

HEALTH AND DEMOGRAPHIC SURVEILLANCE IN MATLAB: PAST, PRESENT AND FUTURE

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What is ICDDR,B: Centre for Health and Population Research?



ICDDR,B, or "The Centre", was established in 1978 as successor to the Cholera Research Laboratory created in 1960 to study the epidemiology, treatment, and prevention of cholera. The Centre is an independent, international, non-profit organization for research, education, training, clinical services, and information dissemination. Located in Dhaka, the capital city of Bangladesh, the Centre is the only truly international health research institution based in a developing country. The results of research conducted over the years at the Centre provide guidelines for policy makers, implementing agencies, and health professionals in Bangladesh and around the globe. Researchers at the Centre have made major scientific achievements in diarrhoeal disease control, maternal and child health, nutrition, and population sciences. These significant contributions have been recognized worldwide.

How is the Centre Organized?

The Centre is governed by a distinguished multinational Board of Trustees comprising researchers, educators, public health administrators, and representatives of the Government of Bangladesh. The Board appoints a Director and four Division Directors who head the Centre's four scientific divisions. The Director's Division provides support to the scientific divisions. The Director's Division include Administration and Personnel Department, Finance Department, Training and Education Department, External Relations and Institutional Development Department, Dissemination and Information Services Centre (DISC), Audiovisual Department, and the Director's Office.

The **Clinical Sciences Division (CSD)** staffed with physicians and scientists trained in gastroenterology, infectious diseases, nutrition, epidemiology, paediatrics, and general medicine is engaged in: (i) hospital- and community-based clinical research in the fields of infectious diseases and nutrition; (ii) hospital care to more than 110,000 patients annually at the Clinical Research and Service Centre in Dhaka; (iii) preventive health care to mothers and children; and (iv) training in case management of diarrhoeal diseases and research methodology. Research activities are along the themes of case management (nutritional, fluid, and pharmacological therapies), pathophysiology, and preventive, maternal and child health.

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The **Training and Education Department (TED)** started training programmes in 1978 for manpower development in research field, increasing capabilities to manage programmes for the control of diarrhoeal diseases and population increase. The training programmes are designed to enhance the potential of developing

(See inside of the back cover...)

Health and Demographic Surveillance in Matlab: Past, Present and Future

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PREFACE

The Matlab Health Research Programme of ICDDR,B has been in continuous operation for more than 30 years. It has enlarged our knowledge of the causes of a decline in fertility and improvements in health status. It has given us new knowledge on childhood diseases, and conditions related to pregnancy and delivery. In addition, it has substantially contributed to the development and improvement of global programmes in child health and reproductive health including maternity care and family planning and nutrition. This success has largely been due to the existence of two longitudinal data collection systems, the Demographic Surveillance System (DSS) and the Record Keeping System (RKS).

Many of the objectives which were formulated for the Matlab Programme several years have now been achieved. For this reason ICDDR,B and its Public Health Sciences Division (PHSD) have embarked on an ambitious effort to formulate new long-term objectives for this Programme in child and reproductive health and a number of exciting proposals have been or are being developed. I am confident that funding will be found for them and the same applies to the two surveillance systems. The DSS and RKS are being modernized and integrated into a new and more comprehensive Health and Demographic Surveillance System.

As already stated above, the two surveillance systems have played an important role in the Matlab Programme. The purpose of this publication is to show what has been achieved and what can be expected from a modernized system in the future. We hope that this publication will reach a broad audience in Bangladesh, including the policy makers and funding-agencies.

A wealth information has been generated by these two systems which has also been useful for the formation of global health and population policies. We believe results achieved amply justify the investments which have been made over the years by many different agencies. I am convinced that a modernized and integrated Health and Demographic Surveillance System will also continue to make important contributions to improving policies concerned with child and reproductive health.



