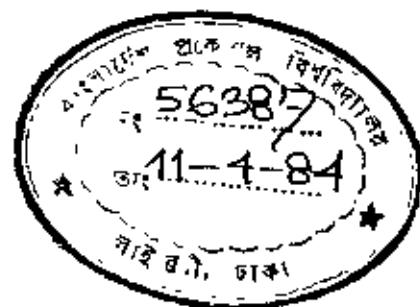


A STUDY OF WATER SUPPLY SYSTEM OF SELECTED  
SLUM AREAS OF DHAKA

Thesis submitted to the Department of Urban and Regional Planning, in partial fulfilment of the requirements for the Degree of MASTER OF URBAN AND REGIONAL PLANNING.

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January, 1984.



THESIS ACCEPTANCE FORM

DEPARTMENT OF URBAN AND REGIONAL PLANNING  
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

A STUDY OF WATER SUPPLY SYSTEM OF SELECTED SLUM  
AREAS OF DHAKA

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## ABSTRACT

Bangladesh is the eighth populous country of the world having cities which have experienced rapid growth in recent past. The process of urbanization in Bangladesh is not only rapid, but also dysfunctional in nature. The degree of dysfunctional may be explained by the multiple problem of urbanization, as well as by the urban planning problem. Without problem there is no city in the world and large city has variety and intensity of the problems. These problems are more acute and complicated for the more rapid growth of population.

As such given the serious implication of rapid urbanization trend and many other constraints the most needed service facilities like water supply needs special attention in daily life and this situation is more acute in low income communities specially for slum dwellers. It is not only for the maintenance of health in the community but also for the prevention of nuisance.

The present research focuses on problems of water supply system of selected slum areas of Dhaka. This study reviews the existing water supply system especially network facilities of WASA's water supply in Dhaka city. The study also attempts to analyse the socio-economic characteristics of the respondents in an attempt to findout their capabilities regarding water supply. The existing situation however shows an interesting picture, that seems in new part of the city about sixty five percent of

piped water is supplied and in old part it is thirty five percent. Where most of the low income people are dependent on street hydrants of WASA. It reveals that social justice is not maintained in different localities properly.

Different organizations are aware regarding water supply but they cannot help or advice for further improvement, except WASA. The opinion of the Authority(WASA) is that without people's participation and civic awareness it is not possible to improve this situation. The methods used for the study were structured and unstructured interviews. In addition, to measure the level of satisfaction an attitude scale was used. The level of satisfaction varies on different income group as well as attitude and values of the consumers. In respect of physical, social and economic factors, an attempt is also made to determine the optimum number of user per water tap. From the study it can be concluded that the Authority(WASA) cannot solve the problems alone. Both government agencies and private developers should try side by side to improve the water supply system which adds little impact on the overall environmental condition of the slum dwellers as well as for total society. Hopefully the study will be able to suggest improvements or measures for water supply system in Dhaka city. And also this study will provide the guidelines for further study.

**TITLE OF THE THESIS :** A STUDY OF WATER SUPPLY SYSTEM OF SELECTED SLUM AREAS OF DHAKA.

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## CHAPTER - I

### 1.0.0 SCOPE OF THE STUDY

### 1.1.0 INTRODUCTION :

Adequate supply of good quality water is an essential part of the Twentieth century urban life. It is universally accepted that an adequate supply of water for drinking, domestic, industrial purpose and an adequate means of waste disposal are essential to public health and well being of the society. Safe drinking water is one of the basic needs for the population and over the last few years it has become an important guideline in development policy. The year 1981-1990 is declared by the united nations as the decade of "International Drinking water supply and Health Protection Period".<sup>1</sup>

Water supply has become a critical and important factor in public health and economic development in most part of the world, particularly in the developing countries such as India, Bangladesh, Pakistan, Sri Lanka etc. It can be estimated that more than seventy percent of the urban population in the developing countries either have an adequate water supply or are being supplied with unsafe water or both.<sup>2</sup> This worst situations are to be found

- 
1. World Health Organisation, "Report on the International Drinking Water and Sanitation Decade", EKISTICS No. 286, Vol. 48, Jan/Feb. 1981. P.4.
  2. Bernd H. Disterich & John M. Henderson, Urban Water Supply Conditions and Needs in Seventy five Developing Countries, Geneva:World Health Organisation P.15.

particularly in South-East and South central Asia, where about twothirds of the urban population have no piped water at all. According to the World Health Organization survey report, there is no adequate supply of safe drinking water to three persons out of every five in Developing countries.<sup>1</sup> This situation is more acute in Least Developed countries of the world including Bangladesh.

The World Health Organization (WHO) estimates that approximately eighty percent of sickness and disease in the developing world can be attributed to inadequate water supply and sanitation.<sup>2</sup> The provision of safe drinking water supply means quantity as well as quality. In a number of countries such as Sudan, Egypt, Sri Lanka, Iran, Pakistan and Venezuela-it has been observed that diarrhoeal diseases were primarily reduced because of the availability of water rather than the quality of water. An average daily minimum requirement of water per person for drinking and basic hygiene is estimated at thirty litres.<sup>3</sup>

From different sources it can be said that inadequacy of water supply is a problem for the city dwellers. It is

- 
1. EKISTICS, Ibid. page - 5.
  2. Vithal C. Deskmuni .., "give us Rain ! give us water !" The Illustrated weekly of India Vol. c.11 20, June 7-13, 1981 P.10.
  3. "Impact of community water supply", Bangladesh Observer, May 8, 1982.

mainly due to demographic pressure and inequities in the design of large scale water and sewerage projects, which usually exclude the needs of squatters and slum dwellers.<sup>1</sup>

In Dhaka city the supply is highly inadequate and irregular in relation to the demand of its consumers. For this purpose a huge amount of water is needed to meet the increasing demand of the rapidly growing population.

#### 1.2.0 NEED FOR THE STUDY

The impact of urbanization is felt more intensely in major cities of the country. Specially service facilities of these cities could not be expanded to tackle the rapid population growth. As a result it was not possible to meet the minimum service facilities for the citizen. Dhaka city therefore rightly experiencing continuous deterioration of service facilities especially for slum dwellers. They cannot afford the formal employment and basic civic facilities of the city.

The most needed service facility such as water supply needs special attention due to its priority in daily life. According to 1983 estimate, the Dhaka water and sewerage authorities are capable of supplying only eighty

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1. Alan J. New, "Water Dependency and urban poverty"  
Bangladesh Observer, August 18, 1979.

two million gallons of water per day for the population of 3.2 million. It is estimated that only 0.6 million of city population are enjoying adequate supply of piped water at present and rest of the people are experiencing inadequate supply of water, while the situation in low income communities is deplorable.

This situation will be further worsen due to various reasons such as, economic, social, political etc. As such given the rapid population growth and many other constraints in providing water supply to the city dwellers, it is felt necessary that the water supply system of Dhaka city particularly slum dwellers, should be thoroughly investigated. Hopefully the study will be able to suggest improvements or measures for water supply system of Dhaka city specially low income communities under the constraint of rapid population growth.

#### 1.3.0 OBJECTIVES OF THE STUDY

The above discussion of the study essentially focusses on the search for a rational water supply system in the slum areas of Dhaka city which could be visualized under the necessary provision of water supply facilities. The conceptualization of the water supply problem in the slum as such sets the following specific set of objectives.

- i. to findout the Socio-economic characteristics of the survey area in relation to 7 sources of water supply,

types of water connection, choice of water connection etc.

- ii. to assess the role and performance of different organization or agencies towards the improvement of water supply and physical environment of the slum areas.
- iii. to findout the regional variation of public opinion regarding different aspects of WASA's water supply system in Chaka city.
- iv. to assess the consumer's level of satisfaction in the management of water supply system to be improved in future.
- v. the secondary objective was to study the existing water supply system in Chaka city and the availability for slum dwellers.
- vi. finally, to develop some guidelines which may essentially provide the basis of undertaking any slum development programme relating to water supply.

#### 1.4.0 TOPIC SELECTION

Slums or squatters in urban areas is the most important phenomenon of the large urban centres of the Third World countries. It is closely related with the overall socio-economic environment of the country. The quality of public utilities in most low-income communities are very poor. Municipal tap water is the main source of drinking water, which is

highly inadequate and irregular. And in the morning to evening a long queue is formed for water which is serious and acute problem for the slum dwellers.

For this purpose a systematic study on this related aspect may help to solve the acute problems of the slum dwellers and the whole community as well.

#### 1.5.0 METHODOLOGY OF THE STUDY

For any research work certain methods are followed in different stages. The methods of the study consists of literature survey, data collection and analysis, direct communication and field investigation.

The present research deals with water supply system of slum areas. In order to fulfil the objectives, it was conducted at different approaches, those are as follows:

The primary objective was to assess the role of different organizations and agencies in order to improve the water supply system in low-income communities. To achieve this objectives both primary and secondary data were used. In addition to these, interview was conducted with many experts in relevant fields.

The secondary objective of the present study was to investigate the existing situation of water supply system in Dhaka city. To fulfil this objective data were collected from secondary sources and a detail literature survey was conducted.

#### 1.5.1 Selection of the Study Area:

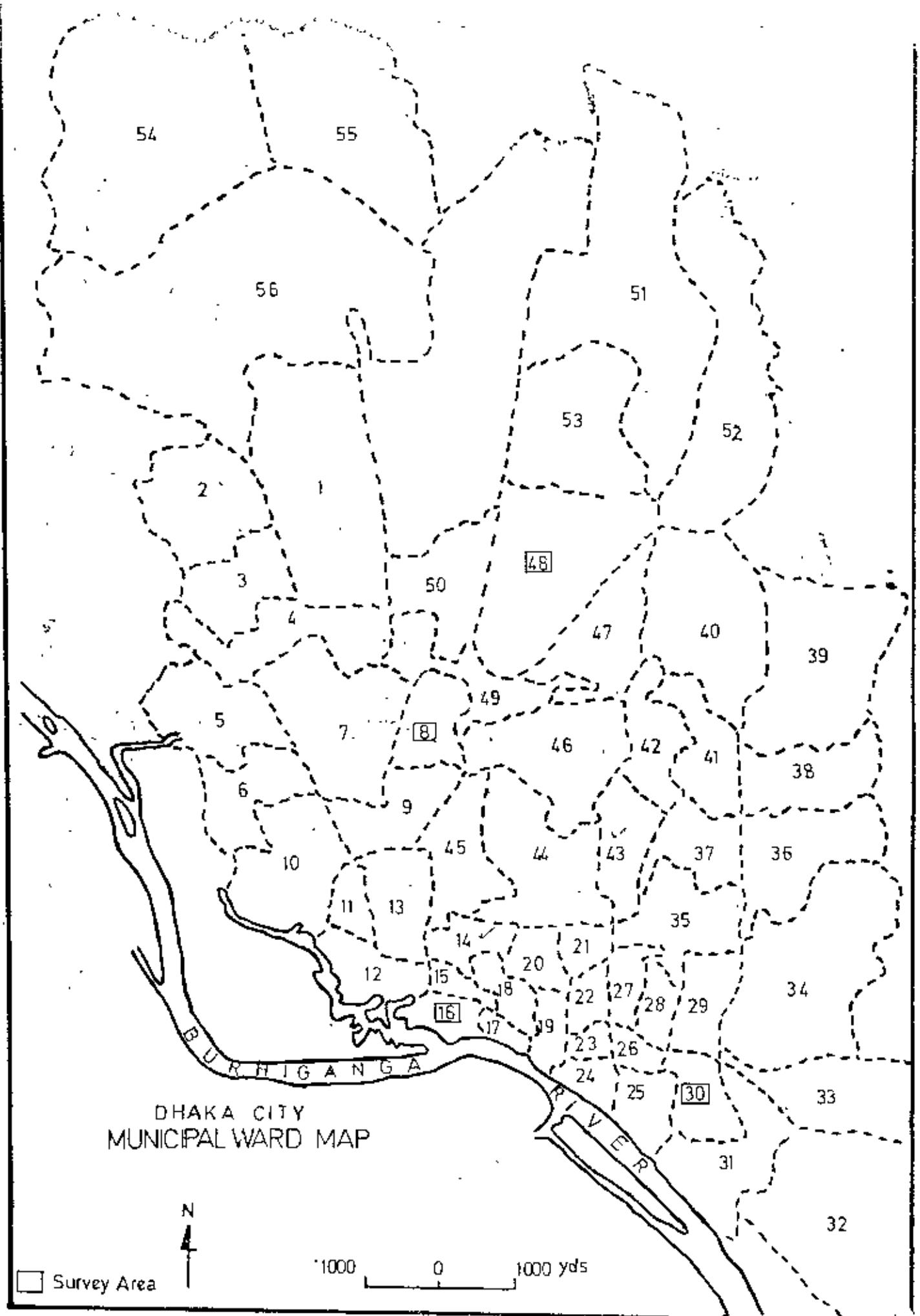
One of the main objectives of the study was to assess the consumers attitude and behaviour towards solving the existing water supply system in the slums. For comparative study, both old and new Dhaka were selected as the study areas.

For the present study four wards of Dhaka were selected. These are Kethal Bagor and Nakhalpara in New Dhaka, Rehmatganj and Nemopara in old part of the city. And these wards falls within ward number eight, fortyeight, sixteen and thirty respectively of Dhaka Municipality.

Before taking up the field survey a preliminary survey of the study area has been conducted. Whether there is any existing supply system provided by either NASA or other organizations was checked.

#### 1.5.2 Sampling of Study Population:

After selecting the survey areas a household survey was considered as the sample study. The number of households in the survey areas Kethal Bagor, Nakhalpara, Rehmatganj and Nemopara were eightyfive, 120,200 and 100 respectively. Forty percent of the households from the survey areas were selected for field survey. On the basis of this, sample households account for Kethal Bagor thirypsix,Nakhalpara fiftytwo, Rehmatganj eighty and Sharafatganj fortytwo.



All together 210 households were taken for questionnaire survey.

#### 1.5.3 Questionnaire Formulation:

To fulfill the objectives of the study a questionnaire was formulated. The questionnaire was prepared in English version, which attached in Appendix - D) Page - 121.

The questionnaire was divided into two major parts. The first part was designed to identify the socio-economic and housing condition. The second part was designed to identify the problems of water supply system, the level of satisfaction and the attitude of consumers and different other related organizations and agencies were consulted. How these organizations have participated in solution or improvement the water supply system in the survey areas.

The questionnaire was structured and pre-coded with multiple choice type of answer. In addition to these, the digit '0' was used for not responded cases and the digit '9' was used for not applicable cases.

#### 1.5.4 Data Cleaning and Processing:

After collecting the date through questionnaire survey and editing these, the data were transferred into diskette and verified for any possible error. After these, the processing were done using the IBM-370 computer at BUET.

1.5.5 A list of Maps and Diagrams were used to examine the system in its space dimension and to see its distribution over the urban space.

#### 1.6.0 LIMITATION OF THE STUDY:

(In a developing country like Bangladesh, it is difficult to findout appropriate information for related research problems. Nevertheless, it is hoped that the study will generate enough interest among the future researchers to improve the problems of water supply system for a low-income communities. Due to non-availability of temporal data, it was not possible to go for comparative study between the present and past situations. Moreover, sector-wise(Old Dhaka and New Dhaka) data or information about the problem were not sufficient.)

The slum dwellers were reluctant to answer the questions related to the problem. Water supply problem could also be examined by the consumption of water, but due to time and resource constraints this could not be done. Different statistical analysis were carried out to explain the relationship between the income and types of water connection, or income and level of satisfaction as for example.

#### 1.7.0 CHAPTERIZATION OF THE PRESENT STUDY

The research has been comprised in six chapters. Chapter one includes an introductory note on the importance of

water supply system in the context of third world countries. Significance , objectives and methodology of the study are also dealt here. The second chapter deals with the physical characteristics of the study area. Demographic and socio-economic characteristics of the study area is discussed in chapter three. A brief review of studies on water supply system in Dhaka city is discussed in chapter four. Attitude and opinion of the people regarding water supply is analysed in chapter five. Chapter six , that is final chapter deals with the summary of the study and recommendation for improving the existing supply system of the study area. Maps, diagrams and charts are also attached in this report. A general bibliography and appendices are given at the end of the thesis.

## CHAPTER - II

### 2.0.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

#### 2.1.0 INTRODUCTION

Slums and squatters are the most common and significant phenomenon of the rapidly growing large urban centres of the third world countries and nearly about one third of the urban population dwelle in them. According to recently survey carried out by United Nations Children Fund(UNICEF), from fifty to seventy five percent of the urban population in the third world cities are living in the slums.<sup>1</sup>

A recent census counts and estimates that, in Developing world the cities are growing at double the growth rate of National Population. By the year 2000 two thirds of the urban population of the world will be living in the less developed countries.<sup>2</sup> As a result these cities have had neither time nor resources to adjust their infrastructure, housing and even their jobs to satisfy the needs of a population. These situation mainly due to rural-urban migration which is known as push-pull factor. Most of the immigrant are poor and ultimately find their houses in

- 
1. "Cities and Slums" Editorial, The Bangladesh Observer September 14, 1982, Dhaka.
  2. United Nations, World Housing Survey 1974, United Nations, New York, 1976, P. 28.

squatters settlements. As a result, overcrowding and homelessness remain a perennial problem in the City.<sup>1</sup>

(In the case of Dhaka about 730,000 population are living in the slums and the total area covered by these slums is approximately 600 acres.) More than sixty percent of Bostees are located on low land with poor drainage facilities. Most of these are located along the rail line, roads and marshy land. Maximum of these have been constructed after the liberation period. But a significant proportion of Bostees were found in early sixties. But the location of Bostee areas are more or less near to the place of employment.

The rapid increase of slum population creates problems for the city dwellers as well as the total society, which is associated with planning problems in Dhaka and other major urban areas of Bangladesh.

(The slum problem, on the other hand is basically a problem of the attitudes and behaviour of people and of the indifference of the community to the neglect and the victimisation of the underprivileged."<sup>2</sup>)

1. Monara Begum, "Squatters Rehabilitation Programmes in Dhaka City: An evaluation and Recommendation". An unpublished MURP Thesis, BUET, Dhaka, Sept. 1981.
2. Centre for Urban Studies, Slums in Dhaka City, (Dhaka: Centre for Urban Studies), June , 1982, P.5.
3. Marshall, B. Clinard., Slums and Community Development: London: Collier Macmillan Limited. P.6.

As regards, Nealey reports on a document

"..... every community of more than 50,000 people is likely to have an area of multiple deprivation. These areas, already suffering from bad housing, tend to have the worst of everything else. They have poor services, bad education, high unemployment and delinquency rates, ill health and bad communication with local and central government".<sup>1</sup>

#### 2.2.0 LANDUSE OF THE STUDY AREA

##### KATHALBAGH SLUM

Among the different slum areas, Kathal bagan is one which is known as "Lekhy Bari Bastee". It is located adjacent to a high class residential area of New Dhaka. This area is enclosed by Free School Street(South) and Crescent Road. The houses are built on high land which is surrounded by low land in the North East. The other two sides are attached with high and middle class residential areas and commercial shopping establishments. The area is developed in an unorganized way.

Housing conditions are poor, too small in size and very congested in the pattern. No uniformity have been maintained in the pattern of slum-housing. This is obviously not helpful to good environment for living. Different

1. A. Foludi, A Reader in Planning Theory, Oxford: Pergamon Press 1973, p. 251.

commercial activities and shops are found within and outside the area. Education and recreational facilities are not available for slum dwellers. The road layout is irregular and narrow. The maximum width of lanes and by lanes are four to eight feet. Moreover these lanes are kutchas in nature. Different service facilities are not available in the area. For example water supply system is inadequate and no water taps have been set-up within the dwelling houses. One single tap is usually used by a large number of family and the inadequacy in the supply of water creates hardship for the slum people. Other service facilities such as sewerage and garbage disposal facilities are also inadequate. The overall environmental condition is not satisfactory. Moreover the depressed land creates very unhygienic and unfavourable atmosphere for living in Kathal Begon slum.

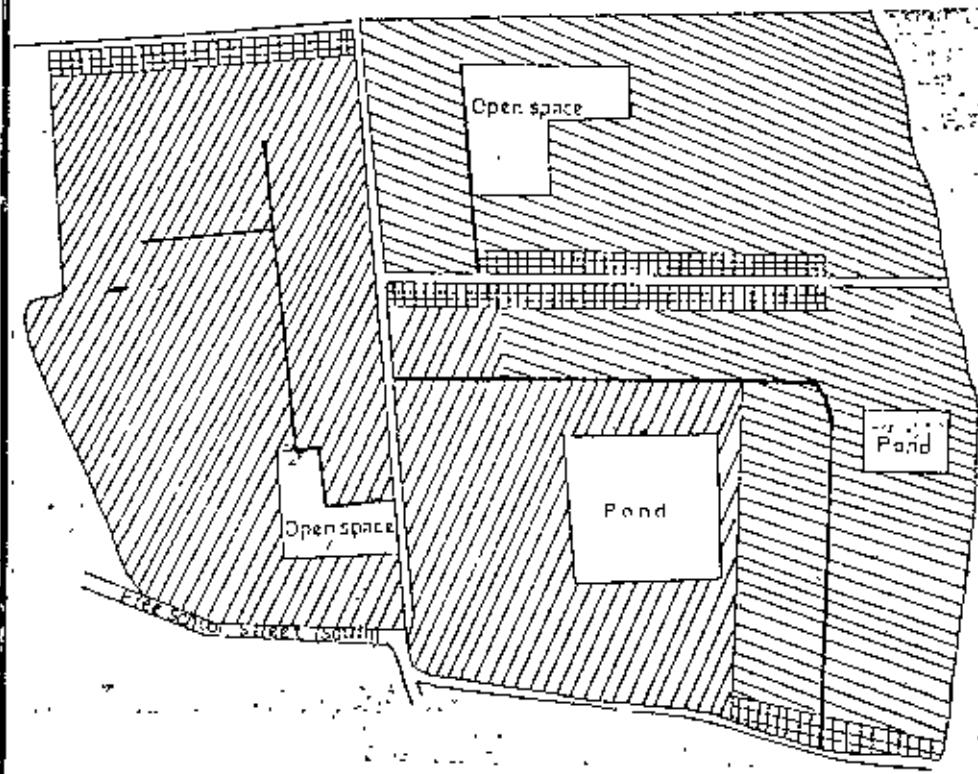
#### NAKHAPARA SLUMS

The study area in Nakhapara is also located in New part of the city. It is mainly mixed area. The location is about one mile on the north from light industry and besides the railway line that passes through Nakhapara. This slum area is relatively low than its surrounding residential and commercial areas.

