2da Pyda.	Fleytas-Baez
		RL-S05	San Lorenzo	2da Pyda.	Torrez-Garcete
	*	RL-S06	San Lorenzo	Tte. Rivarola c/ 25 de Agosto	Ayala Delgadillo
	*	RL-S07	San Lorenzo	Tte. Rivarola c/ 25 de Agosto	Fernandez
	*	RL-S08	San Lorenzo	Tte. Rivarola c/ 25 de Agosto	Jara
	*	RL-S09	San Lorenzo	Tte. Rivarola c/ 25 de Agosto	Villalba
	*	RL-S10	San Lorenzo	Tte. Rivarola c/ 25 de Agosto	Arrua Benitez
		RL-N01	Ñemby	O'Leary y Gral Diaz M23-L29	Lopez
		RL-N02	Ñemby	F.R.Moreno /Gral Diaz M22-L33	Salinas-Cespedes
		RL-N03	Ñemby	Tte.Rivas 590 c/Paz del Chaco	Blanco
	*	RL-N04	Ñemby	Batalla de Ytororo 1019	Baez
		RL-N05	Ñemby	Paz del Chaco 110 c/Ytororo	Recalde
	*	RL-N06	Ñemby	Batalla de Ytororo	Romero
	*	RL-N07	Ñemby	Batalla de Ytororo 560	Rojas
	*	RL-N08	Ñemby	Fco. Ydoyaga 121 c/Padre Perez	Florentin
	*	RL-N09	Ñemby	Fco. Ydoyaga 111 c/Padre Perez	Florentin
	*	RL-N10	Ñemby	Fco. Ydoyaga esq/ Ytororo	Areco
Commercial	Restau-rants	CR-01	Asuncion	Acuña de Figueroa 674	Pio-Pio
		CR-02	Asuncion	Acuña de Figueroa 842	Don Diego
		CR-03	Asuncion	A. Figueroa.Sal 1y2 del Atlant	Emilios
	*	CR-04	Asuncion	Acuña de Figueroa 860	Donna (dueña del Salon)
	*	CR-05	Asuncion	Acuña de Figueroa 960	Don Pepe
		CR-16	Asuncion	Avda. Peron c/Felix Bogado	Restaurant Westfalia
		CR-17	Asuncion	Avda. Peron c/Felix Bogado	Restaurant El Tomate
	*	CR-18	Asuncion	Avda. Peron (con Westfalia)	Bier Palast
	*	CR-19	Asuncion	Avda. Peron	Hamburgueseria Mita'i
	*	CR-20	Asuncion	Avda. Peron	Stager
	Others	CO-01	Asuncion	Avda E. Ayala y Gral Santos	Artic.Electrodomesticos
		CO-02	Asuncion	Avda E. Ayala 995 c/Aca Vera	Distrisan S.R.L.
		CO-03	Asuncion	E. Ayala 790 c/ Centenario	Muebles Diana
	*	CO-04	Asuncion	E. Ayala 786 c/ Centenario	Farmacia Diana
	*	CO-05	Asuncion	E. Ayala 778 c/ Centenario	Repuestos p/ Vehiculos
		CO-16	Asuncion	Palma y Ayolas	Casa Iberia
		CO-17	Asuncion	Palma 764 e/ Ayolas y O'Leary	Optica Vision
		CO-18	Asuncion	Estrella 723 casi O'Leary	Libreria Internacional
	*	CO-19	Asuncion	Palma c/ 14 de Mayo	Vent Champ Nike, Reebook
	*	CO-20	Asuncion	Palma c/ 14 de Mayo	Up & Down
Markets		M-01	Asuncion	Market No 5	
		M-02	Asuncion	Market No 2	
Governmental Institutions		I-01	Asuncion	Ministry of Public Health and Social Welfare	
		I-02	Asuncion	Ministry of Justicia y Trabajo	
		I-03	Asuncion	Ministry of Hacienda	
		I-04	Asuncion	Instituto de desarrollo Municipal	
		I-05	Asuncion	Instituto de Bienestar Rural	
Street Sweeping		S-01	Asuncion	Brasil	
		S-02	Asuncion	Alfredo Seiferheld	

Note: * are new sampling points selected in the summer.
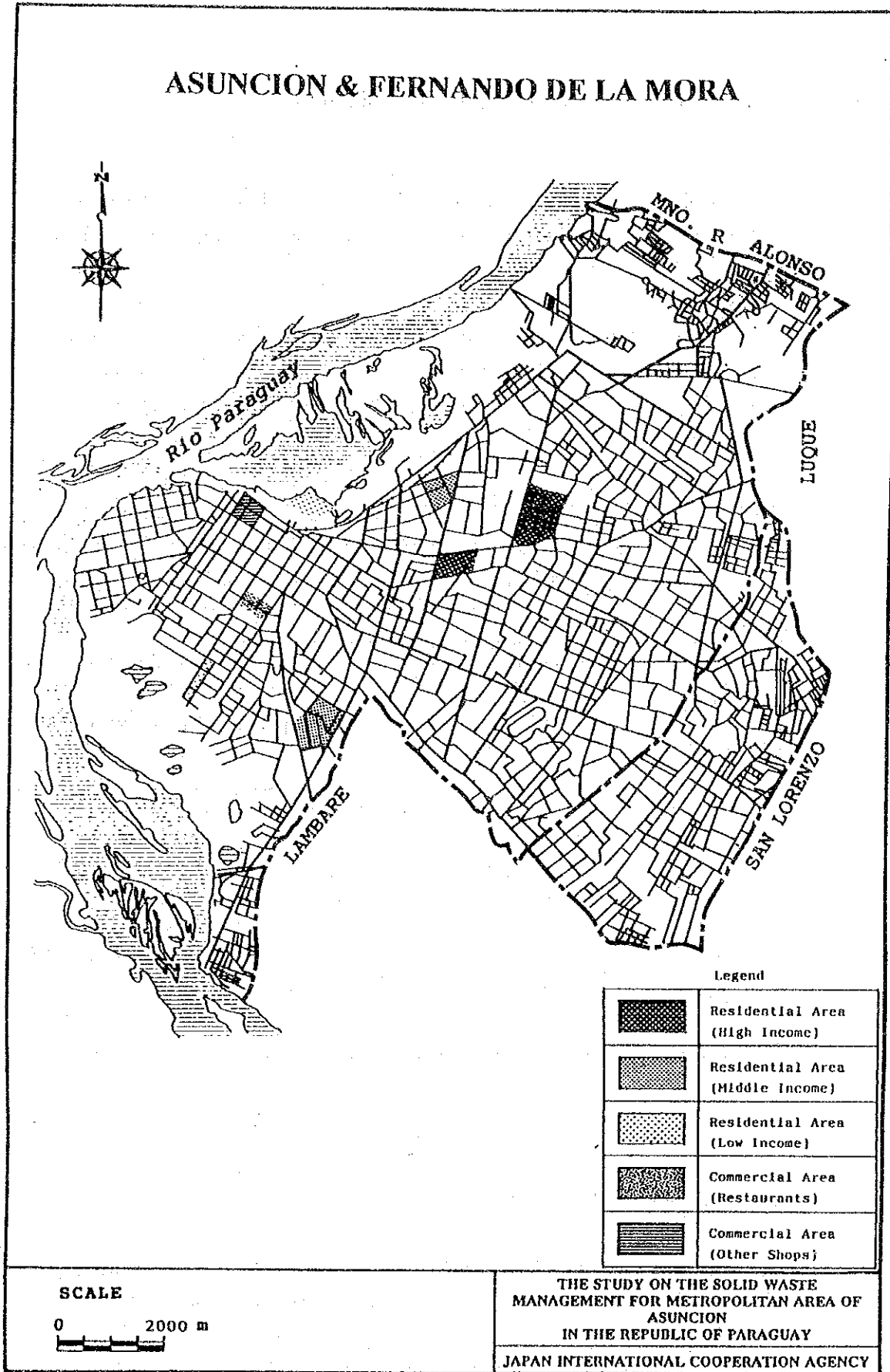
Figure B.2.2a   Location of Sampling Points (Asuncion Municipality)

B.2.3   Method of the Generation Ratio and Composition Survey

Method of the Survey is tabulated in Table B.2.3a. Upon consideration of daily fluctuation of generated waste, the survey was conducted continuously for 8 days. The data of the first day is used only for a reference.

Waste composition survey mainly consists of physical composition and chemical analysis. In the winter, both analyses were executed. In the summer, however, physical composition and moisture content of chemical analysis were executed to compare with the winter data.

Table B.2.3a   Method of the Survey

Generation Source	Collection of Sample	Waste Amount Survey	Waste Composition Survey
Residential Area (High Income)	by plastic bag	by spring balance	Analysis Items
Residential Area (Middle Income)	by plastic bag	by spring balance	– ASG (Apparent Specific Gravity)
Residential Area (Low Income)	by plastic bag	by spring balance	– Physical composition in wet base (kitchen waste, paper, textile, plastic, glass, grass and wood, leather and rubber, metal, ceramic and stone, others)
Commercial Area	by plastic bag	by spring balance	– Chemical Analysis
Market	by pick-up trucks	by weighbridge	+ Three contents (moisture, combustibles, ash)
Institution	by plastic bag	by spring balance	+ Lower calorific value
Street Sweeping	by plastic bag	by spring balance	+ Ultimate analysis (carbon, hydrogen, nitrogen, sulphur, chlorine, oxygen)

a.   Method of the Generation Ratio Surveys

aa.   Collection of Sample

Before the execution of the WACS, required numbers of plastic bags were distributed to residences, shops and offices selected as sampling points.

Samples discharged from markets were collected by pick-up trucks.

ab. Waste Amount Survey

Amount of waste was measured by each sampling point. Samples carried in plastic bags were measured by a spring balance. Then, when a sample was collected, the plastic bags were bound with colored strings which classified them according to generation sources. Samples of market waste transported by pick-up trucks were measured at the truck scale owned by Asuncion Municipality in winter and at the truck scale installed at the Cateura landfill by Study Team in summer.

b. Method of Waste Composition Survey

ba. Method of Sampling

The composition of waste was measured in wet base in accordance with the following seven categories:

- residential area (High Income)
- residential area (Middle Income)
- residential area (Low Income)
- commercial area (Restaurant)
- commercial area (Others)
- markets
- institutions

Each category of waste was gathered and mixed together. Waste mixed together was reduced in volume by applying the reducing method repeatedly, described below, until the volume fell to about 30 to 50 liters as shown in Figure 2.1.2b.

Mixing
When large particles (e.g. cardboard, textile etc.) were found in the waste, they were reduced and mixed again.

Dividing
The waste mixed well was divided into four blocks of almost equal volume.

Reducing
The diagonal two blocks of waste divided into four was removed.

The above-mentioned method was continued until remaining waste volume became a designated amount for waste composition analysis (30 to 50 liters). Then, the waste was put into a plastic bucket.

The plastic bucket containing waste was tapped at a height of 30 centimeters from the ground removing air pockets, thus reducing its volume. Waste was further added and the compacting procedure repeated thrice until a fixed volume of the plastic bucket was maintained.