Prof. Robert M. Suskind, M.D.
Director, ICDDR,B

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The ICDDR,B is supported by countries and agencies which share its concern for the health problems of developing countries. Current donors include: the aid agencies of the Governments of Australia, Bangladesh, Belgium, Canada, Japan, the Netherlands, Norway, Saudi Arabia, Sri Lanka, Sweden, Switzerland, the United Kingdom, and the United States; international organizations, including Arab Gulf Fund, European Union, the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), and the World Health Organization (WHO); private foundations including Aga Khan Foundation, Child Health Foundation (CHF), Ford Foundation, Population Council, Rockefeller Foundation, Thrasher Research Foundation, and the George Mason Foundation; and other organizations including Helen Keller International, International Atomic Energy Agency, International Development Research Centre, Karolinska Institute, London School of Hygiene & Tropical Medicine, National Institute of Health (NIH), RAND Corporation and others.

A large number of persons and organizations have over a period of many years contributed to the Matlab Programme and, therefore, also to DSS and RKS; four groups need to be mentioned in particular. First, the people of Matlab who for many years have provided the requested information. Second, the Matlab-based ICDDR,B staff who posed the questions and recorded the information. Third, the many scientists and other staff at ICDDR,B in Dhaka who in the past have been or currently are involved in the processing and analysis of data. Of the various ICDDR,B staff members who have contributed to Matlab, we can only mention three: Dr. Md. Yunus, Head of the Health Research Programme in Matlab, Mr. J. Chakraborty, Head of the Community Health Research Unit in Matlab and Dr. Kashem Shaikh, Manager of the DSS Office in Dhaka. Fourth, the various funding agencies who in the past have provided or are now providing the much needed financial resources. We express our gratitude to all these individuals and organizations for their collaboration.

The initiative to this publication was taken by Prof. D. Habte, former Director and Mr. Graham Wright, former Associate Director of External Relations & Institutional Development of ICDDR,B. Their support to this project was crucial in the early stages of production and the same applies to the assistance given by the current Director of ICDDR,B, Prof. R. Suskind in the later stages. We are grateful to them for the interest they have shown in this project.

Mrs. Gillian Duffy, Consultant Editor, helped a great deal in the various stages of production; she traced literature, supplied ideas, wrote parts of two early drafts and designed the graphs. We also acknowledge the help provided by Mrs. Indrani Pieris-Caldwell who summarized Matlab articles and Professor Rachel Snow, University of Heidelberg, who made valuable editorial comments. Mr. Sentu B. Gomes, Office Manager, Health and Demographic Surveillance Programme, ably assisted with the word processing and lay-out.

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ABBREVIATIONS

ARI	Acute Respiratory Infection
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
BRAC	Bangladesh Rural Advancement Committee
CHW	Community Health Worker
CPR	Contraceptive Prevalence Rate
CRL	Cholera Research Laboratory
DBMS	Data Base Management System
DSS	(Matlab) Demographic Surveillance System
EOC	Emergency Obstetric Care
FWA	Family Welfare Assistant
GIS	(Matlab) Geographical Information System
HA	Health Assistant
HAPP-5	Fifth Health and Population Programme
HDSP	Health and Demographic Surveillance Programme
HIS	(Matlab) Health Information System
HIV	Human Immunodeficiency Virus
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
ICPD	International Conference on Population and Development
IUD	Intrauterine Device
MCH-FP	Maternal and Child Health and Family Planning
MHDSS	Matlab Health and Demographic Surveillance System
MOHFW	Ministry of Health and Family Welfare (Bangladesh)
MR	Menstrual Regulation
NIPORT	National Institute for Population Research and Training
ORS	Oral Rehydration Solution
PHSD	Public Health Sciences Division
POA	Plan of Action (of ICPD)
RDP	Rural Development Programme
RKS	(Matlab) Record Keeping System
RTI	Reproductive Tract Infection
SHA	Senior Health Assistant
STD	Sexually Transmitted Disease
TFR	Total Fertility Rate
WHO	World Health Organization

GLOSSARY OF TERMS/DEFINITIONS

Below Five Mortality Rate: the probability of dying between birth and the fifth birthday (measured per 1,000 live births).