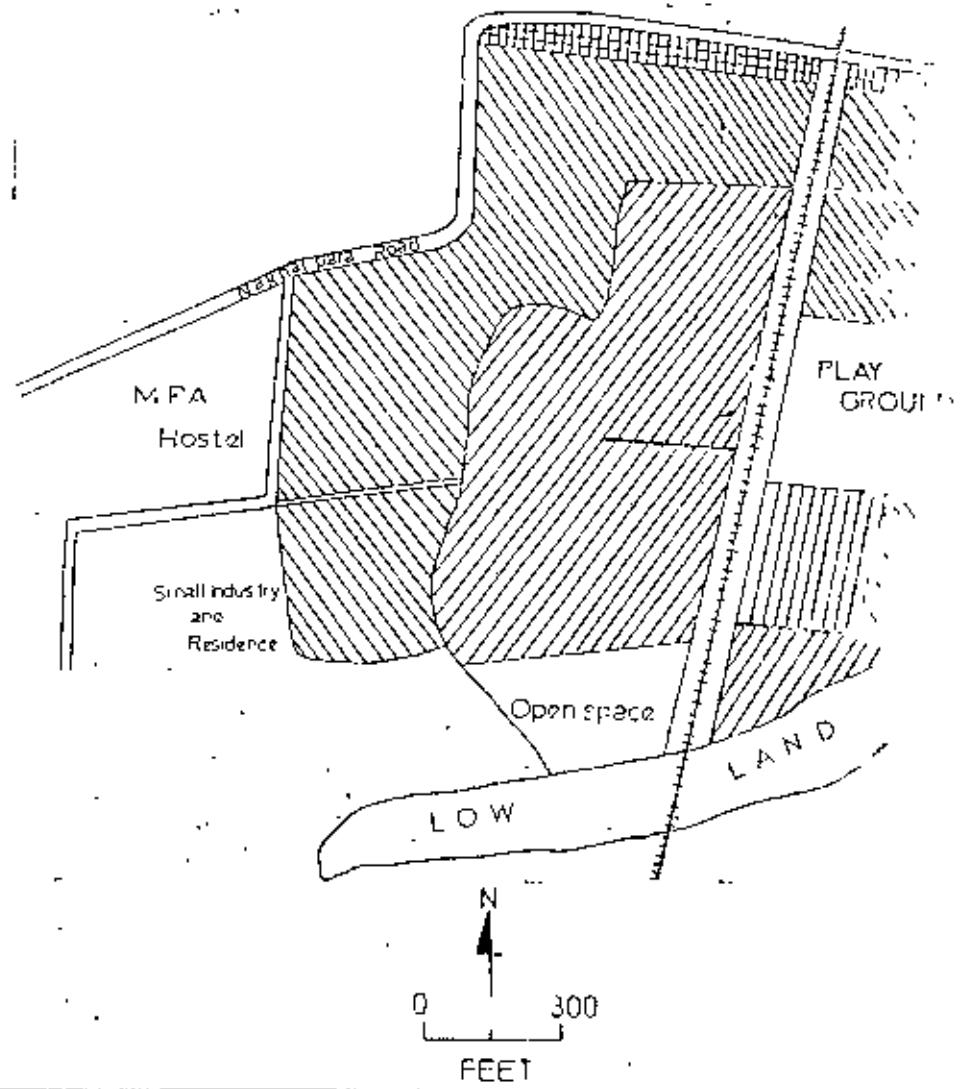
Figure 2

## LANDUSE MAP

KATHALBAGAN



NAKHALPARA



Slums



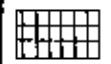
Bazar



Middle class residence



Road (kutcha)



Shops



Rail line

The environmental and housing conditions are comparatively poor than its surrounding areas and developed in an unplanned way. A large number of people inhabited now in this slum. The housing pattern is linear but congested, there is no space between two houses and the little space available in the front of each houses for the movement of people. The internal roads are kutchha in nature and street lighting facilities are quite inadequate. There are no fixed place of garbage disposal facility of the municipality. Small shops and kutchha Bazar are found within the locality. Education and other recreational facilities are not available both within and outside the area. Drainage system is very poor and inadequate. In such situation, the drains are again in most cases open and not properly cemented every where which creates bad smell all the time and spreads mosquitoes and other uncleaned insects. The water supply system is very ordinary and according to the slum people it cannot meet up their day to day need for water. Moreover the taps are fewer in numbers which at the busy hours make long queue. These poor drainage arrangement and inadequate supply of water has created unhealthy and polluting the slum environment.

#### RAJHATGANJ SLUM

It is situated in a most important part of old Dhaka which is the most congested with the complex range of

settlement patterns. It is located near a depressed land filled with vast collection of waste after creating unhealthy and unhygienic condition in the area. This area is enclosed by water works road, Rehmatganj Road and Playground. This area has developed in an unplanned way which is the main characteristics of old Shaks.

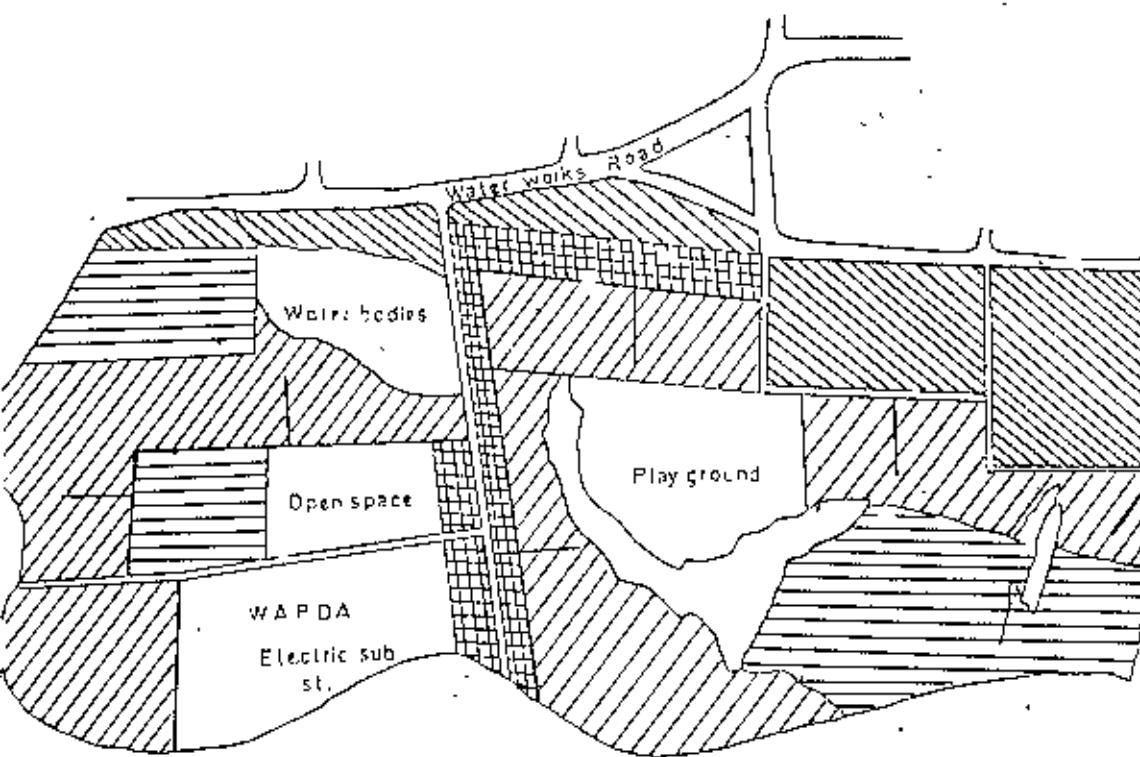
Social services are inadequate but the commercial and small scale industrial enterprise appear to be flourishing within and outside the locality. The houses are in most cases arranged in rows and in some others the houses are irregularly built. Recreational facilities are not available in the area except playground. The garbage disposal and street lighting facilities are inadequate. Roads are narrow and congested but pucca in nature. The surroundings of the slum is not bad comparatively than that of other areas, but the presence of water bodies now being used for waste deposition also is obviously a source for the existence of unhygienic condition within the slum area.

#### SHARAFATGANJ SLUM:

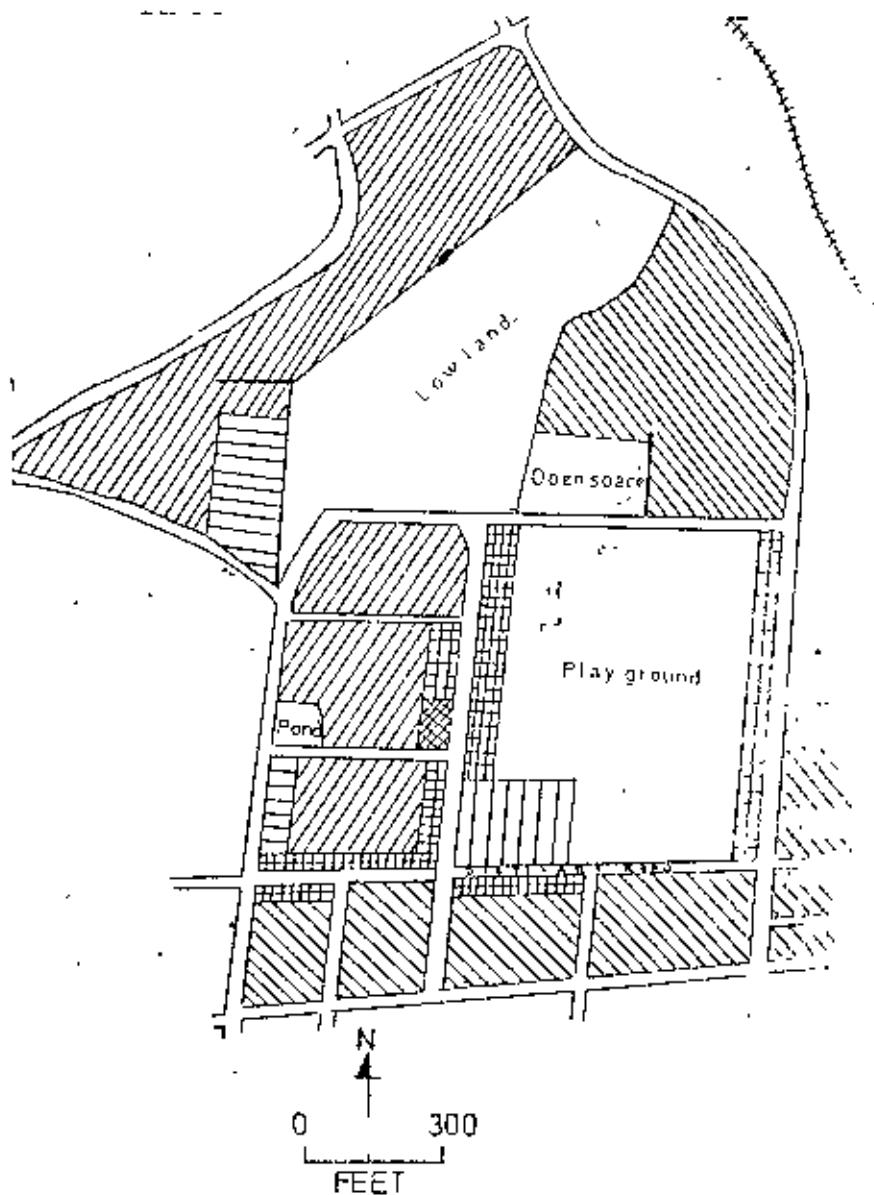
Sharafatganj is one of the two sample areas located in old part of the city. This is also known as "Namepara slum". The location is about two and half mile from

# LANDUSE MAP

**RAHMATGANJ**



**NAMAPARA**



Slums	Industry
Middle class residence	Road(kutcha)
Shops	Rail line
Bazar	

0 300  
FEET

Sutrapur (ham) and opposite to Dupkhola maidan. The slum is located on slope land surface with frequent undulations which causes water pressure to be lowered in places reducing the supply of water.

Housing condition in Nempara is a bit better than the Nekhalpara and Rahmatganj slums. Structural composition are mixed and poor in nature. Housing pattern is linear and too small in sizes. Shops and small commercial activities found within and outside the locality. Street layout is quite better than that of other slum areas which is pucca in nature. Recreational facilities are not available within the locality. Other service facilities are more or less same as other slum areas. There is no fixed spot of garbage disposal. Lighting facility is little better. People of this slum are fortunately opportunized by WASA storm sewerage connection but demoralised by bad circulation and defective maintenance of water supply system. The problems are acute in some part of the slum due to inadequate supply of water and lesser number of water taps. A single water tap is used by an unmanageable number of families. Drains are not appropriately constructed and openness of these drains has been a reason to pollute the slum environment by disagreeable odour from the hub of waste accumulation. It has been conceived from the intuitive approach of field observation that housing regulations are either lacking or not

properly maintained in the slum and this has slackened the water supply system as an evolved problem from others.

#### 2.3.0 HOUSING CONDITION

Housing is an important component of urbanization. Perhaps the most distinguishing feature of all primate cities of the third world is urban explosion. In developing countries the concept of housing is the residential environment not just the dwelling unit. A housing includes community facilities and services such as water supply, sanitation and transportation etc. The population of South Asian cities are growing at a frightening rate giving a warning signal to the process of urbanization and its attendant crisis of housing. This scarcity is supply of housing caused a serious problem in the urban areas. This situation has been gradually deteriorating due to the rapid increase of urban population in relation to the amount of housing stock. But complete data do not exist to determine the exact nature to this problem, but some indicators are available, which may serve to provide a general idea from the 1973 census. Moreover this research work attempts to reveal some of the housing conditions of the study areas which are directly or indirectly related with the present study of water supply.



### 2.3.4 Ownership of Housing and Rent Structure:

The pattern of house ownership is more or less same in the study area. Majority of the households live as tenants which constitute sixty three percent of the total and twenty eight percent are owner occupied. This group is much higher in new part of the city while the case is exactly reverse in old Dhaka. Whereas most of them are tenants and pay taka between fifty one to hundred as house rent per month. Only 0.95 percent pay more than taka 300 per month.

The slum houses being small and filthy are not expected to draw high rental value but inspite of these house rent are not very low. From the attitude and physical survey it is found that in new Dhaka below fifty taka as house rent is completely absent, where both new and old Dhaka (Nakhalpara and Rabnatganj) also pay more than taka 4300 as house rent which comprises less than one percent of the total and other rental structure more or less same in the study area.

In a mess-housing on average five to ten people are living. They share house rents and other living cost in an organised way. A mess leader (known as manager) collects the money about fifty to hundred taka per head per month as house rent and other charges. This housing system is completely absent in the study area except Kathal Bagan. Besides these, each owner has more than one housing unit and house rent is the second

Table-2.1 Ownership of House

Study Area	Owner	Tenant	Mess	Total
Kathal bagan	17(47%)	5(14%)	19(53%)	36(100%)
Nakhalpara	10(35%)	34(65%)	-	52(100%)
Rahmatganj	16(20%)	64(80%)	-	80(100%)
Nama para	8(19%)	34(81%)	-	42(100%)
	<u>59(28%)</u>	<u>132(63%)</u>	<u>19(9%)</u>	<u>210(100%)</u>

Table 2.2 House Rent structure ( In Taka)

Study Area	≤50	50-100	101-150	151-200	201-250	251-300	300+	*9	Total
Kathal bagan	-	-	7 19.4%	12 33.3%	-	-	-	17 47%	36 100%
Nakhal para	-	13 21.2%	13 26%	7 17.3%	2 3.8%	-	1 1.9%	18 34.6%	52 100%
Rahmat ganj	1 1.2%	28 35%	23 28.7%	6 7.5%	2 2.5%	3 3.7%	1 1.2%	16 20%	80 100%
Nama para	1 2.4%	24 57.1%	5 11.9%	3 7.1%	1 2.4%	-	-	8 19%	42 100%
<b>Total:</b>	<b>2</b>	<b>63</b>	<b>48</b>	<b>28</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>59</b>	<b>210</b>
	<b>0.95%</b>	<b>30%</b>	<b>23%</b>	<b>13.3%</b>	<b>2.37%</b>	<b>1.45%</b>	<b>0.9%</b>	<b>28%</b>	<b>100%</b>

\*9 Not applicable. That means they live in their own house.

Table 3  
source of i.  
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delay the paym  
between  
understanding of  
Architect  
Author 2.2).  
2.3.2 Structural Compositions

House or building types in  
profile. On the basis of build  
classified into different houses

are pucca, kutchha, mixed houses etc. They  
built their structures with all kinds  
which are easily available. Housing construction and design  
are mainly done by the local people. Majority of the houses,  
about ninety two percent have the roof made of tin and 2.0  
percent have pucca materials which only exist in Rajshahi  
and Mymensingh. Bamboo materials mainly used for con-  
struction of walls which accounts 83.0 percent of the total.

Floors are usually kutchha in nature and only few made of  
wood, Bamboo and other materials. Oakholpara only exist in  
this category, because it is comparatively less land than

that of other areas. In this area the plinths are found  
costly raised about two and half foot from the ground level.  
It is mainly due to flood protection during the rainy sea-  
son. Houses are built on bamboo and wooden platforms.

Note: The ISRT shows that about forty three percent of the  
Urban household lived in rental housing system which was  
higher than the national average of 33.6 percent in 1973.  
Urban housing demand survey in Bangladesh, ISRT, Dhaka  
University, 1974.

Naturally owners are supposed to take care of the houses but in the survey area tenants bear the burden of repair and other minor alterations when it is necessary. The condition of both these houses are particularly miserable during the rainy season.

It is observed from the empirical field investigation that structural composition are more or less same among the different sample areas but Kathalbagh is structurally poor and Naarpara slum is little better than that of other areas (Table 2.3).

#### 2.3.3 Living Space and Floor Areas

Fifty percent of the households in Bangladesh are overcrowded and this figure is more acute in urban areas, which comprises about sixty five percent. This overcrowding is reflected in the floor space in a house. The "Percentage of occupied dwellings with three or more persons per room has been selected as a basic indicator of overcrowding".<sup>1</sup> On the basis of this standard, urban houses in Bangladesh are overcrowded and this situation is more acute for slum dwellers, which is usually very small.

The four areas show striking similarities in the distribu-

1. World Housing Survey, opcit, P.43.

Table - 2.4 Number of Rooms for Use

Area	One Room	2+3 Room	Total
Kethalbogen	26(72.23%)	10(27.77%)	36(100%)
Nakhalpara	27(51.9%)	25(48.1%)	52(100%)
Rehmetganj	42(52.5%)	38(47.5%)	80(100%)
Nempara	29(69%)	13(30.9%)	42(100%)
<b>Totals</b>	<b>124(59.05%)</b>	<b>84(40.95%)</b>	<b>210(100%)</b>

Table - 2.5 : Floor Area of the House( in. sq. mt)

Area	-10	11-20	21-30	31-40	41+	Total
Kethal bagen	20(55.5%)	6(16.7%)	0(22.2%)	2(5.6%)	-	36(100%)
Nakhal para	18(54.6%)	12(23%)	10(19.2%)	8(15.4%)	4(7.7%)	52(100%)
Rehmet ganj	44(55%)	22(27.9%)	10(12.5%)	4(5%)	-	80(100%)
Nempara	32(76.22%)	8(19%)	1(2.4%)	1(2.4%)	-	42(100%)
<b>Totals</b>	<b>114(54.3%)</b>	<b>48(22.8%)</b>	<b>29(13.8%)</b>	<b>15(7.2%)</b>	<b>4(2%)</b>	<b>210(100%)</b>

tion of floor space. Among these, Nenepara seems to have more of the small structure and most of them live in a single room house, which constitute sixty nine percent of the total.

Each room is used by single family in general which is more than five members. They live together but some on bed and some on the floor, and these single rooms are used for sleeping, cooking and entertainment too.

In new part of the city, Nakhalpara is comparatively better than others. About sixty five percent have more than ten sq. mt. floor area and the maximum living space or floor area(more than forty sq.mt.) also exist in this area. It is also evident from sample survey that floor area decreases in relation to the number of household in old part of the city while the inverse relations are found in new part of the city (Table 2.4 & 2.5).

#### 2.3.4 Plot Size of the Study Area:

According to housing census of 1973, about ten to twelve families live on three katha of land and the number of persons per family was eight to twelve persons. On the basis of this, we can calculate that about 144 persons lived on three katha plot. From the above findings it appears that the slum housing are not only structurally poor but they also lack in adequate plot size, which are the causes of congestion or overcrowding.

Table 2.6 Plot Size ( In sq.mt.)

Area	-10	11-20	21-30	31-40	41-50	50+	Total
Kathal Bagan	10(50)	10(27.8%)	6(16.7%)	2(5.5%)	-	-	36(100%)
Nakhal Para	-38(73%)	6(11.5%)	3(8%)	2(3.8%)	2(3.8%)	1(.9%)	52(100%)
Rahmatganj	54(67.5%)	18(22.5%)	8(10%)	-	-	-	80(100%)
Nama Para	32(76%)	8(19%)	2(5%)	-	-	-	42(100%)
<b>Total</b>	<b>142(67.6%)</b>	<b>42(20%)</b>	<b>19(9%)</b>	<b>44(1.9%)</b>	<b>2(0.9%)</b>	<b>1(.5%)</b>	<b>210(100%)</b>

In the survey area plot size varies from below ten sq.mt. to more than fifty sq.mt. But this figure does not represent the prevailing condition, where 67.6 percent of the total households have areas below ten sq.mt. and only 0.5 percent have over fifty sq.mt. plot size. The average plot size of the study area are extremely small and not more than fifteen sq.mt. In Kathalbagan slum, fifty percent households have less than ten sq.mt. plot, while the corresponding figures for Nakhalpara, Rahmatganj and Nama Para are seventy three percent, 67.5 percent and seventy six percent respectively (Table 2.6).

A significant relationship between size of the plot and location of the area exist. The survey area also reveals that in New Dhaka larger plot sizes exist (more than fifty sq.mt.) which is less dominant in old part of the city.

## CHAPTER - III

### 3.03) DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

The population composition or the population structure refers to those aspects of population which may be measured.<sup>1</sup> These are age, sex, marital status, religion, household and family size, migration etc. And the socio-economic characteristics can be determined by occupation, income, literacy and level of education etc.

It may be noted here that population of all study areas are muslims.

#### 3.1.0 DEMOGRAPHIC CHARACTERISTICS

##### 3.1.1 Age-Sex Structure

Age is the one of the most fundamental characteristics of any population distribution. It is also an important factor in the trends of the crude death rate and crude birth rate. For an overall view of the age-sex composition, the age groups are divided into eight. Out of the total population 40.49 percent are below fifteen years of age, of which 20.52 percent are male & 19.97 percent are female. The distribution of age group also indicate that in new part of the city having lower share(14.25 percent) of the age group 0-14 and in old part having high share(26.24 percent) of the same.<sup>2</sup>

- 
1. John I Clarke. "Pattern of population composition", Population Geography, Oxford Pergamon Press, 1970., P.62.
  2. It has been noted here that in Kathalgagan slum about 55.55 percent of the total are mass holding. For this purpose children aged under fifteen years are lower than others.

