SUPPORTING REPORT D

SOCIO-ECONOMY

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SUPPORTING REPORT D: SOCIO-ECONOMY

1. ADMINISTRATION

The Federative Republic of Brazil consists of five major regions, namely; the North, Northeast, Southwest, South and Central West. Administratively, it comprises 27 Federative Units, which are constituted as follows: 7 Units in the Northern Region, 9 Units in the Northeast, 4 Units in the Southwest, 3 Units in the South and 4 Units in the Central West. These Federative Units are called States. The States are further divided into Municipalities, and the Municipalities into Districts. At the end of August 1997, there were 5,507 Municipalities and 9,516 Districts.

The State of Pernambuco, including the current project area, is located at the eastern end of Northeast Region. It consists of 185 Municipalities and 382 Districts. Recife Metropolitan Region (RMR), the Study area, is located at the eastern end of the State. The RMR was established by Federal Law (Law No.14, 8th of June 1973), and confirmed in the State Law (1st of January 1994) under the 1988 Federal Constitution. It comprises 14 Municipalities and 27 Districts. The Municipality of Recife is the capital of the state. The respective Municipalities are composed of the following number of Districts.

Municipalities and Districts

Name of Municipality	Number of Districts	Name of Municipality	Number of Districts
Abreu e Lima	1	Itapissuma	1
Araçoiaba	1	Jaboatão dos Guararapes	3
Cabo de Santo Agostinho	4	Moreno	1
Camaragibe	1	Olinda	1
Igarassu	3	Paulista	4
Ipojuca	3	Recife	1
Itamaracá	1	São Lourenço da Mata	2

Source: Contagem da População 1996, 1997, IBGE

2. POPULATION AND LABOR FORCE

2.1 Population

2.1.1 Population in RMR

According to the census of population in 1996 by the Brazilian Institute of Geography and Statistics (IBGE), Brazil had a population of 157 million. The population had increased by 10.2 million compared with the 1991 census, as shown in Table D2-1. During these five years, the average growth rate was 1.4% per annum. Since the average growth rate during the 1980's was 1.9%, it had dropped by 0.5% point.

In the State of Pernambuco, the population in 1996 was 7.40 million or 4.7% of the national population. The average growth rate between 1991 and 1996 was 0.7% per annum. This growth rate was smaller than that of the country. If the national growth rate was the natural growth rate throughout the country, migration from Pernambuco must have increased.

The population growth trend of the RMR comprising 14 municipalities was tabulated in Table D2-1. The average growth rate between 1991 and 1996 was 1.3% per annum. This rate was 0.6 point higher than the state average rate. Accordingly, a considerable number of the rural population is assumed to have migrated into the RMR.

Among the14 municipalities, the Municipality of Recife is the largest in terms of population, and functions as the center of the RMR. Its population was 1.35 million in 1996, accounting for 43.3% of the RMR population. The five largest municipalities in terms of population are Recife, Olinda, Jaboatão dos Guararapes, Paulista and Camaragibe and they form a core of the RMR in terms of their socio-economic activities in the RMR. These core municipalities account for 2.57 million or 83% of the RMR population.

The urban population of the 14 municipalities is also tabulated in Table D2-1. The total urban population of the RMR was 2.94 million in 1996, accounting for 94% of the total population. The growth rate between 1991 and 1996 was 1.3%. The growth rates of the core Municipalities of Recife and Olinda were 0.7% and 0.5%, smaller than the rate of the RMR. On the other hand, the surrounding municipalities recorded higher growth rates than that of the RMR. This means that the increased population during this period was absorbed in these surrounding municipalities.

2.1.2 Population Density

The population density in the municipal areas of the RMR was calculated at 11.2 persons/ha in 1991. The densities of the respective municipalities ranged from the largest at 91.7

persons/ha in Olinda to the smallest at 0.9 persons/ha in Ipojuca, as shown in the table below. In addition to Olinda, the following four municipalities recorded a high population density of more than 20 persons/ha: Recife, Paulista, Camaragibe and Jaboatão dos Guararapes. These five municipalities have 2.57 million people or 83% of the RMR's population.

Population and Population Density by Municipality (1996)

Municipality	Total Population (1000)	Municipal Area (km^2)	Population Density (Persons per ha)
Abreu e Lima	80.8	129.1	6.3
Araçoiaba	12.0	96.9	1.2
Cabo de Santo Agostinho	140.8	448.4	3.1
Camaragibe	111.1	48.3	23.0
Igarassu	73.0	304.2	2.4
Ipojuca	48.5	514.8	0.9
Itamaracá	13.8	65.4	2.1
Itapissuma	19.2	74.3	2.6
Jaboatão dos Guararapes	530.0	257.3	20.6
Moreno	40.0	192.1	2.1
Olinda	349.4	38.1	91.7
Paulista	233.6	102.3	22.8
Recife	1,346.0	218.7	61.5
São Lourenço da Mata	89.8	264.4	3.4
RMR	3,088.0	2,754.3	11.2

Source: Censo Demografico 1996, Numero 14 Pernambuco, IBGE

The population density in the urbanized areas of the RMR was calculated at 97 persons/ha on average in 1996. The density of the respective Municipalities ranged from the largest at 139 persons/ha in Olinda to the smallest at 18 persons/ha in Itamaracá. In addition to Olinda, the following four Municipalities recorded a high population density of more than 100 persons/ha: Recife, Araçoiaba, Jaboatão dos Guararapes, and Cabo de Santo Agostinho. The five core municipalities, i.e., Olinda, Recife, Paulista, Camaragibe and Jaboatão dos Guararapes, accounted for 2.49 million people or 85% of the total urban population in their urbanized areas. The table below shows the urban population density of the respective municipalities.

Urban Population and Population Density by Municipality (1996)

Municipality	Urban Population (1000)	Urbanized Area (ha)	Urban Density (Persons per ha)
Abreu e Lima	72.7	1,092	66.6
Araçoiaba	9.3	83	112.0
Cabo de Santo Agostinho	125.0	1,186	105.4
Camaragibe	111.1	2,267	49.0
Igarassu	55.9	1,125	49.7
Ipojuca	30.4	885	34.4
Itamaracá	11.2	620	18.1
Itapissuma	16.1	175	90.9
Jaboatão dos Guararapes	457.7	4,230	108.2
Moreno	32.1	415	77.3
Olinda	349.4	2,520	138.6
Paulista	229.5	3,012	76.2
Recife	1,346.0	10,852	124.0
São Lourenço da Mata	78.8	1,687	46.7
RMR	2,925.2	30,150	97.0

Source: Censo Demografico 1996, Numero 14 Pernambuco, IBGE

2.1.3 Family Size

The average family size in the RMR was calculated at 3.5 on average in 1997. It was smaller than that of the state (3.8). The average family size in rural areas was 4.2, larger than that of the state. The table below shows the average family sizes in the respective areas.

Family Sizes

Area	Total Population (1000)	Number of Households (1000)	Average Family Size (Persons)
Brazil *	156,128	43,967	3.6
Urban *	124,336	35,790	3.5
Rural *	31,792	8,177	4.0
Pernambuco State	7,480	1,994	3.8
Urban	5,697	1,567	3.6
Rural	1,783	427	4.2
RMR	3,089	874	3.5

Source: Pesquisa Nacional por Amostra de Domicílios 1997, Vol 1 Brasil, IBGE
Pesquisa Nacional por Amostra de Domicílios 1997, Vol 19 Pernambuco, IBGE
Note: * Data in 1996

A household does not always live in one housing unit. A housing unit is principally considered to be a unit of contract with public entities for utility services, identified as a consumption unit (C.U.) and called "economia" in Portuguese. The average number of residents per housing unit in the RMR was calculated at 4.0 in 1997. It was smaller than that of the average size (4.2) in Pernambuco State as shown in the following table. The average

for urban areas was 4.1, smaller than that of the state average. The respective sizes in the state were larger than the corresponding average sizes in the country.

Average Residents per Housing Unit

Area	Total Population (1000)	Number of Housing Units (1000)	Average Residents per Housing Unit (Persons)
Brazil *	156,128	40,697	3.8
Urban *	124,336	33,020	3.8
Rural *	31,792	7,677	4.1
Pernambuco State	7,480	1,801	4.2
Urban	5,697	1,401	4.1
Rural	1,783	400	4.4
RMR	3,089	767	4.0

Source: Pesquisa Nacional pr Amostra de Domicílios 1997, Vol 1 Brasil, IBGE
Pesquisa Nacional pr Amostra de Domicílios 1997, Vol 19 Pernambuco, IBGE
Note: * Data in 1996

2.2 Labor Force

2.2.1 Labor Force and Employment

In the 1996 census year, the labor force in Brazil registered 73.1 million. This accounted for 57.7% of the total working age population (123.6 million), i.e., 10 years old and over. Of this number, 68.0 million or 93.0% were employed. Thus, the unemployment rate was 7.0% nationwide. In the Northeast Region, the labor force was 20.4 million in the same year. This accounted for 57.8% of the total working age population (35.3 million). Of this number, 19.2 million or 94.1% were employed, so the unemployment rate was 5.9%, which is lower than the national rate.

In the State of Pernambuco, the labor force was recorded at 3.39 million in 1997. This accounted for 57.5% of the total working age population (5.89 million). Of the total number, 3.10 million people or 91.4% were employed. Thus, the unemployment rate was 8.6% in the state. In the RMR, the labor force was recorded at 1.34 million in the same year. The labor force accounted for 40% of the total labor force in the state, which was slightly smaller than the rate of population (43%). This labor force in the RMR accounted for 53.4% of the total working age population (2.51 million). Of the total labor force, 1.16 million or 86.6% were employed. Thus, the unemployment rate was 13.4% in the RMR, which was much larger than the state's average rate of 8.6%.

In 1997, the agricultural sector absorbed the greatest portion of manpower resources in the state. It accounted for 31.7% of the total employment. In the RMR, on the other hand, the

agricultural sector absorbed only 3.7% of the labor force, as shown in the table below. The manufacturing sector employed 7.6% only in the state. Even in the RMR, it absorbed only 8.4%.

Employment in Pernambuco and RMR

Economic Sector	Number Employed (1000)		Percentage Distribution (%)	
	Pernambuco	RMR	Pernambuco	RMR
Agriculture	981.2	43.3	31.7	3.7
Industry	446.7	202.3	14.4	17.4
Manufacturing	235.2	97.2	7.6	8.4
Construction	182.6	91.8	5.9	7.9
Other Industries	28.9	13.3	0.9	1.1
Services	1,669.8	918.1	53.9	78.9
Trade	460.0	230.3	14.8	19.8
Hotels & Restaurants	583.8	332.5	18.8	28.6
Auxiliary Services	68.7	51.6	2.2	4.4
Transportation & Communication	125.4	67.3	4.0	5.8
Social Services	239.6	130.8	7.7	11.2
Public Services	141.3	74.5	4.6	6.4
Other Activities	51.1	31.0	1.6	2.7
Total	3,097.7	1,163.7	100.0	100.0

Source: Pesquisa Nacional por Amostra de Domicílios 1997, Vol.19 Pernambuco, 1998, IBGE

Yet, the service sector, including seven sub-sectors such as trade, hotels and restaurants, etc. in the table, absorbed 54% of the total employment in the state. In the RMR, this rate reached 79%. Among the service sub-sectors, accommodation and catering absorbed 29% and the trading sub-sector, 20%. Thus, the labor force in the RMR is characterized by the employment in the service sector.

2.2.2 Monthly Wage

The average monthly income was estimated at 2.1 times the minimum wage in the state in 1997. In the RMR, it was estimated at 3.2 times the minimum wage. These average wages are equivalent to approximately R$ 287/month in the state and R$ 435/month in the RMR. The distribution of monthly wages is shown in the table below. The mean wages of the state and the RMR were between ½ to 1 minimum wage and 1 to 2 minimum wages, respectively. The percentage of workers with an income of up to 3 minimum wages (R$408/month) accounted for 82% of the total workers in the state and 71% in the RMR.

Monthly Wages in Pernambuco and RMR

Income Range	Number of Workers (1000)		Distribution (%)	
	Pernambuco	RMR	Pernambuco	RMR
Up to ½ Minimum Wage*1	287.4	68.7	9.3	5.9
½ to 1 Minimum Wage*1	671.7	226.3	21.7	19.4
1 to 2 Minimum Wage*1	687.7	304.0	22.2	26.1
2 to 3 Minimum Wage*1	262.1	150.7	8.5	13.0
3 to 5 Minimum Wage*1	261.6	142.2	8.4	12.2
5 to 10 Minimum Wage*1	150.4	93.3	4.9	8.0
10 to 20 Minimum Wage*1	64.0	42.5	2.1	3.7
More Than 20 Minimum Wage	33.4	24.4	1.1	2.1
No Income *2	619.9	70.2	20.0	6.0
No Answer	59.5	41.4	1.9	3.6
Total	3,097.7	1,163.7	100.0	100.0

Source: Pesquisa Nacional por Amostra de Domicílios 1997, Vol.19 Pernambuco, 1998, IBGE

Note: *1 A minimum wage is stipulated as R$136 in 1999.

*2 Including workers who received social benefits only.

3. NATIONAL ECONOMY

3.1 National And Regional Accounts

The Gross Domestic Product (GDP) in Brazil was R$864 billion in 1997, as shown in Table D3-1. The table shows the GDP broken down into Gross Value Added (GVA) of the main economic sectors. They are summarized as follows:

(1) **R$ 66 billion or 7.7% of GDP for the agricultural sector,**

(2) **R$ 326 billion or 37.8% for the industrial sector, and**

(3) **R$ 471 billion or 54.5% for the service sector.**

Per capita GDP was calculated at R$ 5,413, equivalent to US$ 4,850.

The Gross Regional Domestic Product (GRDP) in the State of Pernambuco was R$ 23.3 billion in 1997, as shown in Table D3-2. It accounted for 2.7% of the national GDP. The GVA of the main sectors was shown in the same table. They were broken down as follows:

(1) **R$ 2.14 billion or 9.2% of GRDP for the agricultural sector,**

(2) **R$ 7.67 billion or 33.0% of GRDP for the industrial sector and**

(3) **R$ 13.46 billion or 57.9% of GRDP by the service sector.**

The per capita GRDP in Pernambuco was R$ 3,115 (equivalent to US$ 2,790) in 1997, as shown in Table D3-2. It was only 58% of the national per capita GDP. The GRDP for the RMR is not estimated by any agency concerned. In this current study, therefore, it is represented by the GRDP of the state. Similarly, the GRDP in the project sites is considered to be R$ 3,115 the same as in 1997.

Between 1994 and 1997, the GDP increased from R$ 779 billion to R$ 864 billion in real terms, i.e., at average growth rate of 3.5% per annum. The GRDP in Pernambuco grew at a rate of 4.2% per annum on average for the same period, which was higher than the growth rate of the country. Thus, the share of the region in the country increased during this period.

In terms of average annual growth between 1994 and 1997, both per capita GDP of Brazil and per capita GRDP of Pernambuco were calculated as 2.1% and 3.5%, respectively. The economy of the state grew at a higher pace than the national economy, so the disparity between the state and the nation reduced during this period.

3.2 Foreign Trade

Brazil's external trade balance has shown an increase in the deficit since 1995, as shown in the table below. The major traditional commodity exports such as coffee, and mineral ores have contributed to the national trading performance for a long time. These exports amounted to US$ 47.8 billion in 1996 and US$ 53.0 billion in 1997 at FOB value. In 1996, the top five exports comprised the following commodities:

(1) **soybeans, accounting for US$ 4.5 billion or 25%;**

(2) **mineral ores, US$ 2.9 billion or 16%;**

(3) **coffee, US$ 2.1 billion or 12%;**

(4) **meat, US$ 1.5 billion or 8%; and**

(5) **sugar, US$ 1.5 billion or 8%.**

Foreign Trade in Brazil

(Unit: US$ billion)

	1994	1995	1996	1997
Merchandise Export (FOB)	43.55	46.51	47.75	52.99
Merchandise Import (CIF)	35.51	53.83	56.75	64.99
Trade Balance	8.04	-7.32	-9.00	-12.00

In addition, manufactured products have contributed more than the traditional ones, but their performance has not grown at the expected rate. These exports amounted to US$ 29.7 billion. The top five products are the following:

(1) **fabricated metal products, accounting for US$ 6.3 billion or 21%;**

(2) **transportation equipment, US$ 4.8 billion or 16%;**

(3) **chemical products, US$ 3.5 billion or 12%;**

(4) **machines and mechanical instruments, US$ 3.2 billion or 11%; and**

(5) **paper and cellulose, US$ 1.9 billion or 7%.**

The imports amounted to US$ 56.8 billion in 1996 and US$ 65.0 billion in 1997 at CIF value. In 1996, the major import items were the following:

(1) **consumer goods, accounting for 17% of the total imports;**

(2) **raw materials, 33%;**

(3) **petroleum and derivatives, 12%; and**

(4) **capital goods, 38%.**

3.3 Balance of Payment

Brazil has been running a deficit on its current transactions. In particular, it has consecutively recorded a deficit on the service trade, as shown in the balance of payment table below. Borrowing overseas, from official and private sources mainly financed the deficit. This activity has accelerated the worsening current deficit. The deficit is said to be partly offset by tourism.

Balance of Payment

(Unit: US$ billion)

Item	1994	1995	1996	1997
Trade Balance	10.47	-3.35	-5.54	-8.37
Merchandise Export (FOB)	43.55	46.51	47.75	52.99
Merchandise Import (FOB)	33.08	49.86	53.29	61.36
Services' Balance	-14.74	-18.59	-21.71	-27.29
Interest	-6.34	-8.16	-9.84	-10.39
Other Services	-8.40	-10.43	-11.87	-16.90
Net Transfer	2.59	3.97	2.90	2.22
Current Transactions	-1.69	-17.97	-24.35	-33.44
Capital Balance	14.29	29.36	32.39	26.76
Errors and Omissions	0.33	2.09	0.97	-1.13
Balance of Payment	12.94	13.48	9.02	-7.81

In 1997, the current transaction recorded a high level deficit of $ 33.4 billion. Although it was only US$ 1.7 billion in 1994, it jumped to US$ 18.0 billion the following year because the merchandize trade went into deficit. In 1996 the trade gap worsened further due to the outflow of interest and other services. The net result of current transaction was US$ 24.4 billion. These deficits were cancelled by the increase of direct foreign investment. Accordingly, an overall balance recorded a surplus until 1996. In 1997, the capital balance declined to US$ 26.8 billion, so the overall balance went into a deficit of US$ 7.8 billion.