ASG (Apparent Specific Gravity) was calculated by following formula:

ASG = Weight of Waste (Kg)/Volume of Waste

After ASG was measured, waste was applied to the composition survey. Items of waste composition survey were shown in Table 2.1.2d.

i Mixing

ii Dividing

iii Reducing

removed
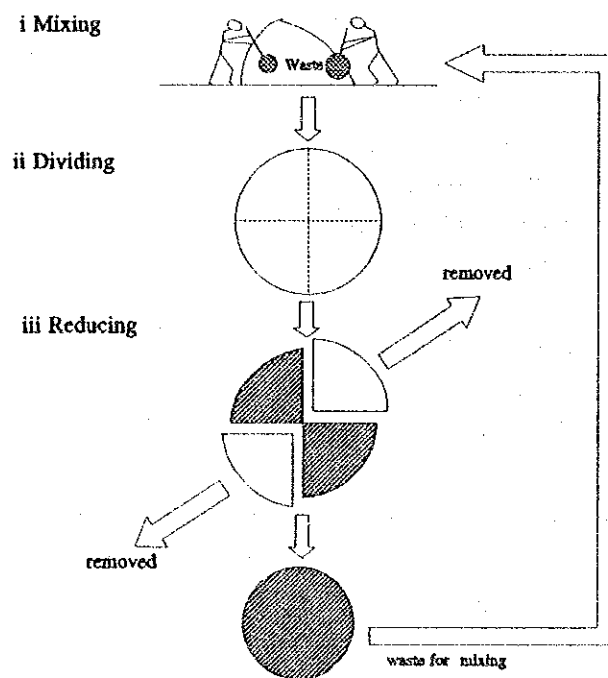
removed

waste for mixing

Figure B.2.3a   Waste Reduction Method

bb.   Composition Analysis

Procedure of physical composition and chemical analysis are shown in Figure B.2.3b.
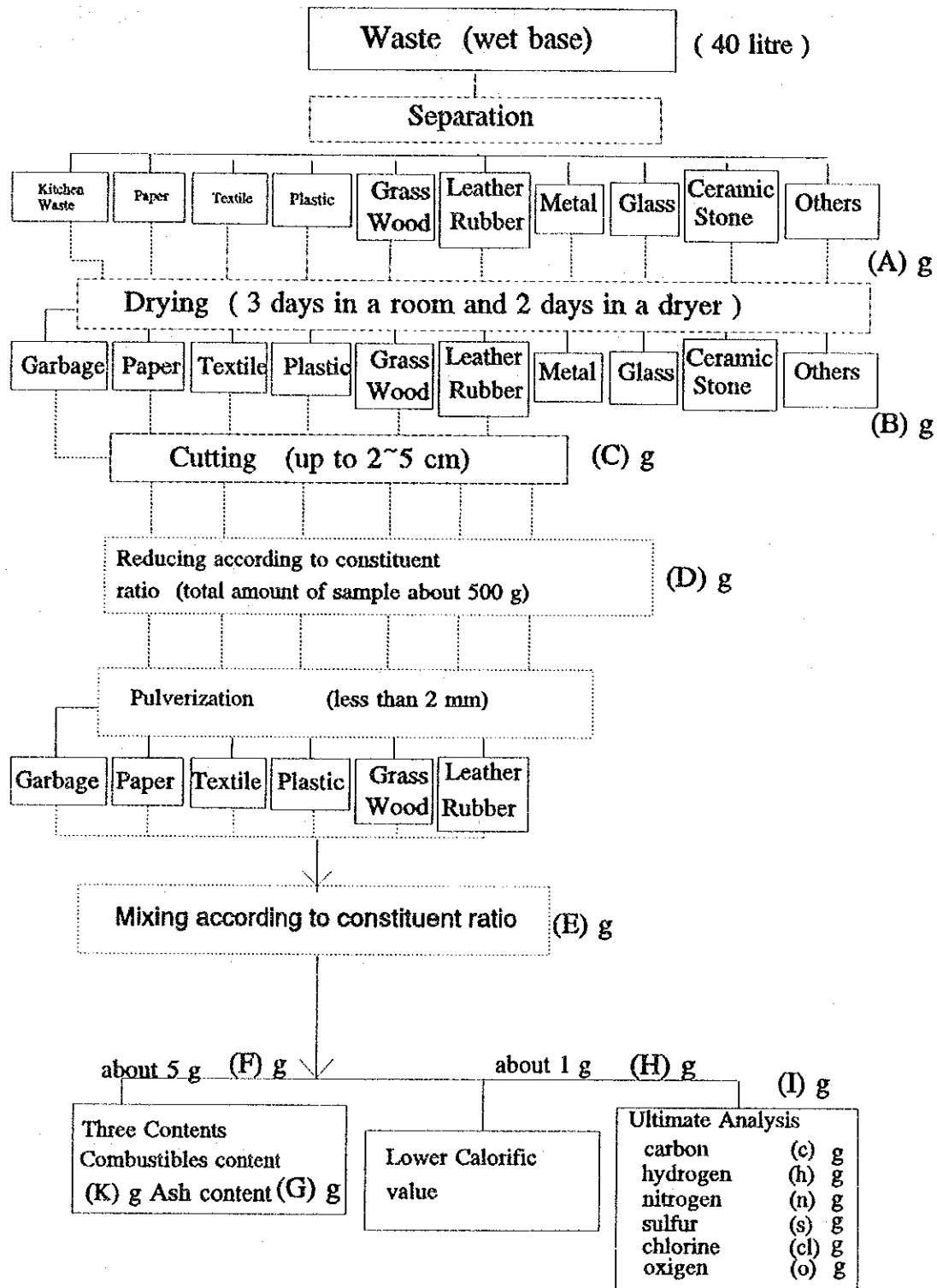
Figure B.2.3b   Procedure of Waste Composition Analysis

bba. Physical Composition

The physical composition was measured in wet base. Before drying, the sample was divided into the following 10 items, then the weight of each item was measured.

- kitchen waste
- paper
- textile
- plastic
- grass and wood
- leather and rubber
- metal
- glass
- ceramic and stone
- other (soil, etc.)

After measuring weight, samples were dried for three days in a room and two days in a dryer (105°C), then the weight of each item was measured again.

Result of the physical composition was presented as a percentage.

bbb. Moisture content

Moisture content is calculated by the following formula:

$$MoistureContent(\%) = \frac{OriginalWeight(A) - DryWeight(B)}{OriginalWeight(A)} x100$$

bbc. Chemical analysis

Chemical analysis was carried out after drying. The combustibles were removed after drying. Six combustible items were as follows:

- kitchen waste
- paper
- textile
- plastic
- grass and wood
- leather and rubber

Each combustible sample was cut into 2 to 5mm pieces. Then six samples were reduced to a total of about 500 g in accordance with each constituent ratio.

Then, each combustible sample was pulverized into the fraction less than 2 mm size by the cutting mill. After pulverization, the samples were mixed together again, chemical analysis were applied to the samples.

Chemical analysis was conducted on the following items:

i. Ash Content

Ash content in this study includes ash after the combustion of the combustible matters and the following non-combustible items:
- metal
- glass
- ceramic and stone
- others

$$AshContent(\%) = \frac{G \times \dfrac{C}{F} + Non\text{-}combustibleWeight(B - C)}{A} \times 100$$

ii. Combustible Content

Combustible content was calculated by the method shown below:

$$CombustibleContent(\%) = 100 - MoistureContent - AshContent$$

iii. Lower calorific value

Lower calorific value was obtained by combustion in a calorimeter bomb, measuring water temperature increase in a calorimetric vessel surrounding the bomb.

Lower calorific value (LCV) was calculated by following formulas:

$$HCV \text{ (wet base)} = HCV \text{ (dry base)} \times \frac{100 - [IncombustibleContent(\%) + MoistureContent(\%)]}{100}$$

$$LCV \text{ (wet base)} = HCV \text{ (wet base)} - 6(9H + W)$$

HCV : Higher Calorific Value
H : Content of Hydrogen (%)
W : Moisture Content (%)

iv. Ultimate Analysis

Ultimate analysis was done for the following 6 items:

- carbon
- hydrogen
- nitrogen
- sulphur
- chlorine
- oxygen

Content of each element was calculated as follows:

$$carbon(\%) = c \times \frac{C}{I} \div A \times 100$$

$$hydrogen(\%) = h \times \frac{C}{I} \div A \times 100$$

$$nitrogen(\%) = n \times \frac{C}{I} \div A \times 100$$

$$sulphur(\%) = s \times \frac{C}{I} \div A \times 100$$

$$chlorine(\%) = cl \times \frac{C}{I} \div A \times 100$$

$$Oxygen(\%) = Combustible \ Content(\%) - (Carbon(\%) + hydrogen(\%) + nitrogen(\%) + sulphur(\%) + chlorine(\%))$$

B.2.4   Period and Schedule of the Survey

The Survey was conducted in winter, from 19th to 26th July 1993, and in summer, from 31th January to 7th February, 1994.

Schedule of the survey is shown in Table B.2.4a

Table B.2.4a   Survey Period of WACS

Items	Survey Period	
	Winter Season	Summer Season
Delivery of Plastic Bags and Instruction Papers	July 15th to July 19th	Jan. 27th to Jan. 28th
Waste Collection From Each Generation Sources	July 20th to July 27th	Feb. 1st to Feb 8th
Waste Amount Measurement	July 20th to July 27th	Feb. 1st to Feb 8th
Trial of Waste Composition Analysis	July 20th	Feb. 1st
Waste Composition Analysis	July 20th to Sep. 30th	Feb. 1st to Feb 20th

B.3   Results of the Survey

B.3.1.   Waste Amount

a.   Household Waste

The result of waste amount survey, both in winter and summer is tabulated in Table B.3.1a. The waste generation ratio in accordance with the income levels does not differ between 3 cities, i.e. Asuncion, San Lorenzo and Ñemby, except low income of Asuncion. And also, in accordance with the season, it does not differ between winter and summer. Average generation ratio of high income was 1,152 g/person/day, middle income was 879 g/person/day and low income was 814 g/person/day, in winter and 1,086 g/person/day, 1,092 g/person/day and 762/person/day respectively in summer. Average generation ratio of residential waste was 949 g/person/day in winter and 980 g/person/day in summer.

Table B.3.1a   Generation Ratio of household Waste   unit: g/person/day

Season	Income Level	Asuncion	San Lorenzo	Ñemby	Average
Winter	High	1,164	1,111	1,181	1,152
	Middle	930	855	859	881
	Low	544	911	988	814
	Average	——	——	——	949
Summer	High	991	1,108	1,160	1,086
	Middle	1,132	1,007	1,136	1,092
	Low	532	766	989	762
	Average	——	——	——	980

b.   Commercial, Market, Institution and Street Sweeping Waste

The result of waste amount survey, both in winter and summer is tabulated in Table B.3.1.b.

The waste generation ratio of each category does not differ between winter and summer, except street sweeping waste. According to the interview with the sweepers, it was found that street sweeping waste in winter was mixed with commercial waste. Therefore, the waste generation ratio of street sweeping waste in winter was more than double in comparison with the summer.

Table B.3.1b   Generation Ratio of Commercial, Market, Institution and Street Sweeping Waste in winter

Category	Unit	Generation Ratio	
		Winter	Summer
Market waste	g/shop/day	6,580	5,341
Commercial waste (Restaurant)	g/shop/day	26,119	37,797
Commercial waste (others)	g/shop/day	2,545	3,826
Institutional waste	g/person/day	81	74
Street sweeping waste	g/km/day	91,272	39,950

B.3.2   Waste Composition

The results of the waste composition survey, both in winter and summer are tabulated in Tables B.3.2a, B.3.2b, B.3.2c and B.3.2d.

a.   Physical Composition

aa.   Household Waste

The characteristics of the composition of the household waste are described as follows:

-    The garden waste, which consist of grass/wood and others, occupies about 50 % of the waste, both in winter and summer. Majority of the "others" included soil and sand accumulated from gardening. According to the interview survey conducted at the waste amount survey, about 45 % of the residences treated garden waste by open combustion and disposed of it in their backyard.