Child Mortality Rate (Ratio): the probability of dying between the first and fifth birthday, (measured as a ratio per 1,000 live births) or the number of deaths between the first and fifth birthday (expressed as a rate per 1,000 population 1-4 years old).

Contraceptive Prevalence Rate: percentage of married women of childbearing age who are using, or whose husbands are using, any form of contraception (modern or traditional methods).

Crude Birth Rate: annual number of births (per 1,000 population).

Crude Death Rate: annual number of deaths (per 1,000 population).

Infant Mortality Rate: the probability of dying before the first birthday (measured per 1,000 live births).

Life Expectancy at Birth: number of years a newborn infant would expect to live if prevailing patterns of mortality at the time of its birth were to stay throughout its life.

Maternal Mortality Rate (Ratio) : the probability of a woman dying while pregnant or within 42 days of termination of pregnancy from any cause (expressed as a ratio per 1,000 live births or a rate per 10,000 or 100,000 women of reproductive age)

Natural Growth Rate: the difference between the number of births and deaths in a population (per 100 or 1,000 population).

Neonatal Mortality Rate: the probability of dying between birth and the end of the 28 days of life (per 1,000 live births).

Postneonatal Mortality Rate: the probability of dying between 29 days of life and one year of age (per 1,000 live births).

Total Fertility Rate: the number of children that would be born per woman, if she were to live to the end of her child-bearing years and bear children at each age in accordance with age-specific fertility rates.

Total Population Growth Rate: the growth in population resulting from births, deaths and migration (per 100 or 1,000 population).

EXECUTIVE SUMMARY

During the past 30 years ICDDR,B has carried out a number of its research activities in part of Matlab thana, a rural area of Bangladesh with a population of 210,000. Many of these projects have been longitudinal in nature which means that this population or subgroups (e.g., children below 5) were followed up over time. This has scientific advantages, because it allows more precise measurement of the variables involved than with other research designs and it makes it possible to establish cause-effect relationships with more precision.

Two important components of the **Matlab Programme** are the **Demographic Surveillance System (DSS)** and the **Record Keeping System (RKS)** and this report renders an account of the use of the information generated by these two data gathering systems during the past 20 years. It is especially aimed at **policy makers** in Bangladesh and other Asian countries and at **funding agencies**.

One of the uses of these two systems has been to identify **population and health problems** and their various causes. Illustrations of these types of contributions of DSS and RKS are provided in Chapter 2. They show that a wealth of information has been produced which has contributed substantially to development of health and population policies.

DSS and RKS have also been indispensable in the evaluation of the **impact of health interventions** which have been carried out in Matlab. They are indispensable, because they provide the enumerators and denominators of demographic and epidemiological rates such as birth and death rates, cholera incidence rates, contraceptive use rates, etc. Illustrations of use of DSS and RKS for this purpose are given in Chapter 3.

Many of the research objectives of the projects which started in Matlab a number of years ago have been achieved (in 1997). For this reason **new projects** started several years ago and some of them are described in Chapter 4 with special emphasis on how they use DSS and RKS data. A great deal of effort was spent in 1997 on the task of setting new long-term objectives for Matlab. New initiatives have been taken in the areas of **child health** (e.g., with respect to Integrated Management of Childhood Illness) and in **reproductive health** (e.g., expansion of Safe Motherhood Programme). A question which has to be answered in the near future is if and to what extent these new projects should be implemented in the DSS area of Matlab thana. It may for various reasons be desirable or necessary to start some of them elsewhere in Matlab (the Non-DSS area) or elsewhere in the country.

The new initiatives which have been taken in 1997 have already led to completion of several research protocols which were submitted for funding while more will follow in 1998. All of these projects need a **modernized, integrated Matlab Health and Demographic Surveillance System (MHDSS)** and Chapter 5 summarizes our plans with respect to this new MHDSS.