3.4 Inflation, Prices and Foreign Exchange Rates

Table D3-3 shows price indices of the country and in Recife from 1994 to 1999, covering not only consumer prices (INPC) but also wholesale prices. The price index of construction in

the country is also indicated in the table. The INPC in Recife increased to 180.6 (base: December 1994=100) in November 1999, up by about 80% over the previous five years. Average annual price increase rates of for Brazil and Recife are also shown in the table. In Recife, the rate of increase was 3.6% in 1998 and 8.1% in 1999. However, the rate of increase has stabilized gradually in 1999. On the other hand, the wholesale price index jumped to 27.5% in 1999 because of the devaluation of the "Real".

The table shows the foreign exchange rate of Real per US$ from 1994 to 1999 at the end of each period. The foreign exchange rate of Real per US$ was comparatively stable between 1995 and 1998 as shown in the table. However, the rate of the Real dropped from R$ 1.21 per US$ 1.0 at the end of 1998 to R$ 1.98 at the beginning of 1999. The value of the Real dropped from R$ 0.98 per US$ 1.0 at the end of 1995 to R$ 1.79 at the end of 1999.

3.5 Foreign Assistance and Dept

Gross receipts of official development assistance (ODA) from the bilateral and multilateral agencies aggregated to US$ 43.0 billion in total between 1993 and 1997 and averaged US$8.6 billion per year. The trend was for receipts to increase year by year, but the total receipt in 1994 was minus US$3.2 billion. In 1997, the total receipts amounted to US$20.3 billion, accounting for approximately 6% of the annual revenue. The total receipts from bilateral assistance were US$ 18.5 billion in the same year. The top three donors and their annual amounts in the same year were as follows: (1) US$ 13.5 billion from United States; US$ 1.9 billion from Japan; and US$ 1.5 billion form the Netherlands. The record of ODA to Brazil is summarized in Table D3-4.

In 1997, the total external debt was US$ 194 billion. It accounted for approximately 930% of GDP (US$ 20.8 billion in 1997). The outstanding of long-term debt was US$ 158 billion in the same year. The total debt-service was US$ 38 million, comprising US$ 27 million of principal repayment and US$ 11 million of interest payment. The debt service ratio (DSR) increased rapidly from 24 % in 1993 to 57 % in 1996. The detailed figures are listed in Table D3-5.

4. REGIONAL ECONOMY

4.1 Economic Structure

In the State of Pernambuco, GRDP was R$ 23.3 billion in 1997, as mentioned in Section D3.1. The services sector recorded the highest value of gross value added (GVA) in the GRDP among the major economic sectors in 1997. It accounted for 57.9% of the total as shown in the table below. The industrial sector is in second position, accounting for 33.0%. The agricultural sector accounted for only 9.2%. On the other hand, the agricultural sector absorbed 31.7% of the labor force in spite of having the lowest economic performance. The industrial sector absorbed only 14.4% of the labor force but made a 33.0% contribution to the total GRDP. The service sector absorbed 53.9% of the labor force.

GRDP and Labor Force (1997)

Economic Sector	GRDP in 1997	Labor Force 1997	
		Pernambuco	RMR
Agriculture	9.2%	31.7%	3.7%
Industry	33.0%	14.4%	17.4%
Services	57.9%	53.9%	78.9%
Total	100.0%	100.0%	100.0%

In the RMR, the agricultural sector absorbed only 3.7% of the labor force. The services sector had the largest labor force of 78.9%. Thus, the economy in the RMR is said to specialize in the services industry.

4.2 Agricultural Production

Agricultural activities take place mostly in rural areas in the state. The agricultural production in the RMR is mainly from small-sized intensive farming in the suburbs of the central urban areas, although sugar cane fields are still spread throughout the surrounding municipalities. In 1997, the top five crops in terms of production value were sugar cane, cassava, tomato, feijão bean and banana, as shown in the table below.

Agricultural Production in Pernambuco (1997)

Crop	Cultivated Area (1000 ha)	Production (1000 tons)	Value (R$ Million)
Sugar Cane	421	23,765	446.7
Cassava	74	717	57.8
Tomato	6	219	72.6
Feijão Bean	325	126	72.4
Banana	39	50	76.2

Source: Produção Agricola Municipal 1997, IBGE

4.3 Industrial Production

The industrial sector achieved around one-third of the GRDP in the state. Within the industrial sector, the manufacturing sub-sector had the largest share, accounting for 51%. Among the many types of manufacturing industry, the leading one is the food industry. Its value added attained R$ 1.1 billion in 1997, accounting for 29% of the entire manufacturing performance.

Industrial Production in Pernambuco (1997)

Type of Industry	Gross Value Added (R$ Million)	Percentage Share (%)
Food Industry	1,104	28.5
Beverage	469	12.1
Metal fabrication	459	11.8
Chemical Products	311	8.0
Non-metallic Products	280	7.2
Others	1,257	32.4
Total	3,880	100.0

Source: Gross Regional Domestic Product Information, Dec. 1999, FIEPE & CONDEPE

Next to the food industry, the following types of industry attained high production levels in the state in 1997: beverages, metal fabrication, chemical products and non-metallic products. The performance of these types is enumerated in the table above.

4.4 Tourism

Tourism is expected to be the leading industry in the State of Pernambuco. Under the "PRODETUR II" development program, the state government emphasizes the promotion of the tourism industry. In fact, the number of tourists to the state has been increasing year by year. In 1998, 1.76 million tourists visited the state. Among these tourists, 0.88 million people stayed at hotels or in other commercial accommodation. The total revenue from tourism was estimated at US$ 534 million in the state.

In the RMR, 1.14 million tourists arrived and 0.42 million stayed in commercial accommodation. Of these tourists, 93% were Brazilian and only 7% were from abroad. Their expenses were estimated at US$ 347 million, comprising US$304 million from local tourists and US$44 million of foreign tourists. Statistical data of these tourists are given in the table below.

Tourism Performance in RMR (1998)

Item	Local Tourist	Foreign Tourist	Total
Number of Visitors (1000)	1,064	78	1,142
Number of Tourists Lodged (1000)	-	-	422
Average Length of Staying (days)	8.6	10.8	9.0
Average Daily Expense (US$)	33.2	51.4	34.7
Total Expenses (US$ Million)	303.7	43.7	347.4

Source: Tourism in Pernambuco: Selected Indicators, 1999, Secretary of Economic Development, Tourism and Sports

The major purposes of Brazilian travelers are (1) business; (2) sightseeing and (3) visiting parents and friends as shown in the table below. For foreign travelers, the main purpose is sightseeing, accounting for 57% of the total. National sightseers of local tourists stayed at hotels or other accommodation for an average of 7.2 days. The figure is 7.6 days for foreign tourists, as shown in the table below.

Purposes of Travelers and Period of Stay in RMR (1997/98)

Purpose of Travel	Distribution of Purposes (%)		Period of Stay (days)	
	Local	Foreign	Local	Foreign
Sightseeing	28	57	7.2	7.6
Visit to Parents and Friends	25	14	12.6	24.0
Conference	5	3	7.4	4.9
Business	37	25	8.1	9.9
Health Care	4	0	9.3	0.0
Religion	1	1	5.8	1.5

Source: Macroestrantegia turistica para o Estado de Pernambuco, Aug. 1999, GEP

In a questionnaire survey of tourists, urban infrastructure for tourists in the state was evaluated. In terms of security, 55% of the respondents evaluated it as excellent or good. Regarding airport facilities, 79% evaluated them as excellent or good. On the other hand, 62% evaluated public cleanliness in towns as fair (35% of fair and 27% of poor). The tourists don't seem to have a very good impression of urban cleanliness in the RMR.

4.5 Infrastructure

The table in the following page shows the coverage of basic public services in the state in 1996. Water supply services cover nearly 4.9 million people and 173 districts. There are 184 water treatment stations (ETA) and 19 laboratories in the state. In the RMR, the four largest ETAs had a nominal treatment capacity of 8.1 m^3/sec in 1996. Water supply and sewerage services are managed by COMPESA.

In the RMR, there are 44 wastewater treatment plants (ETE) and 96 pumping stations. Among these ETEs, four major subsystems are located in the center of the RMR. They are Cabanga, Janga, Peixinhos and Southern subsystems. For quality control of effluent, COMPESA has three laboratories.

Coverage of Basic Public Services in Pernambuco (1996)

(Unit: % of residences supplied with services)

Infrastructure	Urban Area	Rural Area	Total
Water Supply	90.1	7.1	71.9
Sewerage Services	33.8	1.5	26.7
Refuse Collection	63.5	3.5	50.3
Electricity	99.4	65.2	91.9
Telephone	15.8	0.9	12.5

Source: Pernambuco, Basic Information, 1997, Secretary of Economic Development, Tourism and Sports

The electricity system serves most of the population in the state, as shown in the table above. The system is managed as follows: generation systems by the Hydroelectric Company of São Francisco (CHESF) and transmission and distribution systems by the Electricity Company of Pernambuco (CELPE). The state is poor in telephone services. At present, mobile phones cover communication services more than the regular telephone system.

4.6 Household Economy

Family income and expenditure can roughly describe living conditions of the people. The data on average household expenditure in Recife is presented in Table D4-1. The average expenditure was R$ 922 per month in 1995/96.

The average expense on housing was R$ 195 per month or 21% of total family expenditure. This expense includes housing cost and utility costs. Of the total the utilities expense accounted for R$ 63 or 7%. This included electricity, gas, telephone and water as well as sewerage services. It is difficult to segregate the expense for sewerage service because of lack of data. Supposing that the expense for sewerage service was one-fifth of the utility expense, the amount would be R$ 13 per month.

The average expense for health care was R$ 69 per month or 7 % of the total family expenditure. The largest among health care items was an expense for insurance, although low-income families do not pay for this item as shown in the table. The second largest expense was for medicines: R$ 20 per month on average. Even low-income families paid a

slightest amount on this item. This means that the expense for medicines could be a heavy burden for low-income families.

While some data on family expenditure is available, the average family income is not clear. If family income is estimated through weighted average of income distribution in the table, the average family income will be around 8 minimum wages. Since the minimum wage was R$ 100 in 1995/96, the average family income was R$ 800 per month, which is smaller than the average family expenditure.

The Engel coefficient, which is the percentage of total income spent on food, is said to be an indicator of living standard. Lower income families have a high coefficient. The coefficient based on the average figures in Recife was calculated at 26 %. Families with and income of 5 and 6 minimum wages had a coefficient of 40 %. These families may be classified as of low-income.

4.7 Public Health Conditions

The public health system covers all the people in Brazil under the Unified Health System (Sistema Único de Saúde: SUS), since the new constitution of 1988 prescribed that health is a right of the people. Under the SUS, Brazilian people can, in principle, get free medical care in specified private hospitals as well as in public hospitals. In the State of Pernambuco, the public health system is managed under 11 regional health management units (Diretorias Regionais de Saúde: DIRES). The RMR belongs to DIRES I. The DIRES I includes four municipalities as well as the 14 municipalities of the RMR.

In DIRES I, Department of Health started to record statistics of the incidence of diseases after 1989, though its statistical system is not quite complete yet. Based on the statistics, the incidence of water borne diseases for the past four years is listed in the table below.

Incidence of Water Borne Diseases (1996-1999)

Water Borne Diseases	Number of Cases *1				Incidence (per 100,000)			
	1996	1997	1998	1999*2	1996	1997	1998	1999
Cholera *3	-	-	6	582	-	-	0.17	15.95
Diarrhea *4	88	1,665	548	1,283	-	-	15.32	35.15
Schistosomiasis	40	219	460	397	-	-	12.86	10.88
Typhoid Fever	2	-	4	9	-	-	0.11	0.25
Hepatitis *5	449	590	590	580	-	-	16.50	15.89
Leptospirosis	340	228	116	34	-	-	3.24	0.93
All Diseases	-	-	32,789	22,780	-	-	917.00*6	624.00*6

Source: DIRES I, State Secretary of Health

Note: *1 the number was confirmed by doctors in hospitals.
*2 The number includes incidence until November.
*3 the cases of cholera were not reported in 1996 and 1997.
*4 the number of diarrhea cases is considered as much more than the notified.
*5 Types A, B and C are included in the figures. Only type A is related to sewerage.
*6 the morbidity was estimated on the basis of population in DIRES I.

Some diseases were not reported for a specific reason in the table above. For example, cholera was prevalent in 1996 and 1997, so information on it was gathered separately for that period. Thus, the number of cases was not reported to the statistical center. Diarrhea is so common that the cases are not always notified to the statistical information center. Therefore, the actual number of diarrhea cases could be much more than the figure in the table. Leptospirosis usually occurs in quite limited areas and does not spread out to other areas.

In the Municipality of Recife, the municipal secretariat of health reported the incidence of cholera and diarrhea between 1995 and 1998. The number of cases of each disease is shown in the table below.

Incidence of Cholera and Diarrhea in Recife Municipality (1995-1998)

Item	Cholera				Diarrhea			
	1995	1996	1997	1998	1995	1996	1997	1998
Number of Cases	38	14	27	37	153	138	132	122
・Up to 10 Years Old	5	4	8	21	91	69	40	41
・10 Years Old and Over	33	10	20	16	62	69	92	81
Incidence (per 100,000)	2.85	1.04	2.00	2.73	11.47	10.25	9.77	9.00

The incidence of these diseases seems to be lower than that of DIRES I. This may be because the sanitary conditions in the Municipality of Recife are better than overall conditions in DIRES I. In the case of cholera, the number of cases in the working age bracket (10 years old and over) was larger than that in the bracket of 10 years old and below in 1995. However, this tendency was reversed in 1998. Meanwhile, diarrhea showed the opposite trend as shown in the table.

According to a master thesis on "Mortalidade Infantil e Condicao de Vida: Uma Analise da Desigualdade Espacial no Recife (Infant mortality and living conditions; analysis of spacial unequality in Recife)", 1998, by Maria J.Bezerra Guimaraes at Pernambuco State University, the infant death rate is affected by living conditions in the neighborhoods. The thesis presented a factor analysis regarding infant deaths in four different economic clusters in the Municipality of Recife. It concluded that the risk of dying during the first year of life of perinatal disorder, bronchopneumonia and gastro-enteritis was 42 %, 61 % and 274 % higher

in the cluster of low level living conditions than that in the cluster of high level living conditions. Hence, living conditions in neighborhood probably influence mortality rates.

5. LAND USE

The RMR was established in 1973. In 1976, FIDEM prepared the first metropolitan development plan of the RMR. The RMR had a population of 3.1 million (in 1996) in the total area of 2,754 km^2. Of the whole RMR, the urbanized areas account for 302 km^2 or 11%. The urbanized areas are located predominantly in the coastal strip, including the estuary of the Capibaribe, Beberibe and Tejipió Rivers. The Island of Recife and the port, sites of the foundation of the city, are located at the estuary of the rivers. The metropolitan character is characterized by the conurbation of Recife with the bordering municipalities and of these with other ones. It functions interdependently and needs an integrated conception of urban planning and politics, transport and sanitation.

Among 14 municipalities, the Municipality of Recife has the largest urbanized area of 109 km^2, as shown in the table below. The five core municipalities, i.e., Recife, Olinda, Paulista, Camaragibe and Jaboatão dos Guararapes, have urbanized areas of 229 km^2.

Municipal and Urbanized Areas of Municipalities in RMR

Municipality	Municipal Area (km^2)	Urbanized Area (km^2)	Proportion of Urbanized Area (%)
Abreu e Lima	129.1	10.9	8.4
Araçoiaba	96.9	0.8	0.8
Cabo de Santo Agostinho	448.4	11.9	2.7
Camaragibe	48.3	22.7	44.5
Igarassu	304.2	11.3	3.8
Ipojuca	514.8	8.9	1.7
Itamaracá	65.4	6.2	9.2
Itapissuma	74.3	1.7	2.3
Jaboatão dos Guararapes	257.3	42.3	16.3
Moreno	192.1	4.2	2.2
Olinda	38.1	25.2	61.5
Paulista	102.3	30.1	30.4
Recife	218.7	108.5	49.8
São Lourenço da Mata	264.4	16.9	6.4
RMR	1,754.3	301.6	10.9

Besides the urbanized areas, the area of the RMR is characterized by two different kinds of occupation. The cultivated areas are characterized by the predominance of sugar cane plantations, which are located in portions to the north, the west and the south of the RMR. Even in the core municipalities, cultivated areas exist in suburban zones outside the urbanized areas. Of the surrounding municipalities, Ipojuca occupies the largest territory, with 527 km^2. It has the least-urbanized areas of all, with a degree of urbanization of 1.7%. In other words, a great part of the population of the town lives on rural activities, above all, on the sugar cane plantations. Cabo de Santo Agostinho, Moreno and Igarassú follow the same pattern.

The forestlands are dispersed throughout residual zones in the RMR. The forestlands are mostly located in the surrounding municipalities as protection zones for water resources catchments under State Law No.9860 of 1986.

6. DEVELOPMENT PLANS

6.1 Federal Development Plan 2000-2003

"Plano Plurianual 2000-2003" (Four-year Development Plan 2000-2003) presents the national development policy to support medium-term economic growth in the country. The plan proposes the macro-economic goals and target figures. This is essential information to project a socio-economic framework for the current study. The targets of GDP growths for the period are proposed as follows. In this study these target figures are adopted to construct a future framework, although the projection period of the plan is only until 2003.

Targets of GDP Growth in "Plano Plurianual 2000-2003"

Item	2000	2001	2002	2003
GDP Growth Rate (%)	4.0	4.5	5.0	5.0

Source: Plan Plurianual 2000-2003, Orçamentos da União 2000, 1999, GOB

The actual GDP growth rate during four years from 1994 to 1997 was 4.6 % on average. The target growth seems to be high compared with what was actually achieved. The plan expects economic conditions in and out of the country to improve after the economic stagnation in these years.

6.2 State Development Plan 2000-2003

The state government plan 2000-2003, "Projeto de Lei do Plano Plurianual 2000-2003, Governo de Pernambuco", is still under preparation, although its draft has been submitted to the state assembly. The plan proposes medium-term budgets for sectors related to the government policy. However, it does not propose a goal for economic growth during the planning period.

7. FRAMEWORK FOR TARGET YEAR 2020

7.1 Population Projection

The Brazilian Institute of Geography and Statistics Foundation (IBGE) provides population projections for the country up to the year 2020 in the yearbook, "Anuário Estatístico do Brasil 1997". It does not indicate any projections of subdivisions such as state, municipality or district. According to this projection, the population in Brazil is projected to increase as follows: 166 million in 2000, 188 million in 2010 and 208 million in 2020. Since Brazil had a population of 157 million in 1996 according to the intermediate census of population, it will have 51 million or one-third more by 2020.

The population in the study area was projected in the PQA reports. The report estimated the future population using a mathematical model for the respective municipalities in the RMR. In the model, the growth rates of the respective municipalities were calculated applying an inferior asymptote. To set the plausible growth rates, the report uses a program called "People". The results of the population projection in the RMR are tabulated up to the year 2020 at 10-year intervals in the following table.