## AGE-SEX STRUCTURE

(Total Survey Area)

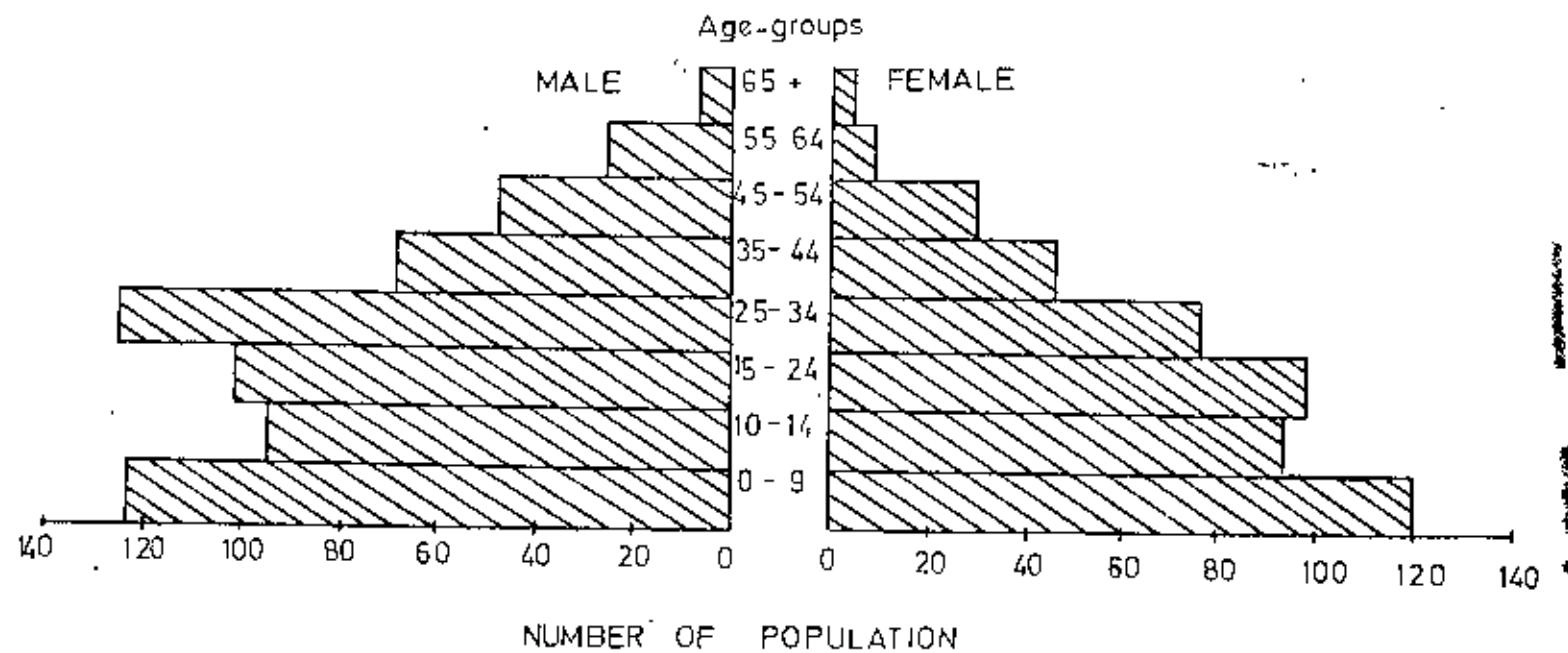
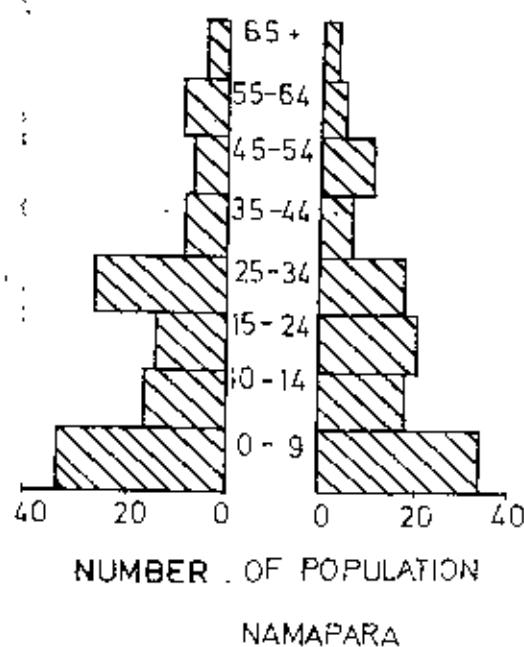
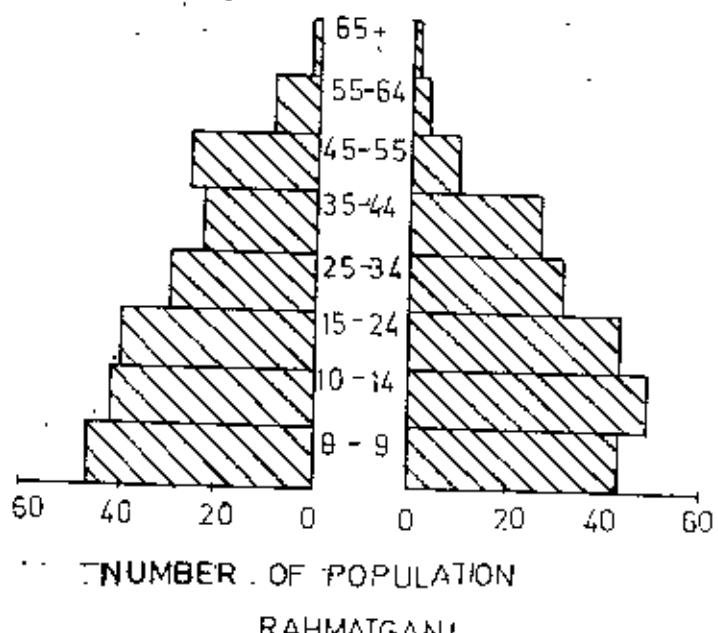
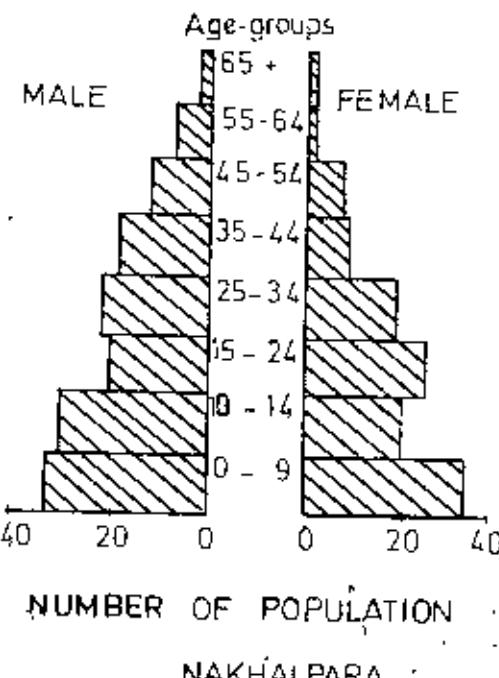
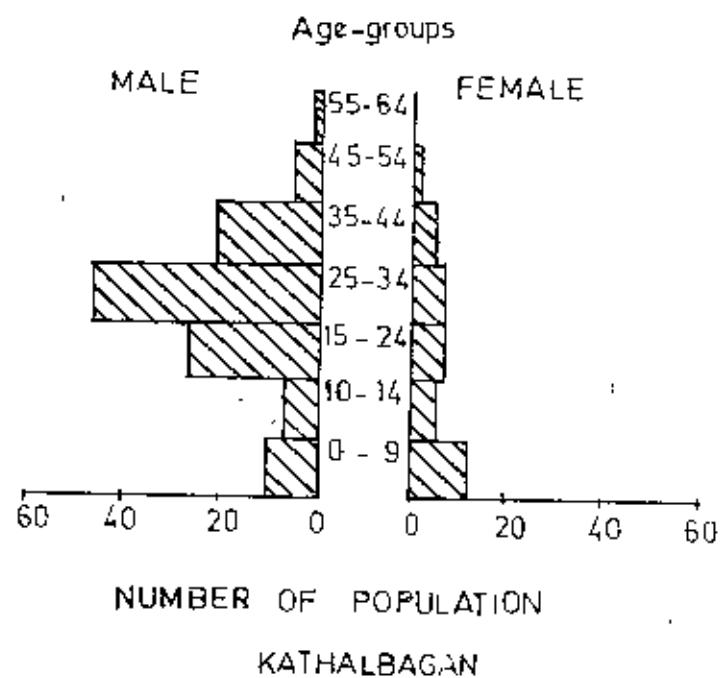


Fig-4

FIG.-5

## AGE-SEX STRUCTURE



Naturally fifteen to fifty nine or fifteen to sixty four years are known as adult age group. This age group is most productive and support the bulk of the other two groups infants and the aged group. This group constitute 58.39 percent of the total.

The aged group sixty five and over are more or less absent in the survey area. It constitute only 1.12 percent of the total and it is totally absent in Kathalbagan. Nonapara slum constitute higher percentage than that of others of which 1.74 percent male and 1.32 percent female.

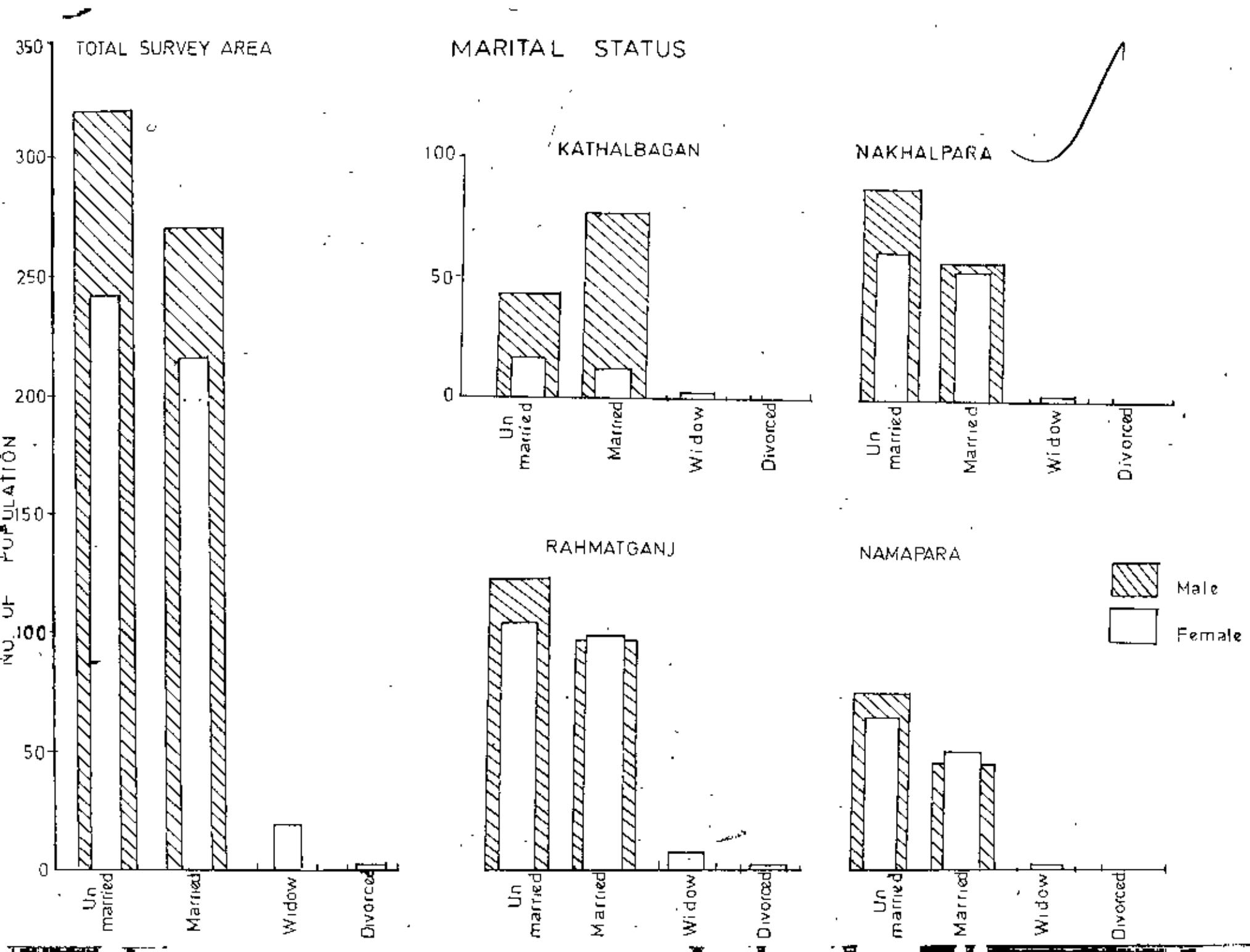
It is also evident from the questionnaire survey that male ratio is higher than female, e.g. 125 males to 100 females. It is possibly due to migrants are largely male (Appendix-A, Table-1).

### 3.1.2 Marital Status:

An overall view of the marital status is that out of the total population 53.23 percent are unmarried, 45.30 percent married, 1.31 percent widow and only 0.09 percent divorced.

From regional perspective 58.44 percent are married in Kathalbagan of which 49.35 percent are male and only 9.09 percent female.<sup>1</sup>

1. In Khalebagan slum most of them are mess holding, most of them are married and their family lives in the village. For this purpose male married persons are higher than female.



The percentage of male-female married persons are more or less same in both Nekhalpara and Rahmatganj. But unmarried male population are higher than female, which constitute 33.21 percent in Nekhalpara and twenty nine percent in Rahmatganj. On the other hand in Nemepara married females are higher than males; Male married constitute 18.78 percent and female constitute 21.4 percent of the total.

From the sample survey it is quite evident that percentage of male married are higher (25.30 percent) than married female and unmarried male are also higher than unmarried female (Appendix B, Table-2).

### 3.1.3 Household and Family Size:

As household size is a function of many variables related to culture, social and economic development. It is also an important criteria of measuring the housing condition. The average household size in Bangladesh is 5.8 and the urban household size is 4.52.<sup>1</sup> In the survey area household size widely varies between one member to more than eight members and this variations also exist among the different survey area.<sup>2</sup>

1. Rejiqui Huda Choudhury, "Families, Households and housing needs in Bangladesh" Bangladesh Institute of Development Studies, Dhaka, P.14.

2. Note: For questionnaire survey maximum eight family members has been conducted.

The average household size is 5.1 which is comparatively low than national households size and most of them are single family. In almost all countries, slum dwellers had larger families than did their relatively well off neighbours and they also tended more to band together for economic protection and social intercourses.<sup>1</sup> Out of

Table 3.1 Household and Family Sizes

Area	1	2	3	Size of the Family				Total
				4	5	6	7	
Kathalbagan	-	-	7	10	11	4	-	36 900%
			19.4%	38.9%	30.6%	11.1%	-	
Nakhalpara	-	4	5	7	17	10	6	52 100%
		7.7%	9.6%	13.5%	32.7%	19.2%	11.5%	
Rahastganj	-	3	7	15	20	15	16	80 100%
		3.7%	8.8%	18.8%	25%	18.6%	20%	
Nonapara	-	3	5	4	8	9	6	42 100%
		3.7%	12%	9.5%	19%	21.4%	14.3%	
Total	-	10	24	60	56	38	28	290 100%
		4.8%	11.4%	9%	26.7%	13.1%	13.3%	

the total household 35.20 percent have four members or less and more than five persons constitute 64.8 percent of the total. In Kathalbagan about thirty nine percent have family size of four persons while the corresponding figures for Nakhalpara, Rahastganj, Nonapara are 13.50 percent, Nineteen percent and 9.50 percent respectively.

1. A.A. Loquien, "Squatters and Slum Dwellers", Housing Asia's Billion, Yeh, Stephen H.K. and A.A. Loquien, (eds) • Canada: IWHC 1979, P.60.

It is also evident from the sample survey that in new part of the city generally have lower share (eleven percent) of the family size more than six members and conversely the old part of the city have high shares ( 27.1 percent) of the same ( Table-3.1 ) .

#### 3.1.4 Urbanization and Migration.

"Urbanism is a way of life". Urbanization means the proportion of total population living in urban areas. It also refers to the process of change of residence from rural to urban areas. The level of urbanization in Bangladesh is relatively low when compared with neighbouring countries. The gross rate of urbanization at present is 7.7 percent per year.<sup>1</sup> Hence, the urban population of Bangladesh will double within eleven years and Dhaka will likely reach more than triple its population by the 2000 year.<sup>2</sup> This is mainly due to natural growth of population and Rural-Urban migration. In this respect Migration is one of the main process of urbanization. Rural-Urban migration has an important demographic bearing also, which lead to changes in the fertility and mortality patterns in both the urban and the rural areas.

1. Charles L.Choguill, "Spatial Planning for Urban Development in Bangladesh", Japan: UNCRD, March, 1982, P.2.
2. Ken Oliwale, and Joe Judd, "Urban Development and Urban Basic Services in Bangladesh", Dhaka: UNICEF, P.2.

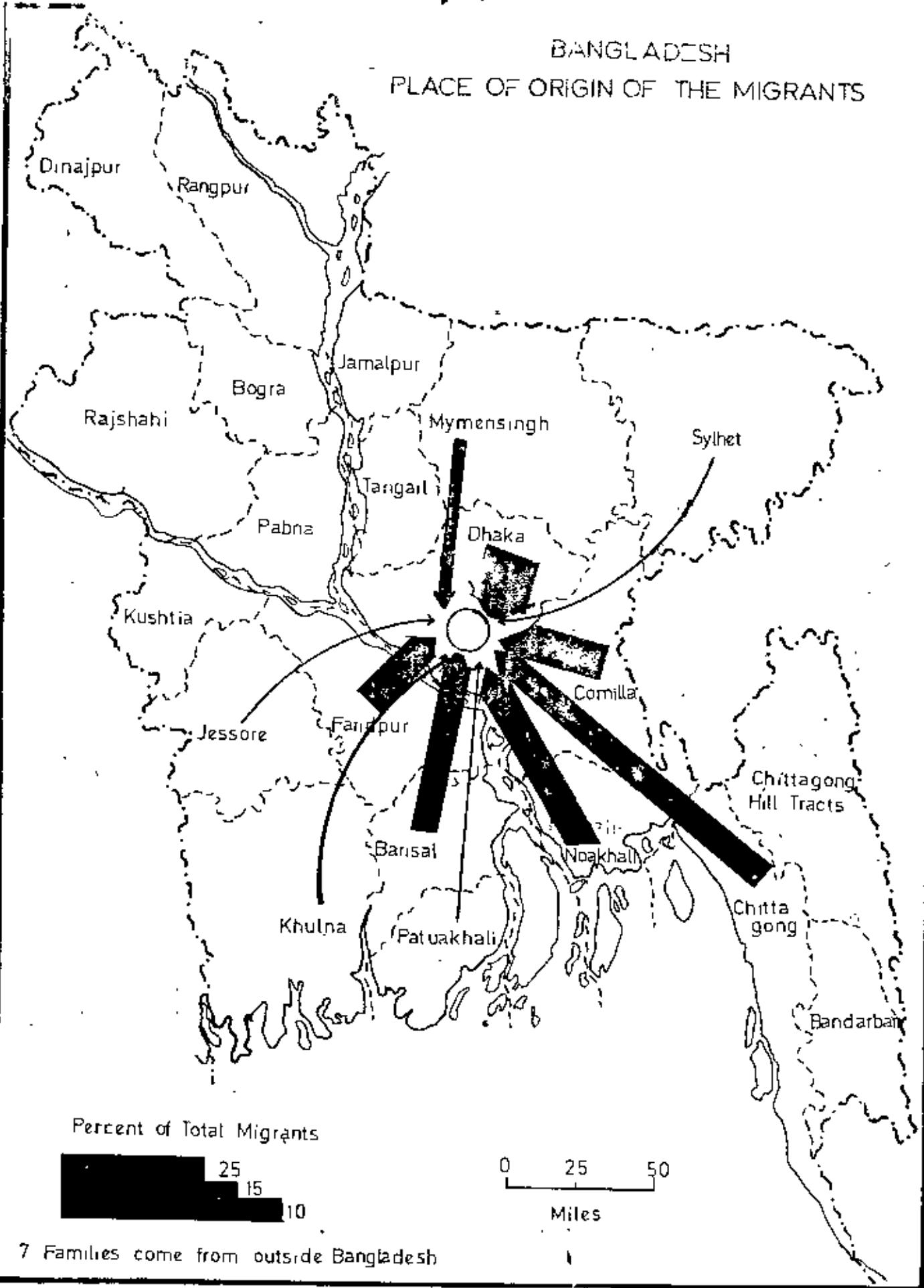
The present study also reveals that overwhelming 88.6 percent of the total households are migrants from outside the city while the rest 11.4 percent have been living in this city since birth. About 54.5 percent of the total households stay in this city below fifteen years and only 28.6 percent lives more than twenty one years. Of which 18.1 percent in old Dhaka and only 10.5 percent in new part of the City (Appendix-A, Table-3 and 4).

#### 3.1.4.1 Place of Origin and Causes of Migration

It is also evident from the sample survey that the migrants of slum areas have originated from eleven districts out of twenty one. Dhaka district contributed more important, about twenty three percent of the total migrants have come from this district which is the first position in ranked order, followed by Comilla district.

The Rural-Urban migration is determined by income disparity between the two sectors. The main causes of migration are related to poverty and unemployment. Those two causes are more or less same in the total survey area except Kathalbagan, which constitute sixty seven percent to unemployment while the corresponding figures for Nekhalpara, Rahmatganj and Nonapara are fifty percent, twenty five percent and nineteen percent respectively (Appendix-A, Table 5).

BANGLADESH  
PLACE OF ORIGIN OF THE MIGRANTS



7 Families come from outside Bangladesh

It is also evident from the sample survey that majority of the Households (82.8 percent) will stay in this locality, 11.9 percent will go to another slum or locality and only 5.7 percent will go back to their own villages. The main causes are inadequate water supply and rent is high(appendix- A, Table 6 and 7).

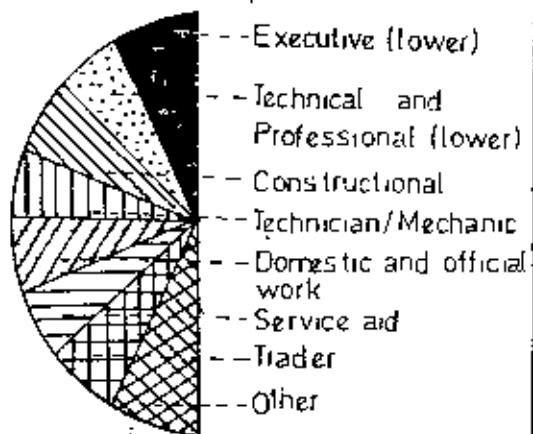
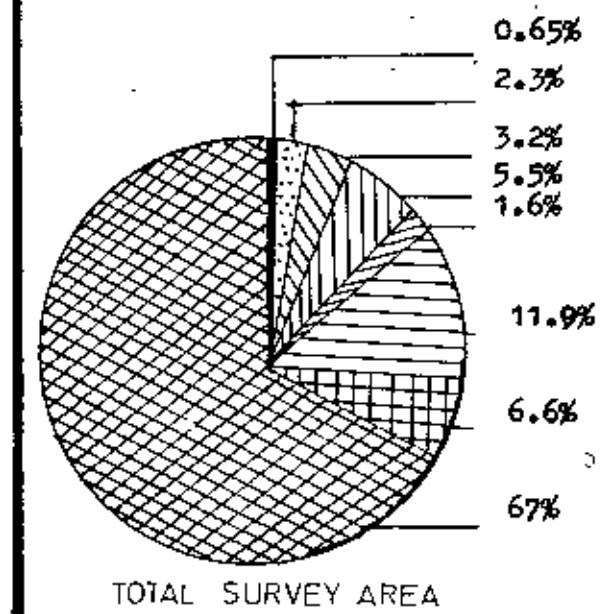
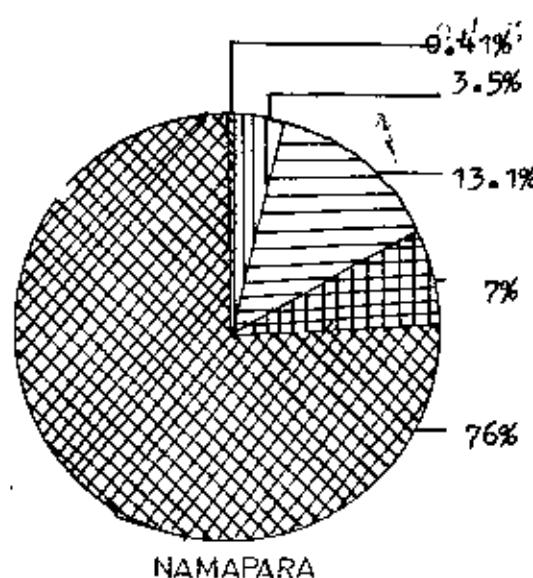
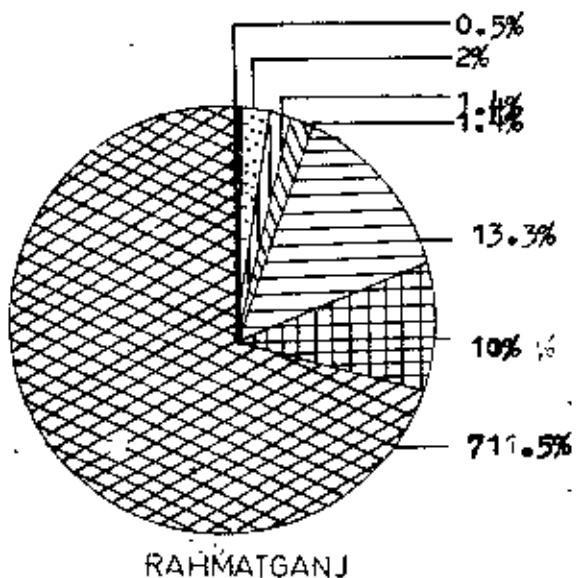
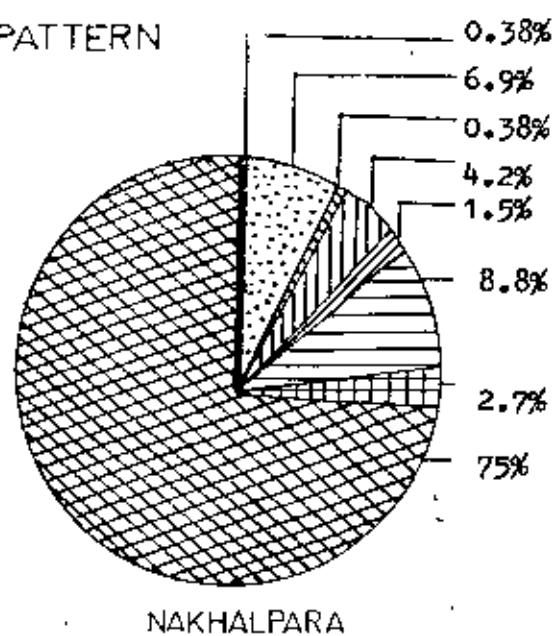
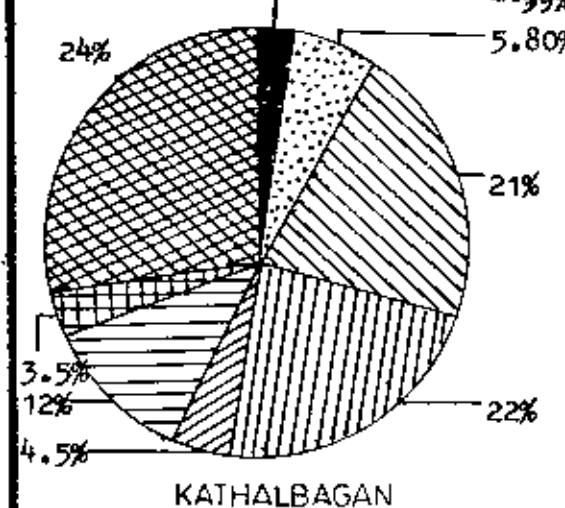
### 3.2.0 SOCIO-ECONOMIC CHARACTERISTICS

#### 3.2.1 Occupational Pattern of the Study Area

Occupation is also an important determinant of social status of a person. Different types of occupation found in the survey area. On the basis of broad occupation group, occupation pattern of the study population has been conducted. The proportion of service and occupation group is higher than other, which constitute about twelve percent of the total. The next occupation group is trader which constitute 6.6 percent of the total (Appendix-3(Table-8)).