CHAPTER ONE

INTRODUCTION TO MHDSS

1. Background

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) has made important contributions to the study of health problems in developing countries and to finding solutions for them. One of the ICDDR,B programmes which has played a key role in this is the **Matlab Health Research Programme** which has been in operation for a number of years in a rural area of Matlab thana in Chandpur District in Bangladesh, with a population of 210,000 (in 1996). The Matlab Health Research Programme is implemented by staff of the **Public Health Sciences Division** and consists of a clinical and community health care unit (which includes the Matlab hospital, four health centres and community health workers), a child health research unit and a reproductive health research unit. A fourth component of this project is the **Matlab Health and Demographic Surveillance System (MHDSS)**. It consists basically of two parts : the Demographic Surveillance System (DSS) and the Record Keeping System (RKS). The DSS has been in operation continuously for more than 30 years, probably the largest longitudinal demographic data collection system maintained in a developing country. RKS started in 1977 focusing on diseases affecting women and children, use of health care and contraceptive use.

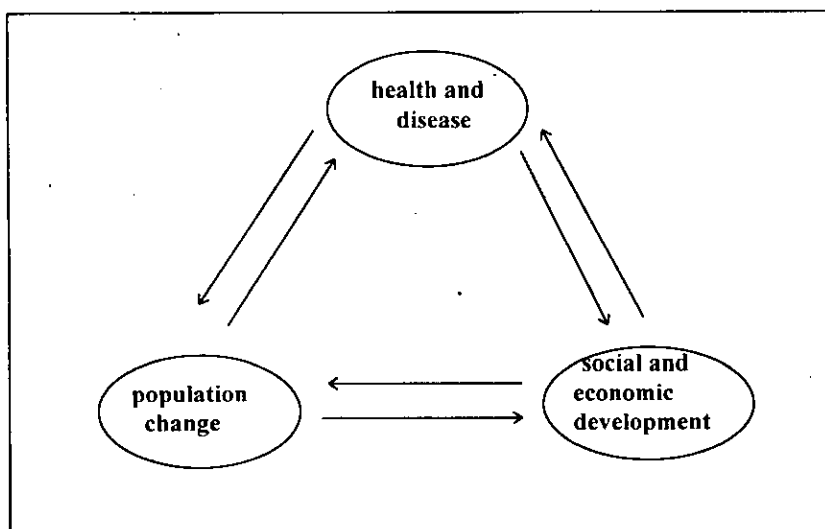


Figure 1: Model of Health, Population and Development Linkages

A distinctive feature of the Matlab Project is that health and disease are viewed in the context in which these problems occur. This perspective has contributed to our understanding of the interrelationships between health and disease, population dynamics and social and economic development (see Figure 1). This means that a multi-disciplinary approach was adopted.

In this report the MHDSS is described in its historical context, from its inception, through various phases to its present form. Examples of major findings of past and current research are highlighted as well as their contributions to formulation of health and population policies. Finally, the importance of the MHDSS for future research is emphasised and plans for modernisation are summarised.

2. History of the Matlab Project

In 1960 the Cholera Research Laboratory (CRL), the forerunner of ICDDR,B, was established in Dhaka to develop a vaccine which would prevent, and eventually eradicate, cholera. An essential element of this programme was the implementation of large scale controlled vaccine field trials. This required selection of a field site where certain conditions could be met, including the presence of endemic cholera and year round access to villages. Matlab thana, in the Chandpur district, was chosen. (Aziz and Mosley, 1994).

Matlab is about 55 kilometres Southeast of Dhaka and typical of many rural and riverine delta areas of Bangladesh. Being flat and low lying, it is subject to annual flooding by the many canals and rivers which criss-cross the area. Communication with the capital is difficult and within Matlab travel between villages is mostly on foot or by rickshaw, or during the monsoon, by country boat. A typical village consists of several *baris*, or groups of houses around a central courtyard, which function as economic and social units. A *bari* is usually made up of two or more patrilineally related families and for the female members of the household, movement and social contact outside the *bari* is restricted. A substantial proportion of villagers is landless and the major sources of income are fishing, agricultural labour and share-cropping.

A field station was set up in Matlab in 1963 with laboratory facilities to identify cholera and a hospital for the rapid treatment of cholera and other diarrhoeal diseases. Large scale vaccine trials require detailed information on the individuals taking part and for this reason mapping of the houses took place and a population census was held.