Projected Population in RMR (2000-2020)

Municipality	Population (1000)				Average Growth Rate (%)		
	1996	2000	2010	2020	'96/'00	'00/'10	'10/'20
Abreu e Lima	72.7	74.4	77.8	80.8	0.6	0.5	0.4
Araçoiaba	10.2	11.0	13.0	15.0	1.9	1.7	1.4
Cabo de Santo Agostinho	125.1	135.0	159.9	186.9	1.9	1.7	1.6
Camaragibe	111.1	120.3	142.1	163.8	2.0	1.7	1.4
Igarassu	65.2	73.8	98.8	130.0	3.2	3.0	2.8
Ipojuca	30.4	34.4	44.5	55.5	3.1	2.6	2.2
Itamaracá	11.2	12.8	17.8	24.6	3.4	3.3	3.3
Itapissuma	16.1	17.7	21.7	26.0	2.4	2.1	1.8
Jaboatão dos Guararapes	457.7	487.3	553.9	616.7	1.6	1.3	1.1
Moreno	32.1	32.3	33.0	33.6	0.2	0.2	0.2
Olinda	349.3	355.1	367.0	377.8	0.4	0.3	0.3
Paulista	229.5	248.4	292.9	337.2	2.0	1.7	1.4
Recife	1,346.0	1,376.5	1,444.0	1,505.8	0.6	0.5	0.4
São Lourenço da Mata	78.8	83.2	94.6	107.0	1.4	1.3	1.2
RMR Total	2,935.4	3,062.2	3,361.1	3,660.1	1.1	0.9	0.9

Source: PQA, Documento Estratégico de Investmentos, Sept. 1999, SEPLANDES

Population projections have been presented in several official development plans. These plans are listed also in the PQA Final Report as references. "Documento Estrategico de Investmentos (Final Investment Scheme), September 1999, SEPLANDES" described their outlines. In this current study, the population projection for the target year 2020 is

formulated referring to the PQA. The future population in the study area is shown in the table above.

The population of the RMR was estimated at 3.66 million for the target year 2020. It has grown at a rate of 1.1% on average between 1996 and 2000, and at 0.9% between 2000 and 2020. The core towns of the RMR, Recife and Olinda, are set to grow at the comparatively low rates of 0.6% to 0.3% as shown in the table.

7.2 Future Land Use

Future urban growth is expected and imposes restrictions on the protection of water resources, the protection of estuaries and ecological reserves, and on risk areas such as landslide and flood prone areas. The expansion of urban areas was delineated based on the following hypotheses in the PQA report.

1) By 2020 the limits of urban growth will not pass beyond the permitted areas or the urban limits.

2) In municipalities where their limits of population density have already been reached, urban areas will not expand – only increase in density. (Recife and Olinda)

3) In municipalities where limits have not been reached, population increases will be absorbed at the outskirts of existing urban areas at the same density.

The urban areas in the PQA were established by reviewing the previous Metropolitan Development Plan (PDM) of 1983 and the land use plan of the City of Recife. During the preparation of the PQA in 1997, land use plan were being drawn up for the cities of Olinda and Cabo. Other cities do not have land use plans. The urban area of the RMR is 316.61 km^2 and 364.25 km^2 in 1997 and 2020 respectively.

1)	Total urban population	3.6 million inhabitants
2)	Urban area	364 km^2

7.3 GRDP Projection

The long-term projection of the GRDP is indispensable for formulating the future framework of socio-economic structure in the study area. However, the official GRDP projection is not available. At present, the national development plan named "Plano Plurianual 2000-2003, Orçamentos da Uniao 2000" is available as of December 1999. It proposes a target growth of around 4.6 % per annum on average for the planning period. The plan, however, presents

the projections only until the year 2003. After that, no projection scenarios have been suggested in any of the existing development plans. Therefore, the GDP and GRDP in the future are estimated on the following assumptions.

(1) Until the year 2003, the GDP will increase at the growth rates predicted in the national plan.

(2) Beyond the year 2003, the growth rates were assumed to slow down to the following pace. Until the year 2010, 4.4% growth was set referring to the World Bank report on "Global Economic Prospects 1998/99". For the final decade between 2011 and 2020, three-quarters (3.3%) of the previous growth rate was assumed to apply.

(3) The GRDP of the state will increase at a 1.2 times higher rate than the GDP growth after 1999, referring to the performance of GRDP growth in the State of Pernambuco from 1994 to 1997.

The GRDP projected with the above assumptions are shown in Table D7-1. It is summarized in the table below. By 2020, the GRDP of the state will reach R$ 65 billion at 1997 constant prices. It will be 2.8 times of that of 1997 (R$ 23.26 billion). Thus, the growth rate will be 3.2 % in 2020, which is larger than the rate (2.7 %) in 1997.

GDP and GRDP Projection at 1997 Constant Prices (2000-2020)

Item	1997	2000	2003	2010	2020
GDP & GRDP Projection (R$ Billion)					
Brazil	864.1	931.9	1,073.6	1,451.3	2,008.0
Pernambuco	23.3	25.8	30.5	43.8	64.8
Per Capita GDP & GRDP (R$)					
Brazil	5,413	5,610	6,229	7,725	9,668
Pernambuco	3,120	3,380	3,933	5,417	7,596
Ratio of Per Capita GRDP to GDP	58	60	63	70	79

The GRDP per capita in 2020 was calculated as R$ 7,600 at 1997 constant prices, as shown in the table above. It was 2.4 times that of 1997 (R$ 3,100). It will be 79 % of the national average, which is larger than that of 1997 (58 %). Thus, the regional disparity may diminish and living standard may get closer to the national level in this period.

Table D2-1 Census Population in Brazil, Pernambuco, RMR and Municipalities Involved: 1970, 1980, 1991 and 1996

Area	Census Population				Census Urban Population				Census Rural Populatiopn			
	1970	1980	1991	1996	1970	1980	1991	1996	1970	1980	1991	1996
Population												
I. Brazil	93,139,037	119,002,706	146,825,475	157,070,163	52,084,984	80,436,409	110,990,990	123,076,831	41,054,053	38,566,297	35,834,485	33,993,332
II. Pernambuco State	5,160,640	6,141,993	7,127,855	7,399,071	2,810,843	3,783,264	5,051,654	5,476,855	2,349,797	2,358,729	2,076,201	1,922,216
III. RMR	1,832,306	2,407,179	2,920,007	3,087,967	1,663,585	2,154,874	2,757,088	2,925,174	168,721	252,305	162,919	162,793
1. Abreu e Lima	26,065	47,058	77,035	80,828	23,083	41,369	70,548	72,679	2,982	5,689	6,487	8,149
2. Araçoiaba	8,669	8,881	10,640	12,061	3,546	6,300	9,077	9,279	5,123	2,581	1,563	2,782
3. Cabo de Santo Agostinho	75,829	104,157	127,036	140,764	40,284	81,901	109,763	125,055	35,545	22,256	17,273	15,709
4. Camaragibe	46,671	87,710	99,407	111,119	41,196	66,992	99,407	111,119	5,475	20,718	0	0
5. Igarassu	37,370	51,843	69,197	72,990	24,198	42,228	50,740	55,884	13,172	9,615	18,457	17,106
6. Ipojuca	35,851	39,456	45,424	48,479	10,003	16,925	25,168	30,428	25,848	22,531	20,256	18,051
7. Itamaracá	7,117	8,256	11,606	13,799	4,087	6,501	8,580	11,210	3,030	1,755	3,026	2,589
8. Itapissuma	9,040	12,521	16,408	19,186	7,193	10,128	14,101	16,077	1,847	2,393	2,307	3,109
9. Jaboatão dos Guararapes	200,975	330,414	487,119	529,966	185,833	290,509	419,479	457,664	15,142	39,905	67,640	72,302
10. Moreno	31,204	34,943	39,132	39,962	17,681	26,229	31,571	32,063	13,523	8,714	7,561	7,899
11. Olinda	196,342	282,203	341,394	349,380	187,428	266,751	341,394	349,380	8,914	15,452	0	0
12. Paulista	43,994	118,689	211,491	233,634	39,401	55,269	207,708	229,515	4,593	63,420	3,783	4,119
13. Recife	1,060,329	1,203,899	1,298,229	1,346,045	1,046,413	1,183,391	1,298,229	1,346,045	13,916	20,508	0	0
14. São Lourenço da Mata	52,850	77,149	85,889	89,754	33,239	60,381	71,323	78,776	19,611	16,768	14,566	10,978
Average Annual Growth Rate (%)	-	'70/'80	'80/'91	'91/96	-	'70/'80	'80/'91	'91/96	-	'70/'80	'80/'91	'91/96
I. Brazil	-	2.5	1.9	1.4	-	4.4	3.0	2.1	-	-0.6	-0.7	-1.0
II. Pernambuco State	-	1.8	1.4	0.7	-	3.0	2.7	1.6	-	0.0	-1.2	-1.5
III. RMR	-	2.8	1.8	1.1	-	2.6	2.3	1.2	-	4.1	-3.9	0.0
1. Abreu e Lima	-	6.1	4.6	1.0	-	6.0	5.0	0.6	-	6.7	1.2	4.7
2. Araçoiaba	-	0.2	1.7	2.5	-	5.9	3.4	0.4	-	-6.6	-4.5	12.2
3. Cabo de Santo Agostinho	-	3.2	1.8	2.1	-	7.4	2.7	2.6	-	-4.6	-2.3	-1.9
4. Camaragibe	-	6.5	1.1	2.3	-	5.0	3.7	2.3	-	14.2	-	-
5. Igarassu	-	3.3	2.7	1.1	-	5.7	1.7	2.0	-	-3.1	6.1	-1.5
6. Ipojuca	-	1.0	1.3	1.3	-	5.4	3.7	3.9	-	-1.4	-1.0	-2.3
7. Itamaracá	-	1.5	3.1	3.5	-	4.8	2.6	5.5	-	-5.3	5.1	-3.1
8. Itapissuma	-	3.3	2.5	3.2	-	3.5	3.1	2.7	-	2.6	-0.3	6.1
9. Jaboatão dos Guararapes	-	5.1	3.6	1.7	-	4.6	3.4	1.8	-	10.2	4.9	1.3
10. Moreno	-	1.1	1.0	0.4	-	4.0	1.7	0.3	-	-4.3	-1.3	0.9
11. Olinda	-	3.7	1.7	0.5	-	3.6	2.3	0.5	-	5.7	-	-
12. Paulista	-	10.4	5.4	2.0	-	3.4	12.8	2.0	-	30.0	-22.6	1.7
13. Recife	-	1.3	0.7	0.7	-	1.2	0.8	0.7	-	4.0	-	-
14. São Lourenço da Mata	-	3.9	1.0	0.9	-	6.2	1.5	2.0	-	-1.6	-1.3	-5.5

Source: (1) Annuario Estatistico do Brasil, 1997, IBGE
(2) Censo Demografico de Pernambuco - 1980 e 1991, IBGE

Table D3-1 Gross Domestic Product by Economic Sector in Brazil: 1994-1997

Economic Sector	1994	1995	1996	1997
Gross Domestic Product at Current Prices (Unit: R$ Billion)				
1. Agriculture	34.0	55.1	63.2	66.4
2. Industry	135.8	240.3	292.1	326.6
1) Mining & Quarrying	4.4	6.6	7.6	9.0
2) Manufacturing	92.9	158.4	187.6	202.9
3) Construction	27.4	56.0	70.1	84.3
4) Elec. Gas & Water	11.1	19.4	26.7	30.4
3. Services	179.4	351.3	423.6	471.1
1) Commerce	29.0	62.0	65.0	68.0
2) Hotel & Restaurant	6.3	12.8	15.3	15.6
3) Transportation & Communication	12.9	21.4	30.9	34.9
4) Finance, Real Estate, etc.	71.4	124.3	151.4	179.1
5) Public Services	45.5	99.9	121.3	128.7
6) Other Services	14.3	31.0	39.6	44.8
6. GDP at Market Prices	349.2	646.2	778.9	864.1
in US$ Billion*1	412.8	658.0	749.6	774.3
8. GDP per Capita (R$)	2,280	4,160	4,946	5,413
in US$	2,695	4,237	4,760	4,850
Gross Domestic Product at 1997 Constant Prices (Unit: R$ Billion)				
1. GDP at Market Prices	778.8	811.7	834.1	864.1
Real Growth Rate (%)	5.9	4.2	2.8	3.6
2. GDP per capita	5,086	5,226	5,296	5,413
Real Growth Rate (%)	4.3	2.8	1.4	2.2
Percentage Distribution (%)				
1. Agriculture	9.74	8.53	8.12	7.68
2. Industry	38.88	37.19	37.50	37.80
1) Mining & Quarryng	1.27	1.02	0.98	1.04
2) Manufacturing	26.59	24.51	24.09	23.48
3) Construction	7.84	8.66	9.00	9.76
4) Elec. Gas & Water	3.18	3.00	3.43	3.52
3. Services	51.38	54.37	54.38	54.52
1) Commerce	8.31	9.60	8.35	7.87
2) Hotel & Restaurant	1.80	1.98	1.96	1.80
3) Transportation & Communication	3.70	3.31	3.97	4.04
4) Finance, Real Estate, etc.	20.44	19.23	19.44	20.73
5) Public Services	13.03	15.46	15.57	14.89
6) Other Services	4.10	4.79	5.09	5.19
4. GDP at Market Prices	100.00	100.09	100.00	100.00

Source: Contas Nacionais Numero 3, Contas Regionais do Brasil 1985-1997, March 1999, IBGE

Note: *1 The following exchage rates were applied, which were at the end of year.

Year	1994	1995	1996	1997
R$ per US$	0.846	0.982	1.039	1.116

Table D3-2 Gross Regional Domestic Product in Pernambuco State: 1994-1997

Economic Sector	1994	1995	1996	1997
Gross Regional Domestic Product at Current Prices (Unit: R$ Billion)				
1. Agriculture	0.92	1.81	2.30	2.14
2. Industry	3.09	5.57	6.41	7.67
1) Mining & Quarrying	0.01	0.02	0.03	0.03
2) Manufacturing	1.77	3.32	3.63	3.88
3) Construction	1.09	1.90	2.34	3.22
4) Elec. Gas & Water	0.23	0.33	0.41	0.54
3. Services	5.03	10.09	12.68	13.46
1) Commerce	1.20	2.55	2.80	2.82
2) Hotel & Restaurant	0.35	0.66	0.86	0.90
3) Transportation & Communication	0.28	0.44	0.79	0.93
4) Finance, Real Estate, etc.	1.23	2.18	2.92	3.26
5) Public Services	1.49	3.29	4.05	4.11
6) Other Services	0.47	0.96	1.26	1.44
6. GRDP at Market Prices	9.04	17.46	21.39	23.26
in US$ Billion*1	10.68	17.78	20.59	20.84
7. GRDP per Capita (R$)	1,239	2,375	2,887	3,115
in US$	1,465	2,419	2,779	2,791
Gross Regional Domestic Product at 1997 Constant Prices				
1. GRDP at Market Prices (R$ Billion)	20.54	21.78	22.50	23.26
Real Growth Rate (%)	7.7	6.0	3.3	3.4
2. GRDP per Capita (R$)	2,832	2,974	3,042	3,115
Real Growth Rate (%)	6.7	5.0	2.3	2.4
Percentage Distribution (%)				
1. Agriculture	10.22	10.34	10.77	9.18
2. Industry	34.16	31.89	29.95	32.97
1) Mining & Quarrying	0.07	0.10	0.12	0.12
2) Manufacturing	19.55	18.99	16.98	16.68
3) Construction	12.03	10.90	10.92	13.84
4) Elec. Gas & Water	2.51	1.90	1.93	2.33
3. Services	55.62	57.77	59.28	57.85
1) Commerce	13.28	14.58	13.11	12.12
2) Hotel & Restaurant	3.88	3.80	4.02	3.86
3) Transportation & Communication	3.14	2.54	3.67	3.99
4) Finance, Real Estate, etc.	13.58	12.47	13.65	14.02
5) Public Services	16.53	18.86	18.94	17.66
6) Other Services	5.21	5.52	5.89	6.20
4. GDP at Market Prices	100.00	100.00	100.00	100.00

Source: Contas Nacionais Numero 3, Contas Regionais do Brasil 1985-1997, 1999, IBGE
Information and data presented by CONDEPE and FIEPE

Note: *1 The following exchage rates were applied, which were at the end of year.