Occupational pattern varies among the different survey areas, for example in Kathalganj, Technician and Mechanic occupation constitute twenty two percent while the corresponding figures for Nakshipara, Rahmatganj and Nampara are 4.2 percent, 1.4 percent and 3.5 percent respectively. It is mainly due to ownership and most of them are engaged in this occupation type.

## OCCUPATIONAL PATTERN



It also reveals that in old part of the city service aid and Trader occupational group are much higher and conversely the survey areas of New Dhaka have lower share of the same. On the other hand constructional and Technician/Mechanic occupation type have high share in new part of the city and the reverse condition exist in old part of the city.

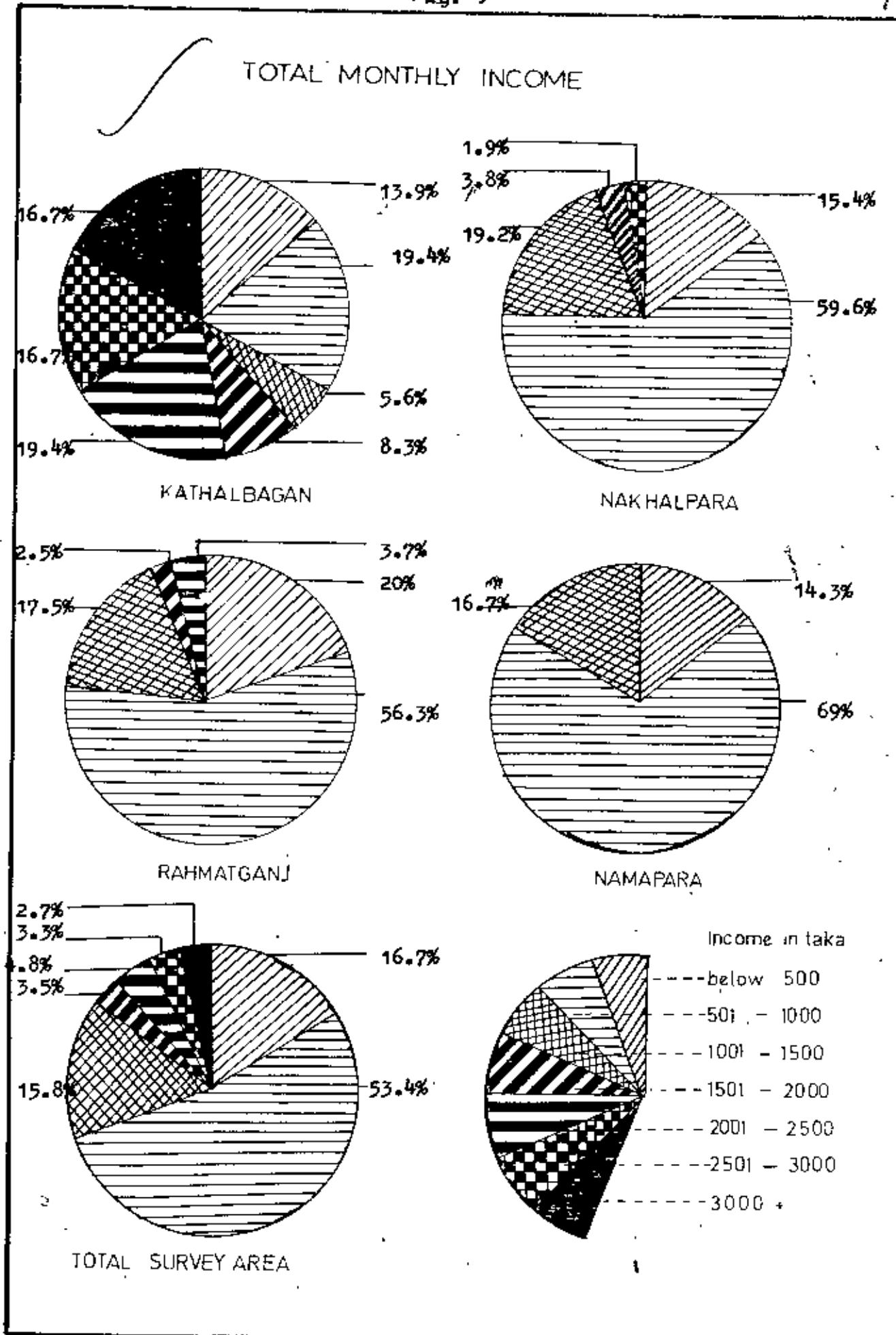
### 3.2.2 Total Monthly Income of the Family

Income is the most important factor in assessing social status of a person. It is also an important variable in the context of housing. The characteristics of slum and squatters are very low monthly income, which reflects their poor standard of living. The average monthly income of the survey areas is almost same except Kathalbagan.<sup>7</sup>

In old Dhaka majority of the households have monthly income below Tk.1000 per month, on the otherhand in new part of the city comparatively lesser number of households have the same. Another aspects also reveals that in old Dhaka Nasipora slum has comparatively lowest income

1. Out of the total households thirty six are taken from Kathalbagan slum. Of these eighteen are household. That means about six to eight persons live together and eat out of a common kitchen. Whether they are married or unmarried and their family lives in the village. Manager is the Head of the household. They submit their meagre allowance to the manager. Some of them send money to their family who live elsewhere and most of them send money only once a year. In such case the total monthly income are calculated jointly. For this reason in that area the monthly income is quite high than other areas.

Fig. 9



people. About 83.3 percent of the households have a monthly income of less than Tk.1000 and only 16.7 percent have income more than Taka 1000 per month. It has been observed from the questionnaire survey that most of the slum people have a secondary occupation to improve their standard of living(Appendix-A, Table-9).

### 3.2.3 Pattern of land ownership

Slums are inhabited by poor people. It is expected that, they have no land or house on which they live. But some people have a piece of owned land even in this city or outside the city.

Table 3.2 : Ownership of land

Area	In this city	Another city	In the villages	No land	Total
Kathal-bagan	-	-	27(75%)	9(25%)	36(100%)
Nekhalpara	4(7.7%)	2(3.8%)	35(67.3%)	11(21.2%)	52(100%)
Ratnai-ganj	2(2.6%)	-	39(48.7%)	39(48.7%)	80(100%)
Nesapara	-	-	14(33.3%)	28(66.7%)	42(100%)
	6(2.6%)	2(0.9%)	115(92%)	87(6.7%)	210(100%)

It has been further observed that most of the households are migrants and most of them have a piece of land in their own in villages or districts, which constitute ninety two percent of the total. Only 2.8 percent of the total households have

own land in this city and 4.7 percent have no land or houses in this city or elsewhere, they are purely slum people or bastuhara( Table-3.2).

Among the different survey area it is revealed that in both new and old Dhaka(Kathalbagan and Namapara) some of them have no land or house in this city or another city. On the other hand Kathalbagan slum is little better, exactly three fourth(seventy five percent)of the total households own a piece of land in the village and conversely the Namapara slum have no land or house in the village of the same percentage.

#### 3.2.4 Literacy and Level of Education:

Slum dwellers are usually not only uneducated but also largely illiterate. The present study reveals that both literacy and level of education are quite low among the study population. Forty seven percent of the study population above five years of age are illiterate and only 30.6 percent have an education upto primary levels. Another major group have extended upto the secondary school. Most of the students are enrolled in Primary school and comparatively lesser number of students are attending secondary school or college(Table-3.3).

Among the different survey areas it is revealed that old Dhaka have high share of the illiteracy rate and conversely the new part of the city have lower share of the same. On the otherhand in Kathalbagan no population have received

degree level education while the corresponding figures for Nekhalpara, Rahmatganj and Nemopara are 0.8 percent, 0.2 percent and 0.4 percent respectively.

Table 3.3 : Literacy and level of Education

Area	Illiterates	Primary	Secondary	S.S.C.	H.S.C.	Degree No Ed.	No. of Ed.	Total population
Kethalpara	64	96	16	5	4	-	9	154
	(14.6%)	(36.4%)	(10.4%)	(3.2%)	(2.6%)		(5.8)	(100%)
Nekharpur	73	97	36	18	4	2	32	262
	(27.9%)	(37.0%)	(13.7%)	(6.9%)	(1.5%)	(0.8%)	(12.2%)	(100%)
Rahmatganj	244	119	18	14	3	1	23	42
	(57.0%)	(28.2%)	(4.3%)	(2.3%)	(0.7%)	(0.2%)	(5.9%)	(100%)
Nemopara	119	99	7	1	-	1	47	229
	(52.0%)	(23.6%)	(3.1%)	(0.5%)		-	(0.4%) (20.5%)	-
	500	326	77	38	11	4	111	1067
	(46.9%)	(30.6%)	(7.2%)	(3.5%)	(1%)	(0.4%)	(10.4%)	(100%)

From the questionnaire survey it is further revealed that the study population have not received the Technical or informal education.

## CHAPTER - IV.

### **4.0.0 THE WASA WATER SUPPLY SYSTEM**

#### **4.1.0 EXISTING SITUATION OF WATER SUPPLY**

The Dhaka WASA was created in 1963 as a semi-autonomous governmental agency. It was empowered to provide potable water supply and waste water disposal service to the greater Dhaka.<sup>1</sup> The authority falls under the aegis of the Ministry of local government, Rural Development and co-operatives(LGRD).

The Dhaka WASA is headed by a chairman, who serves as Chief Administrative Officer of the Authority. He is assisted by a secretariat, a commercial division, and two engineering divisions. The total employee of WASA is around 2105 including professional, clerical and operational personnel.<sup>2</sup>

The area under Dhaka WASA's Jurisdiction has been extended to include the towns of Narayanganj, Demra, Tongi, Joydevpur and a part of Savar. These towns had previously been supplied with water by the Directorate of Public Health Engineering(DPHE)<sup>3</sup>. But at present the water supply net work of the WASA is functioning within the Dhaka Municipal Corporation limit.

- 
1. The Dhaka water & sewerage authorities Feasibility report for the Dhaka Metropolitan Area water supply project, WASA, 1981.,P.4.10.
  2. An Interview with planning Officer, Dhaka WASA.
  3. Shankland Cox partnership, Dhaka Metropolitan Area Integrated Urban Development Project, Dhaka, 1981, Vol.4.P.254.

Dhaka city has an extensive water supply system with a primary net work mains. The supply net works are described as follows:

#### 4.1.1 Deep tubewells and pumping stations

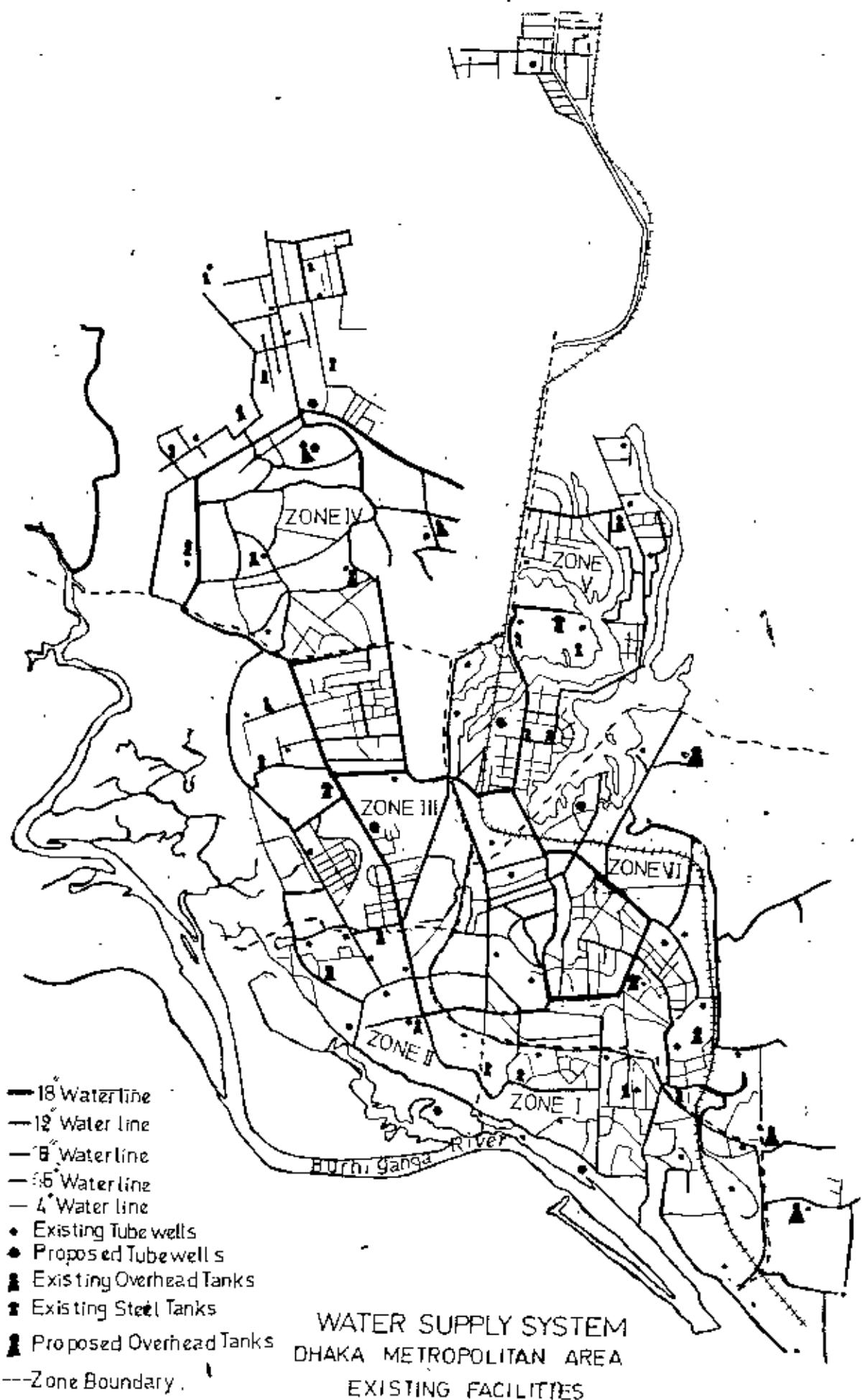
At present Dhaka WASA operates ninety six deep tubewells (April, 1983)<sup>1</sup>. The underground water is drawn by these deep tubewells and pumped to the overhead storage tanks. These tubewells are producing about seventy eight MGD<sup>2</sup> of water which is ninety seven percent of the total.

The average depths of these tubewells varies from 250 to 475 feet, but most of them are over 350 feet deep. The capacity of a tubewell is about twenty five million gallon per minute in Dhaka (Appendix A, Table-10).

#### 4.1.2 Surface Treatment Plants

The only surface treatment plant at Chandnighat, on Buriganga river, was set up in 1976. After treatment, treated water is pumped to the high level reservoirs. This plant is known as "The Dhaka Water Works". At present the production of this plant is about four million gallons per day which is three percent of WASA's production. This production is mainly used for old part of the city.

- 
1. An interview with planning officer, Dhaka WASA, 26-7-1983.
  2. MGD-Million Gallon per day.



Scale=1:166666

### Water Distribution Mains

Dhaka city has a reticular distribution system consisting of 570 miles. The water mains diameter varies from four to eighteen inches. The distribution system is divided into Primary, Secondary and tertiary water mains.

The primary mains bring water from the source within 2,000 ft. of any point of the city. The diameter of this main is eighteen inches. Most of three inch<sup>2</sup> diameter and larger mains are designated as secondary mains and in general any mains less than three inches diameter is classified as tertiary mains. But it has been observed that there is no distinct differences between secondary and tertiary mains, in respect of the function and relative position.

#### Overhead Storage Reservoirs

There are about thirty five elevated reservoirs in Dhaka City with an aggregate capacity of 6.0 million gallons,<sup>1</sup> of these six are out of order.<sup>2</sup> At present Dhaka WASA has twenty nine overhead tanks, of these three reservoirs with a capacity of one million gallons, at Fakirpool, Lalmonirhat and Mohorjhali known as primary distribution reservoirs. And the rest of reservoirs with a capacity of

1. Feasibility Report, Dhaka WASA, Ibid. P. 5.43. 25, 1-5  
 2. An Interview with Planning Officer, Dhaka July 26, 1983

(5)

15000 to 200000 gallons designated as secondary reservoirs.

Tertiary reservoirs with a capacity of 250 to 400 gallons each known as roof tanks (Appendix-A, Table-11).

#### 4.1.5 Service connections and Street Hydrants

According to WASA's records there are 79516 service connections (including 14300 unrecorded or illegal connections) serving about 3.2 million population of Dhaka City, out of these there are about 75753 domestic connections, 1007 for industrial, 1655 for commercial and the rest for the Government and community service connections. It is assumed that all house connections will be metered by the year 1992.<sup>2</sup>

~~Table 4.1 Number of Water Connections March, 1983~~

Sl.No.	Items	Non Govt.	Government	Total
1.	Domestic	71430	4323	75753
2.	Industrial	1007	3	1007
3.	Commercial	1987	68	1655
4.	Govt. office	14	300	322
5.	Community	594	105	779
Total:		74529	4807	79336

Sources: Second Dhaka water supply and sewerage Project,  
March 31, 1983.

1. The term "Service Connections" means the residential as well as industrial and commercial revenue connection. And street Hydrant means stand pipe or street tap.
2. An interview with planning Officer, Dhaka WASA, July 26, 1983.

street hydrants are mainly installed in the street, particularly for those people who are not provided or unable to take separate service connections. At present there are about 1225 street hydrants serving 670,000 persons. These are mainly located in old Dhaka. It is also mentioned here that this figure will decrease by the year 2010<sup>1</sup>.

Besides those, the emergency water carrier are used to meet the emergency demand of water anywhere in the city. There are about ten water carrier engaged for this purpose. The carrying capacity of these carrier varies from 3,000 to 20,000 gallons.

#### 4.2.0 DEMAND AND SUPPLY OF WATER IN RELATION TO THE POPULATION

Water supply facilities in most of developing countries are far from adequate to serve the rapidly growing population. In almost all cities, water quality received little attention and facilities were not properly maintained.

Bangladesh is the eighth most populous country of the world with one of the lowest degree of urbanization. According to the census 1974, Bangladesh had a population of 7,14,79,000 of which urban population constituted 8.70 percent. At present it is eleven percent of the total population.<sup>2</sup> Dhaka is the largest city of the country having population of

1. Interview with Planning Officer, Dhaka WASA, 26-7-83.
2. Bangladesh Bureau of Statistics, the preliminary report on Bangladesh Population Census, 1981.

3.4 million, which constitute about twenty eight percent of the total urban population.<sup>1</sup> This urban population of around nine million by the year 2000.<sup>2</sup>

There is an existing deficiency of water supply to meet the requirement of population. At the rate of forty gallons per head per day about 128 million gallons of water is needed for the city population, whereas the Dhaka water and sewerage authorities are capable of supplying only eighty two million gallons of water per day for 3.2 million population. It can meet only sixty four percent of the total requirements.<sup>3</sup>

Out of the total production sixty five percent are supplied to the new part of the city and thirty five percent for the old part of the city. Particularly low income communities are unsatisfied in general and public hydrants are the major source of water to them.

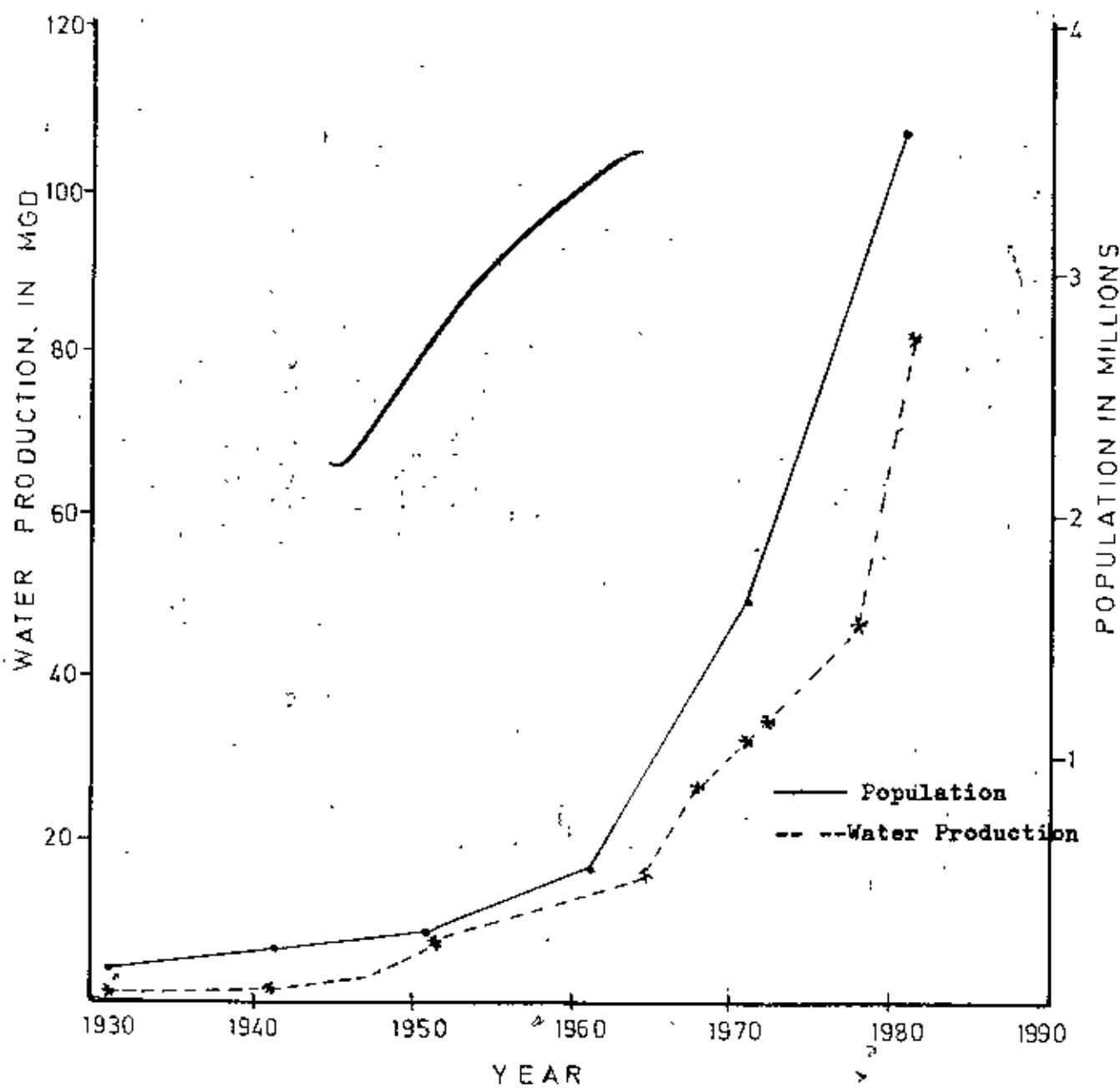
The demand of water supply varies in different sector-Domestic, Industrial and Institutional. Domestic demand is determined by the extent of service connection. Such as, ~~as~~ consumer who use water from the street hydrant is less significant than one who has a tap within a house. More over it varies in between multitap consumers, full service consumers and so on.