-    The kitchen waste occupies about 30 % of the composition, both in winter and summer. According to the interview survey, 70 % of the residences feed their food waste to animals. The amount of food waste fed to animals is 350 g/family/day. It is equivalent to about 80 g/person/day (350 g/household/day ÷ 4.38 persons/household).

ab.   Commercial Waste

The characteristics of the composition of the commercial waste are as follows:

-    Kitchen waste portion occupies about 75 % of waste in restaurants.
-    Paper occupies about 44 % of waste, in winter and about 48 % in summer, in other shops.

ac.   Other Wastes

The characteristics of the composition of other wastes are summarized as follows:

-    Kitchen waste occupies about 70 % of waste, both in winter and summer, in Market waste.
-    Paper occupies about 41 % of waste in winter and about 48 % of waste in

summer, in Institutional waste.

b.   Chemical Analysis

The chemical analysis was carried out only in winter except moisture content.

ba.   Apparent Specific Gravity (ASG)

ASG in summer was higher than in winter in all categories of wastes surveyed.

bb.   Three Contents

Moisture content of restaurant and market waste accounted for more than 50 %. On the other hand, combustible content of other shops was more then 45 %.

bc.   L.C.V. (Lower Calorific Value)

LCV of other shops and institutional waste was more than 2,000 Kcal/Kg. LCV of other categories, i.e. household waste, restaurant waste and market waste was 1,123, 1,036 and 420 Kcal/Kg respectively.

Table B.3.2a   Result of Waste Composition Survey in Winter

Classification			Unit	Household				Commercial		Market	Institutional
				High Income	Middle Income	Low Income	Average	Restaurants	Others		
	Apparent Specific Gravity		kg/l	0.20	0.17	0.24	0.20	0.33	0.05	0.29	0.09
Physical Composition (wet base)	Combustibles	Kitchen waste	%	29.9	46.0	18.0	31.3	75.3	20.0	70.3	8.4
		Paper	%	6.0	9.3	3.4	6.2	5.3	43.7	8.0	40.9
		Textile	%	2.5	1.5	3.3	2.4	0.0	1.4	0.1	0.2
		Plastic	%	3.3	2.4	2.4	2.7	2.6	8.0	2.4	5.3
		Grass and wood	%	25.9	18.0	19.2	21.0	0.7	1.5	2.5	11.9
		Lather and rubber	%	0.6	0.9	0.9	0.8	0.0	0.0	0.2	0.0
		Sub-total	%	68.2	78.1	47.2	64.5	83.9	74.6	83.5	66.7
	Incombustibles	Metal	%	1.6	1.2	1.0	1.3	1.8	1.7	0.3	2.3
		Glass	%	5.1	4.8	2.7	4.2	9.2	7.8	6.0	0.6
		Ceramic and stone	%	2.6	0.7	6.7	3.3	0.0	2.6	0.8	1.0
		Others (soil,etc.)	%	22.5	15.2	42.4	26.7	5.2	13.3	9.4	29.4
		Sub-total	%	31.8	21.9	52.8	35.5	16.2	25.4	16.5	33.3
	Total		%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Three contents	Combustibles (B)	%	27.87	27.48	30.26	28.53	25.88	47.12	24.94	39.40
		Moisture (W)	%	35.79	44.68	24.82	35.10	58.74	33.20	54.71	42.16
		Ash (A)	%	36.34	27.84	44.92	36.37	15.38	19.68	20.35	18.44
		Total	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Chemical Analysis	Ultimate Analysis of Combustibles	Carbon (C)	%	18.23	17.03	20.76	18.67	10.94	25.29	17.37	22.70
		Hydrogen (H)	%	3.25	3.13	3.07	3.15	2.05	4.37	2.37	3.59
		Nitrogen (N)	%	0.73	0.49	0.62	0.61	0.91	0.57	0.49	0.46
		Sulphur (S)	%	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		Chlorine (Cl)	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		Oxygen (O)	%	5.63	6.80	5.78	6.07	11.95	16.86	4.68	12.62
		Total	%	27.87	27.48	30.26	28.53	25.88	47.12	24.94	39.40
	Lower Calorific Value		kcal/kg	1,184	1,130	1,055	1,123	1,036	2,277	420	2,055
	C/N Ratio		—	24.97	34.76	33.48	31.07	12.02	44.37	35.45	49.35

Table B.3.2b   Result of Waste Composition Survey in Summer

	Classification		Unit	Household Waste				Commercial Waste			Market Waste	Institutional Waste
				High Income	Middle Income	Low Income	Average	Restaurants	Others			
	Apparent Specific Gravity		Kg/l	0.16	0.25	0.29	0.23	0.36	0.09		0.43	0.10
Physical Composition (wet base)	Combustibles	Kitchen Waste	%	32.1	38.8	19.8	30.2	74.7	16.5		68.5	19.4
		Paper	%	11.2	4.0	5.4	6.9	9.2	47.3		9.0	45.8
		Textile	%	0.7	0.5	0.9	0.7	0.1	0.6		0.4	2.8
		Plastic	%	6.6	5.0	5.4	5.7	3.0	8.0		3.6	5.3
		Grass and Wood	%	30.0	24.2	27.1	27.1	2.5	10.7		1.5	14.5
		Leather and Rubber	%	0.1	0.4	1.2	0.6	0.3	0.0		0.0	0.0
		Sub-total	%	80.7	72.9	59.8	71.2	89.8	83.1		83.0	87.8
	Incombustibles	Metal	%	1.8	1.3	1.4	1.5	1.1	0.8		1.9	2.5
		Glass	%	7.3	1.2	1.1	3.2	2.2	1.8		8.1	3.3
		Ceramic and Stone	%	1.8	2.9	3.0	2.6	1.9	5.4		0.5	2.3
		Others (Soils, etc.)	%	8.4	21.7	34.7	21.5	5.0	8.9		6.5	4.1
		Sub-total	%	19.3	27.1	40.2	28.8	10.2	16.9		17.0	12.2
	Total :		%	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0
Chemical Analysis	Moisture Content (W)		%	33.5	42.5	23.1	33.0	56.9	32.0		53.8	36.9

Table B.3.2c   Results of Ultimate Analysis in Household Waste (Middle Income)

Category	Ultimate Analysis						Total (%)
	Carbon (C) (%)	Hydrogen (H) (%)	Nitrogen (N) (%)	Sulphur (S) (%)	Chlorine (Cl) (%)	Oxygen (O) (%)	
Kitchen Waste	13.80	1.89	0.62	0.02	0.01	11.41	27.75
Paper	31.89	5.26	0.42	0.02	0.01	33.07	70.66
Textile	37.11	4.02	1.06	0.02	0.01	28.61	70.84
Plastic	33.36	4.41	0.42	0.02	0.01	42.37	80.59
Grass/Wood	22.38	3.08	0.69	0.02	0.01	19.60	45.78
Leather/Rubber	39.95	4.61	0.85	0.02	0.01	32.09	77.52

Table B.3.2d   Results of Three Contents and Lower Calorific Value in Household Waste (Middle Income)

	Three Contents				Lower Calorific Value (Kcal/Kg)
	Combustible (%)	Moisture (%)	Ash (%)	Total (%)	
Kitchen Waste	27.75	61.03	11.22	100.00	1,445
Paper	70.66	26.11	3.23	100.00	2,818
Textile	70.84	27.17	1.99	100.00	2,491
Plastic	80.59	16.11	3.30	100.00	7,798
Grass/Wood	45.78	42.04	12.18	100.00	1,579
Leather/Rubber	77.52	1.27	21.21	100.00	4,738

B.4   Findings

B.4.1   Waste Amount

a.   Generation Ratio

aa.   Household Waste

aaa. Population by income level

In order to obtain the population ratio of high, middle and low income level, the Study Team carried out the following works;

- Asuncion city is divided into 71 wards (Barrios).

- The 71 wards were classified into high, middle and low income wards by the staff of the Asuncion Municipality.

- The total population of high, middle and low income wards are as follows:

Table B.4.1a   Population by Income Level in Asuncion

Wards	Population	Rate
High income	53,256 persons	10.6 %
Middle income	348,081 persons	69.3 %
Low income	101,089 persons	20.1 %
Total	502,426 persons	100 %

As a result, we set up the population ratio by income level in this study as follows:

High income: 10 %
Middle income: 70 %
Low income: 20 %

aab. Generation Ratio Obtained from WACS

Generation ratio obtained from WACS is tabulated in Table B.4.1b. As a result, generation ratios in accordance with the season are almost same among the three

municipalities and each category of wastes. Therefore, average generation ratios in winter and summer is adopted as the generation ratio in study area.

Table B.4.1b   Generation Ratio of Household Waste Obtained from WACS

unit: g/day/person

Period	Income Level	Asuncion	San Lorenzo	Nemby
Winter	High	1,164	1,111	1,181
	Middle	930	855	859
	Low	544	911	988
Summer	High	991	1,108	1,160
	Middle	1,132	1,007	1,136
	Low	532	766	989
Average	High	1,078	1,110	1,171
	Middle	1,031	931	998
	Low	538	839	989

aac. Generation Ratio

In order to obtain the generation ratio in the Study area, a weighted average of generation ratio in each municipality was calculated as shown below:

Asuncion: 1,078 X 0.1 + 1,031 X 0.7 + 538 X 0.2 =   937 g/person/day
San Lorenzo: 1,110 X 0.1 +   931 X 0.7 + 839 X 0.2 =   931 g/person/day
Ñemby: 1,171 X 0.1 +   998 X 0.7 + 989 X 0.2 = 1,014 g/person/day

Accordingly, the generation ratios were 937 g/person/day in Asuncion, 931 g in San Lorenzo and 1,014 g in Ñemby, respectively.

Since the generation ratios obtained were almost same among three municipalities, the average of generation ratio of three municipalities was deduced from the simple calculation as shown below:

$$\frac{937+931+1,014}{3}=961 \, g/person/day$$

Consequently the generation ratio of household waste was shown in Table B.4.1c.

Table B.4.1c   Generation Ratio of Household Waste

unit: g/day/person

Income Level	Asuncion	San Lorenzo	Nemby	Average
High	1,078	1,110	1,171	1,119
Middle	1,031	931	998	986
Low	538	839	989	788
Weighted Average	937	931	1,014	961

ab.   Commercial, Market, Institution and Street Sweeping Waste

Generation ratios of each category of waste are shown in Table B.4.1d. Generation ratios of commercial, market and institution wastes do not differ from in winter and summer. Therefore, average generation ratios are applied to the generation ratios of each category.

On the other hand, street sweeping waste differ significantly from in winter and summer due to the inclusion of domestic waste from the shops and residences along the streets. Therefore, generation ratio of street sweeping waste in summer is determined as the generation ratio in the Study area.

Table B.4.1d   Generation Ratio of Market, Shop, Institution and Street Sweeping Waste   unit: g/day/unit

Waste Category	Unit	Generation Ratio		
		In Winter	In Summer	Average
Market Waste	g/shop/day	6,580	5,341	* 5,961
Shop Waste (Restaurants)	g/shop/day	26,119	37,797	* 31,958
Shop Waste (Others)	g/shop/day	2,545	3,826	* 3,186
Institutional Waste	g/employee/day	81	74	* 78
Street Sweeping Waste	g/km/day	91,272	* 39,950	65,611

Note :   * are adopted data for generation ratio of each category

Although the generation ratio of street sweeping waste is concluded as 39,950 g/km/day, the disposal amount of swept waste in Asuncion was 67.23 ton/day according to the data obtained by the truck scale at Catcura Landfill. This is equivalent to 254,700 g/km/day.

(67.23 tn/day ÷ 264 km x 1,000,000 = 254,700 g/km/day).

The difference of the generation ratio and disposal amount would be due to the inclusion of household and commercial wastes and tree cutting waste. Since Asuncion Municipality is supposed to apply the present system in future, the generation ratio of street sweeping waste for Asuncion calculated by the disposal amount 254,700 g/km/day will be used.

ac. Municipal waste generated in medical institutions

The generation ratio of municipal waste generated in medical institutions was estimated as 4,000 g/bed/day by the former study "Estudio Tecnico Sobre Manejo de Residuos Solidos Hospitalarios de la Ciudad Ntra. Sra. de la Asuncion Paraguay–Marzo in 1989."