Year	1994	1995	1996	1997
R$ per US$	0.846	0.982	1.039	1.116

Table D3-3 Consumer and Wholesale Price Indices and Foreign Exchange: 1994-1999

Year	Month	National Consumer Price Index: INPC(Base: Dec. 1994 = 100)					Wholesale Price Index (Base: Aug. 1994=100)	Price Index of Construction (Base: Aug. 1994=100)			Foreign Exchange Rate (Reals/US$)	
		Brazil				Recife						
		All Items	Food & Beverages	Housing	Health & Pers. Care	All Items		Total	Materials	Labor	Official Rate	Parallel Rate
1994	Dec.	100.0	100.0	100.0	100.0	100.0	100.0	105.5	104.2	107.1	-	-
1995	Dec.	122.0	108.4	166.3	128.5	121.6	115.1	138.7	124.3	156.5	0.9820	1.0000
1996	Dec.	133.1	110.8	209.6	145.1	132.1	115.0	151.9	129.9	181.5	1.0390	1.1200
1997	Dec.	138.9	112.3	226.8	154.3	134.7	123.9	162.3	135.2	199.8	1.1160	1.2200
1998	Dec.	142.3	115.8	232.6	162.9	139.6	134.6	-	-	-	1.2080	1.2900
1999	Jan.	143.3	116.8	232.8	163.7	140.5	136.8	-	-	-	1.9832	2.0000
	Feb.	145.1	120.2	233.7	165.0	142.9	146.3	-	-	-	2.0648	1.9800
	Mar.	147.0	122.7	235.7	167.9	144.1	150.5	-	-	-	1.7220	1.7800
	Apr.	147.7	122.1	237.4	170.9	144.8	150.0	-	-	-	1.6607	1.7200
	May	147.7	120.7	237.9	173.6	144.3	148.7	-	-	-	1.7240	1.7300
	Jun.	147.8	119.1	239.5	174.9	145.1	150.8	-	-	-	1.7695	1.8200
	Jul.	148.9	118.6	242.5	175.9	146.0	153.8	-	-	-	1.7892	1.8550
	Aug.	149.8	118.7	244.7	178.0	146.8	157.1	-	-	-	1.9159	1.9800
	Sep.	150.3	119.2	245.4	179.3	147.5	160.7	-	-	-	1.9223	1.9800
	Oct.	151.8	121.7	245.4	180.1	148.8	164.9	-	-	-	1.9530	2.0200
	Nov.	153.2	123.7	246.2	180.6	149.9	-	-	-	-	1.9227	2.0200
	Dec.	-	-	-	-	-	-	-	-	-	1.7890	1.9500
		Annual Increase Rate of INPC (%)					Annual Increase Rate (%)	Annual Increase Rate of Construction (%)			Annual Increase of Foreign Exchange Rate	
		Brazil				Recife						
		All Items	Food & Beverages	Housing	Health & Pers. Care	All Items		Total	Materials	Labor	(%)	(%)
1995	Dec.	22.0	8.4	66.3	28.5	21.6	15.1	31.5	46.1	19.4	-	-
1996	Dec.	9.1	2.2	26.0	12.9	8.6	-0.1	9.6	16.0	4.5	5.8	12.0
1997	Dec.	4.3	1.3	8.2	6.3	2.0	7.8	6.8	10.1	4.1	7.4	8.9
1998	Dec.	2.5	3.1	2.5	5.6	3.6	8.6	-	-	-	8.2	5.7
1999	Nov.	8.4	7.5	6.4	11.9	8.1	27.5	-	-	-	48.1	51.2
Average (94-99)		9.3	4.5	21.9	13.1	8.8	11.8	-	-	-	17.4	19.5

Source: (1) Anuario Estatistico do Brasil 1997, 1998, IBGE
(2) Brazil em Numeros, Vol.6 - 1998, IBGE
(3) Banco Central do Brasil
(4) "Conjuntura Estatistica" by FGV

Table D3-4 Official Development Assistance: 1992-1997

(Unit: US$ Million)

Item	1993	1994	1995	1996	1997
Bilateral	**4,337**	**-2,978**	**9,393**	**11,233**	**18,547**
1. United States	3,640	6,375	6,124	5,731	13,460
2. Japan	-175	-7,439	575	2,746	1,908
3. Netherlands	260	-89	201	158	1,489
4. Germany	497	886	1,812	516	1,292
5. Italy	-69	166	651	240	1,234
6. France	-117	-2,885	-753	788	1,219
7. United Kingdom	70	440	807	1,103	943
8. Spain	1	20	57	539	612
9. Portugal	-1	2	34	322	495
10. Belgium	8	21	-163	-1,026	-4,618
11. Others	223	-475	48	116	513
Multilateral	**-566**	**-246**	**-19**	**1,650**	**1,710**
1. Interamerical Development Bank	83	280	136	494	1,051
2. World Bank	-808	-706	-539	278	368
3. UN Development Programme	41	85	97	123	201
4. Others	118	95	287	754	90
Total	**3,771**	**-3,225**	**9,374**	**12,882**	**20,257**

Source: Geographical Distribution of Financial Flows to Aid Recipients, Disbursements Commitments Country Indicators 1993-1997, OECD Development Assistance Committee

Note: Official development assistance is defined as grants and loans, with at least a 25% grant element, administered with the aim of promoting economic and social development.
Figures indicate net amounts.

Table D3-5 External Debt: 1992-1997

(Unit: US$ Billion)

Item	1993	1994	1995	1996	1997
Total External Debt	**143.8**	**151.2**	**159.0**	**179.5**	**193.7**
1. Long Term Debt	112.9	119.6	128.4	144.0	157.6
2. Use of IMF Credit	0.3	0.2	0.1	0.1	0.0
3. Short Term Debt	30.6	31.4	30.5	35.4	36.1
Debt Outstanding of Long Term Debt	**112.9**	**119.6**	**128.4**	**144.0**	**157.6**
1. Public and Publicly Guaranteed	92.0	94.9	97.6	95.0	86.7
a. Official Creditors	30.0	29.4	28.4	26.5	23.3
- Multilateral	9.5	9.4	9.4	9.4	10.1
- Bilateral	20.6	20.0	19.1	17.1	13.2
b. Private Creditors	62.0	65.5	69.1	68.5	63.4
- Bonds	11.6	53.6	54.6	56.1	50.7
- Commercial Banks	45.0	6.8	9.7	8.7	9.9
- Others	5.4	5.2	4.8	3.6	2.9
2. Private Non-guaranteed	20.9	24.7	30.8	49.0	70.8
Total Debt Service	**11.2**	**16.2**	**21.7**	**25.1**	**38.1**
1. Principal Repayment	6.8	9.6	10.9	14.4	26.5
a. Long Term Debt	6.3	9.4	10.9	14.4	26.5
b. IMF Repurchases	0.5	0.1	0.0	0.1	0.0
2. Interest Payments	4.4	6.6	10.8	10.6	11.6
a. Long Term Debt	3.2	5.1	9.0	8.8	10.2
b. IMF Charges	0.0	0.0	0.0	0.0	0.0
c. Short Term Debt	1.2	1.5	1.8	1.9	1.4
Ratios (%)					
1. Total External Debt/GNP	33.6	28.1	22.9	23.5	24.1
2. Debt Service Ratio *1	24.4	30.6	36.8	42.3	57.4

Source: Global Development Finance 1998, March 1999, World Bank

Note: Long term debt is defined as having original maturity of more than one year.
*1 Debt service as a percentage of earnings from exports of goods and service.

Table D4-1 Average Annual Household Expenditure by Expenditure Item in Recife: 1995/96

(Unit: R$)

Item	Entire Families	Monthly Family Income Class (Ratio to Minimum Wage)									
		Less than 2	2 to 3	3 to 5	5 to 6	6 to 8	8 to 10	10 to 15	15 to 20	20 to 30	30 and Over
Gross Expenditure	922.74	246.69	359.68	514.42	683.07	774.62	952.70	1,291.18	1,732.63	2,360.86	4,559.97
I. Current Expenditure	807.44	230.06	344.17	476.43	648.38	731.36	866.89	1,143.78	1,507.47	1,999.34	3,669.61
A. Expenditure for Consumption	738.15	225.01	334.23	452.69	608.62	691.68	805.51	1,063.35	1,379.90	1,789.53	3,142.00
1. Food and Beverages	209.43	96.26	137.67	174.61	220.27	234.83	214.26	294.24	299.94	377.32	601.31
2. Housing and Utilities	194.56	54.76	77.91	105.34	137.45	167.25	223.00	277.56	376.71	480.03	935.68
a. Housing Rent	36.50	10.73	14.94	16.08	15.46	31.67	40.79	61.02	75.58	95.66	174.54
b. Utilities	63.48	13.37	16.42	29.67	50.02	47.98	54.74	90.09	128.89	164.13	369.01
c. Furnishing	94.58	30.66	46.55	59.59	71.97	87.60	127.47	126.45	172.24	220.24	392.13
3. Clothing and Foot Wear	53.08	14.73	24.72	36.76	51.94	56.21	69.16	86.70	100.41	115.15	187.84
4. Transport	86.57	21.26	36.34	53.93	54.11	75.04	98.72	119.92	167.95	234.61	398.99
5. Personal Care	17.85	5.72	9.78	14.05	17.30	19.19	23.37	28.86	33.85	31.89	56.76
6. Health Care	68.70	11.56	16.29	24.71	48.24	52.66	69.05	105.77	167.39	212.25	377.13
a. Medicines	19.89	8.35	10.51	15.12	22.30	23.06	25.79	28.64	37.21	44.09	50.46
b. Insurance	30.09	0.86	2.42	5.06	13.12	17.38	28.12	51.68	87.36	111.34	197.87
c. Medical Consultation	1.21	0.16	0.21	0.48	0.50	0.43	1.77	2.64	2.88	2.63	7.37
d. Hospitalization	2.53	-	-	-	-	0.26	0.67	1.12	1.48	0.41	38.05
e. Others	14.98	2.19	3.15	4.05	12.32	11.53	12.70	21.69	38.46	53.78	83.38
7. Education	38.81	6.81	6.10	15.92	28.71	26.17	41.89	60.66	101.33	126.59	203.69
8. Recreation and Culture	22.12	3.04	4.18	7.07	20.09	15.14	21.65	32.31	44.19	86.84	123.09
9. Tobacco	9.23	4.74	8.52	6.96	8.00	11.81	11.17	10.95	14.05	19.98	18.85
10. Personal Services	11.53	2.72	5.42	6.31	10.10	11.82	14.00	17.09	20.03	28.38	51.15
11. Other Consumption	26.27	3.41	7.30	7.03	12.41	21.56	19.24	29.29	54.05	76.49	187.51
B. Other Expenditure	69.29	5.05	9.94	23.74	39.76	39.68	61.38	80.43	127.57	209.81	527.61
II. Increment of Assets	103.03	15.60	13.93	31.59	28.03	38.32	78.74	137.07	196.34	325.84	795.22
III. Repayment of Debts	12.27	1.03	1.58	6.40	6.66	4.94	7.07	10.33	28.82	35.68	95.14
Number of Families	715,938	184,972	96,624	130,097	40,027	66,053	35,024	56,535	29,830	33,339	43,437
Average Family Size	4.06	3.56	3.93	4.40	4.27	4.53	4.30	4.32	4.13	3.94	4.04

Source: Pesquisa de Orcamentos Familiares 1995-1996, Vol 1 Despesas, Recebimentos e Caracteristicas das Familias, Domicilios, Pessoas e Locais de Compra, 1999, IBGE
Note: A minimum wage is stipulated as R$136 in 1999.

Table D7-1 GDP and GRDP Projection at 1997 Constant Prices: 1998 to 2020

Item	1997*1	1998	1999	2000	2003	2010	2020
1. GDP and GRDP Projection (R$ Billion at 1997 Constant Prices)							
1) Brazil	864.11	863.25	896.05	931.89	1,073.65	1,451.32	2,008.02
2) Pernambuco	23.26	23.52	24.59	25.77	30.52	43.81	64.85

Growth Rate (%/annum)

			Four -Year Plan 2000-2003				
			1999	2000	2001	2002	2003
1) Brazil	3.60	-0.10	3.80	4.00	4.50	5.00	5.00
	3.52 (Average Growth Rate Between '94 & '97)						
						After the Year 2003*2	
						--2010	--2020
						4.40	3.30
2) Pernambuco*2	3.40	1.10					
	4.23 (Average Growth Rate Between '94 & '97)						
			Projection of GRDP Growth *3				
			1999	2000	2001	2002	2003
			4.56	4.80	5.40	6.00	6.00
						After the Year 2003	
						--2010	--2020
						5.30	4.00

	1997*1	1998	1999	2000	2003	2010	2020
2. Population Projection (1,000)							
1) Brazil	159,636	161,790	163,948	166,113	172,359	187,862	207,697
2) Pernambuco	7,455	7,567	7,738	7,623	7,760	8,087	8,537
3. Per Capita GDP and GRDP (R$)							
1) Brazil	5,413	5,336	5,465	5,610	6,229	7,725	9,668
2) Pernambuco	3,120	3,108	3,178	3,380	3,933	5,417	7,596
4. Ratios of Per Capita GRDP to GDP (%) *3	58	58	58	60	63	70	79
5. GRDP by Major Economic Sector at 1997 Constant Prices							
1) Agriculture	2.14	2.21	2.25	2.29	2.48	2.88	3.07
2) Industry	7.67	7.24	7.44	7.66	8.57	10.70	12.70
- Manufacturing	3.88	4.06	4.17	4.29	4.80	5.99	7.11
3) Services	13.46	14.06	14.90	15.82	19.46	30.23	49.08
- Hotel & Restaurant	0.90	0.92	0.96	1.01	1.20	1.73	2.50
6. GRDP Growth Rate (% per annum)							
1) Agriculture	-	-	1.6	1.8	2.7	2.1	0.6
2) Industry	-	-	2.7	2.9	3.8	3.2	1.7
- Manufacturing	-	-	2.7	2.9	3.8	3.2	1.7
3) Services	-	-	6.0	6.2	7.1	6.5	5.0
- Hotel & Restaurant	-	-	4.8	5.0	5.9	5.3	3.8

Source: Plano Plurianual 2000-2003, Orcamentos da Uniao 2000, 1999, GOB, MPO
Anuario Estatistico do Brasil 1996, 1997, IBGE
Global Economic Prospects, 1998/99, The World Bank

Note: *1 Actual Performance
*2 The economic growth rates in the country are assumed as follows:
Beyond 2003, 4.4% per annum referring to "Global Economic Prospects"
Between 2011 and 2020, three-quarters of the previous growth during 2004-2010.
*3 The economic growth rates of Pernambuco State are assumed to continue 20% higher than the national one, referring to the ratio of average growth between 1994 and 1997.
Accordingly, the disparity between the national average and the state average will shrink, as the ratio of per capita GRDP to GDP will increase from 58% in 1997 to 79% in 2020

SUPPORTING REPORT E

SOCIAL ISSUES

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SUPPORTING REPORT E: SOCIAL ISSUES

1. Questionnaire used for the Residents Awareness Survey

QUESTIONAIRE # ___

GENERAL INFORMATION

1. Name of the city _____
2. Neighborhood _____
3. Name of the Community _____
4. How long have you been living in this place? _____

5. Living environment
1. Urbanized area
2. Urbanized area (former slum)
3. Slum (spontaneous occupation)
4. Organized occupation
5. Others. Which? _____

6. Local topography
1. Hilly without land sliding hazard
2. Hilly with land sliding hazard
3. Flat without problems
4. Flat with flooding problems

7. Type of house
1. Shack / Adobe house
2. House constructed with mixed materials
3. Masonry house
4. Apartment
5. Others

8. House ownership
1. Own
2. Rented
3. Borrowed / Invaded
4. Shared with other relatives
5. Others

9. How many people live in your house? _____

BASIC INFORMATION ABOUT THE FAMILY

10. Gender of the interviewee.
1. Male
2. Female

11. Family Member	12. Age	Employment		15. Unemployed	16. Retired	17. Income	18. Don't Work
		13. Formal	14 Informal				
Interviewee							

11. Number of family members: _____

12. Number of adults (18 years or more): _____

13. Number of family members with a formal employment: _____

14. Number of family members with an informal employment: _____

15. Number of unemployed family members: _____

16. Monthly income with the formal employment: _____

17. Monthly income with the informal employment: _____

18. Number of family members (18 years or more) who don't work: _____

BASIC INFORMATION ABOUT THE RESIDENCE

19. Household items owned by the family

	ITEMS	QUANTITY
01	Radio	
02	Gas stove	
03	Bicycle	
04	Electric fan	
05	Electric shower	
06	Stereo sound	
07	TV	
08	Video cassette player	
09	Refrigerator	
10	Telephone	
11	Cellular phone	
12	Ar conditioning device	
13	Washing machine	
14	Freezer	
15	Motorbike	
16	Computer	
17	Car	

20. What is the total average monthly expense of the family?

R$ _____

97 Does not know

98 No answer

ACCESS TO THE URBAN INFRASTRUCTURE SERVICES

21. Does your house have electric power?

1. Yes
2. No

22. How is the solid waste of your house disposed?

1. It is collected in front of my house by the municipal service

23. How many times a week? _____
99. No answer

2. It is taken to a different place to be collected by the municipal service

24. How many times a week? _____
99. No answer

3. It is burned at the backyard
4. It is buried in the backyard
5. It is dumped in a nearby open land
6. It is dumped in a river or canal
7. Others

25. Does your house have tap water?
1. Yes (go to 27)
2. No

26. If not, how do you get water?
1. Public tap / fountain
2. Public tank truck
3. Private tank truck
4. Private deep well
5. Private shallow well
6. River, creek, small reservoir or canal
7. Others. Which? _____
99. No Answer

Go to 40

27. How many houses are connected to the same water connection your house is connected to? _____
99. No Answer

28. Where does the tap water come from?
1. Only from COMPESA
2. Mixed source: COMPESA / Well / Tank Truck
3. Only shallow well (Go to 40)
4. Only deep well (Go to 40)
5. Others
99. No Answer

29. How many days a week do you have tap water?
1. Everyday in the week (Go to 31)
2. 1 – 2 days a week
3. 3 - 4 days a week
4. 5 - 6 days a week
5. Every 10 days
6. Every 15 days
7. A few days during the month
99.No Answer

30. In a water saving condition such as being carried out by COMPESA, how do you get water for your house?

1. Store water in tanks or small reservoirs at the house
2. Utilize deep well water
3. Utilize shallow well water
4. Utilize tank truck water
5. Others. Which? _____

99. No Answer

31. Is the water consumption at your house controlled by a hydrometer?

1. Yes (Go to 34)
2. No

32. If not, why?

1. The connection is borrowed
2. The connection is directly, without hydrometer
3. The connection is illegal ("Jacaré") (Go to 40)
4. Others

99. No Answer

33. Do you pay the water charge (individually, through the apartment building condominium, or the person who lend you the connection)?

1. Yes
2. No, because COMPESA does not send me the bill (Go to 41)
3. No, due to other reasons (Go to 41)

99. No Answer

34. How much do you pay for water?

1. Minimum charge
2. R$ _____

Total _____

99. No Answer

35. How do you pay your water bill?

1. The bill amount is automatically withdrawn from my bank account
2. At the bank
3. At service offices (lottery, drugstore, post office...)

99. No Answer

36. Are you satisfied with the value of the water bill?

1. Yes
2. No

99. No Answer

37. If not, why?

1. The bill is too expensive
2. The bill is fair but I can not afford to pay it
3. The bill is not fair
4. Others. _____

99. No Answer

38. Why? _____

99. No Answer

39. In relation to the water bill, which would you like to improve first?

1. Less expensive water
2. A fairer water bill
3. The form of payment
4. The deadline for payment
5. Other (specify) _____
99. No Answer

40. What is the approximately amount of water consumed at your house (see water bill)

1. m^3 / month _____
2. Buckets / day _____
3. Others _____
97. Does not know

41. Here, at your house, how do you use water the most? (graduate from the higher to the lowest consumption)

___ Washing laundry
___ Bathing
___ Using the toilet basin
___ Cooking and dish washing
___ Washing the house
___ Washing the car
___ Cleaning the backyard
___ Others

42. How is your house sewage collected?

1. COMPESA sewerage system

43. How much do you pay for sewerage bill?

R$ / month _____
99. No Answer

2. Stormwater drainage system (Go to 46)
3. Discharged in open air (ditches, nearest creek, etc.) (Go to 46)
4. Shallow pipeline and then discharged into the river or canal (Go to 46)
5. Septic tank
6. Mixed system: septic tank + stormwater drainage system
7. Mixed system: septic tank + discharged into open air
8. Mixed system: septic tank + used water (except toilet pit) in the sewerage system
9. Others. Which? _____

44. If you have a septic tank, how many times to you clean it?

1. Once a year
2. Once each three years
3. Never
99. No Answer

45. If you have your septic tank cleaned, who does it?

1. A company / someone hired for this
2. Someone from my family
99. No Answer

46. Are you satisfied with the way your sewage is collected?

1. Yes (Go to 51)
2. No

47. If not, what would you like to be done to improve this situation?

_____

_____

99. No Answer

48. Why?

_____

_____

99. No Answer

49. In order to carry out what you propose, how much would you (or your apartment building residents) be willing to contribute monthly?