- ~~1. Bangladesh Bureau of Statistics, Ibid, P. 22.~~
- ~~2. Shankland Cox Partnership, Dhaka Metropolitan Area, Integrated Urban Development Project, Final Report Vol.I.P.38.~~
- ~~3. Interview with the Chairman, Dhaka WASA, 12-6-83.~~

Fig. 11

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WATER PRODUCTION AND GROWTH OF  
POPULATION IN DHAKA CITY



The industrial demand depends on different types and function of the industry. In 1980, about 3.5 million gallons of the daily industrial demand was concentrated in the densely built-up areas, and this figure could increase to about six mgd. by the year 2010.<sup>1</sup>

Other institutional demand depends on different service facilities such as school, Hospital, Religious Institutions etc. In addition to these, there are numerous demands for parks, cemeteries etc. About 0.10 gpcd applied to the entire population should be adequate to meet these requirement.<sup>2</sup>

The increasing demand of water supply in Dhaka city is due to the rapid growth of population. In 1990 the population of greater Dhaka is likely to rise to 6.4 million and by the year 2010 it may be 10.20 million. The demand for water supply by that time will be 270 mgd. and then 670 mgd. respectively.<sup>3</sup>

With ever increasing number of city's population the demand for water has increased to such an extent which water and sewerage authorities(WASA) can hardly cope with at present. With the implementation of the Demra water treatment plant it is hoped that the crisis will be minimised.

#### 4.3.0 WATER SUPPLY FROM DIFFERENT SOURCES:

The water supply system of Dhaka city is divided into public and private institutional supply. Public supply is meant by

1. Feasibility report, Dhaka WASA, opcit. P. 4.9
  2. Feasibility report, opcit. P.4-12.
  3. Shahjahan, Ruby, "City Water Supply" Bangladesh Observer, February 7, 1983.
- Gpdd= Gallon per capita per day.

organized water supply system. The Dhaka water and sewerage authorities are the only public water supply organization in the city of Dhaka.

Private-institutional water supply is meant by private arrangement which is made by different institutions, organizations, commercial or industrial firms etc. Such private institutions are Bangladesh University of Engineering and Technology, Dhaka University, Bangladesh Railway, Different Government agencies and many other industrial and commercial firms.

Table 4.2 Public and Private Water Supply Systems  
Distribution of Production

Public Water Supply	Production(in mgd.)
Dhaka WASA Number of Tubewells	
96 Deep tubewells	78
1 Surface treatment plant(Chandnighat)	4
Total	82
<u>Private and Institutional Number of Deep Tubewells</u>	
3 Engineering University	0.90
8 Dhaka University	1.75
6 Bangladesh Railway	2.00
7 Different Govt. agencies	2.75
16 Commerce and Industries	6.60
40	16.00
Public and Private Institutional piped water 96 mgd.	

Sources: The Dhaka Water and Sewerage Authority, March 1983

Beside these, there are different source of water supply in Dheke city these are tubewells, walls, ponds and rivers which also play a significant role in order to meet a part of water supply in Dheke city.

The total production of piped water in Dheke city is ninety six mgd of which eighty two mgd. is produced by the Dheke water and sewerage authority and the rest of fourteen million gallons of water is being produced by the forty deep tubewells of different private institutions. Details are shown in the Table 4.2.

#### 4.4.0 CONSUMPTION OF WATER SUPPLY FOR DIFFERENT PURPOSE

Water consumption is one of the fundamental parameters used in formulating a programme of improvements for water supply. Water supply in the city are to be provided on the following needs. Such as Domestic needs for drinking, cooking, washing, bathing and other purposes. Industrial and commercial use it varies depending on nature and function of the industry. Public purposes such as street washing, flushing of sewers etc. Beside these water is also used for fire fighting as well as recreational purpose. It is also noted here that a huge amount of water is wasted due to leakage in pipe, faulty connections, unauthorised connection, bad plumbing etc. At present about forty percent water is wasted which is the main cause of inadequate supply of water. Consumption of

water for different purposes is shown in the following table.

Table 4.3 Consumption of Water in Different Purpose  
(In MGD).

Sectors	1978	1980	1981	1982	1983 (March)
Domestic & Other Use	35.42	36.52	34.93	30.42	47.17
Industry & Commerce	1.32	1.52	2.29	1.00	2.03
Wastage & Unaccounted	10.34	10.78	24.05	26.78	32.80
	47.08	48.40	61.27	66.00	82.00

Sources: Water supply and waste water system Development plan and feasibility study, Dhaka WASA, 1979.

#### 4.5.0 LEAKAGE AND WASTAGE OF PIPED WATER

In Dhaka city water supply is not only inadequate but also irregular. Moreover the flow of water is slow and a huge quantity of water is wasted through street taps, leaky pipes, defective pipe fittings and over flow of roof tanks.

At present about forty percent of water production is lost as leakage and wasted, out of these thirty percent is wastage and ten percent is leakage.<sup>4</sup>. This figure will reduce to

1. Quarterly Report, Dhaka WASA, 1981, Appendix-4, P.1.
2. Quarterly Report, Dhaka WASA, 1982, Appendix-4, P.2.
3. Second Dhaka water supply and sewerage project, quarterly report, March, 1983, Appendix-5, P.1.
4. Interview with the Chairman, The Dhaka WASA(12-5-83).

about thirty five percent by 1990. And to increase the meter installations and systematic maintenance leakage and wastage of water could be reduced to about twenty percent by the year 2010.<sup>4</sup> And it will be hoped to increase the output in future.

#### 4.6.0 FEE STRUCTURE AND TARIFF SYSTEM

Dhaka water supply and sewerage authorities meet only sixty four percent of the daily requirements. Paucity of fund has delayed implementation of development programme for which WASA could not improve the quantum of water supply in the city. Beside these, a huge amount of water is wasted due to defective service and maintenance, for this purpose pressure of water is low and most of the residential areas people do not get sufficient water, even in the ground floor. Water meter have not been introduced to all consumers particularly in old Dhaka. It is the responsibility of Dhaka Municipality to collect water revenue from the consumers and remit it to WASA. Moreover a huge amount of take is lying unpaid by these consumers.

The fee structure for water rates from 1966 to 1975 more or less same, no changes occurred. Since 1975 sizeable increases both metered and non-metered rates have occurred. For example, in 1975, metered water rates take 2.00 per 1000 gallons for residential and community water service, and

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1. Feasibility report, Dhaka WASA, opcit. P. 4.15.

Table-4.4 : The WAGA Water Fee Structure

Connected water service	July 1975	July 1976	July 1977	July 1978	Jan. 1979	Jan. 1980	Jan. 1981	April '82 <sup>1</sup> to present
Residential/ Community Metered, <sup>a</sup> Non Metered <sup>b</sup>	2.00 5%	3.00 5%	3.00 7.5%	3.50 10%	3.50 14%	50.00 14%	5.00 14.1	7.00 17.5%
Office/ Commercial Metered Non-metered	4.00 2.5%	6.00 5%	10.00 5%	18.00 5%	18.00 7%	18.00 7%	18.00 7%	22.50 17.50%
Industrial Metered								
Ist. 150,000 gains	3.00	4.50	9.00	9.00	13.00	13.00	13.00	22.50
Next : 150,000 gains.	2.50	3.75	7.50	7.50	13.00	13.00	13.00	22.50
Above 300,000 gains	2.00	3.00	6.00	6.00	13.00	13.00	13.00	22.50
Non Metered	2.5%	5%	5%	5%	5%	7%	7%	17.50%
Non connected water service old Dhaka (street hydrants)	2%	2%	2%	2%	3%	3%	3%	4.5%

a. metered= Taxes/1000 Imperial gallons

b. non-metered=Annual Valuation of the holding.

Source: Feasibility report for the Dhaka Metropolitan area water supply project, 1981.

1. An interview with Chief Revenue Officer, Dhaka WAGA.

this figure increased to take 7.00 per 1000 gallons at present. Moreover both commercial and industrial water rates also be increased.

The consumers have to assess their bills themselves by the reading on the meters fixed at their holdings and unmetered consumers pay their bill at the rate of 17.50 percent on the basis of 10 months rent of rented house or 7.5 months rent of a non-rented house.<sup>1</sup>

#### 4.7.0 DEVELOPMENT PROJECTS OF DHAKA WASA

In the Fall of 1958 the United States Agency for International Development entered into an agreement with a consulting Engineering firm to prepare a field survey for the most feasible methods of increasing water supply. In December 1959 a comprehensive water supply and sewerage schemes(Master Plan) was completed for the whole city of Dhaka. In 1961 the National Economic Council(NEC) approved the scheme in principle.

The comprehensive water supply scheme for Dhaka was based on surface water treatment plant as a first phase, to be constructed near Demra by the side of the river Lakhya. But for technical and financial difficulties, the proposal was beyond and the water and sewerage authority established revised scheme in 1968. This treatment plant was deferred in favour of deep tubewells. This plant was the first

1. The second Dhaka water supply project, Dhaka WASA 1983, P.12.

Development Project of the Dhaka WASA. To improve the water supply system in Dhaka city different development projects have been taken. A recent study on "The Dhaka Metropoliton Area water supply project" has been completed. It is hoped that the problem would be solved by this project.

#### 4.7.1 The Second Development Projects

Second Dhaka water supply project has been approved in 1979 by the ECNEC. This project was designed as an interim measure to meet the water shortage for the next few years(1978 to 1982) but the project extent upto June 1986.<sup>1</sup> Because the current water supply system is inadequate and not in a position to meet the increasing demand of the population.

Upto the end of the quarter, out of thirty four tubewells, twenty seven wells have been completed. The project will be provide 25,978 new connections. This figure included 12,928 unauthorised connections that have been regularised after completing all formalities. The overhead tanks will not be provided in this project.

#### 4.7.2 Third Dhaka water supply Project or Future development programme

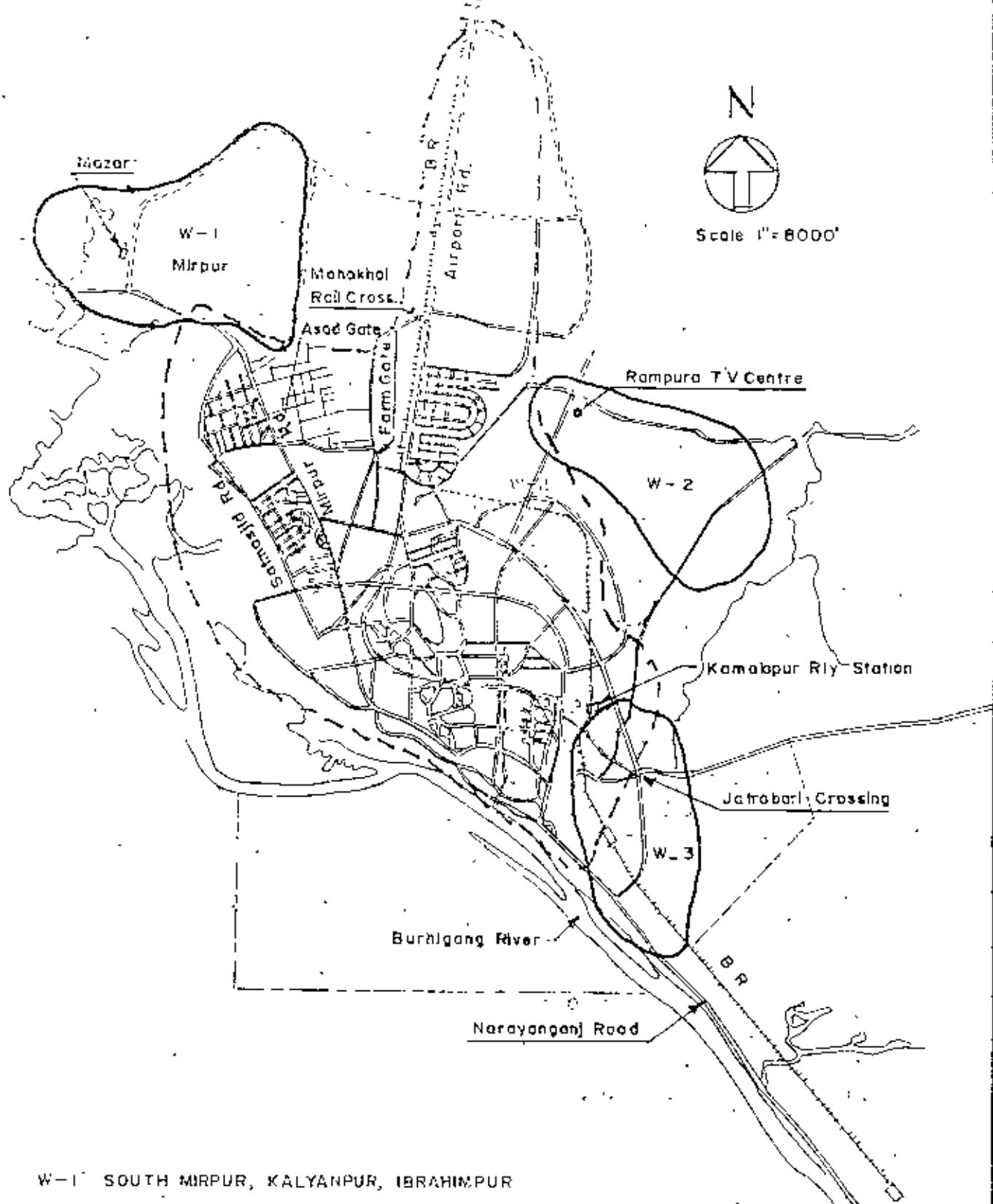
The Third Dhaka water supply project is the "priority programme" of the larger phase-I of long term development

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1. An Interview with Planning Officer, Dhaka WASA, 26-7-83.

Fig. 12

25



W-1 SOUTH MIRPUR, KALYANPUR, IBRAHIMPUR

W-2 RAMPURA, MERADIA, GORAN

W-3 JATRABARI

THE SECOND DEVELOPMENT  
PROJECT: Water Needs Area

plan for water supply facilities. The jurisdiction area is a group of urban centres including urban Dheke, Marayengonj, Tongi, Joydevpur, Savar and Jinjira. This plan will meet the demand for water supply facilities of greater Dheke through the year 2010 A.D.

This development programme has been divided into three ten-year phases covering the decades 1980-1990, 1991-2000 and 2001-2010. But this programme will be started after completion of second development project and these phase must be changed.

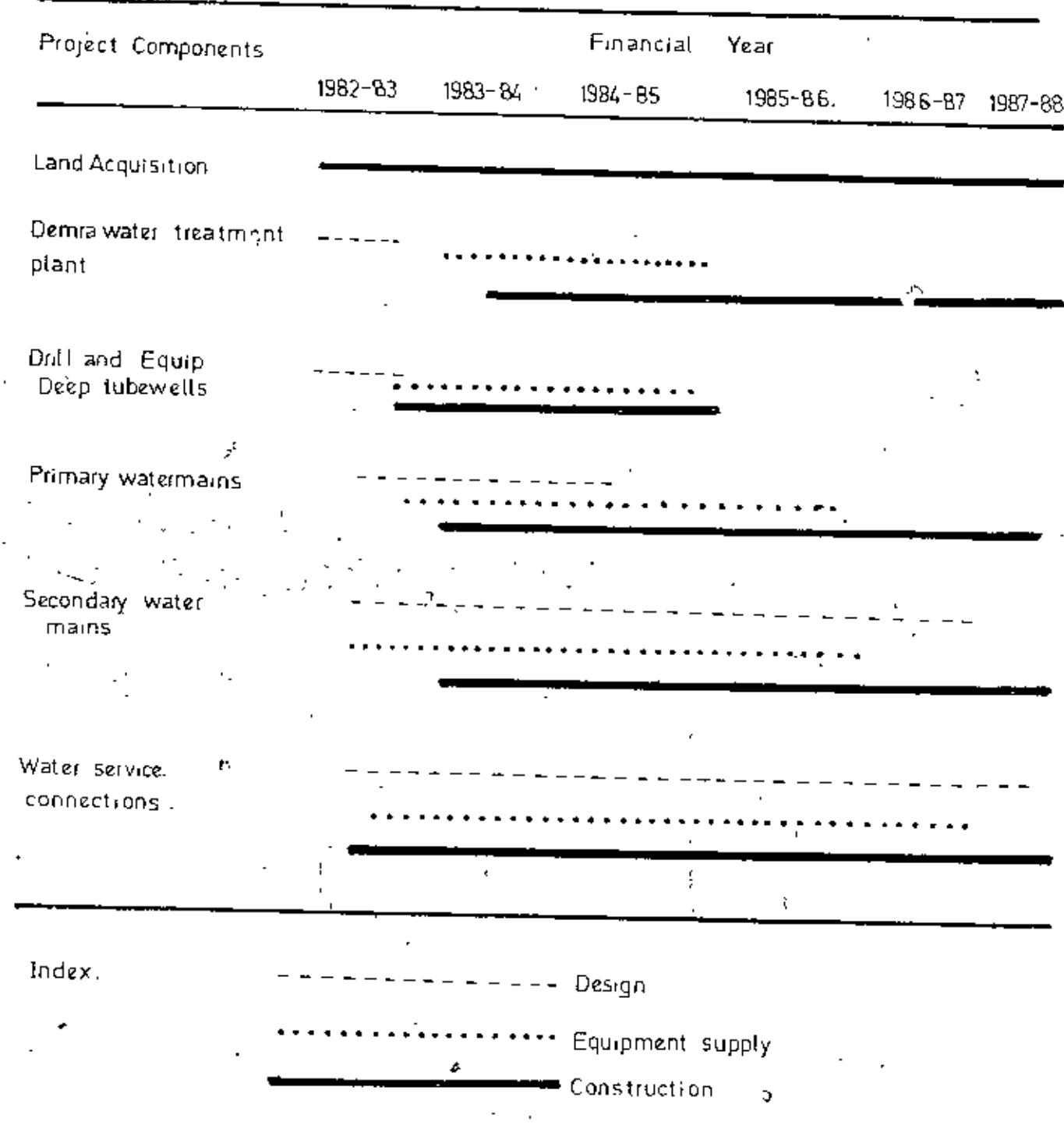
#### Phase-I Programme(1980-1990)

This programme is characterized by an intensive effort to increase water production capacity and upgrade the existing system to provide twenty four hours service to all developed areas. Construction of a 150 mgd water treatment plant at Denga, with a capacity of one mgd, eight overhead steel tanks will be constructed. To reduce the unauthorized service connections and to replace old leaky water mains on a priority basis.

#### Phase-II Programme(1991-2000)

Phase-II programme is generally characterised by the extension of services to newly developing areas. New and higher capacity tubewells will be constructed. Construction of primary and secondary water mains will continue during the period.

THE DHAKA WATER SUPPLY AND SEWERAGE PROJECT  
Design and construction schedule



Phase-III Programme(2001-2010)

The phase-III development programme will be continuation of the phase two and expansion into newly developing areas.

At present the main source of water supply is deep tubewells and in addition to a small treatment plant. It is obvious that if deep tubewells are treated as the only source of water then there will be acute scarcity for drinking water. So the only option for water supply remains to be the surface water. For this purpose under this development programme the provision in the Master Plan is kept for surface water treatment plant at Demra with a capacity of treating upto 200 mgd. The peak capacity 50 million gallons per day and water supply to Narayanganj will be covered by this treatment plant.

## CHAPTER-V

### 5.0.0 ATTITUDE AND OPINION OF THE PEOPLE REGARDING WATER SUPPLY

#### 5.1.0 INTRODUCTION:

"The attitude of the slum dwellers toward the slum itself, toward the city of which the slum is a part, toward his own chances of getting out, toward the people who control things, toward the 'system', this is the element which as much as anything else will determine whether or not it is possible to 'do something' about slums".<sup>1</sup>

The term 'attitude' is not only indispensable to social psychology but also related to the psychology of personality. From this point of view "An attitude is a relatively enduring organization of beliefs around an objective situation predisposing one to respond in some preferential manner".<sup>2</sup> It is the process of identifying something which depends on past experiences.

Virtually all theorists agree that an attitude is not a basic and irreducible element within the personality, but represents a cluster of two or more interrelated elements.<sup>3</sup> In this definition the elements are beliefs cognitions, values and expectations of humanities.

1. Clinard B., Marshall, Ibid ,P.15

2. Rokeach, Milton,, "The Nature of Attitudes", International Encyclopedia of Social Sciences, Vol.1, P.450

3. Rokeach, Milton, Ibid, P. 450.

Another author's view that "all attitudes are incorporated with beliefs, but all beliefs are not necessarily a part of attitudes". There is a wide distinction between belief and attitude. Beliefs have only a cognitive component while attitudes have both cognitive, affective and behavioural component. From this point of view attitude is a set of interrelated predispositions to action around an object or situation.

An opinion is defined as a verbal expression of some belief, attitude or value, which reflects as a matter of inference. Public opinion is not the name of something but a classification of a number of something.<sup>1</sup> Another specialist stressed that public opinion consists of peoples reactions to definitely worded statements and replies under the interviewee position, and this opinion influence over individual behaviour, group behaviour and govt. policy.

Slum dwellers lack an effective means of communication with the outside world because of apathy, lack of experience in communicating with outsiders, and their own inhibitions to make their voices heard. Inevitably the slum dweller's conception of himself comes to reflect the attitudes of outsiders toward the slum and its inhabitants.

1. Onwugbwe C. Phillips., "Public Opinion", International Encyclopedia of social sciences, Vol. 13, P. 188.

An attempt has been made in this chapter to analyses the attitude and opinion of the slum people towards the existing water supply situation in the selected slum areas of Dhaka city. Realization of the functional role of different organizations has considerably helped to the empirical and intuitive understanding of the attitude and opinion of the slum dwellers regarding the existing water supply system.

#### 5.2.0 FUNCTION AND ROLE OF DIFFERENT ORGANIZATION AND AGENCIES

Different departments, agencies, organizations and many other authorities are responsible for providing different service facilities to the people of Dhaka city. These service facilities are not equal, it varies from area to area as well as in different income groups. It may be noted here that slum or scatter peoples are not enjoying these service facilities.

Some of these major agencies or organizations which have programmes for the improvement of the city and are related to the present research have been revised as follows:

##### 5.2.1 Dhaka Municipal Corporation(DMC)

Dhaka Municipal Corporation is one of the organization which is directly involved with development of Dhaka city. But Dhaka Municipal Corporation has no planning section related to the development of Dhaka city. The main functions or activities of this organization are garbage disposal,

street lighting, construction of road within the Municipal boundary and issuing licence for various business and other activities. Besides, Dhaka Municipality constructed several multistoried building for low income people specially for secopars, and constructed 1000 sanitary latrines in the low income areas particularly in old Dhaka. The Authority states that, the Municipality does not have any specific programs such as water supply for slum dwellers . As it describes, without sufficient financial subsidies and necessary help from the government, it becomes difficult for the Municipality to undertake such development programmes.

#### 5.2.2 Dhaka Improvement Trust(DIT)

Dhaka Improvement trust is the only organization for the development of Dhaka city. The main objectives of this authority to improve the physical condition of the old areas, development of adjoining areas, widening the existing roads, creation of new roads, Parks, Playgrounds, construction of markets, shopping centres, development of new residential, commercial and industrial areas and clearance of slums and rehousing. Poor income group of people who are affected due to lack of inappropriate development programmes in some areas. No service facilities are provided by this development agency. From the discussion with the planners of DIT it can be mentioned here that;

"It is very difficult to engage us in other service facilities like water supply for the slum dwellers. WASA is the only public authority to be responsible for the supply of water in the city and no other organizations are involved in this programme. It is then supposed to be better that only WASA takes the responsibility of supplying water to the slums".