In this survey, the ratio of 4,000 g/bed/day is applied to the Study based on the above mentioned report.

ad. Bulky waste

At present bulky waste is hauled by the producer personally because there are no bulky waste collection services and its generation ratio is very limited. In addition, bulky items are generally recycled and reused. The amount of the bulky waste among direct hauled wastes by the private sector to the Cateura Landfill was observed for one month in February 1994. According to the observation, the amount was 0.317 ton/day. Consequently, its generation ratio is 0.6 g/person/day.

ae. Other wastes

Other wastes which are various kinds of ISW (Industrial Solid Wastes) are disposed of at the Cateura Landfill. It was, however, not observed in the other landfills according to the 3 days inspection of incoming ISW to 12 present landfills.

Based on the result of the truck scale data from October 1, 1993 to February 28, 1994, the daily amount of other wastes were 18.0 ton/day. This figure may represent ISW generation in Asuncion and Fernando de la Mora although some or most of ISW may be disposed of at a compound of each factory or may be illegally dumped elsewhere. In this Study, the generation (disposal) ratio of other wastes is taken as 29.8 g/person/day.

b. Determination Number of Generation Sources

ba. Population, number of shops and public officers and length of street sweeping

Population, number of shops, number of public officers and length of streets swept in the Study area were obtained from counterparts as shown in Table B.4.1e.

Table B.4.1e   Population, Number of Shops, Number of Public Officers and Length of Streets Swept in 1993

Category	Population (person)	Shop		Market (Shop)	No.of Public Officers (persons)	Length of Streets Swept (km)
		Restaurant (Shop)	Others (Shop)			
Highly Urbanized Mu.	603,701	633	19,582	4,676	21,715	266
Asuncion	506,445	454	17,102	4,676	19,974	264
Fernando de la Mora	97,256	179	2,480	0	1,741	2
Urbanized Mu.	499,560	262	9,617	700	9,091	40
Lambare	103,990	55	1,600	0	1,827	6
San Lorenzo	140,075	73	3,000	700	2,398	6
Capiata	88,932	47	1,571	0	1,476	0
Luque	91,676	48	2,190	0	2,124	28
M.R. Alonso	42,576	22	800	0	720	0
Villa Elisa	32,311	17	456	0	546	0
Less Urbanized Mu.	98,797	52	3,526	210	3,416	9
Nemby	28,868	15	1,054	0	708	0
J.A.Saldivar	2,137	1	58	0	350	0
Ita	14,846	8	464	150	605	6
Aregua	6,462	3	321	0	425	2
Limpio	27,716	15	1,340	60	648	1
Villa Hayes	12,317	6	121	0	478	0
Benjamin Aceval	6,451	3	168	0	202	0
Total	1,202,058	947	32,725	5,586	34,222	315

Sources:
Population;   Direccion General de Estadisticas, Encuestas y Censos.
Shops;   Sistema Commercial e Industrial, Municipalidad de Asuncion
Markets;   Direccion de Mercados, Municipalidad de Asuncion
No. of Public officers;   Recursos Humanos, Sector Publico Municipalidad de Asuncion, F. de la Mora etc.
Length of Streets Swept;   15 municipalities

bb. Number of beds and medical staff

bba. Asuncion

The statistical data on the number of medical institutions, beds and employees are presented in Table B.4.1f, although these data appear not to cover the whole area.

Assuming that the number of beds have increased since 1989 by 10 %, the number

of beds in 1993 is estimated as 3,330.

bbb. Other 14 Municipalities

The number of medical institutions in the other Municipalities is much less than Asuncion as shown in Table B.4.1g. Among the other 14 municipalities Ita has the most number of beds with 18. The estimated number of staff is approximately 40 persons, the amount of municipal waste discharged is forecasted to be less than 100 kg. This amount is judged to be negligible because its influence is very little on the whole waste collection service.

Table B.4.1f   Number of Beds and Medical Staff in Asuncion

Name of Medical Institutions	Staff	Beds
1. Asuncion		
01 Hospital de Clinicas	1,700	600
02 I.P.S.	1,215	435
03 Hospital Central del FF.AA.	790	287
04 Hospital J.M. Boettner	790	246
05 Policlinico Policial	148	100
06 Hospital Barrio Obrero	330	52
07 Hospital Universitario	220	43
08 Sanatorio San Lucas	85	30
09 Hospital Neurosiquiatrico	40	600
10 Primeros Auxilios	69	70
11 Cruz Roja	285	122
12 Lacimet	266	34
13 Sanatorio Migone	50	32
14 Sanatorio Italiano	66	42
15 Hospital Bautista	95	86
16 Sanatorio Espanol	230	26
17 Sanatorio Santa Clara	60	20
18 Sanatorio Adventista	25	20
19 Cruz Blanca	24	20
20 Santorio San Benigno	25	18
21 Sanatorio Americano	14	17
22 Sanatorio San Pablo	13	13
23 Sanatorio Mayo	20	11
24 Sanatorio San Roque	16	11
25 Sanatorio San Antonio	7	6
26 Medicus S.R.L.	8	6
27 Sanatorio Leriche	9	5
28 Sanatorio San Rafael	4	5
29 Sanatorio Promed	21	13
30 Centro de Salud No.5	100	55
Total :	6,026	3,025
	6,026/3,025=2.0 Staff/Bed	

Source: Estudio Tecnico sobre Manejo de Residuos Solidos de Hospitales de la Ciudad de Ntra. Sra. de la Asuncion Paraguay – Marzo 1989 Anexo No.1 .

Table B.4.1g   Number of Beds and Medical Staff outside Asuncion

District Outside Asuncion (Except Private Hospitals)	1992
	Beds
2. Fernando de la Mora	8
3. Lambare District	5
4. San Lorenzo District	12
5. Capiata District	7
6. Luque District	17
7. M.R. Alonso District	10
8. Villa Elisa District	4
9. Nemby District	6
10. J.A. Saldivar District	1
11. Ita District	18
12. Aregua District	5
13. Limpio District	15
14. Villa Hayes District	14
15. Benjamin Aceval District	6

Source: 1992: Censo Hospitalario Resumen Ano 1992

ac.   Conclusions

Based on the WACS conducted in July 1993 and February 1994, we concluded that the generation ratios of each generation source is as follows:

Table B.4.1h   Waste Generation Ratio

	Unit	1994
1. MSW		
Household	g/person/day	961
Shop	g/shop/day	3,186
Restaurant	g/shop/day	31,958
Market	g/shop/day	5,961
Institutional	g/employee/day	78
Street Sweeping	g/km/day	39,950 (254,700)
Hospital	g/bed/day	4,000
Bulky	g/person/day	0.6
2. Other wastes (ISW)	g/person/day	30

Note: The generation ratio for Asuncion shown in parentheses is calculated by the actual disposal amount observed by the truck scale at the Cateura Landfill while the ratios for the other 14 municipalities is the one obtained from the WACS conducted by the JICA Study Team.

The generation ratio of household waste, 961g/person/day, is very high in comparison with those of the other countries as shown in Table B.4.1i.

Table B.4.1i   Generation Ratio of Household Wastes

Country	City	Year	Population	Household waste (g/person/day)	MSW (g/person/day)
Paraguay	Asuncion	1993	506,445	961	1,312
Poland[1]	Poznan	1992	590,500	654	769
	Lublin	1992	352,500	400	508
Laos[2]	Vientiane	1991	142,700	753	987
Malaysia[3]	Pulau Pinang	1988	559,300	504	640

Source:

*1:   The Study on the Solid Waste Management for Poznan City, the Republic of Poland, May 1993.

*2:   The Study on the Solid Waste Management System Improvement Project in Vientiane, Lao People's Democratic Republic, August, 1992.

*3   The figure is not generation ratio but disposal amount from "Solid Waste Management Study for Pulau Pinang and Seberand Perai Municipalities, August, 1989"

The reasons why the generation ratio of household waste is so high are that:

−   The generation of the garden wastes, which consists of grass and wood, and others (soils, etc.), is extremely high (44.2%) in comparison with those in Poznan, Pulau Pinang, Rio de Janeiro (1991), Tokyo (1972), which are 10.3%, 22.2%, 16.7%, 16.6%, respectively. (As a matter of interest, the rate of garden wastes in Vientiane is the highest (58.5%). The excessive rate of garden waste accounts for the high generation ratio even though Laos is one of the poorest countries in the world.)

−   Most of the garden wastes are generated from gardens of detached houses. In the Study area, the proportion of detached house is very high (96.6% in Asuncion and more than 90% in the other 14 municipalities) and average site area of a detached house is large enough (average 450m^2) to produce an enormous amount of garden wastes according to the results of the POS.

−   According to the interview survey conducted in July 1993 to the sampling household of the WACS, self disposal by means of burning, etc. and source recycling by means of feeding domestic animals are 245 g/person/day and 54 g/person/day respectively in the collection service area. Consequently the

discharge (or collection) ratio comes 662 g/person/day. This is a reasonable ratio.

B.4.2 Waste Composition

a. Physical Composition and ASG (Apparent Specific Gravity)

Physical composition and ASG of commercial, market and institutional waste do not differ much between winter and summer. Therefore, the average of those in winter and summer is adopted as physical composition and ASG of these wastes in the Study area.

On the other hand, physical composition and ASG of household waste are calculated with consideration of weighted average in accordance with the following population ratio:

−   Population ratio

        High Income . . . . 10 %
        Middle Income . . . . 70 %
        Low Income   . . . . 20 %

−   Weighted average

        Each item of physical composition, i.e. kitchen waste, paper etc, and ASG of household waste is calculated as follows:

$$\left(\begin{array}{l}\text{Average physical}\\\text{composition in}\\\text{winter and}\\\text{summer in High}\\\text{Income}\end{array}\right) \times 0.1 + \left(\begin{array}{l}\text{Average physical}\\\text{composition in}\\\text{winter and}\\\text{summer in Middle}\\\text{Income}\end{array}\right) \times 0.7 + \left(\begin{array}{l}\text{Average physical}\\\text{composition in}\\\text{winter and}\\\text{summer in Low}\\\text{Income}\end{array}\right) \times 0.2$$

b. Chemical Analysis

Chemical characteristics of each category of waste, i.e. three contents , ultimate analysis of combustibles and lower calorific value was only analyzed in winter. The results are summarized in Table B.4.2a.

Table B.4.2a   Result of Waste Composition Survey

Classification			Unit	Household Waste				Commercial Waste		Market Waste	Institutional Waste
				High Income	Middle Income	Low Income	Weighted Average	Restaurants	Others		
	Apparent Specific Gravity		kg/l	0.18	0.21	0.26	0.22	0.34	0.07	0.36	0.09
Physical Composition (wet base)	Combustibles	Kitchen Waste	%	31.0	42.4	18.9	36.6	75.0	18.3	69.4	13.9
		Paper	%	8.6	6.7	4.4	6.4	7.3	45.5	8.5	43.4
		Textile	%	1.6	1.0	2.1	1.3	0.1	1.0	0.3	1.5
		Plastic	%	5.0	3.7	3.9	3.9	2.8	8.0	3.0	5.3
		Grass and Wood	%	28.0	21.1	23.2	22.2	1.6	6.1	2.0	13.2
		Leather and Rubber	%	0.4	0.7	1.1	0.7	0.2	0.0	0.1	0.0
		Sub-total	%	74.6	75.6	53.6	71.1	87.0	78.9	83.3	77.2
	Incombustibles	Metal	%	1.7	1.3	1.2	1.3	1.5	1.3	1.1	2.4
		Glass	%	6.2	3.0	1.9	3.1	5.7	4.8	7.1	2.0
		Ceramic and Stone	%	2.2	1.8	4.9	2.5	1.0	4.0	0.7	1.7
		Others (soils, etc.)	%	15.3	18.3	38.4	22.0	4.8	11.0	7.8	16.7
		Sub-total	%	25.4	24.4	46.4	28.9	13.0	21.1	16.7	22.8
		Total :	%	100.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Three Contents	Combustibles (B)	%	27.87	27.48	30.26	28.08	25.88	47.12	24.94	39.40
		Moisture (W)	%	35.79	44.68	24.82	39.82	58.74	33.20	54.71	42.16
		Ash (A)	%	36.34	27.84	44.92	32.11	15.38	19.68	20.35	18.44
		Total :	%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Chemical Analysis	Ultimate Analysis of Combustibles	Carbon (C)	%	18.23	17.03	20.76	17.90	10.94	25.29	17.37	22.70
		Hydrogen (H)	%	3.25	3.13	3.07	3.13	2.05	4.37	2.37	3.59
		Nitrogen (N)	%	0.73	0.49	0.62	0.54	0.91	0.57	0.49	0.46
		Sulfur (S)	%	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		Chlorine (Cl)	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
		Oxygen (O)	%	5.63	6.80	5.78	6.48	11.95	16.86	4.68	12.62
		Total :	%	27.87	27.48	30.26	28.08	25.88	47.12	24.94	39.40
	Lower Calorific Value		kcal/kg	1,184	1,130	1,055	1,120	1,036	2,277	420	2,055
	C/N Ratio		—	24.97	34.76	33.48	33.52	12.02	44.37	35.45	49.35

ANNEX C

PUBLIC OPINION SURVEY

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C.1 Method of the Survey

C.1.1 Objectives of the Survey

Solid waste management is closely related to the culture, peoples' way of living, habits, etc.. The public opinion survey was carried out in order to understand them and also people's view on SWM, which was taken into account in the formulation of the MSWM master plan. The main objectives are summarized below.