1. R$ _____
2. Nothing
3. No Answer

50. If "nothing", why? _____

99. No Answer

Go to 54

51. The city in which you live have several sewage (collection and treatment) and stormwater drainage (floods) problems. What do you think could be done to improve this situation?

_____

_____

99. No Answer

52. In order to carry out what you propose, how much would you (or your apartment building residents) be willing to contribute monthly?

1. R$ _____
2. Nothing
3. No Answer

53. If "nothing", why? _____

99. No Answer

HYGIENE AND CLEANNESS

54. What is the type of sanitary fittings your family utilizes?

1. Toilet fitting with flush
2. Toilet fitting without flush
3. A whole on the ground
4. Collective toilet fitting (for more than one family) with flush
5. Collective toilet fitting (for more than one family) without flush
6. Public toilet

7. There is no toilet
8. Others

55. How is the water you drink at home?

1. Filtered
2. Mineral water
3. Boiled water
4. From the tap (COMPESA treated water)
5. Other sources

56. In what type of facility do your family use to have a bath / shower?

1. In a Jacuzzi bathtub with shower and hot water
2. With shower and hot water
3. With shower and cold water
4. Although there is a shower, due to water shortage, take bath with a bucket
5. Without shower and piped water
6. Others

57. How many persons in your family were or are sick with infectious diseases (except flu, including skin problems) in the past two years?

# of Persons	Diseases
	99. None
	1. Diarrhoea
	2. Leptospirosis
	3. Schistosomiasis
	4. Filariasis
	5. Dengue fever
	6. Cholera
	7. Impetigo
	8. Scabies
	9. Tuberculosis
	10. Chagas disease
	11. Hepatitis
	12. Others

48. What are the causes of the main health problems that concerns your family the most? (Graduate from the highest important to the lowest important)

—Water quality
—Food quality
—Lack of food
—Existence of rats, mosquitoes and cockroachs
—The surrounding environment (pollution)
—Working conditions
—Hereditary diseases
—Lack of sewerage system
—Stress caused by the work
—Garbage and dirtiness in general

49. What are the social issues that concerns your family the most (graduate from the highest to the lowest important)

— Politicians
— Children education
— Crime / public security
— Lack of employment / unemployment
— Pollution (destruction of the environment)
— Natural disaster (flood / drought)
— Corruption in the public sector
— Income improvement
— Medical assistance
— Social care
— Epidemics
— Others

END OF THE INTERVIEW

2. ANALYSIS OF THE RESIDENTS AWARENESS SURVEY RESULTS

2.1 Sampling Criteria

The present survey was carried out between Dec. and Nov of 1999 and covered all the 14 (fourteen) municipalities of the Recife Metropolitan Region (RMR). The sampling was elaborated taking into account the proportionality to the municipalities' population and the existence of sewerage system as shown in the Table 1 below.

Table 1. Sampling

Municipality	Urban Population (1998)	Urban Households			Sample		
		Total (1998)*	With Sewerage**	% with Sewerage	Total	Without Sewerage	With Sewerage
RMR	2,999,265	749,816	123,446	16.46	605	509	96
1 Abreu e Lima	74,040	18,510	304	1.64	19	18	1
2 Araçoiaba	9,710	2,428	0	0.00	4	4	0
3 Cabo de Santo Agostinho	130,866	32,716	192	0.59	35	33	2
4 Camaragibe	116,503	29,126	507	1.74	31	29	2
5 Igarassú	58,433	14,608	200	1.37	15	14	1
6 Ipojuca	31,855	7,964	0	0.00	12	12	0
7 Itamaracá	11,754	2,939	0	0.00	4	4	0
8 Itapissuma	16,805	4,201	0	0.00	6	6	0
9 Jaboatão dos Guararapes	475,438	118,860	20,009	16.83	86	71	15
10 Moreno	32,670	8,167	0	0.00	15	15	0
11 Olinda	353,051	88,263	21,667	24.55	64	48	16
12 Paulista	239,854	59,964	32,851	54.78	44	20	24
13 Recife	1,368,029	342,007	45,336	13.26	247	217	30
14 São Lourenço da Mata	80,255	20,064	2,380	11.86	23	20	3

Sources: IBGE; Compesa
Note: * Estimated Data, ** Data supplied by COMPESA

2.2 General Information

2.2.1 Living Environment and Topographic Conditions

In terms of living environment, there are basically 4 (four) types that are defined as follows:

(1) Urbanized Area: masonry residences, or medium or high standards apartment buildings located at areas with paved streets with electric light, paved sidewalks with curb, etc;

(2) Urbanized Area – Former Slum: simple residences located at narrow streets, and sometimes notoriously known as a former slum according to its history (e.g. Brasília Teimosa); it is provided with some degree of urban infrastructure;

(3) Organized Occupation: it is an area occupied by a group of organized homeless people, with a previous arrangement of how to occupy the land; and

(4) Slum: it is a spontaneous occupation of a land by homeless people without any previous arrangement. In both (c) and (d) cases, the houses are precariously constructed and the urban infrastructure is also precarious.

(Note: The words underlined are used from herein on to name these living environment types.)

The distribution of these types of living environment in the survey is as follows;

Table 2. Living Environment

Living Environment	No.	%
Urbanized	409	67.6
Former Slum	97	16.0
Occupation	36	6.0
Slum	57	9.4
Others	6	1.0
Total	605	100.0

According to the Table 2, the proportion of households located in "poverty areas", i.e., in "former slums", "occupations", and "slums", corresponds to 31.4% of the sample

Utilizing the same "living environment" criteria, an analysis of the household location topography was carried out showing the following situation.

Table 3. Topographic Conditions

TOPOGRAPHY	Urbanized		Former Slum		Occupation		Slum		Others		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Flat (flood hazard)	100	24.4	24	24.7	19	52.8	27	47.4	3	50.0	173	28.6
Hilly (land sliding hazard)	13	3.2	6	6.2	2	5.6	5	8.8	0	0.0	26	4.3
Flat (no hazard)	235	57.5	40	41.2	10	27.8	19	33.3	3	50.0	307	50.7
Hilly (no hazard)	61	14.9	27	27.8	5	13.9	6	10.5	0	0.0	99	16.4
TOTAL	409	100.0	97	100.0	36	100.0	57	100.0	6	100.0	605	100.0

According to the above Table 3, in general, the majority of the households, i.e. 50.7% of them are located in flat areas without flood hazardous conditions, 28.6% are located in flat areas with flood hazardous conditions, 16.4% are located in hilly areas without land sliding hazardous conditions, and only 4.3% are located in hilly areas with land sliding hazardous conditions.

However, if we analyze the same information regarding the living environment, the situation changes. For example, the households located in "occupations" and "slums" are much more subjected to flood hazardous conditions, 52.8% and 47.4%, respectively. The households in "slums" over hilly areas with land sliding hazardous conditions represents 8.8% of the total,

which is almost the double if compared to the percentage that represents the same conditions for all the sample (4.3%).

2.2.2 Household Composition and Economy

(1) Family Members

Table 4. Composition of the Household

	No. of family members	No. of families	Members / family	No. of adults	% of adults
Urbanized	1,680	409	4.1	1,242	73.9
Former Slum	417	97	4.3	286	68.6
Occupation	169	36	4.7	108	63.9
Slum	252	57	4.4	162	64.3
Others	20	6	3.3	12	60.0
TOTAL	2,538	605	4.2	1,810	71.3

The average number of members per family is 4.2. The families living in "occupations" and "slums" are slightly bigger, with an average of 4.7 and 4.4 members per family respectively. The percentage of adults in the family is in average 71.3%, being remarkably higher in the "urbanized" areas, 73.9%, in comparison with the other types of living environment. "Adults" here are considered those individuals aged 18 years or more.

(2) Employment Conditions

As for employment, the following Table 5 reveals the present conditions of the survey households adult members.

Table 5. Employment Conditions

	Members with formal work	% formal work	Members with informal work	% inform. Work	No. of unemployed members	% of unemp.	Members who don't work (age > 18)	% of no work	No. of retired members	% of retired
Urbanized	286	23.0	227	18.3	134	10.8	374	30.1	263	21.2
Former Slum	57	19.9	64	22.4	36	12.6	82	28.7	51	17.8
Occupation	21	19.4	23	21.3	14	13.0	34	31.5	16	14.8
Slum	22	13.6	43	26.5	39	24.1	41	25.3	24	14.8
Others	0	0.0	6	50.0	1	8.3	2	16.7	3	25.0
TOTAL	386	21.3	363	20.1	224	12.4	533	29.4	357	19.7

An explanation is need regarding to the types of work presented in the above Table.:

- *Formal Work*: this is the type of work where the employee is legally contracted, or the person is the owner of a legal business.
- *Informal Work*: this is the type of work where there is no legal contract between the employer and the employee, and the work can be carried out in temporary basis. It also represents the owners of small businesses without legal operation authorization).

In general, the number of adults with "formal work" represents 21.3% of the total no. of adults. Those with "informal work" represent 20.1%, the unemployed ones represent 12.4%, and the retired ones represent 19.7%. Calls our attention the number of adults who do not work, supposedly those over 18 years who had never worked (29.4%). This figure summed up with the unemployment figure (12.4%) is very high, 41.8% representing the number of adults without any type of work.

The sum up of all the percentages does not account to 100% because sometimes the same person has a "formal work" as well as an "informal work" to complement the income. Or, sometimes that person is retired and because of the low value of the pension, he/she also has to work in another "formal" or "informal" activity.

At the "slums" households, the situation is remarkably worse. They represent the lower percentage of adults with "formal work" (13.6%), the higher percentage of adults with "informal work" (26.5%), and the higher number of unemployed adults (24.1%). On the other extreme, the households at "urbanized" areas present the higher percentage of adults with "formal work" (23.0%), the lower percentage of unemployed (10.8%), and the higher percentage of retired members (21.2%). In any case, the unemployment rate is quite high considering any standards.

(3) Household Income and Expenses

The following tables present the distribution of household income and expenses, utilizing as unit the Minimum Wage (MW) that is at present equivalent to R$ 136, or approximately US$ 80 (Feb/2000).

Table 6. Household Income

Range of Income	TOTAL		Urbanized		Former Slum		Occupation		Slum		Others	
	No	%	No	%	No	%	No	%	No	%	No	%
< 1/2 MW	118	23.9	72	22.4	21	25.6	10	32.3	13	25.0	2	33.3
1/2 MW ~ < 1 MW	26	5.3	8	2.5	7	8.5	1	3.2	10	19.2	0	0.0
1 MW ~ < 3 MW	188	38.1	129	40.1	24	29.3	12	38.7	21	40.4	2	33.3
3 MW ~ < 5 MW	63	12.8	39	12.1	13	15.9	6	19.4	4	7.7	1	16.7
5 MW ~ < 10 MW	65	13.2	44	13.7	16	19.5	1	3.2	3	5.8	1	16.7
= or > 10 MW	33	6.7	30	9.3	1	1.2	1	3.2	1	1.9	0	0.0
SUB-TOTAL	493	100.0	322	100.0	82	100.0	31	100.0	52	100.0	6	100.0
no answer	112	18.5	87	21.3	15	15.5	5	13.9	5	8.8	0	0.0
TOTAL	605	100.0	409	100.0	97	100.0	36	100.0	57	100.0	6	100.0

Table 7. Household Expenses

Range of Expenses	TOTAL		Urbanized		Former Slum		Occupation		Slum		Others	
	No	%	No	%	No	%	No	%	No	%	No	%
< 1/2 MW	12	2.4	4	1.2	4	4.9	3	9.7	1	2.1	0	0.0
1/2 MW ~ < 1 MW	53	10.7	24	7.3	7	8.5	3	9.7	19	39.6	0	0.0
1 MW ~ < 3 MW	284	57.3	186	56.2	50	61.0	18	58.1	26	54.2	4	100.0
3 MW ~ < 5 MW	65	13.1	44	13.3	15	18.3	5	16.1	1	2.1	0	0.0
5 MW ~ < 10 MW	55	11.1	46	13.9	6	7.3	2	6.5	1	2.1	0	0.0
= or > 10 MW	27	5.4	27	8.2	0	0.0	0	0.0	0	0.0	0	0.0
SUB-TOTAL	496	100.0	331	100.0	82	100.0	31	100.0	48	100.0	4	100.0
no answer	109	18.0	78	10.5	15	8.4	5	7.5	9	8.6	2	20.0
TOTAL	605	100.0	740	100.0	179	100.0	67	100.0	105	100.0	10	100.0

Both tables are very similar in the information they provide. The first one represents the total household income per month. The second one represents the total household expenses per month. Since for both cases the percentage of "no answer" was quite high, 18.5% and 18.0% respectively, the analysis will be carried out only for the actual answers.

As for the income, the distribution of the 03 (three) higher average percentages is as follows: 38.1% (1 to < 3 MW), 23.9% (< ½ MW), and 13.2% (5 to < 10 MW). If we consider a range of income of less than 3 MW (or approximately US$ 230), the percentage is as high as 67.3%.

Considering the living environment distribution, once again the conditions of the households located at "slums" and "occupations" show to be worse than at the other places. The households with less than 3 MW represent 84.6% and 74.2%, respectively. On the other hand, the same percentages for "urbanized" areas and "former slums" are very similar, 65% and 63.4%, respectively. The basic different between the "urbanized" areas and "former slums" households is that the first one present a percentage of 9.3% of households with income = or > 10 MW, while for the other one this percentage is of only 1.2%. We can conclude that the "urbanized" areas can encompass several ranges of income, not being restrained to better ones.

It is interesting to note that for all the cases except for "urbanized", there is at least one household with an income = or > 10 MW. This fact leaves the question of why, despite of this income, these families are still living in such precarious conditions. This may be explained by the lack of a housing policy. If there was a current governmental or private housing policy for low and medium income families, the figures for "urbanized" would be surely higher.

The Table 7 about household expenses shows a similar reality exposed by the Table 6 about household income.

2.3 Urban Infrastructure Conditions

2.3.1 Electricity

Almost all the survey households have electricity. The percentages according to living environment are as follows.

Table 8. Electricity by Living Environment

	Eletricity		TOTAL
	No	%	
Urbanized	408	99.8	409
Former Slum	97	100.0	97
Occupation	36	100.0	36
Slum	56	98.2	57
Others	6	100.0	6
TOTAL	603	99.7	605

These optimistic figures however do not show that in the majority of "slums" and "occupations" the electricity is sometimes obtained by an illegal and dangerous connection made directly to the electric wire network. This connection is nicknamed "macaco" (monkey) because it hangs on the wire.

2.3.2 Solid Waste Collection

The collection, transportation and treatment of Municipal Solid Waste is the responsibility of the municipal governments. Therefore, the following tables were structured according to each municipality in the RMR.

Table 9. Solid Waste Collection or Destination

Municipality	What is done with the Solid Waste?										TOTAL
	Collected at the door		Collected at a nearby site		Dumped in a nearby land or water stream		Burned in the backyard		Others		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Abreu e Lima	17	89.5	1	5.3	1	5.3	0	0.0	0	0.0	19
Araçoiaba	2	50.0	0	0.0	1	25.0	1	25.0	0	0.0	4
Cabo de Santo Agostinho	31	88.6	3	8.6	1	2.9	0	0.0	0	0.0	35
Camaragibe	30	96.8	0	0.0	1	3.2	0	0.0	0	0.0	31
Igarassú	13	86.7	2	13.3	0	0.0	0	0.0	0	0.0	15
Ipojuca	10	83.3	2	16.7	0	0.0	0	0.0	0	0.0	12
Itamaraca	1	25.0	1	25.0	2	50.0	0	0.0	0	0.0	4
Itapissuma	5	83.3	1	16.7	0	0.0	0	0.0	0	0.0	6
Jaboatão dos Guararapes	61	70.9	13	15.1	12	14.0	0	0.0	0	0.0	86
Moreno	10	66.7	5	33.3	0	0.0	0	0.0	0	0.0	15
Olinda	55	85.9	4	6.3	4	6.3	1	1.6	0	0.0	64
Paulista	39	88.6	1	2.3	3	6.8	1	2.3	0	0.0	44
Recife	220	89.1	21	8.5	3	1.2	0	0.0	3	1.2	247
São Lourenço da Mata	16	69.6	6	26.1	1	4.3	0	0.0	0	0.0	23
TOTAL	510	84.3	60	9.9	29	4.8	3	0.5	3	0.5	605

In most of the households, the collection is carried out at the door (or at the curbside). The highest coverage is performed in Camaragibe (96.8%) and the lowest one in Ipojuca (25.0%). The average of curbside collection for the RMR is 84.3%. The alternative "collected at a nearby site" are for those households located in places where the collection truck can not reach thus the resident has to take his garbage to the nearest place where the collectors can pick it up. Summing up the 02 (two) first alternatives, "collected at the door" and "collected at a nearby site", the average collection coverage for the RMR is 94.2%. It is a quite high coverage rate.

However, in Table 9, one figure in particular calls our attention. Although Araçoiaba and Itamaracá also present a high percentage of "dumped in a nearby land or water stream" (25.0% and 50.0%, respectively), these two municipalities participate in the survey with only 8 households, 4 each. On the other hand, Jaboatão dos Guararapes, a major municipality participating in the survey with 86 households, came up with 12 households (14.0%) also using the alternative "dumped in a nearby land or water stream".

Table 10. Frequency of Solid Waste Collection

Municipality	Frequency of Collection in a Week								Total Collected
	1 - 2 times		3 - 4 times		5 times or more		does not know		
	No.	%	No.	%	No.	%	No.	%	
Abreu e Lima	4	22.2	14	77.8	0	0.0	0	0.0	18
Araçoiaba	1	50.0	1	50.0	0	0.0	0	0.0	2
Cabo de Santo Agostinho	4	11.8	21	61.8	8	23.5	1	2.9	34
Camaragibe	7	23.3	15	50.0	8	26.7	0	0.0	30
Igarassú	4	26.7	8	53.3	3	20.0	0	0.0	15
Ipojuca	0	0.0	0	0.0	12	100.0	0	0.0	12
Itamaraca	0	0.0	0	0.0	2	100.0	0	0.0	2
Itapissuma	6	100.0	0	0.0	0	0.0	0	0.0	6
Jaboatão dos Guararapes	18	24.3	34	45.9	18	24.3	4	5.4	74
Moreno	1	6.7	3	20.0	10	66.7	1	6.7	15
Olinda	4	6.8	18	30.5	37	62.7	0	0.0	59
Paulista	9	22.5	19	47.5	11	27.5	1	2.5	40
Recife	11	4.6	48	19.9	178	73.9	4	1.7	241
São Lourenço da Mata	3	13.6	5	22.7	14	63.6	0	0.0	22
TOTAL	72	12.6	186	32.6	301	52.8	11	1.9	570

The collection frequency is reasonable, with a predominance of "5 times a week or more" (52.8%). All the survey households in Ipojuca have collection with this frequency. In Camaragibe, although the coverage is the highest one, the predominant collection frequency is "3 – 4 times a week" (50%). In major municipalities such as Recife and Olinda, the predominant collection frequency is "5 times or more", representing 73.9% and 62.7%, respectively. On the other hand, in the other two major municipalities, Jaboatão and Paulista, the predominant frequency is "3 - 4 times" representing 45.9% and 47.5%, respectively.