#### 5.2.3 Urban Development Directorate(UDD)

Urban Development Directorate is not directly involved with the development of Dhaka city, it works as an advisor. The main functions of UDD are to advise the Government, concerning Urbanization, land use and land development. Moreover, preparation and co-ordination of regional plans and making detailed layout and site plans for the existing as well as the new urban centres outside in the town development Jurisdiction.

But in reality UDD fails to provide any service facilities for the newly developed areas. The comment of one planner regarding this problem is:

" We can not play any significant role regarding water supply as WASA is the independent semi-autonomous organization which deals it. However, if WASA requires any advice or assistance in respect of developing the water supply system in the slums, UDD can usefully play an important role as an urban development Authority".

#### 5.2.4 Dhaka water supply and Sewerage Authority

WASA is the only public water supply system for the city. At present it produces eighty two million gallons of water per day but on population basis it requires at least 128 million gallons of water per day. The water supply in Dhaka city mainly depends on deep tubewells and surface treatment plant .

In terms of its present population, water supply in the city is, therefore, highly insufficient and in slum areas this problem appears with its more intricacy . In old part of the city especially in slums and low income communities, the problem of water supply is acute and draws immediate attention for the solution.

The place of the authority in this regard is that there is no separate water supply system or special programme for the low income people or slum areas. But in the reality the situation of these people are more acute than the general condition relating to water supply in the city. The supply system of WASA is on zonal basis and not for a particular area. Moreover, the pumping capacities of these tubewells are limited depending on their durabilities for a certain period. Above all, there is huge wastage of water through overflow of tanks, leaky pipes, public stand pipes without bib-cocks which are either broken or stolen. These factors stand against the usual and increasing demand for water by the slum dwellers. The main

object in this respect is to ensure regular sufficient supply of water for the inhabitants of Dhaka. And the main problem of old Dhaka is the shortage of land, where new tubewells can not be installed.

In consideration of these acute problems, and the increasing demand of the public water supply, the authority have recently met with the ward commissioners and chalked out certain intensive programmes. They have empowered the commissioners to look after the broken and stolen bib-cocks of the public stand pipes, and also an investigation team has been formed to check up the wastage of water through different points, and the illegal water connections. The observation team also finds that a lot of consumers to be getting water through illegal connections beyond the knowledge of the authority for an indefinite period. This dispute results to a huge loss of government revenue. The comment of WASA's chairman in this respect is that—

"The people can play a significant role in this behalf. It is impossible for us alone and we can not do anything satisfactorily without the effective support and participation of the public in the development process of water supply. The people understand better than us about the demand and difficulties of supply of water in their slums,<sup>1</sup> and about the remedies thereof. WASA may engage itself to look into the present problems for the future improvement programmes but the co-operation of public with their sincere responsibilities is a must to make it a success."

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1. Dhaka means Aces.

It can be mentioned here that to meet the challenge of improving the adequacy of water supply another surface treatment plant has recently been taken up at Domsra as a top priority programme in this regard.

#### 5.3.0 PERCEPTION AND OPINION OF THE CONSUMERS REGARDING WATER SUPPLY

Perception of the people is not an isolated state of mind but is an expression associated with income, education, occupational status and cultural background of the household concerned.<sup>1</sup> And it also varies from person to person, from place to place and from time to time. It has been conceived from the people's opinion during the questionnaire survey that the authority (WASA) usually do not reach the slum people and take necessary steps to solve the problems of water supply system for slum dwellers. The WASA people only go to the house owners to collect the bills of water. Since the WASA do not reach the tenants, the slum people do not know about the rate of payment for water and the cost of water used by them. Thus, they remain ignorant in this respect and do not show keen interest to know

1. M. Shahidul Islam, "Housing and the Quality of life: An Analysis of regional variations in urban Delhi". An unpublished Ph.D. Thesis, Centre for the Study of Regional Development, School of Social Science, Jawaharlal Nehru University, New Delhi, June, 1982, P. 267.

about this. But from the intuitive understanding of the people's perception and attitude regarding this, it has been realized that they actually hide themselves in the fear of house owners. It has been also perceived that there may have been any adoption of unfairness in the bill collecting and bill paying procedure. Since there is no provision of meter connections in the slum dwellings, the WASA people do not think to keep any contact with the tenants.

A person's knowledge or attitude can develop with some sort of awareness. By saying that,

"..... a person whose knowledge, including his self-knowledge, and whose commitments result in action aimed at deriving the resources and the impetus for his growth from transforming his environment and/or himself.<sup>1</sup>

#### 5.3.1 Major defects of WASA's Water Supply System

The major problems to the slum people are irrationally small number of water taps or stand pipes and their non-uniform distribution. It has been observed from Table-5.1 that out of the total households 44.76 percent express their opinion about major draw backs of WASA's water supply system as negligency and 16.19 percent gives opinion on

1. A. Faludi, Ibid, P. 56.

unequal distribution of water. It indicates that certain areas are getting adequate water supply and rest of the areas being deprived of service facilities.

From regional perspective it can be observed that this situation is more or less same in different sample areas. Out of the total households 47.22 percent of Kathalgagan express their opinion on negligency, where the corresponding figures for Nokhalpara, Rabatganj and Nonapara are 46.16 percent, 46.25 percent and 38.40 percent respectively.

It is also interesting to note that sample areas of old part of the city only express their opinion on defective service and maintenance is the major problem which is totally absent in new part of the city. One of the consumer's opinion in this respect is:

"I do not know about their responsibility. They do not take necessary steps at present, since the slum people pay for water to WASA through the owner of the houses, but they do not perform their duties of regular supervision. To improve the present situation, WASA should be sincere to extend its service and maintenance to the slum areas".

The consumers also expressed their opinion on the necessity of regular supervision and fulfilment of the

Table- 5.1 Major defects of WASA's water supply system

Major defects	Study Area				Total
	Kathalganj	Nakhalpara	Rahmatganj	Namapara	
Bad circu- lation system	12(33.33%)	4(7.69%)	9(6.25%)	6(14.29%)	27(12.86%)
Neglegency	17(47.22%)	24(46.15%)	37(46.25%)	16(30.10%)	94(44.76%)
Unequal distribu- tion	5(13.89%)	7(13.46%)	19(23.75%)	3(7.14%)	34(16.19%)
Lack of fund	-	6(11.54%)	2(2.50%)	1(2.38%)	9(4.29%)
Lack of cooper- ation	-	6(11.54%)	3(3.75%)	-	9(4.29%)
Defective Service & maintenance	-	-	8(10%)	19(35.91%)	10(10.94%)
Not applicable	-	5(9.62%)	4(5%)	-	9(4.29%)
No response	2(5.56%)	-	2(2.50%)	1(2.38%)	5(2.38%)
Total:	36(100%)	52(100%)	80(100%)	42(100%)	210(100%)

Note applicable: They have no complain about WASA's water supply system.

requirement for water supply in the locality. It should be investigated where more taps are to be installed and opinion of the local people can be considered with due importance.

The prevailing situation in the slums does not permit one to live in unhygienic condition. The defective and bad water supply system is primarily responsible for such condition. To check this worst situation, drainage system requires to be improved and to maintain adequate supply of water the connecting pipes need by better and number of taps more. Regular supervision over the circulation system is necessary to prevent the casual failure of supply.

#### 5.3.2 Types of difficulties in getting water from the stand pipe

Inadequate supply of water as a major cause of getting water from the stand pipe, has been expressed by 27.44 percent of the total households in Table-5.2. From regional point of view these difficulties are varied from area to area as well as person to person. Out of the total households at Kethalbagan 83.33 percent express their opinion on long Queue as the major difficulty in getting water from the public stand pipe, while 30.77 percent at Ngthalpara in new Dhaka express their opinion on inadequate supply of water is the major difficulty in getting water from the stand pipe. To improve the drainage

system, together with requisite number of taps distributed uniformly can standardize the existing condition.

Table- 5.21 Types of difficulties in getting water from stand pipe

Area	Inadequate water supply	Uncertainty	Long queue	Often Face quarrel	Others	Not applicable	Total
Kathalbagan	12	1	30	4	-	1	36
		2.78%	83.33%	11.11%		2.78%	100%
Nakhalpara	16	11	4	9	-	16	52
	30.77%	21.15%	7.69%	9.62%		30.77%	100%
Rahmatganj	10	13	16	19	1	13	80
	22.5%	16.25%	20%	23.75%	1.25%	16.25%	100%
Nampara	23	3	7	6	0	3	42
	54.76%	7.15%	16.67%	14.29%		7.14%	100%
Total:	57	20	57	34	1	33	210
	27.14%	13.33%	27.14%	16.19%	0.48%	15.72%	100%

Not applicable - They face no any difficulties in getting water from public stand pipe.

And the water pressure is low which generates long queue and wastes valuable time in busy hours of the day. Maintenance of required water pressure is therefore highly necessary to avoid this long queue.

Regional variation is more acute in old part of the city. Out of the total households in Nampara, 54.76 percent express their opinion on inadequate supply of water is the serious problem in this area, because in some portion of the city water supply is adequate and at another supply is very low.

Water supply should be adequate to meet up the expending demand. The extreme view point of a consumer to improve the water supply system:

"The present circulation system is not well enough to sustain the growing need of the residents. It requires to be replaced by good one. The drainage condition needs improvement substantially to preserve healthy atmosphere and environment".

### 5.3.3 Maintenance and Service of the WASA:

Maintenance and service is one of the important aspects of WASA's water supply system which is presented in Table 5.3. 51.9 percent of the total consumers gives opinion on moderate, maintenance and service of the city water supply system. 36.20 percent gives opinion as unsatisfactory and only 5.23 percent express their opinion as satisfactory.

Table- 5.3 : Maintenance and service of the WASA

Area	Satisfactory	Moderate	Unsatisfac-	No res-	Total
			tory	ponse	
Kothal- bagan	-	25(69.44%)	6(16.67%)	5(13.89%)	36(100%)
Nekhalpara	6(11.53%)	28(53.85%)	18(34.62%)	-	52(100%)
Rahman- ganj	4.5.10% )	38(47.5% )	30(37.5%)	8(10%)	80(100%)
Namapara	1(2.38%)	18(42.86%)	22(52.38%)	1(2.38%)	42(100%)
<b>Total :</b>	<b>11(5.23%)</b>	<b>102(51.9%)</b>	<b>76(36.20%)</b>	<b>14(6.87%)</b>	<b>219(100%)</b>

From regional perspective the opinion of the respondents more or less same except at Namapara in old part of the city. 52.38 percent of the total households in Namapara express their opinion on unsatisfactory and only 2.38 percent

gives opinion on satisfactory. Supply in all portion of the slum is not same. The weaker section should be provided with better arrangement and some more stand pipes can be installed.

It is also evident from the sample survey that, maintenance and service of the WASA create dissatisfaction amongst the slum dwellers, and it is acute in Namapera slum.

For this reason it has been noted by a respondent:

" Better management is necessary to maintain adequate supply of water. It should maintain a regular supervision over the water supply condition. Purification of water and present circulation system can be improved through regular supervision by the Authority".

#### 5.3.4 Nature of Irregularity:

The opinion of the people regarding nature of irregularity is recorded in table 5.4. Out of the total 210 households,

**Table -5.4 : Nature of Irregularity:**

Area	Daily	Weekly	Seasonal	Not applic- able	Total
Kathal- bagan	1(2.78%)	14(38.89%)	7(19.44%)	14(38.89%)	36(100%)
Nakhal- para	10(19.23%)	13(25%)	8(15.38%)	21(40.39%)	52(100%)
Rehmat- ganj	15(15.75%)	12(15%)	10(12.50%)	43(53.75%)	80(100%)
Nama- para	11(26.19%)	20(47.62%)	4(9.52%)	7(16.67%)	42(100%)
<b>Total:</b>	<b>37(17.62%)</b>	<b>59(28.09%)</b>	<b>29(13.81%)</b>	<b>85(40.48%)</b>	<b>210(100%)</b>
Not applicable-	They get water supply regularly.				

28.09 percent express their opinion on weekly irregularity 17.62 percent and 13.81 percent opine daily and seasonal nature of irregularity of water supply respectively.

From regional variation, majority of the households express their opinion that nature of water supply is irregular and this situation is comparatively more acute at Namapara slum in old Dhaka. Out of the total households 47.62 percent gives opinion on this regard. But in other sample areas less number of respondent opine on this, specially in New Dhaka.

Opinion of the respondents on daily irregularity in old part of the city is high than new part. On the other hand the sample area in New Dhaka have high share of public opinion on seasonal irregularity and conversely the old part of the city have lower share of the same.

#### 5.3.5 Frequency of breakdown or low pressure:

Frequency of breakdown or low pressure appears as a major problem to the slum people to get water while it is required. The over all view of the low pressure of water supply may be seen in Table 5.5. It has been conceived from the peoples opinion that most of the respondents(26.19)percent express their opinion on low pressure being very rarely and 23.33 percent gives opinion on most of the day. This

controversial opinion also prevailed in different sample areas. Because the variation of opinion, in fact which depends upon the physical and socio-economic condition as well as perception of the people.

Table - 5.5 Frequency of breakdown or low pressure:

Area	Once a week	Most of the day	Once only	Once in Fortnight	Very rarely	Not applicable	Total
Kathalbagan	6 16.67%	6 16.67%	7 19.44%	11 30.55%	6 16.67%	-	36 100%
Nakhalpara	14 26.92%	9 17.31%	3 5.77%	3 5.77%	23 44.23%	-	52 100%
Rahmatganj	6 7.5%	21 26.25%	4 5%	6 7.5%	25 31.25%	18 22.25%	80 100%
Nama Para	16 38.09%	13 30.96%	2 4.79%	6 14.28%	1 2.38%	4 9.52%	42 100%
Total:	42 ✓20%	49 ✓23.33%	16 7.62%	26 12.38%	55 26.19%	22 10.48%	210 100%

Not applicable: They get sufficient water supply.

From regional perspective Namapara slum is more depressed area regarding low pressure. Out of the total, forty two households, 38.09 percent express their opinion in favour of once a week and only 2.38 percent opinion on very rarely where the corresponding Figures for Nakhalpara, Kathalbagan and Rahmatganj are 44.23 percent, 16.67 percent and 31.25 percent respectively.

From the evaluation of public opinion in all areas it is conceived that Nakhalpara slum in New Dhaka is little

better in respect of water pressure than other sample areas; where at Namaparo the problem of low water pressure is more acute.

A comment by a consumer of Namapara slum can reflect the condition of water pressure that prevails at present:

" Oh ! water pressure it is horrible. Is it really possible to describe such a difficult situation ? It is absurd to define this problem without witnessing the situation. The pressure at present is so low that you (interviewer) can not imagine. Separate power pump should be installed to increase the water pressure, so that it can efficiently serve the purpose for the overall well being of the community. But we are poor and our suggestions will not reach the ears of the Authority".

#### 5.3.6 Number of Families Sharing the Same Water Tap

From the table 5.6 it can be observed that most of the households (thirty six percent) express their opinion that more than twenty one families sharing the same water tap and this problem is more acute in old part of the city. In the slum areas (both old and new) a huge backlog of unfilled containers leading to the taps is common-sense, every day. These creates the problems of long queue and quarrel. Moreover much time is wasted for this purpose.

Out of the total households, the highest number of respondents (39.50 percent) spend more than twenty one minutes and

Table-5.6: Number of Families sharing the same water tap

Area	No. of Families							Not App	No. Res.	Total licable
	0-5	6-10	11-15	16-20	21-25	26+				
Kathal- bagan	1	1	3	4	4	19	-	4	36	
	2.78%	2.70%	8.33%	11.11%	11.11%	52.78%		11.11%	100%	
Nakhal- Para	8	16	10	4	-	9	9	-	52	
	15.33%	30.77%	19.23%	7.69%		9.62%	17.30%		100%	
Rahmat- ganj	2	5	10	16	16	24	7	2	80	
	2.50%	6.25%	12.50%	17.50%	20%	30%	8.75%	2.50%	100%	
Name- Para	4	8	7	4	3	6	6	4	42	
	9.52%	19.05%	16.67%	9.52%	7.14%	14.29%	14.29%	9.52%	100%	
Totals	15	30	30	26	23	54	22	10	210	
	7.14%	14.29%	14.29%	12.30%	10.95%	25.71%	10.48%	4.76%	100%	

Table 5-7 Approximate time Spends

Area	Approximate time(in minutes)							Not app	No Res.	Tot licable
	0-5	6-10	11-15	16-20	21-25	26+				
Kathal- bagan	-	2	4	5	3	20	-	2	5.56%	36
		5.56%	11.11%	13.89%	8.33%	55.55%		5.56%	100%	
Nakhal- Para	4	15	5	7	4	8	6	3	52	
	7.69%	20.84%	9.62%	13.46%	7.69%	15.38%	11.54%	5.77%	100%	
Rahmat- ganj	2	12	10	13	16	19	7	1	80	
	2.5%	15%	12.50%	16.25%	20%	23.75%	8.75%	1.25%	100%	
Name- Para	3	6	8	5	4	9	6	1	42	
	7.14%	14.29%	19.05%	11.90%	9.52%	21.43%	14.28%	2.38%	100%	
Totals	9	35	27	30	27	156	99	57	210	
	4.28%	16.67%	12.86%	14.29%	12.86%	26.67%	9.04%	3.33%	100%	

only 4.28 percent spend below five minutes to collect water from the stand pipes. And only 9.04 percent consumers have no objection against the time they spend ~~for collection~~ of water from neighbourhood stand pipe or close proximity.

On the basis of above findings it is observed that there is no significant differences in time spent to collect water from the stand pipes between old and new part of the city. But it is further observed that in Rehmatganj area situation is acute, a large share(fifty percent) express their opinion that more than twenty one families sharing the same water tap and 43.75 percent spend time more than twenty one minutes to collect water from a stand pipe(Table 5.7).

For this purpose more taps are needed to recover this situation with adequate water pressure. Moreover to minimize time in busy hours of the day they may be engaged in other occupation type which can improve their standard of living.

#### 5.3.7 Price or rate of NASA's Water Supply System:

It has been observed from the sample survey that the water supply system has been extended to the slums from the nearby NASA connection. The initiative worked behind this originally came from the house owners themselves. The realization come to them from their profit-motive as they could manage an additional amount of earning through the collection of high rate of house rent from the tenants.

From table 5.8 , it can be seen that most of the households (46.19 percent), express their opinion that rate of WASA's water supply is normal and 13.81 percent of the consumers refrained from giving any opinion.

Table-5.8: Price/rate of WASA's water supply

Area	Very high	High	Normal	No response	Total
Kathalbagan	-	7(19.44%)	24(66.67%)	5(13.89%)	36(100%)
Nokhalpara	1(1.92%)	21(40.39%)	29(55.77%)	1(1.92%)	52(100%)
Rahmatganj	1(2%)	32(40%)	34(42%)	13(1.92%)	100(100%)
Namapara	-	22(52.38%)	10(24%)	10(24%)	42(100%)
Total	2 0.95%	82 39.04%	97 46.19%	29 13.81%	210 100%

The regional variation of the consumers opinion can be perceived from the questionnaire survey. Out of the total households of Kathalbagan, 66.67 percent consider that the price is normal, where in Namapara slum of old Dhaka the case is exactly reverse, only twenty four percent have such opinion. The reason of such response of the slum dwellers of Kathalbagan is due to their high income in

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It may be noted here that most of the slum dwellers collect water from street stand pipes free of cost. Usually they are not aware or do not feel the price or rate of WASA's water supply system. However, an attempt has been taken here to explain them, if they are tenants and pay money to the house owners(including water charge) whether it is high or low to them.

comparison with the other slum included in this study.

In Rehatganj of Old Dhaka out of the total respondents forty two percent express their opinion on normal price and forty percent opine in favour of high price.

It is also evident from the sample survey that an average opinion is prevalent toward on normal price of water supply system and this group is much higher in new part of the city.

#### 5.4.0 RELATIONSHIP BETWEEN INCOME AND WASA'S WATER SUPPLY SYSTEM

##### 5.4.1 Relationship between income and sources of water supply

Relationship between income and sources of water supply has been discussed in table 5.9 . It has been conceived from the questionnaire survey that the slum dwellers collect water for their domestic consumption from three sources – within the house within the neighbourhood and outside the neighbourhood. Out of the total respondents seventy eight percent collect water from sources within the neighbourhood, 10.5 percent of households possess sources within the house and the rest 11.5 percent collect water from sources out side the neighbourhood.

It is evident from the sample survey that regional pattern of sources of water supply also varied. 94.4 percent households in Kathalganj consume water from the neighbourhood

Table- 5.9 | Relationship between income and source of water supply

Income group	Within house tubewell	NASA	Within the neighbourhood			Outside the neighbourhood		
			Tubewell	Neigh. pipe	other	Tube	Standpump	
3001+	-	-	-	6(16.7%)	-	-	-	
2501-3000	-	-	-	8(16.7%)	-	-	-	
20-2500	-	-	-	7(19.4%)	-	-	-	
1501-2000	-	-	-	3(8.3%)	-	-	-	
1001-1500	-	-	-	2(5.6%)	-	-	-	
501-1000	-	-	-	5(13.8%)	1(2.8%)	-	1(2.8%)	
- 500	-	-	-	3(8.3%)	1(2.8%)	-	1(2.8%)	
3001+	-	-	-	-	-	-	-	
2501-3000	-	1(1.9%)	-	-	-	-	-	
2001-2500	-	-	-	-	-	-	-	
1501-2000	-	2(3.8%)	-	-	-	-	-	
1001-1500	-	3(5.8%)	-	2(13.5%)	-	-	-	
501-1000	-	3(9.8%)	-	23(44.2%)	-	2(3.8%)	3(5.8%)	
- 500	-	-	-	8(15.4%)	-	-	-	
3001+	-	-	-	-	-	-	-	
2501-3000	-	-	-	-	-	-	-	
2001-2500	1(1.2%)	2(2.5%)	-	-	-	-	-	
2001-2000	-	-	-	2(2.5%)	-	-	-	
1001-1500	-	2(2.5%)	3(3.7%)	6(7.5%)	-	-	-	
501-1000	-	2(2.5%)	9(11.2%)	27(33.7%)	-	1(1.2%)	3(3.7%)	
- 500	-	-	1(1.2%)	9(11.2%)	-	2(2.5%)	4(5%)	
3001+	-	-	-	-	-	-	-	
2501-3000	-	-	-	-	-	-	-	
2001-2500	-	-	-	-	-	-	-	
1501-2000	-	-	-	-	-	-	-	
1001-1500	1(2.4%)	-	2(2.4%)	4(9.5%)	-	-	1(2.4%)	
501-1000	1(2.4%)	4(9.5%)	4(9.5%)	20(47.6%)	-	-	-	
- 500	-	-	1(2.4%)	9(11.9%)	-	-	-	
1+	210	3	19	19	143	2	5	19
	100%	1.5%	9%	9%	68%	1%	2.5%	9%

stand pipes of which 5.6 percent collect water from their owners house. Only 5.6 percent households have monthly income below taka 1000, depends upon road side stand pipes.

The table also provides that 3.7 percent households belonging to high income group(more than taka 2000) of Rehatganj have the WASA supply connections within the house whereas as 14.3 percent households at Nemepara get water from the same, of which monthly income have below taka 1000. The distribution pattern of sources of water supply among middle income group ,(below 2000 per month) it is evident that 71.25 percent households in Rehatganj have the water connections within the neighbourhood and more or less the same distribution picture (85.3 percent) is prevalent in Nemepara.

It is also evident from the survey that the house owners have WASA connections inside their house. Among the different study areas Kathalganj have no WASA connections within the house though the income is comparatively high than that of other survey areas. Whereas as only 2.6 percent households at Nemepara which have income between taka 1001-1500 depend upon the out-side stand pipes.

#### 5.4.2 Relationship between income and types of water connection

In Table 5.10, the relationship between income and type of water connections is presented. It is found from the table that majority of the respondents prefer separate connections

which comprises about 32.8 percent, 25.7 percent prefer common connection with separate tap, about twenty one percent opine on common connection with common tap and only one respondent gave no opinion regarding his preference.