- To understand background such as way of living.
- To understand about the method of waste discharge.
- To understand about the waste collection service.
- To understand recycling.
- To understand collection fee and financial matters
- To understand public cooperation

C.1.2 Selection of the Samples

In order to obtain the information on the present situation, public opinions and the basic information concerning MSWM in the Study Area, the sample residences and shops for interviewees were selected in the following manners:

- Total of 180 interviewees were selected in the Study Area. Among the interviewees, 120 samples were selected in residential areas and 60 samples were selected in commercial areas.

- For the survey of residences, the following three municipalities were selected as the representative municipalities.
  . Highly urbanized municipality   : Asuncion
  . Urbanized municipality   : San Lorenzo
  . Less urbanized municipality   : Nemby

- Residential area were classified into three categories by income level as follows:
  . High income residential areas
  . Middle income residential areas
  . Low income residential areas

– The commercial areas were classified into two categories as shown below and 30 samples were selected in each categories in Asuncion.

.   Restaurant   : 30 samples
.   Other shops   : 30 samples

Table C.1.2a   List of Public Opinion Survey Samples

Category of Area	Location	Income Level	Location	Sample numbers
Residential	Asuncion	High	Dr.A.Bestard, El Dorado, Tte.coco	20
		Middle	Concordia, Florida, Centenario, Carmelo Peralta	20
		Low	Tacuary, Estados Unidos,etc.	20
	San Lorenzo	High	Cnel Romero	10
		Middle	Nanawa, Estero Bellaco	10
		Low	Agost, Proyectada	10
	Nemby	High	Presbitero Molas, etc.	10
		Middle	Gral E Diaz, etc.	10
		Low	Tte.Z.Rivas, Gral Diaz, etc.	10
Commer-cial	Asuncion	Restaurants	Acuna de Figueroa, Avda.J.Dom.Peron, etc.	30
		Shops		30
Total			Avda. E. Ayala, Palma, Estrella	180

The location of sampling points of public opinion survey are shown in Figure C.1.2a.

Legend

▨	Residential Area (High Income)
▨	Residential Area (Middle Income)
░	Residential Area (Low Income)
▨	Commercial Area (Restaurants)
▤	Commercial Area (Other Shops)

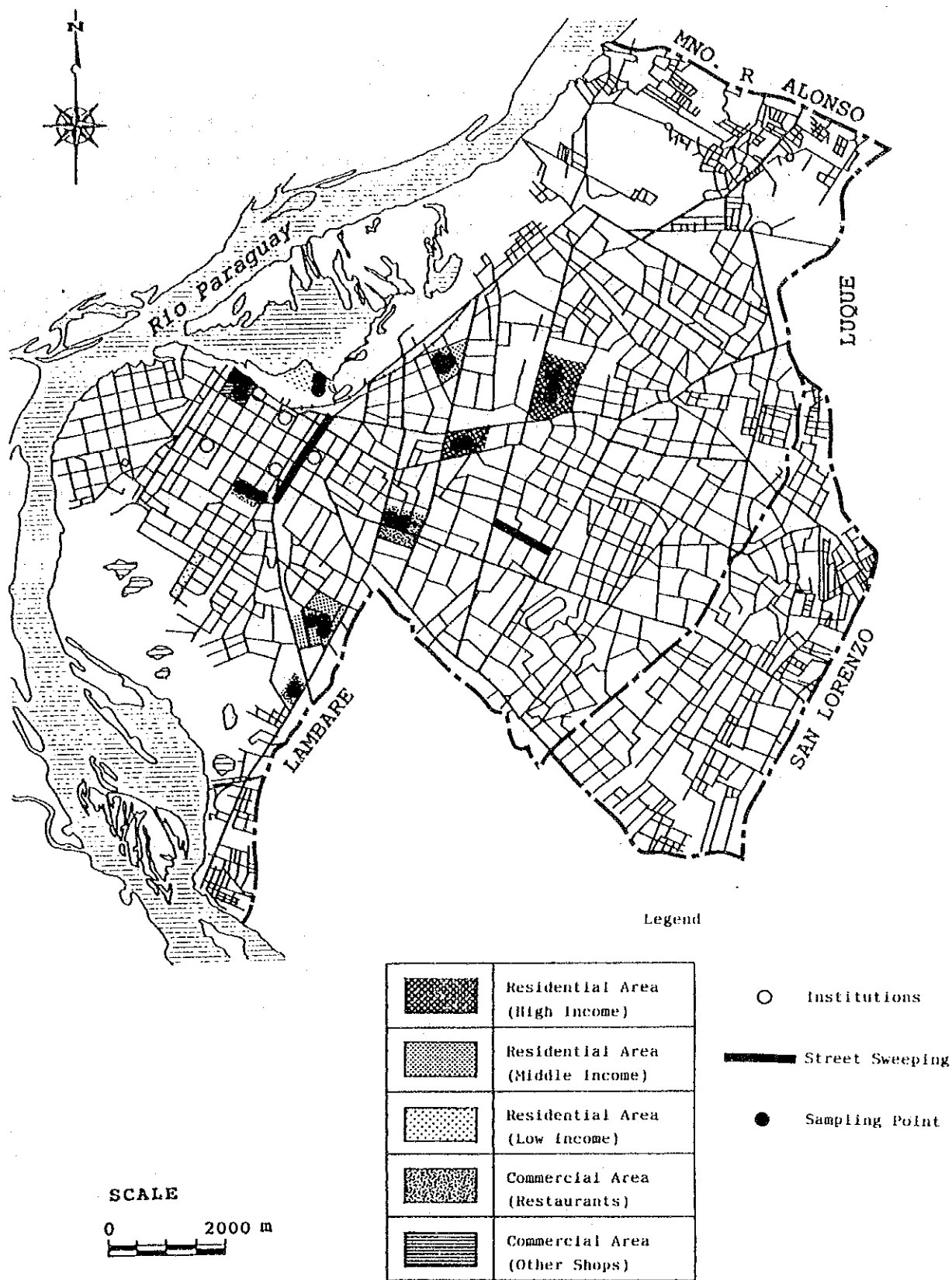|	
○	Institutions
▬	Street Sweeping
●	Sampling Point

SCALE

0 ——— 2000 m

Figure C.1.2a   Sampling Points Map of Public Opinion Survey

C – 3

C.1.3   Method of the Survey

Considering the present condition of SWM and the characteristics of the Study Area, a draft questionnaire was prepared in English by the Study Team. After being translated into Spanish, the draft questionnaire was reviewed and corrected through discussion with the counterparts so that the contents of questionnaires meet with the actual situation of the Study Area.

Before the execution of the survey, the Study Team performed a lecture for the interviewers in order to let them understand the objectives and the contents of the survey.

POS was conducted by interviewing each resident, shop and restaurant owners or employees. The interviewer visited each interviewee and collect answers from them at the same time. All the answers were input into a computer for analyzing.

C.2   Results of the Survey

I   Items Filled by Interviewer

Q1–4   Category of House:

In Asuncion

No.	Answer	Residential				Commercial		
		Low	Middle	High	Average	Food	Other	Average
1	Detached house	95.0%	95.0%	100.0%	96.6%	0.0%	0.0%	0.0%
2	Semi–detached house	5.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%
3	Apartment building	0.0%	5.0%	0.0%	1.7%	0.0%	0.0%	0.0%
4	Commercial building	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	100.0%

In San Lorenzo

No.	Answer	Residential
1	Detached house	93.3%
2	Semi–detached house	6.7%
3	Apartment building	0.0%
4	Commercial building	0.0%

In Nemby

No.	Answer	Residential
1	Detached house	96.7%
2	Semi–detached house	3.3%
3	Apartment building	0.0%
4	Commercial building	0.0%

Q1-5   Distance from the house to a road of more than 5m width:

In Asuncion

No.	Answer	Residential				Commercial		
		Low	Middle	High	Aver-age	Food	Other	Aver-age
1	In front of the premises	45.0%	100.0%	100.0%	81.7%	100.0%	100.0%	100.0%
		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	Less than 10 m	15.0%	0.0%	0.0%	5.0%	0.0%	0.0%	0.0%
3	10 – 29 m	10.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%
4	30 – 49 m	30.0%	0.0%	0.0%	10.0%	0.0%	0.0%	0.0%
5	50 m or more							

In San Lorenzo

No.	Answer	Residential
1	In front of the premises	100.0%
2	Less than 10 m	0.0%
3	10 – 29 m	0.0%
4	30 – 49 m	0.0%
5	50 m or more	0.0%

In Nemby

No.	Answer	Residential
1	In front of the premises	100.0%
2	Less than 10 m	0.0%
3	10 – 29 m	0.0%
4	30 – 49 m	0.0%
5	50 m or more	0.0%