The frequency has a great influence in the collection quality. Sometimes, due to the lack of space at home or due to a lack of environmental consciousness, if the collection is not carried out in a daily basis, the resident tends to dump the waste just to get rid of it from his/her home.

These figures must be carefully analyzed. In a day trip around the main drainage canals and rivers of the RMR, we can observe a large amount of solid waste accumulated in some points of these canals and rivers. Part of this solid waste is represented by those 4.8% of the survey households that dump it in nearby land or water stream. It can also be represented by that Solid Waste that, despite the existence of regular collection, is never placed for collection. In particular, the large size solid waste (such as tires, pieces of old furniture, wood, dead animals, etc.) is almost never placed for ordinary collection, being dumped in nearby land or water stream, unless the local government has a special collection for these items. Therefore, the solid waste issue can not be considered a solved problem at present in the RMR.

The ideal scenario for the Solid Waste collection would be a coverage of a 100%, with a 4-5 times a week collection frequency, special collection for large size waste, and an educational campaign to enhance the environmental consciousness, among other actions.

2.3.3 Water Supply

(1) Water Sources

The water supply conditions are presented in the next Tables (Table 11 and Table 12) in which this service is going to be analyzed by "living environment" and by "municipality".

Table 11. Water Supply by Living Environment

	TOTAL	Existence of Tap Water		Source of the Tap Water							
		No.	%	Compesa	%	Mixed	%	Shallow Well	%	Deep Well	%
Urbanized	409	393	96.1	330	84.0	53	13.5	8	2.0	2	0.5
Former Slum	97	94	96.9	85	90.4	7	7.4	2	2.1	0	0.0
Occupation	36	33	91.7	32	97.0	1	3.0	0	0.0	0	0.0
Slum	57	49	86.0	45	91.8	4	8.2	0	0.0	0	0.0
Others	6	6	100.0	6	100.0	0	0.0	0	0.0	0	0.0
TOTAL	605	575	95.0	498	86.6	65	11.3	10	1.7	2	0.3

According to the above table, in almost all the "living environments" there is tap water in over 90% of the survey households. Only at the "slums", this percentage is under 90% (86.0%).

The major source for tap water is from Compesa. However, it calls our attention that the lowest percentage of Compesa water utilization appears at the "urbanized" living environment (84.0%). In this case, the 2nd source is a mixed one (Compesa + well or tank trucks, etc.) with 13.5% of utilization. It may be due to the fact that, because of the water shortage in the last years, this group of households are utilizing other sources they can afford to.

When the source is the groundwater, there is a predominant use of "shallow wells" (depth up to ± 18 m) instead of "deep wells" (depth of ± 80 m). This is a concern considering the possibility of "shallow well" water contamination due to the precariousness of the existing sewerage system.

Table 12. Water Supply by Municipality

Water Supply	COMPESA Local Offices in Recife (ELOs)													
	Alto do Céu		Aurora		Cabanga		Dois Irmãos		Jenipapo		Jangadinha		Ibura	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Existence of Tap Water	37	97.4	39	97.5	31	100.0	44	95.7	24	100.0	40	95.2	25	96.2
Sources of Water														
COMPESA	35	92.1	32	80.0	26	83.9	38	82.6	20	83.3	31	73.8	17	65.4
Mixed Sources	2	5.3	7	17.5	5	16.1	5	10.9	2	8.3	6	14.3	7	26.9
Shallow Well	0	0.0	0	0.0	0	0.0	1	2.2	2	8.3	3	7.1	1	3.8
Deep Well	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total Households	38	100.0	40	100.0	31	100.0	46	100.0	24	100.0	42	100.0	26	100.0

Water Supply	RECIFE		OLINDA		JABOATÃO		CAMARA GIBE		PAULISTA		Other Municipalities	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Existence of Tap Water	240	97.2	62	96.9	80	93.0	29	93.5	42	95.5	122	91.7
Sources of Water												
COMPESA	199	80.6	56	87.5	70	81.4	26	83.9	42	95.5	105	78.9
Mixed Sources	34	13.8	4	6.3	9	10.5	3	9.7	0	0.0	15	11.3
Shallow Well	7	2.8	0	0.0	1	1.2	0	0.0	0	0.0	2	1.5
Deep Well	0	0.0	2	3.1	0	0.0	0	0.0	0	0.0	0	0.0
Total Households	247	100.0	64	100.0	86	100.0	31	100.0	44	100.0	133	100.0

In regard to the municipalities, in all of them the percentage of those with "tap water" is always over 90.0%. The highest percentage is in Recife (97.2%), followed by Olinda (96.9%).

The most utilized water source is from Compesa for all the municipalities. However, there are differences in the degree in which only Compesa water is utilized or "mixed sources" are utilized. Analyzing the ELOs in Recife, we observe that in Ibura there is the highest utilization of "mixed sources" (26.9%), while the lowest one is observed in Alto do Céu (5.3%). Recife, as a whole, present a 80.6% of "mixed sources" utilization. Only in Paulista, all the households with tap water utilizes only Compesa water (95.5%). The following Table, presenting "water shortage" conditions may give some explanation of this situation.

Table 13. COMPESA Water Supply Frequency

Frequency of Water Supply	COMPESA Local Offices in Recife (ELOs)													
	Alto do Céu		Aurora		Cabanga		Dois Irmãos		Jenipapo		Jangadinha		Ibura	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Every day	1	2.7	1	2.6	0	0.0	1	2.3	3	13.6	1	2.7	0	0.0
1 - 2 days a week	16	43.2	19	48.7	12	38.7	23	53.5	8	36.4	16	43.2	5	20.8
3 - 4 days a week	15	40.5	5	12.8	3	9.7	4	9.3	9	40.9	0	0.0	1	4.2
5 - 6 days a week	2	5.4	4	10.3	1	3.2	2	4.7	2	9.1	1	2.7	1	4.2
Every 10 days	1	2.7	8	20.5	12	38.7	10	23.3	0	0.0	15	40.5	14	58.3
Every 15 days	1	2.7	2	5.1	2	6.5	1	2.3	0	0.0	0	0.0	1	4.2
A few days in a month	1	2.7	0	0.0	1	3.2	2	4.7	0	0.0	4	10.8	2	8.3
Total	37	100.0	39	100.0	31	100.0	43	100.0	22	100.0	37	100.0	24	100.0

Frequency of Water Supply	RECIFE		OLINDA		JABOATÃO		CAMARA GIBE		PAULISTA		Other Municipalities		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Every day	7	3.0	9	15.0	2	2.5	0	0.0	31	73.8	41	34.2	90	16.0
1 - 2 days a week	99	42.5	27	45.0	29	36.7	1	3.4	2	4.8	38	31.7	196	34.8
3 - 4 days a week	37	15.9	15	25.0	2	2.5	0	0.0	7	16.7	23	19.2	84	14.9
5 - 6 days a week	13	5.6	6	10.0	1	1.3	1	3.4	1	2.4	9	7.5	31	5.5
Every 10 days	60	25.8	0	0.0	34	43.0	24	82.8	1	2.4	4	3.3	123	21.8
Every 15 days	7	3.0	1	1.7	9	11.4	1	3.4	0	0.0	3	2.5	21	3.7
A few days in a month	10	4.3	2	3.3	2	2.5	2	6.9	0	0.0	2	1.7	18	3.2
Total	233	100.0	60	100.0	79	100.0	29	100.0	42	100.0	120	100.0	563	100.0

The before mentioned Ibura ELO does present the worst condition in terms of water shortage in comparison to the other ELOs. 58.3% of the households are supplied with Compesa water only every 10 days, and as much as 20.8% is supplied only 1 – 2 days a week. On the other hand, in Alto do Céu ELO 43.2% is supplied 1 – 2 days a week, while 40.5% is supplied 3 – 4 days a week. In general, those who are supplied with Compesa water every day are very few (3.0% for Recife). Thus, we can conclude that the utilization of "mixed sources" is directly proportional to the degree of Compesa water shortage.

As for the other municipalities, the worst water supply conditions are found in Camaragibe. None of the households are supplied in a daily basis. As much as 82.8% is supplied only every 10 days while only 3.4% is supplied 5 – 6 days a week. Jaboatão is not in a much better situation. 43.0% of the survey households are supplied only every 10 days, and as much as 36.7% are supplied 1 – 2 days a week. The best conditions are found in Paulista where 73.8% of the survey households have Compesa water everyday, followed by 16.7% with water 3 – 4 days a week. In general, for the whole RMR, the situation is as follows: 21.5% is supplied every day or 5 – 6 days a week in one hand, while on the other hand 28.7% is only supplied at best every 10 days. The majority, 49.7% is supplied between 1 – 4 days a week.

Other general features of the water supply in the RMR are presented in the following Table 14 and Table 15.

Table 14. Water Charge

Water Charge Range	No.	%
R$ 4.6 - R$ 10.0	346	67.7
> R$ 10.0 - R$ 20.0	105	20.5
> R$ 20.0 - R$ 30.0	34	6.7
> R$ 30.0 - R$ 40.0	18	3.5
> R$ 40.0 - R$ 50.0	4	0.8
> R$ 50.0 and more	4	0.8
Sub-total	511	100.0
did not know	4	0.7
did not answer	9	1.5
others	81	13.4
TOTAL	605	100.0

Table 15. Water Consumption

Water Consumption (m3/month)	No.	%
Up to 10	337	68.6
> 10 - 15	70	14.3
> 15 - 20	48	9.8
> 20	36	7.3
Sub-total	491	100.0
did not know	75	12.4
did not answer	17	2.8
others	22	3.6
TOTAL	605	100.0

Among those who pay water charge or at least know how much they pay, 67.7% pays between R$ 4.60 to R$ 10.00. The great majority pays at maximum R$ 20.00 (88.2%). The water consumption follows about the same standard. 68.6% of the households consume up to

10 m^3/month, followed by those who consume > 10 – 15 m^3/month (14.3%). The majority, or 92.7% consume up to 20 m^3/month.

Table 16. Water Use – Water Consuming Activities

Water Use in the RMR	TOTAL					
	1st		2nd		3rd	
	No.	%	No.	%	No.	%
Laundry	417	69	73	14	37	9.4
Bathing	103	17	202	38	98	24.8
Cleaning the house	11	2	27	5	29	7.3
Cooking and washing dishes	42	7	152	29	120	30.4
Using the toilet	25	4	57	11	85	21.5
Cleaning the yard	2	0	6	1	7	1.8
Washing the car	0	0	1	0	3	0.8
Others	2	0	14	3	16	4.1
Total	602	100	532	100	395	100.0

As for the water consuming activities, the water is reported to be used more for "Laundry" (69.0% in the 1st place), followed by "Bathing" (38.0% in the 2nd place), and "Cooking and washing dishes" (30.4% in the 3rd place).

2.3.4 Sewerage System

The presentation of sewerage data is carried out in two different ways, by living environment and by each of the five municipalities with larger population, in order to provide a deeper understanding of the present conditions.

Table 17. Sewage Collection by Living Environment

	Type of Sewage Collection	TOTAL		Urbanized		Former Slum		Occupation		Slum		Others	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	COMPESA sewerage system	95	15.7	78	19.1	11	11.3	3	8.3	2	3.5	1	16.7
2	Stormwater drainage system	39	6.4	33	8.1	3	3.1	0	0.0	3	5.3	0	0.0
3	Discharged into the curbside, into a water stream, etc.	79	13.1	31	7.6	15	15.5	12	33.3	20	35.1	1	16.7
4	Precarious shallow sewerage pipeline	93	15.4	62	15.2	13	13.4	3	8.3	15	26.3	0	0.0
5	Septic tank	147	24.3	120	29.3	18	18.6	4	11.1	5	8.8	0	0.0
6	Septic tank + drainage system	24	4.0	10	2.4	13	13.4	1	2.8	0	0.0	0	0.0
7	Septic tank + discharged into the curbside, water stream, etc	57	9.4	25	6.1	16	16.5	7	19.4	5	8.8	4	66.7
8	Septic tank + waste water into the sewerage system	36	6.0	28	6.8	4	4.1	2	5.6	2	3.5	0	0.0
9	Cesspit	21	3.5	13	3.2	2	2.1	3	8.3	3	5.3	0	0.0
10	Others	14	2.3	9	2.2	2	2.1	1	2.8	2	3.5	0	0.0
	Total	605	100.0	409	100.0	97	100.0	36	100.0	57	100.0	6	100.0

Some explanation need to be provided about the "Types of Sewage Collection":

- The 1st alternative is obvious and the percentage of incidence was expected (15.7%) because it was one of the prerequisites of the sampling (see Table 1).
- The 2nd one represents all the households which sewage is canalized and connected to the stormwater drainage system, thus without any further treatment.
- The 3rd alternative represents those households which sewage is not canalized and is directly discharged into the curbside, open ditches, water streams, channels, etc.
- The 4th alternative deserves a more detailed explanation. It occurs in all types of living environment, but mostly at the "slums" (26.3%). The householder connects his/her sewage into a pipeline he him/herself buries into the street, into the curbside, or into the backyard, and from there taking it until a nearby water stream. Some neighbors, utilizing the same pipeline, connect their sewage and also discharge it into the same water stream and so on. It is not an organized facility. It happens spontaneously without any guidance from the COMPESA officials. It can not be misunderstood by the "Community Sewerage System" sometimes used by COMPESA and some municipal governments.
- The 5th, 6th, 7th, and 8th alternatives all include the utilization of a septic tank. In the 6th alternative, the sewage goes into the septic tank and the residual water flows into the stormwater drainage system. In the 7th alternative, after the septic tank, the residual water is discharged as in the alternative 3rd. In the 8th alternative, the toilet sewage goes into the septic tank and the waste water flows into the COMPESA sewerage system.
- The 9th alternative is simply an ordinary cesspit for all the sewage.

As expected the percentage of households connected to the COMPESA sewerage system is in average 15.7%. It is slightly higher at "urbanized" areas (19.1%) and very low at the "occupations" and "slums", 8.3% and 3.5% respectively. For the households located in "urbanized" areas, the most used system is the septic tank, 29.3%, followed by the COMPESA system. At the "former slums", the septic tank is also the most used system (18.6%), but the second one is the combination of "septic tank + discharge into the curbside, water streams, etc." (16.5%). At the "occupations" and "slums", 33.3% and 35.1% of the households respectively (the majority in both cases) discharge their sewage directly into the curbside, water streams, etc. At the "slums", the second most used alternative is the "precarious shallow sewerage pipeline" (26.3%), as described before. At the "occupations", the second place is of the combination of "septic tank + discharge into the curbside, water streams, etc." (19.4%).

Therefore, it becomes clear that, in the absence of the COMPESA sewerage system, the households located in urbanized living environments ("urbanized" + "former slums") preferably adopt the septic tank, while at the informal areas ("occupations" + "slums") the sewage is mostly discharged into the curbside, water streams, etc.

Table 18. Sewage Collection by Municipality

	Type of Sewage Collection	COMPESA Local Offices in Recife (ELOs)													
		Alto do Céu		Aurora		Cabanga		Dois Irmãos		Jenipapo		Jangadinha		Ibura	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	COMPESA sewerage system	5	13.2	14	35.0	3	9.7	6	13.0	0	0.0	1	2.4	4	15.4
2	Stormwater drainage system	5	13.2	2	5.0	7	22.6	3	6.5	0	0.0	1	2.4	1	3.8
3	Discharged into the curbside, into a water stream, etc.	6	15.8	4	10.0	3	9.7	6	13.0	0	0.0	5	11.9	2	7.7
4	Precarious shallow sewerage pipeline	3	7.9	6	15.0	3	9.7	9	19.6	1	4.2	8	19.0	4	15.4
5	Septic tank	16	42.1	3	7.5	6	19.4	15	32.6	20	83.3	19	45.2	2	7.7
6	Septic tank + drainage system	0	0.0	3	7.5	2	6.5	2	4.3	0	0.0	1	2.4	6	23.1
7	Septic tank + discharged into the curbside, water stream,	1	2.6	4	10.0	3	9.7	0	0.0	0	0.0	4	9.5	4	15.4
8	Septic tank + waste water into the sewerage system	0	0.0	3	7.5	2	6.5	3	6.5	0	0.0	1	2.4	3	11.5
9	Cesspit	2	5.3	0	0.0	1	3.2	2	4.3	1	4.2	1	2.4	0	0.0
10	Others	0	0.0	1	2.5	1	3.2	0	0.0	2	8.3	1	2.4	0	0.0
	Total	38	100.0	40	100.0	31	100.0	46	100.0	24	100.0	42	100.0	26	100.0

	Type of Sewage Collection	RECIFE		OLINDA		JABOATÃO		CAMARAGIBE		PAULISTA		Other Municipalitie	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	COMPESA sewerage system	33	13.4	17	26.6	14	16.3	3	9.7	21	47.7	7	5.3
2	Stormwater drainage system	19	7.7	0	0.0	1	1.2	13	41.9	2	4.5	4	3.0
3	Discharged into the curbside, into a water stream, etc.	26	10.5	9	14.1	17	19.8	5	16.1	2	4.5	20	15.0
4	Precarious shallow sewerage pipeline	34	13.8	12	18.8	16	18.6	3	9.7	4	9.1	24	18.0
5	Septic tank	81	32.8	9	14.1	17	19.8	3	9.7	1	2.3	36	27.1
6	Septic tank + drainage system	14	5.7	5	7.8	1	1.2	1	3.2	0	0.0	3	2.3
7	Septic tank + discharged into the curbside, water stream,	16	6.5	8	12.5	11	12.8	0	0.0	2	4.5	20	15.0
8	Septic tank + waste water into the sewerage system	12	4.9	4	6.3	4	4.7	3	9.7	9	20.5	4	3.0
9	Cesspit	7	2.8	0	0.0	5	5.8	0	0.0	3	6.8	6	4.5
10	Others	5	2.0	0	0.0	0	0.0	0	0.0	0	0.0	9	6.8
	Total	247	100.0	64	100.0	86	100.0	31	100.0	44	100.0	133	100.0

The five (05) most populous municipalities in RMR present very different conditions in relation to the "type of sewage collection". These conditions are going to be described as follows.

(1) Recife

Recife, in average, has the "septic tank" as the main form of sewage collection (32.8%). The 2nd one is the "precarious shallow sewerage pipeline" (13.8%), almost the same as the "Compesa sewerage system" (13.4%). However, when it comes to analyze each "ELO" (Compesa local office coverage area) the situation changes.