To find out the relationship between income and types of water connection it is evident that income can not play a significant role to prefer water connection. Out of the total 7.7 percent prefer separate connection which have income Tk. 1001-1500, whereas which have income below Tk. 500, 10.5 percent prefer this types of water connection.

Types of water connection also varied in different sample areas as well as in different income groups. In Kathalgagan slum 5.6 percent prefer separate connection which have monthly income over Tk. 3000 . Whereas which have monthly income below taka 500, 11.1 percent prefer common connection with common tap. It is also noted here that most of the households prefer common connection with separate tap. The households were asked why they prefer this type of water connection ? In response to this question:

- " At morning one tap can not serve all families. Moreover, this is necessary for family works, privacy can be maintained and long queue and little quarrel

Table- 5-10 : Relationship between income and types of Water connection

Income &	Study Area									Total							
	Kathalbagan			Makhalpara			Rahmatganj			NamoDara			1	2	3	No response	
1	2	3	1	2	3	1	2	3	1	2	3	No response	1	2	3	No response	
3000+	2 5.6%	3 8.3%	4 2.8%	-	-	-	-	-	-	-	-	-	2 1%	3 1.4%	1 0.5%	-	
2501- 3000	-	6 16.7%	- 1.9%	1	-	-	-	-	-	-	-	-	1 0.5%	6 2.9%	-	-	
2001- 2500	1 2.8%	6 16.7%	-	-	-	-	3 3.7%	-	-	-	-	-	4 1.9%	6 2.9%	-	-	
1501- 2000	-	3 8.3%	- 3.8%	2 3.8%	-	-	1 1.2%	-	1 1.2%	-	-	-	3 1.4%	3 1.4%	1 0.5%	-	
1001- 1500	-	1 2.8%	1 2.8%	7 13.5%	3 5.8%	-	8 10%	6 7.5%	1 2.4%	13 9.3%	3 7.3%	-	16 7.7%	13 6.2%	4 1.5%	-	
501- 1000	1 2.8%	3 8.3%	3 8.3%	24 46.2%	6 11.5%	1 1.9%	34 42.5%	5 6.3%	6 7.5%	4 9.8%	6 14.6%	4 4.3%	2.4%	30 30%	9.5%	13.3%	0.5%
-500	-	1 2.8%	4 11.1%	6 11.5%	1 1.9%	1 1.9%	16 20%	-	-	-	1 2.4%	5 12.3%	-	22 10.5%	3 1.4%	10 48%	-
	4 11.1%	23 63.9%	9 25%	40 76.9%	10 19.2%	2 3.9%	62 77.5%	11 13.8%	7 8.7%	5 11.9%	10 23.8%	26 61.9%	1 2.4%	111 52.9%	54 25.7%	44 20.9%	1 0.5%
	36 100%			52 100%			80 100%			42 100%			218 100%				

1. Separate connection

2. Common connection with separate tap

3. Common connection with common tap.

(93)

that happens at now and then. It can be checked through separate tap system. But we are poor who can help us?"

Most of the respondents in Rehmetganj of old Dhaka prefer separate connection like Nokhalpara slum, which constitute about 77.50 percent of the total. But their economic condition is not better than Kothalibagan slum.

Income plays a significant role in the study area of Nokhalpara slum. The income group in this area is between Tk. 251-1500. Out of these most of the households prefer common connection with common tap which comprise 63.4 percent of the total. The justification of a consumer in this regard;

"..... Since we are not able to pay such money for water. Moreover our houses are kutcha in nature, it is not possible for all families<sup>to</sup>. So, we went common connection with common taps in our houses. But number of taps must be increased, each four to five families may enhance the present situation".

Only 2.4 percent prefer separate connection and 7.3 percent prefer common connection with common tap which have monthly income Tk. 1001-1500. Where as 43.9 percent prefer common connection with common tap which have monthly income Tk. 501-1000.

From the questionnaire survey it may be inferred that income is not the only determinate. Attitude, norms, values mentality also play a significant role to prefer water connection for their household work.

### 5.6.3 Relationship between income and choice of water connection (metered and non-metered)

It appears from Table 5.11 that most of the households prefer non-metered water connections which constitute 57.17 percent of the total. This type of water connection also varied in different sample areas as well as in different income groups.

Table- 5.11: Relationship between income and choice of water connection  
(metered/non-metered)

Area	Water connection	Income in Taka						No responsee	Total
		-500 1000	501- 1500	1001- 2000	1501- 2500	2001- 3000	3000+ 3000		
Kathal- bagen	Metered	-	2	-	1	2	3	3	11
	non- metered	5	9	2	2	5	3	3	36 } 36
Nokhal- para	Metered	6	23	7	1	-	-	-	37 } 37
	non- metered	11	53	44.23	13.46	1.93	-	-	71.15 } 52
Rohmat- ganj	Metered	3	19	6	1	1	-	1	30 } 80
	Non- metered	13	25	8	1	2	-	-	49 } 61.25
Ramo- para	Metered	2	6	3	-	-	-	-	11 } 42
	Non- metered	4	23	4	-	-	-	-	31 } 73.80
Total:		35	111	33	7	10	7	6	210 } 100%
		16.97%	52.86%	15.7%	3.33%	4.76%	3.33%	2.86%	4.8%

The table also shows that monthly income of the family plays a significant role in selection of water connection. It has been observed that most of the households prefer non-metered water connection which have monthly income

below take 1000 per month. But in regional variation there is a significant differences in the choice of water connection. In Kathalbagan of new part of the city, majority of the households prefer non metered water connection which comprises about 69.44 percent of the total. On the other hand 71.15 percent at Nakhalpara prefer metered water connections.

Table- 11(1) willing to pay for water

Taka per month	Study Area				Total
	Kathal- bagan	Nakhal- para	Rohmat- nagar	Nama- para	
0 - 10	11(30.56%)	-	34(42.50%)	14(33.33%)	59(28.10%)
11- 20	9(25%)	9(17.31%)	14(17.5%)	11(26.14%)	43(20.48%)
21- 30	3(8.33%)	4(1.69%)	-	1(2.38%)	8(3.80%)
31- 40	1(3.28%)	-	-	-	1(0.48%)
41- 50	1(2.78%)	2(3.89%)	1(1.25%)	-	4(1.90%)
50+	-	-	-	1(2.38%)	1(0.48%)
Not applicable	11(30.50%)	37(71.15%)	30(37.50%)	11(26.10%)	89(42.38%)
No Response	-	-	1(1.25%)	4(9.52%)	5(2.38%)
Total:	36	52	80	42	210
	100%	100%	100%	100%	100%

The householders were asked if non metered is best how much they are willing to pay for water ? In response to this question, 48.58 percent of the total consumers told they are able to pay below taka twenty per month and only 0.48 percent willing to pay more than taka fifty .( Table-11(1)).

It may be noted here that most of the slum people do not have necessary understanding on meter-system. They are interested in earning more money from minimum investment in their rented houses. Under the prevailing circumstances the house owners do not care much for meter connections to their houses. But this is also true that existing housing condition coupled with their limited income can not encourage them for such standardization of their livelihood.

#### 5.4.4 Relationship between income and level of satisfaction

Perception appears to have played an important role in the comprehensive assessment of the level of satisfaction.<sup>1</sup> To measure the level of satisfaction, attitude and perception of the consumers are taken into consideration. The level of satisfaction ranging from below twenty percent to over eighty percent is shown in Table 5.12. It also varies in different sample areas as well as in different income groups. But majority of the households expressed their level of satisfaction below forty to twenty percent scale of unit, which comprises 41.90 percent of the total and the income of this group is below taka 1500. Only 0.5 percent is highly satisfied in this regard, and over eighty percent is mainly at

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1. M. Shahidul Islam, "Quality of Life: Intra-city Disparities and variations in Urban Delhi", Paper presented at the 3rd Indian Geography Congress, New Delhi, December 26-29, 1981, P.92.

## Level of Satisfaction( in percent)

Study Area	Income (in Taka)	80+	80-60	60-40	40-20	20+	No response
Kathal-bagan	3000+	-	-	1(2.77%)	5(13.90%)	-	-
	2501-3000	-	-	-	4(11.11%)	1(2.77%)	-
	2001-2500	-	-	1(2.77%)	6(16.67%)	-	-
	1501-2000	-	-	1(2.77%)	1(2.77%)	-	-
	1001-1500	-	-	1(2.77%)	-	-	-
	501-1000	-	-	-	5(13.90%)	-	-
Nakhal-Pora	≤ 500	-	-	1(2.77%)	3(8.33%)	-	6(16.7%)
	3000+	-	-	-	-	-	-
	2501-3000	-	1(1.9%)	-	-	-	-
	2001-2500	-	-	-	-	-	-
	1501-2000	-	-	1(1.9%)	1(1.9%)	-	-
	1001-1500	-	3(5.8%)	4(7.76%)	2(3.8%)	1(1.9%)	-
Rahmat-ganj	501-1000	-	6(11.5%)	10(19.2%)	11(21.2%)	4(7.7%)	-
	≤ 500	-	2(3.8%)	1(1.9%)	5(9.6%)	-	-
	3000+	-	-	-	-	-	-
	2501-3000	-	-	-	-	-	-
	2001-2500	1(1.2%)	-	2(2.5%)	-	-	-
	1501-2000	-	-	1(1.2%)	1(1.1%)	-	-
Namer-Pora	1001-1500	-	-	8(10%)	5(6.3%)	3(1.2%)	-
	501-1000	-	7(8.7%)	12(15%)	21(26.2%)	5(6.3%)	-
	≤ 500	-	6(7.5%)	3(3.7%)	4(5.0%)	3(3.4%)	-
	3000+	-	-	-	-	-	-
	2501-3000	-	-	-	-	-	-
	2001-2500	-	-	-	-	-	-
Total:	1501-2000	-	-	-	-	-	-
	1001-1500	-	-	4(9.5%)	3(7.1%)	-	-
	501-1000	-	2(4.8%)	16(38.1%)	8(19%)	3(7.1%)	-
	≤ 500	-	-	3(7.1%)	3(7.1%)	-	-
	1	27	70	68	18	6	210
	0.5%	12.86%	33.33%	41.70%	8.57%	2.86%	100%

Rahmatganj of old Dhaka which have income more than taka 2500.

From regional point of view it shows that income is not only the criteria; it depends on adequacy and regularity of water supply system, e.g. in Kathalbagan about fourteen percent expressed their level of satisfaction forty to twenty percent scale of unit which have monthly income of more than taka 3000, on the other hand 7.5 percent at Rahmatganj slum which have monthly income below Taka 500 express their level of satisfaction in eighty to sixty percent scale of unit.

With respect to supply of water, 12.86 percent of the total respondents, grade their level of satisfaction as high as eighty to sixty percent and 11.5 percent at Nakhalpara, 8.7 percent at Rahmatganj and 4.8 percent at Namapara at express the level of satisfaction. This group have monthly income ranging between taka 501-1000, while in this income group 7.7 percent at Nakhalpara, 6.3 percent at Rahmatganj and 7.1 percent at Namapara grade their level of satisfaction below twenty percent.

## CHAPTER- VI

### **6.0.0 FINDINGS RECOMMENDATION AND CONCLUSION**

#### **6.1.0 SUMMARY OF THE FINDINGS AND DISCUSSIONS:**

Within the conceptual frame of the study several objectives were considered. The first objective was to find out the socio-economic characteristics of the survey area in relation to source of water supply, types of water connection, choice of water connection etc. The second objective was to evaluate the role of different organizations and Agencies regarding water supply. The third and fourth objectives was to find out the regional variation and the role of consumers regarding this problem at household level. The secondary objective was to study the existing water supply system in Dhaka city and the availability for slum dwellers. Finally to suggest some guidelines to improve the existing situation of water supply and to develop some policies toward the slum dwellers.

With a view to achieve these objectives both primary and secondary sources were used. The primary information was basically collected through direct interview. To study the role of consumers four areas were selected for comparative study. These are Kathalbagan, Nakkhalpara, Rahmatganj and Nemopara where slums are located. For this purpose 210 households were surveyed in the study area.

On the basis of those objectives major findings are as follows:

- 6.1.1 It has been observed from the sample survey that very neglected, deteriorated and often obsolete housing conditions present which is very congested in sizes and no uniformity has been maintained in the pattern. Drainage system are poor and in most cases open which creates hardship for the slum people and creates unhealthy environment. To compare these, Nekhalpara slum is little better on an average and total environmental condition also quite better than that of other slum areas. So to cope with the future population growth of the area, Municipal authority should try hard and invest more to improve the poor service facilities.
- 6.1.2 The average household size in the study area is 5.1 which is quite low than urban household size (6.52). It is mainly due to mass holding which constitute about nine percent of the total households. About fifty nine percent of the total households live in a single room and most of the households live as a tenants.

Out of them thirty eight percent pay below take 100 per month as houserent. About 54.3 percent of the total occupied floor space less than ten sq. mt. where only 7.7 percent households at Nekhalpara occupied floor space more than forty sq.mt. An important aspect was also

noticed during the questionnaire survey that majority of the households (50.5 percent) at old part of the city occupied below twenty sq.mt., where 26.7 percent in new Dheka occupied same floor space.

- 6.1.3 The study area also faced with problems of underemployment. Majority, about sixty seven percent engaged in unclassified miscellaneous group. Service and occupation group is in highest position(twelve percent) and this group also varies in different survey areas. In Kathalgagan, Technician and Mechanic constitute twenty two percent, where the corresponding figures for Nekhalpore, Rehmatganj and Namopara are 4.2 percent, 1.4 percent and 3.5 percent respectively. The gross monthly income of the survey areas have below take 1000 which comprises about seventy percent of the total. The corresponding figures for Kathalgagan, Nekhalpore, Rehmatganj and Namopara are thirty three percent, seventy five percent, seventy six percent and eighty three percent respectively.
- 6.1.4 It is also evident that forty seven percent of the total respondents are illiterate but the educational level is quite high in Nekhalpore than that of other areas. Only twenty eight percent are illiterate at Nekhalpore where the corresponding figures for Kathalgagan, Rehmatganj and Namopara are 41.6 percent, 57.8 percent and fifty two

percent respectively. It is revealed that in old Dhaka have low share of the literacy rate and on the other hand in new Dhaka have high share of the same. Another aspect was also revealed that both Nakhalpara and Rahmatganj have only one head of the household who has received degree level education.

**6.1.5** In the study area (88.6)percent are migrants from outside the city. Most of them come from Dhaka and its adjoining areas, which comprises about 22.5 percent of the total respondents. Poverty is the main cause of coming next to unemployment. It is also evident from the sample survey that majority of the households (82.6 percent) will stay in this locality, rest of the total expressed their desire to go to some other places. Inadequate supply of water is the main cause and this situation is more or less same among the total survey areas.

**6.1.6** The existing water supply system is not well enough and not sound to cope up with the expanding requirements. At present Dhaka WASA supplies eighty two million gallons of water per day where as it should produce 128 egd. There is great variation both in supply and production. Out of the total production sixty five percent is supplied to the new part and thirty five percent to the old part of the city. Specially in low income communities of the old part, condition is deplorable. It can meet only sixty four percent of the total requirements.

To meet the increasing demand of water supply, the Dholka WASA is planning to construct a large surface treatment plant at Darsa by the year 1990. And immediate steps should be taken as early as possible.

6.1.7 At present about forty percent of the total production of piped water is wasted due to leakage in pipes and faulty connections. And it is very interesting to note that even in new part of the city a large number of water connections are unauthorised.

But it can be improved through proper investigation by the authority. Hence it is suggested that a permanent investigation team be formed and appropriately checked the unauthorised connection and take action. As a quick remedy of the existing problem to repair the old leakage pipe and these type of pipe should be replaced by the new. To prevent the wastage of water it is suggested that meter be allotted to all the supply connections.

6.1.8 There is a remarkable variation in distribution of water supply among the different income groups as well as in different sample areas. Majority of the slum dwellers collect water from neighbourhood stand pipe which comprises about sixty eight percent of the total and there are only few who use WASA connections within the houses whose monthly income have more than take 1000. But it is not true for all the survey areas. In fact Kothelbagan have more dwellers with high monthly income then that of

other areas but they have no WASA connections. It depends on owners choice and availability of service facilities. It is also true that existing ordinary housing, coupled with their limited income cannot encourage them for such standardization of their livelihood.

6.1.9 Most of the households preferred separate connection which constitute fifty three percent of the total. This figure is also high both in Rohantganj and Rakhepura. In Kathalbagan 8.4 percent preferred separate connection with monthly income more than take 2000. Whereas about forty eight percent preferred common connection with separate tap at the same income group at Kathalbagan. It is also revealed that income is not only the factor. To maintain privacy and ease to household work they preferred separate connection, but it is not possible because housing condition is very poor and kutcha in nature, moreover they are not able to pay such money for water. For this purpose common connection with common taps and a good number of taps should be established.

6.1.10 The service facilities provided by the Authority(WASA) are not sufficient and distribution of water is also uneven. From the study it is revealed that more than twenty six families use the same water tap. Most of the

slum dwellers are not satisfied about the maintenance and service of WASA. With respect to water supply system 41.90 percent of the total respondents grade their level of satisfaction at forty to twenty percent scale of unit. It leads to the conclusion that social justice is not maintained properly. Certain affluent areas are provided with adequate supply of water and they are fully satisfied.

To improve this situation regular supervision is needed. WASA can justify the demand for water supply system and take necessary steps such as to maintain a better condition with uniform distribution. Moreover more taps must be introduced which will help to alleviate this problem. Besides more pumps and elevated storage tanks are therefore necessary to meet the increased demand and to increase the supply pressure.

6.1.11 Majority of the slum people do not have necessary understanding on meter system and they preferred non-metered water connection which comprises about fifty seven percent of the total households. But among the survey areas seventy one percent of the total households at Nekhalpara preferred non-metered water connections. Most of the households are able

to pay below taka twenty per month for non-metered water connections. Only one household at Namapara is able to pay more than taka fifty for the same.

#### 6.2.0 RECOMMENDATION

To make the proposed development of water supply system effective it is suggested to constitute a permanent committee for each locality for three years term. Houseowner may be designated as the chief of the locality under the supervision of the ward commissioner. The chief of the committee must be selected by other owners and tenants of the locality. The main task of this committee would be to collect the money for water as a reasonable amount including houserent (in case of non-metered water connection) and regular supervision must be maintained.

On the basis of their economic capabilities it is suggested that common connection with common tap shared by a reasonable number of families or households in the case of neighbourhood stand pipe. Public stand pipe(street hydrant) is the another source of water supply. In that case it is the responsibility of Dhaka Municipality to collect water revenue from the consumers and remit it to WASA. In the case of neighbourhood stand pipe, if all the physical and other service facilities are provided, on the basis of theoretical calculation (Appendix-8 page 119) each eight families can use the same water tap.

But the theoretical value reflects the magnitude of water supply of the slum dwellers. Since the migration rate and

density of population (fiftynine thousand per sq.mile in old Dhaka) are quite high and on the basis of future population growth it will be far better each four to five families should be served by one water tap and to avoid any long delay in collecting water, moreover about thirty to forty persons will benefited. Finally it is suggested that public participation must be needed to share the responsibility with the Government or the Authority to improve the water supply system.

#### 6.3.0 CONCLUSION

Inadequate and irregular supply of water is the acute problem for the low income communities as well as the total urban society. Areal variation is the another problem for the city dwellers. A large amount of water is supplying in new part of the city which is relatively less densely area and in old part most of the people are getting a little amount of water. For this purpose proper management and planned supply of water plays an important role in the development of total society.

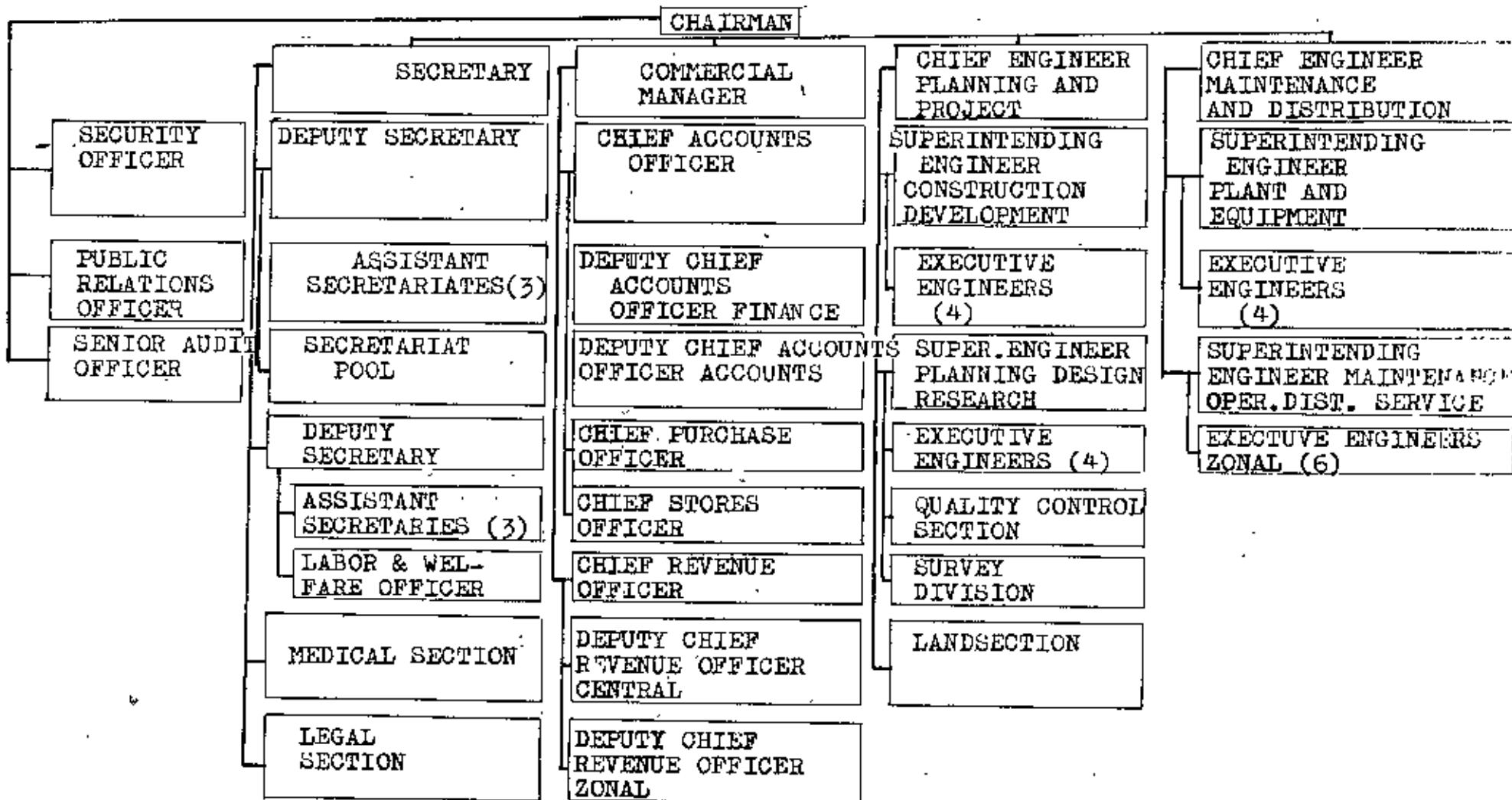
In a developing country like Bangladesh without Government or other organizational assistances it is not possible to develop or improve the water supply system and the overall

environmental condition of the slum areas. To improve this situation people can play a very significant role in the improvement of water supply system through popular participation.

However, the study is not complete and conclusive one. From the study which have been obtained may not be applicable to other parts of the city or the whole country. For further assessment more research and specific study like density of population, water requirement, water collection system, importance of privacy etc. will be need in this field and to establish applicable criteria for other parts of the country or the whole community. In this study an attempt has been made to identify the problems of water supply system for the slum dwellers as well as their environmental condition. To solve these problems an attempt is made to focus on the basic policy guidelines. It is hoped that the study has revealed the different aspects of water supply system and can be used in formulating a comprehensive guidelines.

Fig. 14

ORGANIZATION SETUP  
DHAKA WASA



SOURCE: HEAD OFFICE, DHAKA WASA, DHAKA.