Residential Area in Asuncion

Residential Area in 3 Cities

Commercial Area in Asuncion
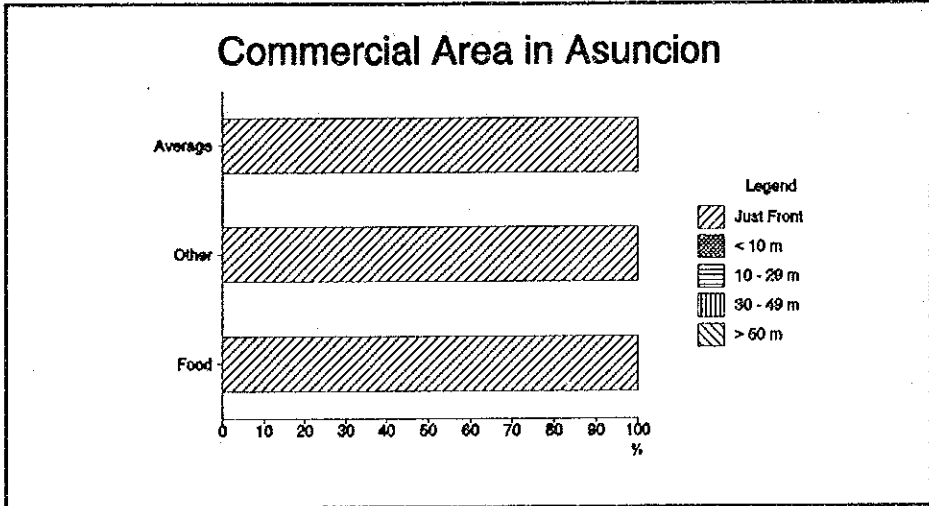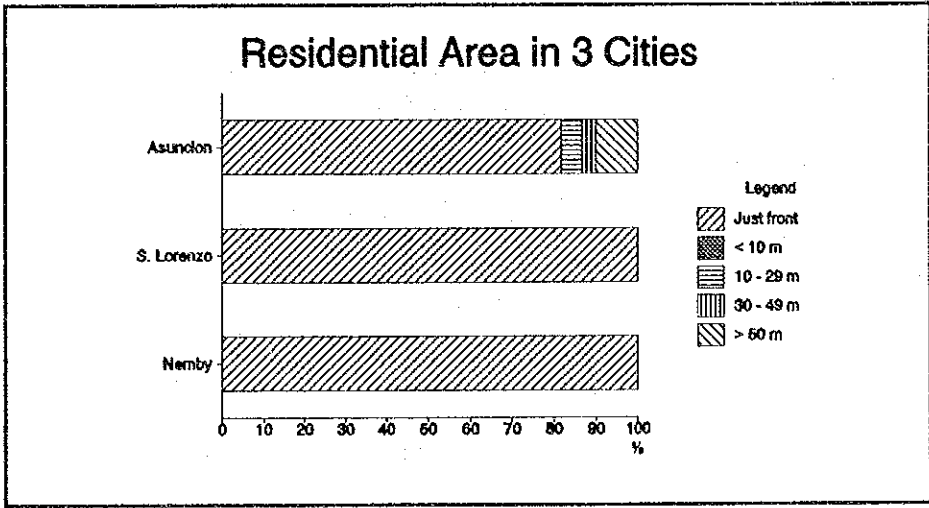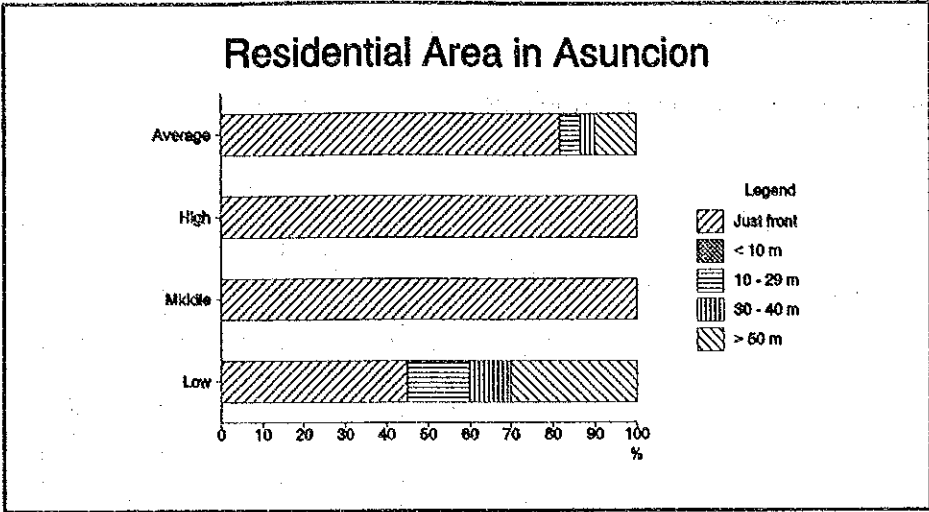
II   General Questions

Q2-1   Business Category of the House:

In Asuncion

No.	Answer	Residential				Commercial		
		Low	Middle	High	Average	Food	Other	Average
1	Residence	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
2	Restaurant	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	50.0%
3	Shops except for restaurants	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	50.0%
4	Others	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

In San Lorenzo

No.	Answer	Residential
1	Residence	100.0%
2	Restaurant	0.0%
3	Shops except for restaurants	0.0%
4	Others	0.0%

In Nemby

No.	Answer	Residential
1	Residence	100.0%
2	Restaurant	0.0%
3	Shops except for restaurants	0.0%
4	Others	0.0%

If the answer to Q2-1 is 1: house is a residence, please answer Q2-2 to Q2-3

Residential Area in Asuncion

Residential Area in 3 Cities

Commercial Area in Asuncion
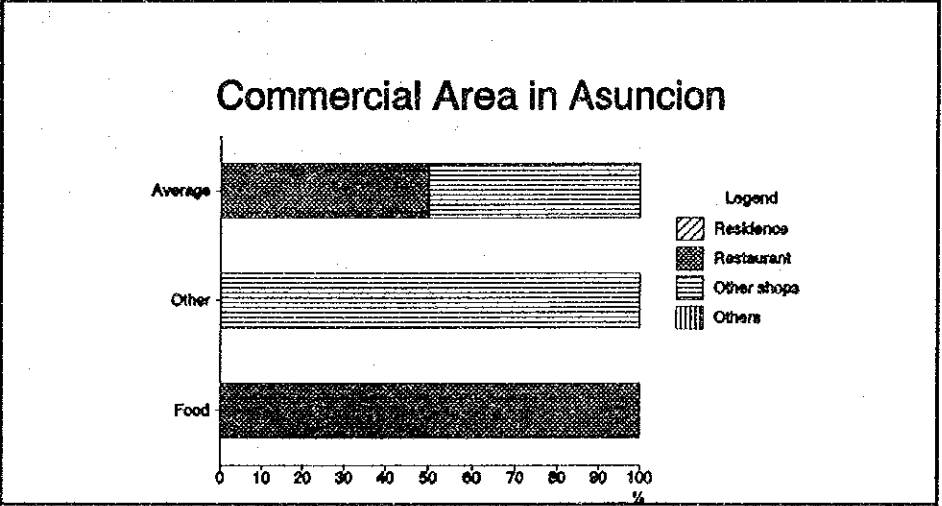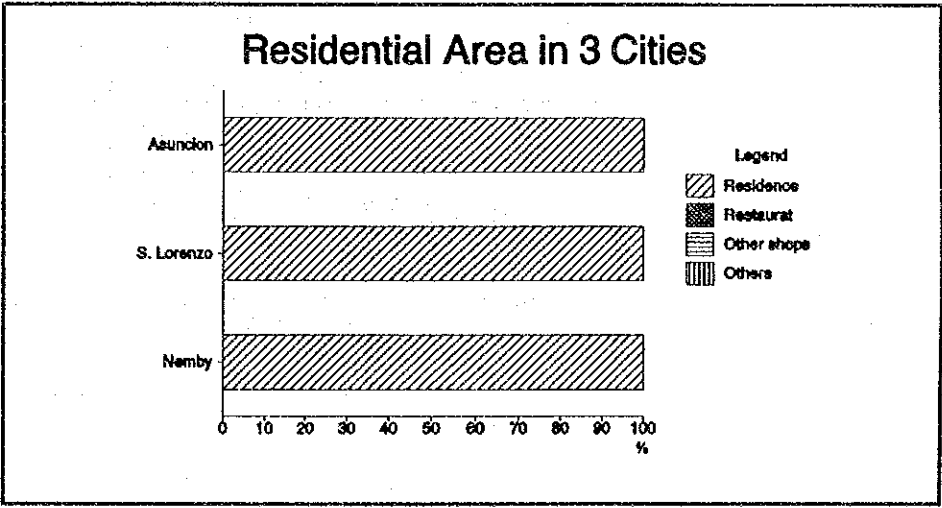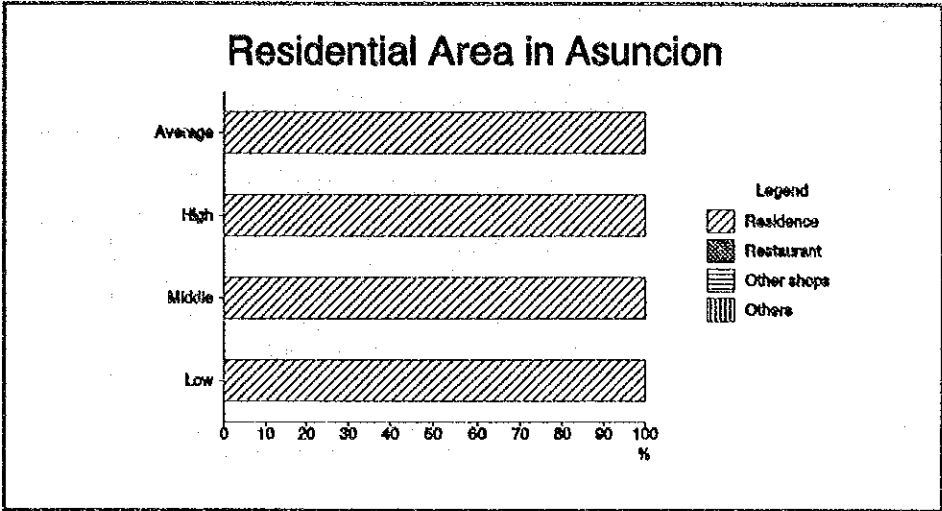
Q2-2   Employment of the title holder:

In Asuncion

No.	Answer	Residential			
		Low	Middle	High	Average
1	Public Servant	15.0%	26.3%	5.0%	15.3%
2	Employee of Private Company	25.0%	21.1%	30.0%	25.4%
3	Owner of company, shop, etc.	25.0%	36.8%	60.0%	40.7%
4	Unemployed	35.0%	15.8%	5.0%	18.6%
5	I don't know	0.0%	0.0%	0.0%	0.0%

In San Lorenzo

No.	Answer	Residential			
		Low	Middle	High	Average
1	Public Servant	20.0%	60.0%	30.0%	36.7%
2	Employee of Private Company	20.0%	10.0%	20.0%	16.6%
3	Owner of company, shop, etc.	0.0%	20.0%	10.0%	10.0%
4	Unemployed	60.0%	10.0%	40.0%	36.7%
5	I don't know	0.0%	0.0%	0.0%	0.0%

In Nemby

No.	Answer	Residential			
		Low	Middle	High	Average
1	Public Servant	10.0%	30.0%	30.0%	23.3%
2	Employee of Private Company	60.0%	50.0%	0.0%	36.7%
3	Owner of company, shop, etc.	0.0%	0.0%	70.0%	23.3%
4	Unemployed	30.0%	20.0%	0.0%	16.7%
5	I don't know	0.0%	0.0%	0.0%	0.0%

Residential Area in Asuncion
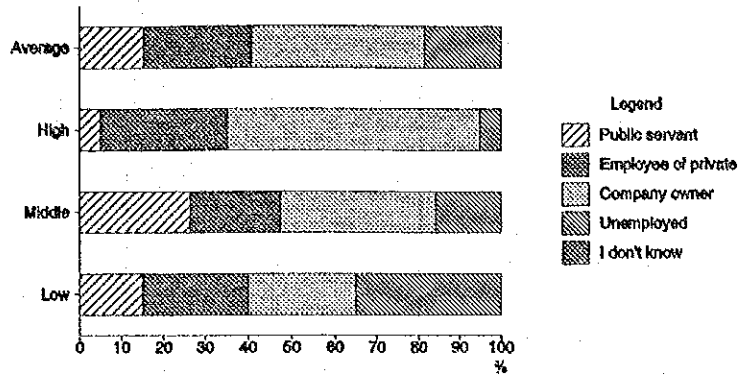
Residential Area in 3 Cities
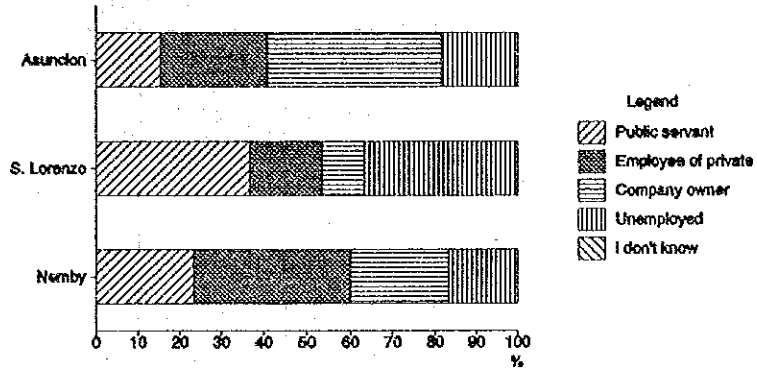
Q2-3   Total expenditure of your family per month:

In Asuncion

No.	Answer	Residential			
		Low	Middle	High	Average
1	Less than 350,000 Gs/month	70.0%	16.7%	0.0%	29.4%
2	350,000 – 600,000 Gs/month	25.0%	44.4%	0.0%	22.4%
3	600,000 – 1,000,000 Gs/month	0.0%	27.8%	20.0%	15.5%
4	1,000,000 – 2,000,000 GS/month	5.0%	11.1%	25.0%	13.8%
5	2,000,000 – 3,500,000 Gs/month	0.0%	0.0%	40.0%	13.8%
6	More than 3,500,000 Gs/month	0.0%	0.0%	5.0%	1.7%
7	I don't know	0.0%	0.0%	10.0%	3.4%

In San Lorenzo

No.	Answer	Residential			
		Low	Middle	High	Average
1	Less than 350,000 Gs/month	60.0%	10.0%	0.0%	23.3%
2	350,000 – 600,000 Gs/month	40.0%	80.0%	10.0%	43.4%
3	600,000 – 1,000,000 Gs/month	0.0%	10.0%	30.0%	13.3%
4	1,000,000 – 2,000,000 GS/month	0.0%	0.0%	50.0%	16.7%
5	2,000,000 – 3,500,000 Gs/month	0.0%	0.0%	10.0%	3.3%
6	More than 3,500,000 Gs/month	0.0%	0.0%	0.0%	0.0%
7	I don't know	0.0%	0.0%	0.0%	0.0%

In Nemby

No.	Answer	Residential			
		Low	Middle	High	Average
1	Less than 350,000 Gs/month	80.0%	10.0%	0.0%	30.0%
2	350,000 – 600,000 Gs/month	20.0%	80.0%	10.0%	36.6%
3	600,000 – 1,000,000 Gs/month	0.0%	10.0%	70.0%	26.7%
4	1,000,000 – 2,000,000 GS/month	0.0%	0.0%	20.0%	6.7%
5	2,000,000 – 3,500,000 Gs/month	0.0%	0.0%	0.0%	0.0%
6	More than 3,500,000 Gs/month	0.0%	0.0%	0.0%	0.0%
7	I don't know	0.0%	0.0%	0.0%	0.0%

Residential Area in Asuncion

Legend
- ⫽⫽ < 0.35 M.Gs/m
- ▨ 0.35 - 0.6 M.Gs/m
- ▦ 0.6 - 1.0 M.Gs/m
- ▨ 1.0 - 2.0 M.Gs/m
- ▨ 2.0 - 3.5 M.Gs/m
- ⫽ > 3.5 M.Gs/m
- ▨ I don't know

Residential Area in 3 Cities

Legend
- ⫽⫽ < 0.35 M.Gs/m
- ▨ 0.35 - 0.6 M.Gs/m
- ▤ 0.6 - 1.0 M.Gs/m
- ▥ 1.0 - 2.0 M.Gs/m
- ▨ 2.0 - 3.5 M.Gs/m
- ▨ > 3.5 M.Gs/m
- ▨ I don't know
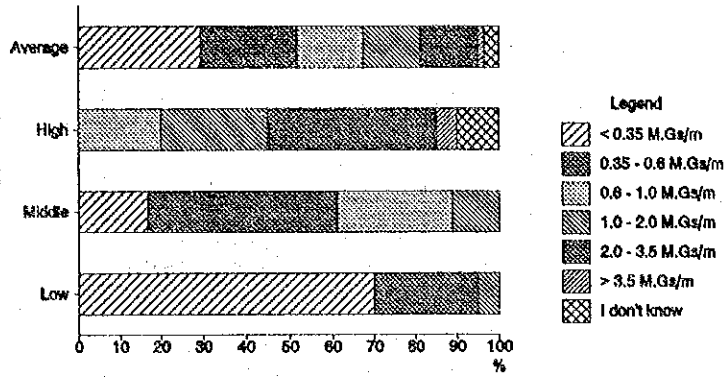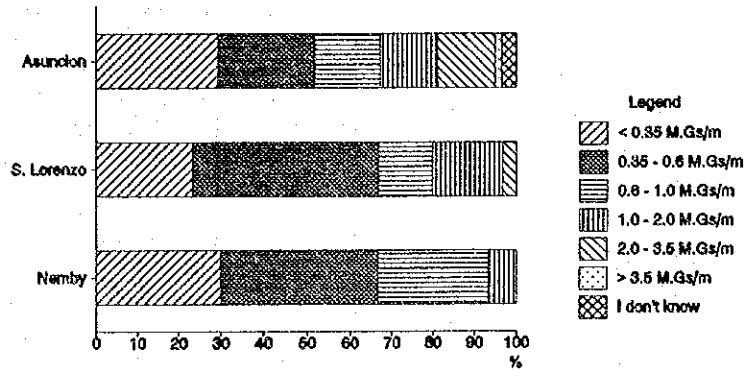
Q2-4   Type of Interviewee:

In Asuncion

No.	Answer	Residential				Commercial		
		Low	Middle	High	Average	Food	Other	Average
1	Housewife	70.0%	55.0%	25.0%	50.0%	0.0%	0.0%	0.0%
2	The master of house or owner of shop	20.0%	0.0%	10.0%	10.0%	28.6%	41.4%	35.1%
3	Children	0.0%	10.0%	0.0%	3.3%	0.0%	0.0%	0.0%
4	Other family member	10.0%	30.0%	0.0%	13.3%	7.1%	0.0%	3.5%
5	Housekeeper or employee	0.0%	5.0%	65.0%	23.4%	64.3%	58.6%	61.4%
6	Others	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

In San Lorenzo

No.	Answer	Residential			
		Low	Middle	High	Average
1	Housewife	50.0%	30.0%	20.0%	33.3%
2	The master of house or owner of shop	40.0%	50.0%	30.0%	40.0%
3	Children	0.0%	0.0%	0.0%	0.0%
4	Other family member	0.0%	0.0%	10.0%	3.3%
5	Housekeeper or employee	0.0%	20.0%	30.0%	16.7%
6	Others	10.0%	0.0%	10.0%	6.7%

In Nemby

No.	Answer	Residential			
		Low	Middle	High	Average
1	Housewife	30.0%	60.0%	10.0%	33.4%
2	The master of house or owner of shop	50.0%	40.0%	30.0%	40.0%
3	Children	0.0%	0.0%	10.0%	3.3%
4	Other family member	20.0%	0.0%	10.0%	10.0%
5	Housekeeper or employee	0.0%	0.0%	30.0%	10.0%
6	Others	0.0%	0.0%	10.0%	3.3%

Residential Area in Asuncion

Residential Area in 3 Cities

Commercial Area in Asuncion
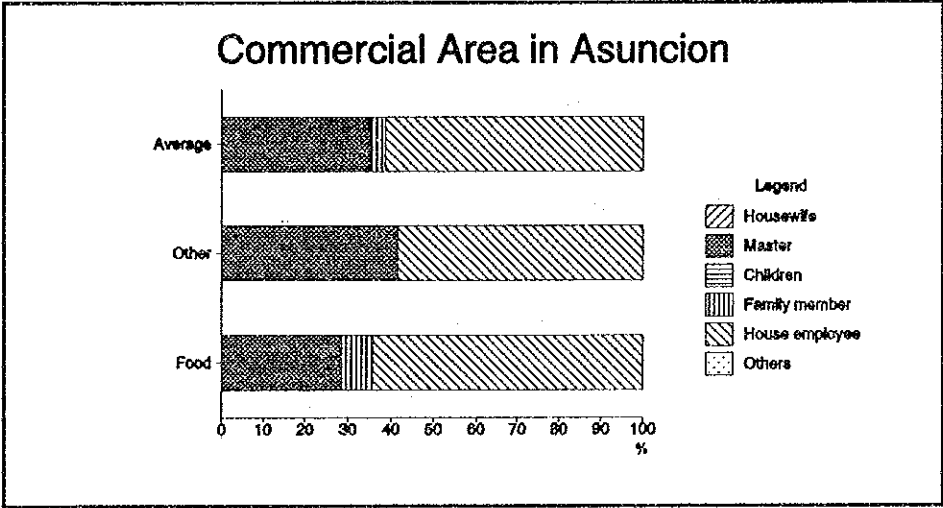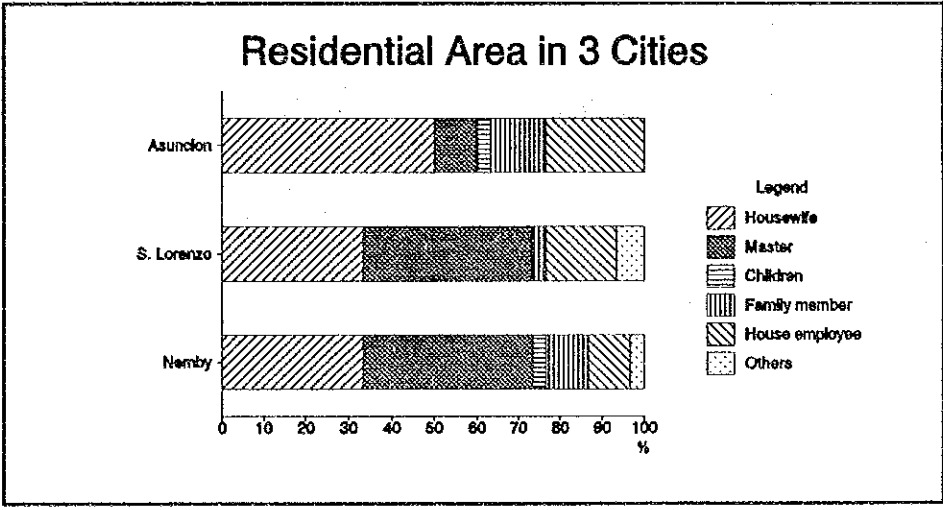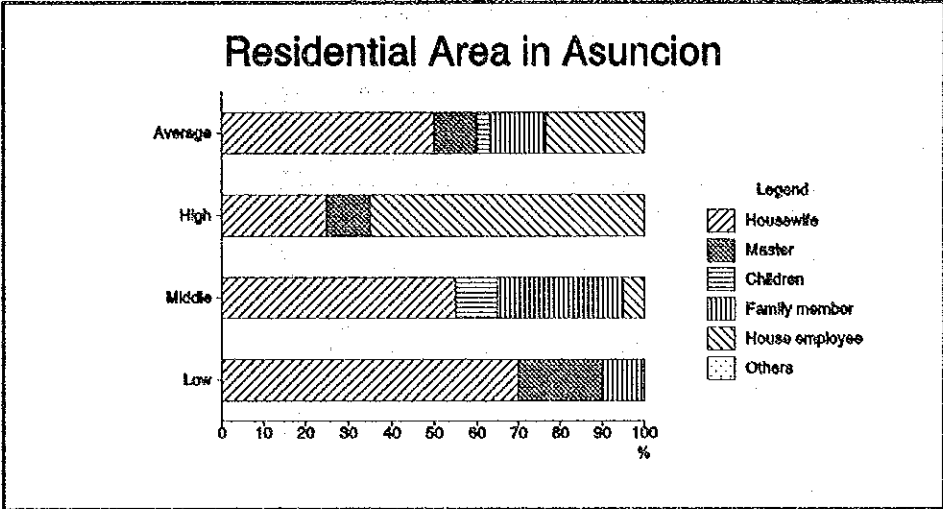
Q2-5　　Number of persons staying in the house/shop:

City	Income Level	Average Numbers (persons)
Asuncion	Low	7.1
	Middle	5.9
	High	6.7
	Average	6.5
San Lorenzo	Low	5.5
	Middle	4.3
	High	5.9
	Average	5.2
Nemby	Low	6.2
	Middle	4.2
	High	5.2
	Average	5.2
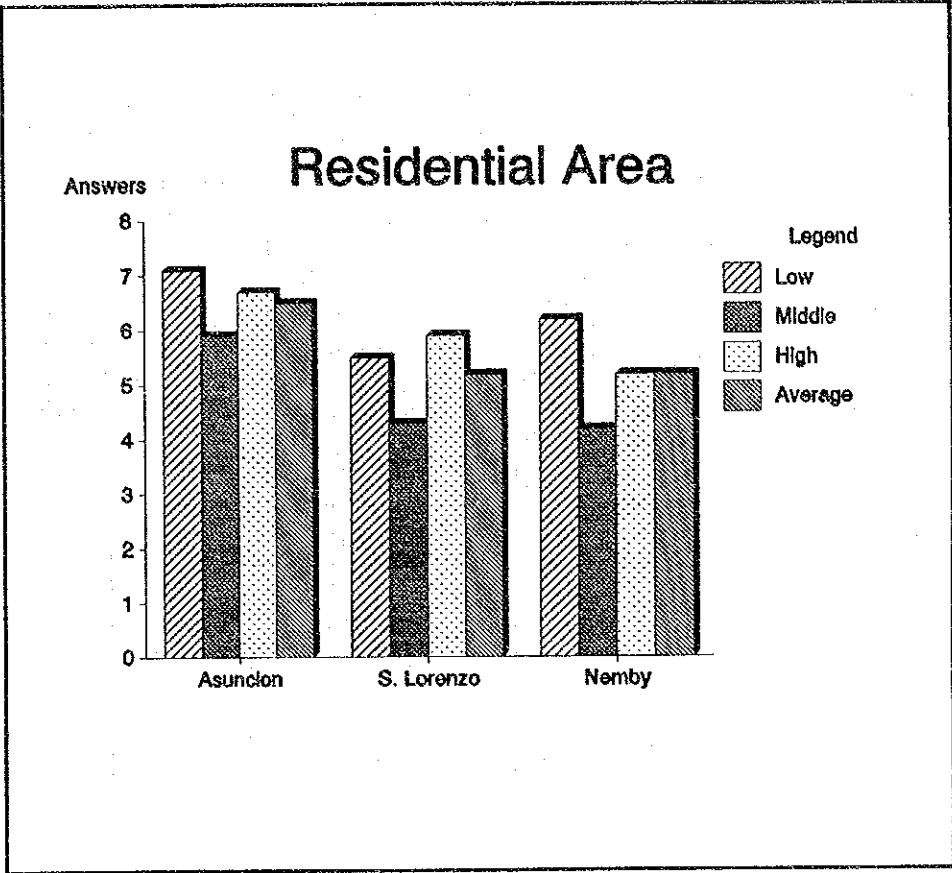
Residential Area

Q2-6　Number of dwelling years at this place:

In Asuncion

No.	Answer	Residential				Commercial		
		Low	Middle	High	Average	Food	Other	Average
1	Less than 5 years	5.0%	10.0%	30.0%	15.0%	60.0%	36.7%	48.4%
2	5 – 9 years	5.0%	20.0%	25.0%	16.7%	16.7%	13.3%	15.0%
3	10 – 19 years	10.0%	10.0%	30.0%	16.7%	16.7%	20.0%	18.3%
4	20 years or more	80.0%	60.0%	15.0%	51.6%	6.6%	30.0%	18.3%

In San Lorenzo

No.	Answer	Residential			
		Low	Middle	High	Average
1	Less than 5 years	30.0%	40.0%	33.3%	34.5%
2	5 – 9 years	20.0%	0.0%	22.3%	13.8%
3	10 – 19 years	40.0%	20.0%	33.3%	31.0%
4	20 years	10.0%	40.0%	11.1%	20.7%

In Nemby

No.	Answer	Residential			
		Low	Middle	High	Average
1	Less than 5 years	30.0%	40.0%	20.0%	30.0%
2	5 – 9 years	10.0%	30.0%	50.0%	30.0%
3	10 – 19 years	20.0%	30.0%	30.0%	26.7%
4	20 years	40.0%	0.0%	0.0%	13.3%

Residential Area in Asuncion

Legend
- //// < 5 years
- ▓▓ 5 - 9 years
- ≡≡ 10 -19 years
- ‖‖ > 20 years

Residential Area in 3 Cities

Legend
- //// < 5 years
- ▓▓ 5 - 9 years
- ≡≡ 10 - 19 years
- ‖‖ > 20 years

Commercial Area in Asuncion

Legend
- //// < 5 years
- ▓▓ 5 - 9 years
- ≡≡ 10 - 19 years
- ‖‖ > 20 years
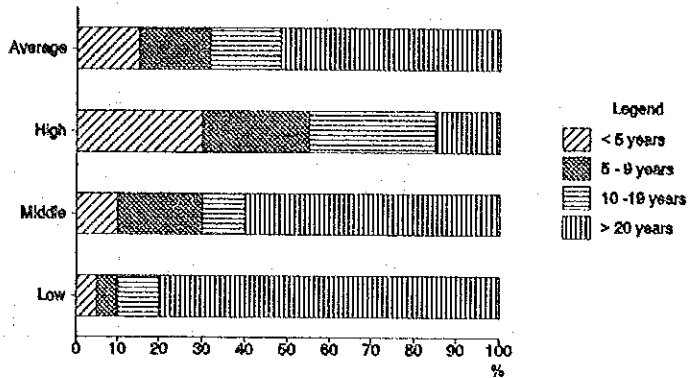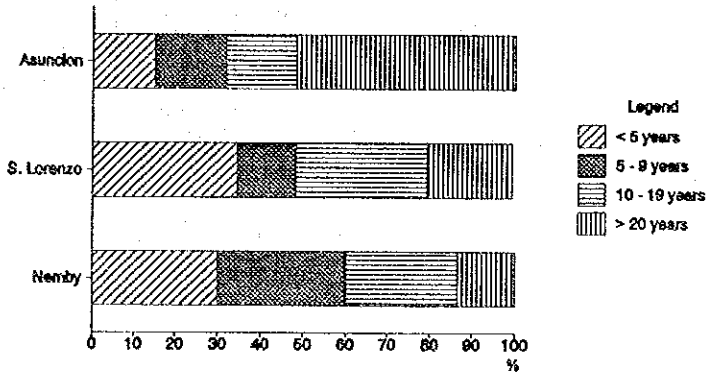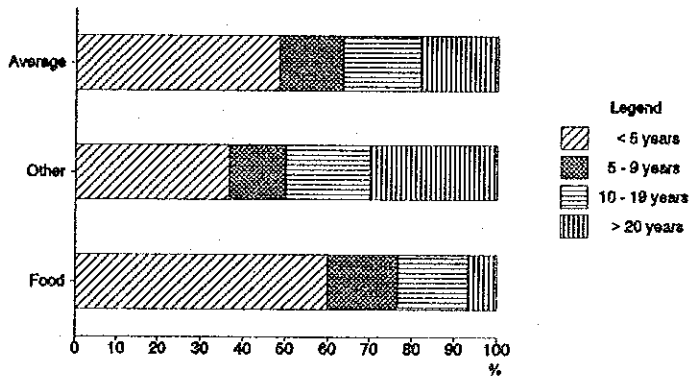
Q2-7   Floor area of the house/shop:

In Asuncion

No.	Answer	Residential				Commercial		
		Low	Middle	High	Average	Food	Other	Average
1	less than 100 m²	60.0%	54.5%	0.0%	36.0%	32.0%	63.7%	46.8%
2	101 – 200 m²	30.0%	18.2%	10.5%	20.0%	28.0%	18.2%	23.4%
3	201 – 300 m²	10.0%	9.1%	47.4%	24.0%	24.0%	4.5%	14.9%
4	more than 300 m²	0.0%	18.2%	42.1%	20.0%	16.0%	13.6%	14.9%

In San Lorenzo

No.	Answer	Residential			
		Low	Middle	High	Average
1	less than 100 m²	80.0%	30.0%	10.0%	40.0%
2	101 – 200 m²	20.0%	60.0%	60.0%	46.7%
3	201 – 300 m²	0.0%	10.0%	20.0%	10.0%
4	more than 300 m²	0.0%	0.0%	10.0%	3.3%

In Nemby

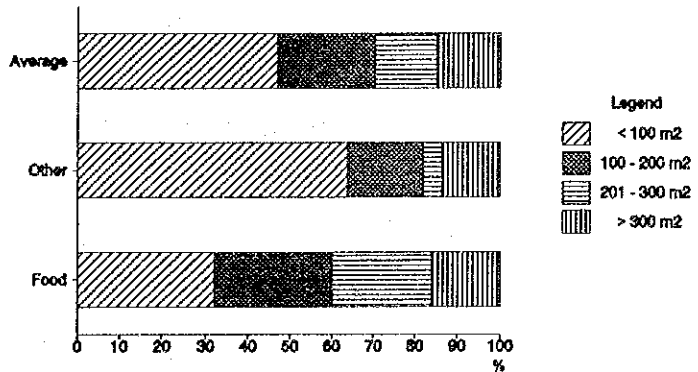| No.	Answer	Residential			
		Low	Middle	High	Average
1	less than 100 m²	100.0%	80.0%	0.0%	60.0%
2	101 – 200 m²	0.0%	20.0%	80.0%	33.3%
3	201 – 300 m²	0.0%	0.0%	0.0%	0.0%
4	more than 300 m²	0.0%	0.0%	20.0%	6.7%

Residential Area in Asuncion
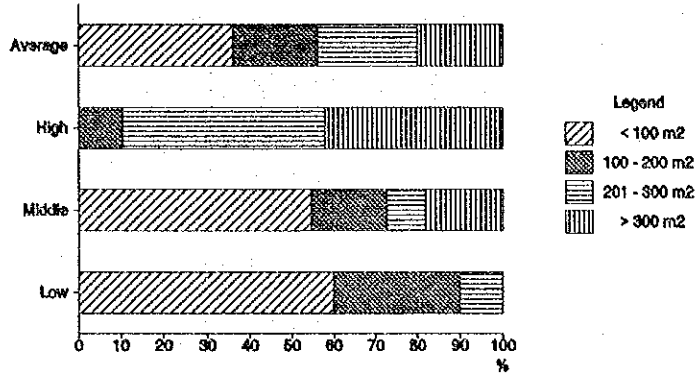
Residential Area in 3 Cities
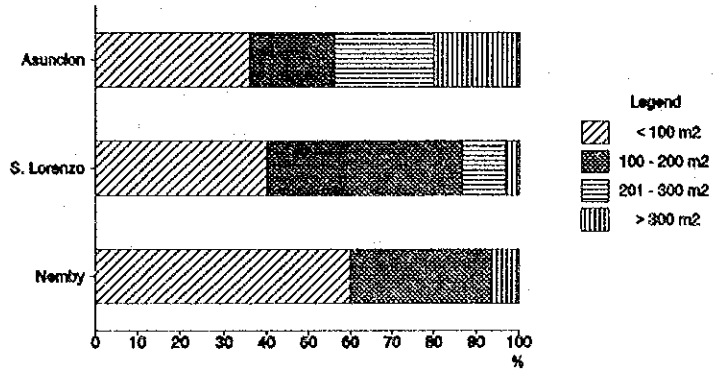
Commercial Area in Asuncion

Q2-8   Land area of the house/shop:

Land area of a house

City	Income Level	Average Land Area (m²)
Asuncion	Low	234.8
	Middle	457.4
	High	739.2
	Average	477.1
San Lorenzo	Low	401.1
	Middle	435.0
	High	556.0
	Average	464.0
Nemby	Low	387.4
	Middle	331.3
	High	500.5
	Average	406.4

Land area of a shop

Type of shop	Average Land Area (m²)
Food shop	645.8
Other shop	262.2
Average	454.0

Land area of a house