In the Alto do Céu ELO, the "septic tank" is even more utilized (42.1%), followed by the "discharged into the curbside, etc." (15.8%). In the Aurora ELO, there is a predominance of "Compesa sewerage system" (35.0%), also followed by the "discharged into the curbside, etc." (15.0%). In the Cabanga ELO, the predominance is of the "stormwater drainage system" (22.6%), followed by "septic tank" (19.4%). In the Dois Irmãos ELO, the "septic tank" again predominates (32.6%), followed by "precarious shallow sewerage system" (19.6%). The Jenipapo ELO presents a very strong utilization of "septic tank" (83.3%). In the Jangadinha ELO, "septic tank" is also very much utilized (45.2%), followed by "precarious shallow sewerage pipeline" (19.0%). The last ELO, Ibura, presents a predominance of the mixed solution "septic tank + drainage system" (23.1%), followed by "Compesa" and "septic tank + discharged into the curbside, etc." both with 15.4%.

As it can be observed, each Compesa ELO presents different conditions although the predominance of the "septic tank" is notorious. The worst conditions, i.e. "discharged into the curbside, etc.", comparing all the ELOs, are stronger in Alto do Céu ELO.

(2) Olinda

Olinda presents a high utilization of the "Compesa sewerage system" (26.6%), followed by the "precarious shallow sewerage pipeline" (18.8%). As the third alternative, "discharged into the curbside, etc." and "septic tank" both present 14.1% of utilization.

(3) Jaboatão dos Guararapes

In Jaboatão, 02 (two) alternatives are in the first place, both with 19.8% of utilization: "discharged into the curbside" and "septic tank". The third place comes to the "precarious shallow sewerage pipeline" (18.6%).

(4) Camaragibe

Camaragibe presents a high utilization of the "stormwater drainage system" (41.9%), followed by "discharged into the curbside, etc." (16.1%).

(5) Paulista

Here again, the "Compesa sewerage system" is highly utilized (47.7%), followed by the alternative "septic tank + waste water into the Compesa system" (20.5%).

In short, it can be said that the places where the "Compesa system" is predominant are the Aurora ELO, in Recife, Olinda and Paulista, although in none of these locations the utilization surpasses 50%. The worst conditions represented by the alternative "discharged into the curbside, etc." do predominate in Jaboatão together with the use of "septic tank". The use of the "stormwater drainage system" predominates in the Cabanga ELO and in Camaragibe, but the utilization does not surpasses 50%. As for the other municipalities of the RMR, they have a predominance of "septic tank" (27.1%), followed by the "precarious shallow sewerage system" (18.0%).

In general, for the RMR, we observe a clear predominance of septic tank utilization, alone or in a "mixed" manner (43.7%). Nevertheless, the alternatives in which the final destination of the sewage is a water stream with no treatment (alternatives 2nd, 3rd, and 4th) also present a high utilization rate, 34.9% all together.

2.4 Sewerage and Stormwater Drainage Systems: Major Problems and Suggested Solutions

2.4.1 Major Problems

(1) Awareness

It calls our attention the fact that despite the situation described in the item 3.4 (Sewerage System), which shows that the conditions are far from ideal, most of the surveyed households didn't show a strong dissatisfaction with the issue. In all the analyzed municipalities and ELOs (Recife), the answer "Yes" for the question "Are you satisfied with your sewage collection system?" was predominant with percentages over 50.0%.

Even in Cabanga ELO, Camaragibe and Jaboatão, the answer "yes" corresponded to 51.6%, 51.6%, and 62.8%, respectively. Paulista presented the higher satisfaction level with the sewerage system (72.7%), followed by Recife (68.0%). In average, the RMR municipalities predominantly said "yes" for the question (63.3%).

Table 19. Satisfaction with the Sewage Collection system

Municipality	Are you satisfied with your sewage collection system?					
	Yes		No		No answer	Total
	No.	%	No.	%		
Recife	168	68.0	79	32.0	0	247
Alto do Céu ELO	29	76.3	9	23.7	0	38
Aurora ELO	29	72.5	11	27.5	0	40
Cabanga ELO	16	51.6	15	48.4	0	31
Dois Irmãos ELO	28	60.9	18	39.1	0	46
Jenipapo ELO	18	75.0	6	25.0	0	24
Jangadinha ELO	32	76.2	10	23.8	0	42
Ibura ELO	16	61.5	10	38.5	0	26
Olinda	35	54.7	29	45.3	0	64
Jaboatão dos Guararapes	54	62.8	32	37.2	0	86
Camaragibe	16	51.6	15	48.4	0	31
Paulista	32	72.7	12	27.3	0	44
Other Municipalities	78	58.6	54	40.6	1	133
TOTAL	383	63.3	221	36.5	1	605

This evidence leads us to believe that one of the major problems is the lack of awareness by the population about the actual problems related to the sewerage system such as pollution of the waters, health problems, etc. This lack of awareness can lead the population to a passivity before these problems.

(2) Reasons for Improvement

For those who answered "no", it was asked to suggest measures to improve their "living environment" concerning to the subject "sewerage". These suggestions are presented in the next item (4.2).

After they made the suggestions, it was asked why those measures were important. Through their answer, we can have an idea of the main problems according to their opinion. The main answers to this question are presented in the next Tables (Table 20 and Table 21).

Table 20. Reasons for Improvement by Living Environment

	Reasons	Urbanized		Former Slum		Occupation		Slum		Others		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Flood prevention	21	16.7	5	11.4	6	30.0	8	29.6	3	60.0	43	19.4
2	Improve hygiene conditions	36	28.6	17	38.6	4	20.0	10	37.0	1	20.0	68	30.6
3	Prevention of open flow sewage	17	13.5	3	6.8	3	15.0	0	0.0	0	0.0	23	10.4
4	Justify payment of taxes	3	2.4	0	0.0	1	5.0	1	3.7	0	0.0	5	2.3
5	Prevent environment pollution	6	4.8	4	9.1	0	0.0	2	7.4	0	0.0	12	5.4
6	Prevent obstruction of sewerage	11	8.7	3	6.8	1	5.0	3	11.1	1	20.0	19	8.6
7	Prevent costly measures	1	0.8	2	4.5	0	0.0	0	0.0	0	0.0	3	1.4
8	Improve present conditions	10	7.9	0	0.0	1	5.0	0	0.0	0	0.0	11	5.0
9	Others	15	11.9	9	20.5	4	20.0	1	3.7	0	0.0	29	13.1
10	No answer	6	4.8	1	2.3	0	0.0	2	7.4	0	0.0	9	4.1
	Total	126	100.0	44	100.0	20	100.0	27	100.0	5	100.0	222	100.0

Considering the table by "living environment", the majority of the answers put the "improvement of hygiene conditions" as the main reason. The percentages for this answer were 28.6% for "urbanized", 38.6% for "former slum", and 37.0% for "slum". Only at the "occupation", the main reason was "flood prevention" (30.0%). As for the RMR as a whole, the first reason mentioned is the "improvement of hygiene conditions" (30.6%), followed by "flood prevention" (19.4%).

Table 21. Reasons for Improvement by Municipality

	Reasons	TOTAL		Recife		Olinda		Jaboatão		Camaragibe		Paulista		Other Municipalities	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Flood prevention	43	19.4	14	17.5	3	10.3	6	18.8	3	20.0	2	16.7	15	27.8
2	Improve hygiene conditions	68	30.6	19	23.8	16	55.2	11	34.4	4	26.7	2	16.7	16	29.6
3	Prevention of open flow sewage	23	10.4	11	13.8	1	3.4	2	6.3	0	0.0	1	8.3	8	14.8
4	Justify payment of taxes	5	2.3	0	0.0	0	0.0	0	0.0	3	20.0	0	0.0	2	3.7
5	Prevent environment pollution	12	5.4	4	5.0	0	0.0	6	18.8	1	6.7	1	8.3	0	0.0
6	Prevent obstruction of sewerage	19	8.6	10	12.5	3	10.3	0	0.0	1	6.7	3	25.0	2	3.7
7	Prevent costly measures	3	1.4	1	1.3	0	0.0	1	3.1	0	0.0	0	0.0	1	1.9
8	Improve present conditions	11	5.0	5	6.3	1	3.4	2	6.3	0	0.0	1	8.3	2	3.7
9	Others	29	13.1	13	16.3	4	13.8	2	6.3	2	13.3	2	16.7	6	11.1
10	No answer	9	4.1	3	3.8	1	3.4	2	6.3	1	6.7	0	0.0	2	3.7
	Total	222	100.0	80	100.0	29	100.0	32	100.0	15	100.0	12	100.0	54	100.0

This situation does not change much when analyzing the municipalities. For all the municipalities, except Paulista, "improve hygiene conditions" come in the first place: Recife

(23.8%), Olinda (55.2%), Jaboatão (34.4%), Camaragibe (26.7%), and Other Municipalities (29.6%). Paulista present as the first reason "prevent obstruction of sewerage" (25.0%) which can be understood as the concern that the sewage can overflow to the environment if the sewerage is obstructed, that indirectly has also to do with hygiene conditions. "Flood prevention" comes in the 2nd place for all the municipalities except Olinda: Recife (17.5%), Jaboatão (18.8%, the same as "prevent environment pollution"), Camaragibe (20.0%, the same as "justify the payment of taxes"), Paulista (16.7%, the same as "improve hygiene conditions" and "others").

(3) Problems of the Sewerage System

Recalling the item 3.4 (sewerage system), it is observed that there is a great utilization of "septic tank" as an alternative for sewage collection, both alone or in composed alternatives. Out of the 605 survey households, 264 (43.7%) utilize the "septic tank" in either way. The following table shows the present maintenance conditions of these "septic tanks".

Table 22. Maintenance Frequency of Septic Tanks

	How often do you clean your Septic Tank?								
	Once a year		Once each 3		Never		No answer		TOTAL
	No.	%	No.	%	No.	%	No.	%	
Urbanized	29	15.8	65	35.5	80	43.7	9	4.9	183
Urbanized (former slum)	10	19.6	20	39.2	18	35.3	3	5.9	51
Organized occupation	2	14.3	6	42.9	5	35.7	1	7.1	14
Slum (spontaneous occupation)	2	16.7	4	33.3	6	50.0	0	0.0	12
Others	0	0.0	1	25.0	1	25.0	2	50.0	4
TOTAL	43	16.3	96	36.4	110	41.7	15	5.7	264

Analyzing the above table, we observe that most of the septic tank users never clean it (41.7%). Those who clean it once each 3 years represent 36.4% of the total, and only 16.3% of the users clean it once a year. This evidence puts in doubt the efficiency of the utilization of septic tanks.

This problem, together with the high utilization of alternatives in which the sewage is discharged with no treatment into water streams, as shown in the item 3.4, gives us an actual view of the precariousness of the present sewerage system in the RMR.

(4) Summary of Major Problems

We can summarize the major problems as follows:

1) Lack of awareness about the actual problems of the sewerage system;
2) Hygiene conditions and flood occurrences;

3) The sewerage system itself: low availability of the Compesa sewerage system, utilization of the stormwater drainage system instead, utilization of septic tanks without proper maintenance, and the worst scenario that is the direct discharge of sewage into the curbside, water streams, etc.

2.4.2 Suggestions for Improvement

When asked if they were satisfied with their sewerage system, and the answer was "no", the interviewees were then asked to suggest some measures to improve that situation, i.e their "living environment". Those who answered "yes" for the first question, were stimulated to suggest some measures to improve the "urban environment". The following Tables presents the 1st row of Suggestions - "Living Environment" (Table 23), the 2nd one – "Urban Environment" (Table 24), and the combination of both (Table 25).

Table 23. Suggestions for the Improvement of the "Living Environment"

	Suggestions	Recife		Olinda		Jaboatão		Camaragibe		Paulista		Other Municipalities		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Expansion of the sewerage system	55	68.8	21	72.4	25	78.1	6	40.0	5	38.5	37	69.8	149	67.1
2	Expansion of the stormwater drainage system	11	13.8	5	17.2	5	15.6	5	33.3	2	15.4	10	18.9	38	17.1
3	Maintenance of the stormwater drainage system	4	5.0	2	6.9	1	3.1	1	6.7	3	23.1	0	0.0	11	5.0
4	Maintenance of sewerage system (cleaning of septic tanks, cleansing of	3	3.8	1	3.4	0	0.0	0	0.0	0	0.0	4	7.5	8	3.6
5	Improvement of water supply conditions	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6	Governmental action	0	0.0	0	0.0	0	0.0	2	13.3	1	7.7	0	0.0	3	1.4
7	Others	6	7.5	0	0.0	1	3.1	1	6.7	0	0.0	2	3.8	10	4.5
8	No answer	1	1.3	0	0.0	0	0.0	0	0.0	2	15.4	0	0.0	3	1.4
9	No need for improvement	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
10	Total	80	100.0	29	100.0	32	100.0	15	100.0	13	100.0	53	100.0	222	100.0

In the row of "Suggestions for the improvement of the living environment", in all the municipalities the "Expansion of the sewerage system" comes, by far, in 1st place (Recife – 68.8%, Olinda – 72.4%, Jaboatão – 78.1%, Camaragibe – 40.0%, Paulista – 38.5%, and Other Municipalities – 67.1%). The 2nd place has a predominance of the suggestion "Expansion of stormwater drainage system" (Recife – 13.8%, Olinda – 17.2%, Jaboatão – 15.6%, Camaragibe – 33.3%, and Other Municipalities – 18.9%). Only in Paulista, the second most suggested item was "Maintenance of the stormwater drainage system" with 18.9%.

Table 24. Suggestions for the Improvement of the "Urban Environment"

	Suggestions	Recife		Olinda		Jaboatão		Camaragibe		Paulista		Other Municipalities		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Expansion of the sewerage system	41	24.6	9	25.7	15	27.8	5	31.3	0	0.0	26	32.5	96	25.1
2	Expansion of the stormwater drainage system	26	15.6	7	20.0	4	7.4	4	25.0	0	0.0	8	10.0	49	12.8
3	Maintenance of the stormwater drainage system	31	18.6	3	8.6	8	14.8	2	12.5	6	19.4	12	15.0	62	16.2
4	Maintenance of sewerage system (cleaning of septic tanks, cleansing of	2	1.2	0	0.0	1	1.9	0	0.0	0	0.0	1	1.3	4	1.0
5	Improvement of water supply conditions	3	1.8	0	0.0	0	0.0	0	0.0	1	3.2	0	0.0	4	1.0
6	Governmental action	2	1.2	1	2.9	1	1.9	0	0.0	2	6.5	2	2.5	8	2.1
7	Others	25	15.0	6	17.1	12	22.2	3	18.8	4	12.9	5	6.3	55	14.4
8	No answer	28	16.8	8	22.9	13	24.1	0	0.0	6	19.4	13	16.3	68	17.8
9	No need for improvement	9	5.4	1	2.9	0	0.0	2	12.5	12	38.7	13	16.3	37	9.7
	TOTAL	167	100.0	35	100.0	54	100.0	16	100.0	31	100.0	80	100.0	383	100.0

In the row of "Suggestions for the improvement of the urban environment", in all the municipalities, except Paulista, the "Expansion of the sewerage system" also comes in 1st place (Recife – 24.6%, Olinda – 25.7%, Jaboatão – 27.8%, Camaragibe – 31.3%, and Other Municipalities – 25.1%). Paulista, in this case, presents a higher percentage of "no need of improvement" answers (38.7%) which may evidence a certain lack of interest in the issue. In this row of suggestions, there is not a predominance of one only suggestion for the 2nd place. In Olinda, Jaboatão, Paulista and Other Municipalities, the 2nd place is for the "no answer" alternative (Olinda – 22.9%, Jaboatão – 24.1%, Paulista – 19.4%, and Other Municipalities – 16.3%). In Paulista, the 2nd place is also shared by the suggestion "Maintenance of the stormwater drainage system" (19.4%). As for the Other Municipalities, the 2nd place is shared with the answer "no need for improvement".

Table 25. Combination of Suggestions for "Living and Urban Environments"

	Suggestions	Recife		Olinda		Jaboatão		Camaragibe		Paulista		Other Municipalities		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Expansion of the sewerage system	96	38.9	30	46.9	40	46.5	11	35.5	5	11.4	63	47.4	245	40.5
2	Expansion of the stormwater drainage system	37	15.0	12	18.8	9	10.5	9	29.0	2	4.5	18	13.5	87	14.4
3	Maintenance of the stormwater drainage system	35	14.2	5	7.8	9	10.5	3	9.7	9	20.5	12	9.0	73	12.1
4	Maintenance of sewerage system (cleaning of septic tanks, cleansing of	5	2.0	1	1.6	1	1.2	0	0.0	0	0.0	5	3.8	12	2.0
5	Improvement of water supply conditions	3	1.2	0	0.0	0	0.0	0	0.0	1	2.3	0	0.0	4	0.7
6	Governmental action	2	0.8	1	1.6	1	1.2	2	6.5	3	6.8	2	1.5	11	1.8
7	Others	31	12.6	6	9.4	13	15.1	4	12.9	4	9.1	7	5.3	65	10.7
8	No answer	29	11.7	8	12.5	13	15.1	0	0.0	8	18.2	13	9.8	71	11.7
9	No need for improvement	9	3.6	1	1.6	0	0.0	2	6.5	12	27.3	13	9.8	37	6.1
	TOTAL	247	100.0	64	100.0	86	100.0	31	100.0	44	100.0	133	100.0	605	100.0

Observing the table combination of suggestions, the trend to prioritize the suggestions for the "Expansion of the sewerage system" and "Expansion of the stormwater drainage system" is evidenced. However, in this table, two situations call our attention: Jaboatão and Paulista. In the first municipality, the alternatives "no answer" and "no need for improvement" summed up to 30.2%, a quite high percentage evidencing a little bit of a lack of concern about the issue. In Paulista, this is still worse, and the two alternatives summed up to 45.5%. In this municipality, the "maintenance of the stormwater drainage system" comes in 2nd place (20.5%).

2.4.3 Willingness to Contribute with Improvement Measures

(1) Willingness to Contribute

After asking for suggestions for the improvement of both the "living environment" and the "urban environment", the interviewees were asked to say how much they would be willing to

contribute for these improvement measures. The willingness to contribute is presented in combined Tables including the answers for the two types of suggestions.