APPENDIX - A

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Table- 11 Age Sex of the Study area  
 (as percent of the total population)  
 in each area

Age- Groups

Area	Sex	0-9	9-14	15-24	25-34	35-44	45-54	55-64	65+	Total
Kathal Ma- bagon	Male	11	7	27	47	21	5	1	-	119
	Fem- ale	11	5	7	7	4	1	-	-	35
Total		22	12	34	54	25	6	1	-	154
		14.28%	7.79%	22.08%	35.06%	16.23%	3.90%	0.65%		100%
Nakhal Ma- para	Male	33	31	20	21	18	11	7	2	143
	Fem- ale	33	21	26	20	9	8	1	1	119
Total		66	52	46	41	27	19	8	3	262
		25.19%	19.85%	17.56%	15.65%	10.30%	7.25%	3.05%	1.14%	100%
Rahmat Ma- ganj	Male	46	42	40	30	23	26	9	1	217
	Fem- ale	43	49	43	31	26	9	3	1	205
Total		89	91	83	61	49	35	12	2	422
		21.09%	21.56%	19.67%	14.45%	11.61%	8.29%	2.84%	0.46%	100%
Nama para	Male	34	15	14	27	7	6	8	4	115
	Fem- ale	33	18	21	18	6	11	4	3	114
Total%		67	33	35	45	13	17	12	7	229
		29.26%	14.41%	15.28%	19.65%	5.68%	7.42%	5.24%	3.06%	100%
Grand Total:		244	188	198	201	114	77	33	12	1067
		22.67%	17.62%	18.56%	18.74%	10.64%	7.22%	3.22%	1.12%	100%

Table - 2: Marital Status of the Study Area  
(as % of total population in each area)

Table - 3 : Place of origin of the migrants

Name of the District	Kathai bagan	Nekhal para	Rahmat ganj	Namer para	Total
Dhaka	9	8	20	9	42(22.5%)
Chittagong	2	6	8	4	20(10.8%)
Bogra	6	4	6	2	18(9.7%)
Faridpur	8	6	9	5	24(13.0%)
Noakhali	6	4	6	7	23(12.3%)
Comilla	4	8	12	8	32(17.2%)
Hymenaingh	1	2	1	2	6(3.2%)
Sylhet	-	1	2	-	3(1.6%)
Khulna	2	1	2	-	5(2.7%)
Jessore	1	-	2	-	3(1.6%)
Petuakhali	1	2	-	-	3(1.6%)
Outside from Bangladesh	-	4	2	1	7(3.8%)
 Total:	36	46	66	38	186(88.61%)
	19.4%	24.7%	35.5%	20.4%	100%
Living in this city since birth	-	6	14	4	24(11.4%)
	25%	50.0%	75.0%	16.7%	100%
Grand total:	36	52	80	42	210(100%)

Table - 4: Duration of stay in this city( in years)

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Area	0-1	2-5	6-10	11-15	16-20	21+	Total
Kathal bagan	1 2.8%	4 11.1%	7 19.4%	6 16.7%	10 27.8%	8 22.2%	36 100%
Nakhal Para	1 1.8%	8 15.4%	12 23.1%	10 19.2%	7 13.3%	14 27%	52 100%
Rahmat ganj	2 2.5%	10 12.5%	18 22.5%	16 20%	14 17.5%	20 25%	80 100%
Namapara	-	7 16.7%	5 12%	7 16.7%	5 12%	18 42.6%	42 100%
<b>Total:</b>	<b>4</b> <b>1.9%</b>	<b>29</b> <b>13.8%</b>	<b>42</b> <b>20%</b>	<b>39</b> <b>18.7%</b>	<b>36</b> <b>17%</b>	<b>60</b> <b>28.6%</b>	<b>210</b> <b>100%</b>

Table - 5: Causes of Migration(according to priority)

Area	Poverty	Unemp- loyment	Depen- dency	Flood natu- ral hazard	Educa- tion	Others	Stay in this city	Total
Kathal bagan	11 30.6%	24 66.6%	-	-	-	1 2.8%	-	36 100%
Nakhal Para	16 30.8%	26 50%	-	1 1.9%	1 1.9%	2 3.8%	6 11.6%	52 100%
Rahmat ganj	40 50%	20 25%	-	-	4 5%	2 2.5%	14 17.5%	80 100%
Namapara	21 50%	8 19%	1 2.4%	2 4.8%	1 2.4%	5 12%	4 9.5%	42 100%
<b>Total:</b>	<b>88</b> <b>41.9%</b>	<b>78</b> <b>37%</b>	<b>1</b> <b>0.5%</b>	<b>3</b> <b>1.4%</b>	<b>6</b> <b>2.8%</b>	<b>10</b> <b>4.8%</b>	<b>24</b> <b>11.4%</b>	<b>210</b> <b>100%</b>

Table- 6: Desire to go to some other place or stay in this locality(according to primary)

Area	Stay in this locality	Go to another slum/locality	Go to village/town	Total
Kathal bagan	20(55.6%)	10(27.8%)	6(16.67%)	36(100%)
Nakhal para	44(84.6%)	4(7.77%)	4(7.7%)	52(100%)
Rahmat ganj	71(88.7%)	7(8.8%)	2(2.5%)	80(100%)
Name- para	39(92.8%)	3(12.4%)	-	42(100%)
<b>Total:</b>	<b>174(82.0%)</b>	<b>24(11.5%)</b>	<b>12(5.7%)</b>	<b>210(100%)</b>

Table- 7: Reasons for go to some other place

Area	Environment is high	Rent is not so good	Inadequate water supply	Unhealthy condition	Other	Not applicable	Total
Kathal bagan	3(8.3%)	6(16.7%)	4(11.2%)	2(5.6%)	1(2.8%)	20(55.5%)	36(100%)
Nakhal para	-	4(7.6%)	2(3.8%)	-	2(3.8%)	44(81.6%)	52(100%)
Rahmat ganj	2(2.5%)	-	4(5.1%)	2(2.5%)	1(1.2%)	71(87.7%)	80(100%)
Name- para	-	-	2(4.8%)	1(2.4%)	-	39(92.8%)	42(100%)
<b>Total:</b>	<b>5(2.4%)</b>	<b>10(4.0%)</b>	<b>12(5.7%)</b>	<b>5(2.4%)</b>	<b>4(1.9%)</b>	<b>174(82.0%)</b>	<b>210(100%)</b>

Table - 8 : Occupational pattern of the Study Area

Occupation Type	Kathal bagan	Nekhal Para	Afan	Rahmat ganj	Namapara	Total
Executive(lower)	4(2.59%)	1(0.38%)	2(0.5%)	-	7(0.66%)	
Technical & professional(lower)	9(5.8%)	18(6.9%)	0(2%)	-	35(3.28%)	
Constructional	32(21%)	1(0.38%)	-	-	1(0.4%)	34(3.19%)
Technician/ Mechanic	34(22%)	11(4.2%)	6(1.4%)	8(3.5%)	59(5.53%)	
Domestic & offici- cial worker	7(4.5%)	4(1.5%)	6(1.4%)	-	-	17(1.59%)
Service Aid	18(12%)	23(8.6%)	56(13.3%)	30(13.1%)	127(11.90%)	
Trader	5(3.2%)	7(2.7%)	42(10%)	16(7%)	70(6.56%)	
Other	45(24%)	197(75%)	302(71.5%)	174(76%)	710(67.29%)	
<b>Total:</b>	<b>154(100%)</b>	<b>262(100%)</b>	<b>422(100%)</b>	<b>229(100%)</b>	<b>1067(100%)</b>	

Table- 9 : Total Monthly Income of the Family:

Income in Tk.	Kathal bagan	Nekhal Para	Afan	Rahmat ganj	Namapara	Total
~500	5(13.9%)	8(15.4%)	16(20%)	6(14.3%)	35(16.7%)	
501 ~1000	7(19.4%)	31(59.6%)	45(56.3%)	29(69%)	112(53.46%)	
1001 ~1500	2(5.6%)	10(19.2%)	14(17.5%)	7(16.7%)	33(15.0%)	
1501 ~2000	3(8.3%)	2(3.8%)	2(2.5%)	-	7(3.3%)	
2001 ~2500	7(19.4%)	-	3(3.7%)	-	10(4.8%)	
2501 ~3000	6(16.7%)	1(1.9%)	-	-	7(3.3%)	
3000+	6(16.7%)	-	-	-	6(2.7%)	
<b>Total:</b>	<b>36(100%)</b>	<b>52(100%)</b>	<b>80(100%)</b>	<b>42(100%)</b>	<b>210(100%)</b>	

Table - 10 : Deep Tube wells of Dhaka WASA

Well No.	Location	Well Age (years)	Pump capacity (lCPM)
1.	Banani I	13	93
1A	Banani II	13	112
3	Gulshan IV	15	563
16A	Lalmotia II	16	750
17	Mirpur XI	3	563
18	Mir X	2	333
19	Mirpur II	2	563
21A	Sukrabad	11	233
50A	Narinda	-	563
56	Dakeswari	-	563
61	Faridabad(I.G.Gate)	14	563
69	Mirpur VI	17	563
74	Lakshibazar	14	563
76	Dhaka Medical College	19	750
78	Abul Heesat Road	12	750
81	Dhansondi VI(Road -I)	12	281
87	Banagram II	11	563
90	Gendaria II	10	750
91	Jagannath College -II	10	375
92	Kawran Bazar	10	750
93	Fakirpool	10	281
94	Royer Bazar	10	563
95	Lichubagan II	10	750
96	Bashaboo II	10	750
97	Peelkhona II	2	750
98	Tojgaon VI	10	750
99	Khilgaon III	10	750
100	Eloppant Road	10	750
101	Mohakhali(T.B.Gate)	9	750
102	Banani III	9	750
104	Acad Goto	9	750
105	Dhaka Water Works	9	750
106	Kakrail IV	9	750
107	Shahjehanpur	-	750
108	Fulbaria II	8	563
109	Mogh Bazar II	-	750
110	Dhansondi VIII	8	750
111	Gulshan V	8	750
112	Tojgaon	8	375
113	Agameahi Lane	8	468
114	Feraahganj	-	750
115	Mirpur VII	7	563
116	Newbaganj - II	7	563
120	High Court	6	750

Table-10 (continued)

Well No	Location	Well Age (years)	Pump Capacity (lGPM)
121	Mohammadpur VII	6	750
122	Mirpur XII	7	675
123	Bagabazar	6	563
124	Jikatala	6	750
125	Green Road III	6	750
126	Rajabagh	5	750
127	Lalmatia	5	563
128	Mohakheli (Cholera Lab.)	5	750
129	Gymkhana	5	750
130	Hatkhole	5	750
131	Azimpur VI	5	750
132	Stadium	5	750
133	Tojgaon VIII	5	750
134	Hazaribagh II	4	750
135	Newabpur	4	750
136	Hill Barrack	3	750
137	Dayaganj	4	750
138	Bangladesh Math	3	750
139	Armanitola Math	3	750
140	Lalmatia III	3	750
141	Shymoli	3	750
142	Rahmatullah High School	3	750
144	Khilgaon IV	3	375
145	Banani IV	3	750
146	Peelkhana III	3	750
147	Green Road IV	3	750
148	Maniknagar	1	750
149	Serajuddullah Park	2	750
150	Bijoynagar II	-	563
151	Malibagh	1	750
152	Mitford Hospital	1	750
153	Baily Road	-	750
154	Azimpur	1	-
155	National Assembly	1	375
-	Dhaka College	-	188
-	Mirpur Pallabi	-	233
-	Norayanganj Walls: (no data)		
-	- Bani Hall		
-	- Chasara		
-	- Marine Diesel Training Centre		
-	- Nataleganj		
-	- Sitalakhya		
-	- Poikpara		
-	- Tolaram College		

Table - 11 : Existing Reservoirs

Location	Capacity (thousands of imperial gallons)	Constructs
<b>DHAKA</b>		
Armanitola Meth	80	Steel
Azimpur	100	Concrete
Benagras	200	Concrete
Bijoynagar	100	Concrete
Dhaka Medical College	100	Concrete
Dhaka Water Works	200	Concrete
Dhanmondi Road I	100	Concrete
Dhanmondi Road II	100	Concrete
Fekirapool	1,000	Steel
Fulbaria	200	Concrete
Gandaria	80	Brick
Gulshan IV	150	Concrete
Hatkhole	200	Concrete
Hazaribagh	200	Concrete
Izampur	200	Steel
Kakrail	100	Concrete
Lalmotia	100	Steel
Hill Barrack Road	120	Steel
Mirpur -I	100	Concrete
Mirpur -II	100	Concrete
Mirpur -VI	150	Concrete
Mirpur -X	150	Concrete
Mirpur -XII	150	Concrete
Mohakhali	30	Concrete
Mohakhali (Golestan)	1,000	Concrete
Mohakhali (T.V. Gate)	20	Concrete
Mohammadpur -I	100	Concrete
Mohammadpur -II	100	Concrete
Motijheel	100	Concrete
Newabganj	80	Steel
Pallabi	200	Concrete
Pealkhana	15	Concrete
Tejgaon -I	100	Concrete
Tejgaon -II	100	Concrete
Victoria Park	120	Brick
<b>NARAYANGANJ</b>		
Boni Halli	-	Steel
Khanpur	-	Concrete
Netalganj	-	Steel

Source: Head Office Dhaka WASA.

APPENDIX - DTheoretical Calculation for the number of families sharing  
the same water tap.

An average twenty five gallons per capita per day water is needed for the city dwellers, whereas on the basis of socio-economic condition and living standard of the slum dwellers an average twenty gpcd water may be considered for design purpose. The number of trip per person per day is five and it is assuming that an average collection per trip is three gallons of water is considered.

The average household size is 5.1 and total number of trips ( $5.1 \times 5 = 25.5$ ) about 26 per household per day. But it is not equal for all the family members, approximately twelve trips is considered for per household per day.

In general 1.30 minute is required to collect three gallons of water(including cleaning and placing the container and long dealt during water collection) and yield capacity of a tap water five gallons per minute.

About Forty percent of the total water collection journeys are made at peak demand period(10-12pm)  $\approx 2$  hours = 120 minutes. If 1.30 minute is considered to collect water, total number of trips at peak demand period  $\frac{120}{1.30} = 0.92$  trips made. The average trips is twelve per household per day, on the basis of this  $(\frac{22}{12} = 7.3)$  eight households can be satisfied by one water tap.

If the collection journeys are made uniformly through the peak demand period and other factor is considered, in fact income is not so bad and variable tap is constant ( $\frac{8}{2} = 4$ ) for this purpose it is far better each four to five families or households can use the same water tap. At this moment it is not possible to required but it may be reduced the number of water tap gradually within a short time period.

LIST OF MUNICIPAL WARD

- |     |                          |     |                          |
|-----|--------------------------|-----|--------------------------|
| 1.  | Shaymolly                | 29. | Wari                     |
| 2.  | Mohammedpur - I          | 30. | Sharafatgong             |
| 3.  | Mohammedpur -II          | 31. | Feridebad                |
| 4.  | Jafarabad Madhu Bazar    | 32. | South Jatrabari          |
| 5.  | Royer Bazar              | 33. | Mir Hazari Bagh          |
| 6.  | Hazari Bagh              | 34. | North Jatrabari          |
| 7.  | Kalabagan                | 35. | Gopi Bagh                |
| 8.  | Kathel Bagan             | 36. | Mogdapara                |
| 9.  | Elephant Road,Chennondi. | 37. | Motijheel Colony         |
| 10. | Hazari Bagh              | 38. | Besabo                   |
| 11. | Newbaganj                | 39. | Goron                    |
| 12. | Anilgola Lalbagh         | 40. | Khilgaon Paipura         |
| 13. | Lalbagh                  | 41. | Shajahanpur              |
| 14. | Maximuddin Road          | 42. | Malibagh                 |
| 15. | Khajadwan Road           | 43. | Fukirkul,New Paltan      |
| 16. | Rahmetganj               | 44. | Fulberia                 |
| 17. | Chhote Kotra             | 45. | Ramna                    |
| 18. | Armanitola               | 46. | Elephant Road Siddesvari |
| 19. | Zindabazar               | 47. | Noyatola                 |
| 20. | Agasadeq Road            | 48. | Nakhalpara               |
| 21. | Siddique Bazar           | 49. | Cekaton                  |
| 22. | Bengali                  | 50. | Tejgaon                  |
| 23. | Teti Bazar               | 51. | Sheora Benoni            |
| 24. | Patuatoli                | 52. | Gulshan                  |
| 25. | Gandaria                 | 53. | Hohokhali                |
| 26. | Pokun Road               | 54. | Mirpur- I                |
| 27. | Newabpur                 | 55. | Mirpur-II                |
| 28. | Narinde                  | 56. | Kalyanpur Peikpara       |

Department of Urban and Regional Planning  
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Research Title : A STUDY OF WATER SUPPLY SYSTEM OF  
SELECTED SLUM AREAS OF DHAKA.

(Number '9' is used as not applicable, '0' is used as  
No Response)

A. Name of Interviewer:

Date:

Time: From \_\_\_\_\_ To \_\_\_\_\_

Signature:

B. Household Identification Word Nos

Name of Locality/Slum:

House No:

C. Identification of Respondents:

Name(optional)

Regional :

- 1. Muslim
- 2. Hindu
- 3. Christian
- 4. Others

Who is the Head of the Household

- 1. Husband
- 2. Wife
- 3. Father
- 4. Mother
- 5. Daughter
- 6. Son
- 7. Cousin
- 8. Others

**1. General Information of the Household**

Sl. No.	Relationship with Head of Household (Start from Head of the H.H.)	Age	Sex	Marital status	Educational level (aged more than 5 years)	Occupation (only main occupation)
						a. b. c. d.
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

a. Please see the page

b. Age groups:

c. 1=Unmarried  
2=Married  
3=Widow  
4=Divorced

- |          |          |
|----------|----------|
| 1. 0-9   | 5. 55-64 |
| 2. 10-14 | 6. 45-54 |
| 3. 15-24 | 7. 55-64 |
| 4. 25-34 | 8. 65+   |

d. 1= Illiterate

2= Primary

3= Secondary

4= S.S.C.

5= H.Sc.C. &

6. Degree above

7. Technical Education

8. Informal Education

2. What is the monthly income of your family ?

- |               |              |
|---------------|--------------|
| 1. below 250+ | 5. 1501-2000 |
| 2. 251-500    | 6. 2001-2500 |
| 3. 501-1000   | 7. 2501-3000 |
| 4. 1001-1500  | 8. 3001+     |

URBANIZATION

1. How long have you been living in this city?  
(in years)
2. Where did you live before coming to this city?
  1. Village District \_\_\_\_\_
  2. Town
3. How long have you been living in this locality  
(in years)
4. What is the objective of coming in this locality/city.  
(according to priority).
 

1. Poverty	4. Dependency
2. Unemployment	5. Flood/Natural hazards
3. Drought	6. Education
	7. Others
- a) Do you think that you will continue to live here  
(according to priority)
  1. Stay in this locality
  2. Go to another place/locality
  3. Go to village/Town
  4. Other(specify)
- b) Please justify your answer(According to Priority)
  1. Environment is not so good
  2. Rent is high
  3. Inadequate supply of water
  4. Inadequate space
  5. Unhealthy condition
  6. Others(specify)

HOUSING:

6. Are you the owner or a tenant in this house ?
 

1. below 50 take	4. 151-200	7. 301-350
2. 51-100	5. 201-250	8. 351+
3. 101-150	6. 251-300	
7. How long have you been living in this house ?  
(in years)
8. Do you have any land or houses anywhere ?
  1. Yes
  2. No

9. If yes, where ?
1. In this city
  2. Another city/town
  3. In the village
10. How old is this house ?(in years)
11. What are the building materials used in this house.  
Structural Element
- Floor  
Wall  
Roof
- |                 |              |
|-----------------|--------------|
| 1. Brick Cement | 4. Polythine |
| 2. Tin          | 5. Leaves    |
| 3. Bamboos      | 6. Mud       |
|                 | 7. Others    |
12. How many rooms do you have in this house for use ?
1. 1 room
  2. 2-3 room
  3. Part of a room
  4. No room
  5. Other(specify)
13. What is the floor area of this house/room ? (in sq. mit.).
14. What is the Floor area of this land ? (in sq. mt.)
- WATER SUPPLY
15. What is the location/source of water supply ?
1. Within the house
  2. Within the Neighbourhood
  3. Out side the Neighbourhood
16. What is the source of water supply in your house ?
1. Hand tubewell
  2. Pond/Tank/Well
  3. Road side stand pipe
  4. WASA connection
  5. Community stand pipe
  6. Neighbourhood stand pipe
  7. Others(specify)
17. What is the distance of source of  
(Water from your residence (In meter))
18. What are the Number of families sharing the same water tap ?
19. What is the approximate time you spend for this purpose  
(in min.)
20. What are the difficulties you face in getting water from  
the stand pipe ?
1. Inadequate supply of water
  2. uncertainty
  3. Long Queue
  4. often face quarrel
  5. Other(Specify)

22. What type of water connection would you prefer ?

- 1. Separate connection to your portion
- 2. Common connection with separate tap in your portion
- 3. Common connection and common taps

22.a) Please justify your answer

23. Do you get sufficient supply of water regularly ?

- 1. Yes
- 2. No

(24). If no, what is the nature of irregularity ?

- 1. Daily
- 2. Weekly
- 3. Seasonal

25. What is the frequency of breakdown or low pressure during the last one month ?

- 1. Once a week
- 2. Most of the day
- 3. Once only
- 4. Once in a fortnight
- 5. Very rarely

26. Does the WASA take necessary steps to solve these problems?

- 1. Yes
- 2. No
- 3. Do not know

27. If no, what is your opinion about the responsibility of WASA.

28. Which connection do you prefer best

- 1. Metered
- 2. Non Metered

29. If non metered is best, how much you are willing to pay for water ? (Taka).

30. What is your opinion about the rate/price of WASA's water supply system ?

- 1. Very high
- 2. High
- 3. Normal
- 4. Low

31. What do you think about the maintenance and service of the WASA.
1. Satisfactory
  2. Moderate
  3. Unsatisfactory
32. What are the major defects do you think in water supply system of WASA (Put your answer according to priority).
1. bad circulation system
  2. negligence
  3. unequal distribution of water
  4. lack of fund
  5. lack of co-operation
  6. defective service and maintenance
33. Would you please grade your level of satisfaction according to the following scale with respect to the supply of water in your locality.
1. 80% and above
  2. 80%-60%
  3. 60%-40%
  4. 40%-20%
  5. 20% and less
34. What is your suggestion to improve the water supply system in your locality (suggest according to priority).

LIST OF OCCUPATION

- |  |   |
|--|---|
| 1. Executive(Higher)                                 | Manager, Director, Secretary, Police Superintendent, High Officials of Private Firms, Commissioner, Accountant Auditor, Doctor, Engineer, Barister, Advocate, Teacher(College and University) Painter, Pilot Officer, Photographer. |
| 2. Executive,<br>2. Technical & Professional (Lower) | Police Constable, Daroga, Clerk, Assistant Cashier, Time keeper, Compounder, Nurse, Kaviraz, School Teacher, Peashkar, Surveyor, Draughtsman, Typist, Steno-grapher, Telephone Operator.  |

SKILLED MANUAL

- |                       |   |
|-----------------------|---|
| 3. Constructional     | Builder, Mason, Book Binder, Carpenter, Driver, Tailor, Smith, Shoe maker.  |
| 4. Technical/Mechanic | Machineman, handicraftsman, Pipe fitter, watchmaker, Radio-mechanic, Cycle and Rickshaw mechanic, Telephone mechanic, Welder, Driver. |

UNSKILLED MANUAL

- |                                 |  |
|---------------------------------|--|
| 5. Domestic and Official worker | Cooker, Domestic servant, Aya, Hostel boy, Decorator, Sweeper, Darwan, Peon, Beaters.  |
| 6. Service aid                  | Rickshawpuller, Handcartpuller, Porter, Birimaker, Barber, Cobbler, Daylabour.         |
| 7. Trader                       | Retail proprietor, shop assistant, salesman, broker, commercial agent, street hawkier. |
| 8. Other                        | House wife, student, unpaid family worker, Retired person, Begger.                     |

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