Table 26. Range of Contribution by Living Environment

Range of Contribution	TOTAL		Urbanized		Former Slum		Occupation		Slum		Others	
	No	%	No	%	No	%	No	%	No	%	No	%
Nothing	323	53.4	227	55.5	46	47.4	23	63.9	23	40.4	4	66.7
R$ 1 ~ R$ 5	82	13.6	50	12.2	19	19.6	3	8.3	9	15.8	1	16.7
> R$ 5 ~ R$ 10	38	6.3	16	3.9	13	13.4	3	8.3	6	10.5	0	0.0
> R$10 ~ R$ 20	12	2.0	8	2.0	2	2.1	1	2.8	1	1.8	0	0.0
> R$20 ~ R$ 30	3	0.5	3	0.7	0	0.0	0	0.0	0	0.0	0	0.0
> R$ 30 ~ R$ 50	2	0.3	2	0.5	0	0.0	0	0.0	0	0.0	0	0.0
> R$ 50	4	0.7	2	0.5	1	1.0	1	2.8	0	0.0	0	0.0
No answer	141	23.3	101	24.7	16	16.5	5	13.9	18	31.6	1	16.7
TOTAL	605	100.0	409	100.0	97	100.0	36	100.0	57	100.0	6	100.0

Table 27. Range of Contribution by Municipality

Range of Contribution	TOTAL		Recife		Olinda		Jaboatão		Camaragibe		Paulista		Other Municipalities	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Nothing	323	53.4	156	63.2	40	62.5	47	54.7	16	51.6	16	36.4	48	35.8
R$ 1 ~ R$ 5	82	13.6	22	8.9	9	14.1	13	15.1	4	12.9	2	4.5	32	23.9
> R$ 5 ~ R$ 10	38	6.3	4	1.6	3	4.7	4	4.7	2	6.5	4	9.1	21	15.7
> R$10 ~ R$ 20	12	2.0	7	2.8	1	1.6	1	1.2	3	9.7	0	0.0	0	0.0
> R$20 ~ R$ 30	3	0.5	1	0.4	0	0.0	0	0.0	0	0.0	0	0.0	2	1.5
> R$ 30 ~ R$ 50	2	0.3	2	0.8	0	0.0	0	0.0	1	3.2	0	0.0	0	0.0
> R$ 50	4	0.7	0	0.0	1	1.6	0	0.0	2	6.5	0	0.0	1	0.7
No answer	141	23.3	55	22.3	10	15.6	21	24.4	3	9.7	22	50.0	30	22.4
TOTAL	605	100.0	247	100.0	64	100.0	86	100.0	31	100.0	44	100.0	134	100.0

Observing the Tables 26 and 27, there is a clear predominance of the answer "nothing", representing 53.4% in average for the RMR as a whole. The 2nd predominant answer is "no answer" (23.3%). These two figures sum up to 76.7%, evidencing the unwillingness to contribute or even to consider this contribution. In the 3rd place, 13.6% of the total surveyed householders are willing to contribute between R$ 1 and R$ 5, only.

There are some surprises, however, among these figures. In the case of "Former Slums", although the "nothing" and "no answer" answers also sum up to a high percentage (63.9%), there is a willingness to contribute between R$ 1 to R$ 10 of 33.0%, the highest among all the other situations (16.1% for "Urbanized", 16.6% for "Occupations", and 26.3% for "Slums").

In the analysis of the municipalities, the surprise is given by Camaragibe and Paulista. In Camaragibe, the willingness to contribute between R$ 1 to R$ 20 is 29.1% as well as in the Other Municipalities where this percentage is 39.9%, quite high compared to the other analyzed municipalities (Recife – 13.7%, Olinda – 20.4%, Jaboatão – 21.0%, and Paulista – 13.6%). On the other hand, in Paulista the answers "nothing" and "no answer" sum up to the percentage of 86.4%, the highest among all the municipalities.

(2) Reasons for not Contributing

In this item, we are going to see the reasons why some of the interviewees said they would not contribute, i.e. they answered "nothing". The following Tables (Table 28 and Table 29) shows the stated reasons and their percentage.

Table 28. Reasons for not Contributing (by Living Environment)

	Can't afford		Government duty		Others		Total
	No.	%	No.	%	No.	%	
Urbanized	75	33.0	130	57.3	22	9.7	227
Former Slum	16	34.8	26	56.5	4	8.7	46
Occupation	4	17.4	16	69.6	3	13.0	23
Slum	14	60.9	7	30.4	2	8.7	23
Others	2	50.0	2	50.0	0	0.0	4
TOTAL	111	34.4	181	56.0	31	9.6	323

Table 29. Reasons for not Contribution (by Municipality)

	Can't afford		Government duty		Others		Total
	No.	%	No.	%	No.	%	
Recife	48	35.0	79	57.7	10	7.3	137
Olinda	11	28.9	23	60.5	4	10.5	38
Jaboatão	15	31.9	29	61.7	3	6.4	47
Camaragibe	5	31.3	7	43.8	4	25.0	16
Paulista	2	12.5	12	75.0	2	12.5	16
Other municipalities	30	43.5	31	44.9	8	11.6	69
TOTAL	111	34.4	181	56.0	31	9.6	323

According to these two Tables, the main reason for not contributing with improvement measures is the opinion that the Government should do that, i.e. the answer "Government duty" (56.0%). This feeling is particularly strong among the interviewees at the "Occupations" (69.6%), and on the other Table, among the interviewees in Paulista (75.0%). The only different answer occurs among the interviewees in the "Slums". There, they are not willing to contribute because they "can't afford" to pay for the contribution (60.9%).

2.5 Hygiene, Health and Social Concerns

The following items will present the interviewees' degree of hygiene and health perception, as well as their social concerns.

(1) Type of Toilet

Table 30. Type of Toilet

Municipality	TYPE OF TOILET										TOTAL
	Own with flush		Own without flush		Pit toilet		No toilet		Others		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Recife	196	79.4	43	17.4	3	1.2	3	1.2	2	0.8	247
Olinda	49	76.6	14	21.9	0	0.0	1	1.6	0	0.0	64
Jaboatão dos Guararapes	62	72.1	21	24.4	1	1.2	0	0.0	2	2.3	86
Camaragibe	24	77.4	7	22.6	0	0.0	0	0.0	0	0.0	31
Paulista	40	90.9	3	6.8	0	0.0	0	0.0	1	2.3	44
Other Municipalities	99	74.4	25	18.8	5	3.8	3	2.3	1	0.8	133
TOTAL	470	77.7	113	18.7	9	1.5	7	1.2	6	1.0	605

In the RMR as a whole, 77.7% of the survey households have their "own toilet with flush". This percentage is remarkably high in Paulista (90.9%). The 2nd used alternative is the "own toilet without flush" (18.7% for the whole RMR).

(2) Type of Drinking Water

Table 31. Type of Drinking Water

Municipality	TYPE OF DRINKING WATER												TOTAL
	Filtered		Mineral		Boiled		Tap Water		Others		No answer		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Recife	39	15.8	181	73.3	2	0.8	17	6.9	8	3.2	0	0.0	247
Olinda	17	26.6	36	56.3	0	0.0	11	17.2	0	0.0	0	0.0	64
Jaboatão dos Guararapes	8	9.3	64	74.4	1	1.2	7	8.1	6	7.0	0	0.0	86
Camaragibe	3	9.7	27	87.1	0	0.0	0	0.0	1	3.2	0	0.0	31
Paulista	8	18.2	27	61.4	2	4.5	7	15.9	0	0.0	0	0.0	44
Other Municipalities	44	33.1	41	30.8	2	1.5	39	29.3	6	4.5	1	0.8	133
TOTAL	119	19.7	376	62.1	7	1.2	81	13.4	21	3.5	1	0.2	605

The most used type of drinking water is the "Mineral" water. In the RMR, this consumption represents 62.1%. Among the analyzed municipalities, the higher consumption of this type of water is in Camaragibe (87.1%) and the lowest one is in Olinda (56.3%). As 2nd option, there is the "Filtered" water (19.7% for RMR). One aspect, however, called our attention. For the "Other Municipalities", which are supposedly less developed than the 05 major ones, the consumption of "Filtered", "Mineral", and "Tap Water" is almost equivalent in percentage, 33.1%, 30.8%, and 29.3%, respectively.

In our opinion, this high utilization of "Mineral" water may be also due to the shortage of water. In many neighborhoods, the residents buy so called "mineral water" from tank trucks

for everyday use, not only for drinking. However, the quality of this "mineral water" is not assured once there are many suppliers operating without the due certificate issued by the responsible agency (CPRH).

(3) Type of Bathing Place

Table 32. Type of Bathing Place

Municipality	TYPE OF BATHING PLACE										TOTAL
	Shower with hot water		Shower with cold water		Shower with no water (due to shortage)		No shower, no tap water		Others		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Recife	11	4.5	103	41.7	113	45.7	14	5.7	6	2.4	247
Olinda	4	6.3	27	42.2	28	43.8	5	7.8	0	0.0	64
Jaboatão dos Guararapes	3	3.5	29	33.7	49	57.0	1	1.2	4	4.7	86
Camaragibe	2	6.5	11	35.5	17	54.8	1	3.2	0	0.0	31
Paulista	7	15.9	29	65.9	7	15.9	1	2.3	0	0.0	44
Other Municipalities	5	3.8	66	49.6	50	37.6	10	7.5	2	1.5	133
TOTAL	32	5.3	265	43.8	264	43.6	32	5.3	12	2.0	605

The third option in this question deserves an explanation. Due to the water shortage, as already mentioned, sometimes the resident utilizes the facility where the shower is located but instead of using it, he/she has to bring the water from a reservoir in a basket and bath him/herself with a small vessel.

Nevertheless, the existence of shower in the households is very high (92.7%). The low percentage of utilization of "shower with hot water" is explained by the climate in the Recife Metropolitan Region. It never gets really cold thus the hot water is dispensable. Therefore, the existence of hot water in the shower may evidence a better economic condition of the household. In this case, Paulista presents the higher utilization of "shower with hot water" (15.9%).

(4) Occurrence of Diseases

Table 33. Occurrence of Diseases

Municipality	OCCURRENCE OF DISEASES											
	Diarrhoea		Schistosomiasis		Dengue		Cholera		Scabies		Hepatitis	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Recife	67	22.4	3	1.0	117	39.1	3	1.0	8	2.7	8	2.7
Olinda	13	17.1	0	0.0	39	51.3	0	0.0	1	1.3	0	0.0
Jaboatão dos Guararapes	6	6.3	1	1.0	40	41.7	0	0.0	1	1.0	3	3.1
Camaragibe	6	16.7	2	5.6	12	33.3	1	2.8	0	0.0	1	2.8
Paulista	9	17.0	1	1.9	23	43.4	3	5.7	0	0.0	0	0.0
Other Municipalities	43	22.5	10	5.2	56	29.3	3	1.6	7	3.7	3	1.6
TOTAL	144	19.2	17	2.3	287	38.2	10	1.3	17	2.3	15	2.0

Municipality	OCCURRENCE OF DISEASES										TOTAL
	Filariasis		Impetigo		Tuberculosis		Others		No diseases		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Recife	4	1.3	4	1.3	1	0.3	7	2.3	77	25.8	299
Olinda	0	0.0	2	2.6	0	0.0	0	0.0	21	27.6	76
Jaboatão dos Guararapes	1	1.0	1	1.0	1	1.0	1	1.0	41	42.7	96
Camaragibe	0	0.0	0	0.0	0	0.0	0	0.0	14	38.9	36
Paulista	0	0.0	0	0.0	1	1.9	0	0.0	16	30.2	53
Other Municipalities	1	0.5	4	2.1	1	0.5	1	0.5	62	32.5	191
TOTAL	6	0.8	11	1.5	4	0.5	9	1.2	231	30.8	751

The Table 33 shows the occurrence of diseases related to hygiene conditions in the survey households, in the 02 (two) previous years before the survey. It does not show how many people were infected per household. However, it shows that in some households more than one disease has occurred during this period.

The highest occurrence in the RMR is of "Dengue" (38.2%), Olinda presenting the highest occurrence among the other municipalities (51.3%). "Dengue" is a disease transmitted by a mosquito (*Aedes aegypt*) whose larvae form grows in fresh water. The high incidence of this disease may be associated to the existence of water reservoirs at the houses due to the shortage of Compesa water. This water is stored without being duly covered with a lid allowing the proliferation of the mosquitoes.

The second highest occurrence is of "Diarrhoea" (19.2% for the RMR) which is a water borne disease, and is directly related to the quality of the drinking water. Recife together with the group of "Other Municipalities" present the higher occurrence of this disease, 22.4% and 22.5%, respectively.

(5) Main Causes for Health Problems

Inquired about what, in their opinion, were the 03 (three) main causes for their health problems, the interviewees answered choosing among the list provided in the following Table 34, listing them in importance order. The results are shown as follows.

Table 34. Main Causes for Health Problems

Main Causes for Health Problems	TOTAL					
	1st		2nd		3rd	
	No.	%	No.	%	No.	%
Water quality	85	15.0	55	11.6	56	15.7
Food quality	23	4.0	18	3.8	18	5.1
Lack of food	21	3.7	14	3.0	15	4.2
Existence of rats, mosquitoes and cockroaches	169	29.8	116	24.5	60	16.9
Surrounding environment (pollution)	40	7.0	52	11.0	39	11.0
Work environment conditions	1	0.2	3	0.6	7	2.0
Inherited diseases	11	1.9	7	1.5	5	1.4
Lack of sewerage facilities	108	19.0	94	19.9	60	16.9
Stress at work	7	1.2	8	1.7	8	2.2
Dirtness in general (garbage)	95	16.7	105	22.2	84	23.6
No problem	8	1.4	1	0.2	4	1.1
Total	568	100.0	473	100.0	356	100.0

In the 1st and 2nd places, the "Existence of rats, mosquitoes and cockroaches" were the first answer (29.8% and 24.5%, respectively). In the 3rd place, the most answered cause was "Dirtness in general (garbage)" with 23.6%. Following these main causes, the answer "Lack of sewerage facilities" comes with 19.0% for 1st place, 19.9% for 2nd place, and 16.9% for 3rd place.

According to these answers, it seems that for most of the interviewees, the problem only exists when you can actually see them (e.g. the animals and the garbage) or smell them (lack of sewerage facilities).

(6) Main Social Concerns

Another similar inquire was made to the interviewees for them to list 03 (three) social issues they were more concerned about. They answered choosing among the list provided in the following Table 35, listing them in importance order. The results are shown as follows.

Table 35. Main Social Concerns

Main Social Concerns	TOTAL					
	1st		2nd		3rd	
	No.	%	No.	%	No.	%
Politicians	36	6.1	21	4.0	33	7.7
Children's education	61	10.4	63	12.0	43	10.1
Crime / Public security	206	35.1	133	25.3	65	15.2
Unemployment	179	30.5	153	29.1	68	15.9
Corruption of the government	4	0.7	17	3.2	39	9.1
Improvement of income	30	5.1	36	6.8	29	6.8
Medical care	36	6.1	50	9.5	95	22.2
Epidemia	1	0.2	9	1.7	3	0.7
Social welfare	4	0.7	9	1.7	13	3.0
Natural disaster	6	1.0	4	0.8	9	2.1
Pollution	7	1.2	12	2.3	15	3.5
Others	17	2.9	18	3.4	14	3.3
Does not know	0	0.0	1	0.2	1	0.2
Total	587	100.0	526	100.0	427	100.0

The 1st concern is about "Crime / Public security" (35.1%), the 2nd one is about "Unemployment" (29.1%), and the 3rd concern is about "Medical Care" (22.2%). As the second option for each of the rows (1st, 2nd, or 3rd) the same answers were given.

The problem of "Crime / Public security" is obviously a concern with the physical integrity of the interviewee and his/her family, as well as a concern with his/her patrimony. It is a real threat that tends to increase with the worsening of the "Unemployment" conditions, also shown as a major concern. The "Medical Care" problem appears as a major concern insofar as the Government is not providing a good medical care system to the destitute population, and those who want a better system have to pay for it, if they can afford to. However, again with the "Unemployment" threat, the payment of a private medical care system is a reality that is becoming far from reach for a large amount of the population.

2.6 Conclusions

The conclusions taken from the "Residents Awareness Survey" results are presented as follows;

- The Recife Metropolitan Region present different types of "living environment". The so called "Poverty Areas" (former slums, organized occupations, and slums) represent 31.4% of the sample universe. The different types of "living environment" also present different degrees of urban infrastructure.

- As for the topographic conditions, we observe a high rate of households located in flat areas with flood hazardous conditions (28.6%). It is specially serious for the households located at "occupations" and "slums" (52.8% and 47.4%, respectively).

- Unemployment rate is very high among the residents of the survey households in the RMR (12.4%). However it is particularly higher at the "slums" (24.2%).

- The majority of the survey households receives a monthly income of less than 3 Minimum Wages (approx. US$ 230) – 67.3%. This percentage is even higher at the "occupations" and "slums", 74.2% and 84.6% respectively.

- The survey showed an optimistic view in relation to the Solid Waste issue. However, our knowledge of the reality, particularly in relation to the presence of solid waste in the stormwater drainage system, leads us to conclude that a deeper understanding of the issue may be necessary.

- As for the Water Supply issue, the survey evidenced the water shortage problem (Compesa water), and the trend of utilizing alternative sources (wells and tank trucks). It also showed that the majority of the householders pay at maximum R$ 20/month for water charge (88.2%), and consume the maximum of 20 m^3/month (92.7%).

- As for the Sewerage System, we could observe the following facts:

  - For the RMR universe, the Compesa participation represents only 15.7%. However in "occupations" and "slums" this participation is particularly low, 8.3% and 3.5%, respectively.

  - The most used alternative for sewage disposal in "urbanized" areas and "former slums" is the "septic tank" (29.3% and 18.6%, respectively). On the other hand, for

"occupations" and "slums" the most used alternative is the direct "discharge into the curbside, water streams, etc." (33.3% and 35.1%, respectively).

- In regard to the municipalities, there are different situations as for the predominance of one or another type of sewerage system. However, in the RMR as a whole, we observe a clear predominance of "septic tank" utilization alone or in a "mixed" manner (43.7%). Nevertheless, the alternatives in which the final destination of the sewage is a water stream with no treatment also present a high utilization rate, 34.9% all together.

- At last, the results of the "Residents Awareness Survey" lead as to conclude that the major concerns in relation to the sewerage and stormwater drainage systems are as follows;

  - There is a lack of residents awareness about the real problems caused by a precarious sewerage system. Nevertheless, they are concerned about the hygiene conditions and flood occurrences in their living environment.

  - Despite the high utilization of "septic tanks" as shown in the previous item, their maintenance conditions are very precarious. This fact, together with the high percentage of households discharging their sewage directly into water streams, urges the elaboration of measures to enhance the sewerage system in general.

  - Although, the survey has shown a strong desire of the residents in having both the sewerage and stormwater drainage systems expanded, the majority of them are not willing to contribute (53.4%). Many of them didn't even answer to this question (23.3%). Only 13.6% of the survey householders said they would be willing to contribute with the minimum amount of R$ 1 to R$ 5. The main reasons for not contributing were the opinion that this type of urban infrastructure intervention is a "Government Duty" (56.0%) and the fact that they "Can't Afford" (34.4%).