The first vaccine trial was conducted in 1963 in 23 villages with a population of almost 28,000. In response to the requirements of later trials, the population coverage was expanded until in 1966 it encompassed 132 villages and close to 112,000 individuals. These villages were later referred to as the Old Trial Area. In 1968 another 101 villages were added for a new vaccine trial, bringing the total in the New Trial Area to 233 villages.

A major reorganization took place in 1977 to take advantage of the wider research potential of Matlab. This involved excluding 84 villages from the study area and dividing the remaining area, comprising 149 villages, into two parts. In one part an intensive **Maternal and Child Health and Family Planning (MCH-FP) programme** was initiated and this area is called the **MCH-FP area**. In the other part, termed the **Comparison area**, only the usual government health services were provided plus some extra services provided by ICDDR,B. Since 1977 the study area has remained unchanged except for the loss of seven villages due to erosion by the Dhonagoda river.

After nearly 20 years of operation many of the objectives of the Matlab MCH-FP programme have been achieved. This means that a new mission for the Matlab project has to be found and new activities have to be initiated. This also applies to the demographic and health surveillance systems (DSS and RKS) in use in Matlab. This report provides a summary of what has been achieved so far with data from DSS and RKS and summarizes future plans.

3. Data Collection Systems

Just after the census of 1966, the **Demographic Surveillance System (DSS)** was initiated in Matlab. The registration of vital events (births, deaths) and in- and out-migration was carried out initially by male field assistants, but as the culture prohibited men from visiting women in their homes they were escorted by local *dais* - typically widows, past child-bearing age, with freedom to move around the village. Later the Matlab DSS registration was extended to include additional information on marriage and divorce. All these demographic events were independently verified by supervisory staff, making the DSS one of the most reliable sources of this type of data in a developing country.

The *dais* were illiterate and in 1977 they were replaced by a smaller number of young married women with secondary education who were designated Community Health Workers (CHWs). This change was required for the MCH-FP project, to be discussed in more detail in Chapter 3.

Households are not only visited by CHWs (two weekly until the middle of 1997; monthly after this), but also by male Senior Health Assistants (SHAs) and Health Assistants (HAs) (monthly until about 1994 and six-weekly since that time). They check the data collected by the CHWs, bring the population registers up to date and fill out the various vital events forms plus the forms dealing with in- and out-migration, inter-area movements, marriage and divorce and changes in household status.

In addition, periodic **censuses** (1974, 1982, 1996) have been carried out in the DSS area to collect demographic and socio-economic information on the study population. Throughout its lifetime and despite the changes which have occurred over the years, the DSS has retained two important features - the accuracy of the data, in particular dates of birth for every person born since 1966, and the use of unique registration numbers, allowing data collected on a particular individual for different purposes to be linked.

The CHWs in the MCH-FP area do not only collect data for DSS, but also for the **Record Keeping System (RKS)**. RKS is a data gathering system on childhood illnesses, nutritional status, health status of women in reproductive age, contraceptive use and use of health care. A number of CHWs are also employed in the Comparison area, but they are only involved in the collection of demographic data for DSS. RKS is, therefore, only operational in the MCH-FP area and not in the Comparison area.

A third data collection system is the **Geographical Information System (GIS)** which is a data set containing information from both DSS and RKS. Much of the GIS information on health and demographic events is stored by village for the period 1983-1996 making it possible to study the role of geographical factors with respect to health and disease and population phenomena.

Together these data collection systems make up the **Matlab Health and Demographic Surveillance System (MHDSS)**. Obviously a huge amount of information spanning three decades has been, and continues to be collected. This has been managed, with increasing sophistication over the years, by ICDDR,B computer facilities, to provide accurate, reliable longitudinal data which can be used by health planners, policy makers and scientists.

4. Uses of MHDSS Data

One of the main objectives of ICDDR,B, enshrined in the Ordinance under which it was created, is to undertake research leading ultimately to improved public health, particularly in developing countries. See Box 1.

The ideal model for research, leading to this goal of improved public health, involves identifying problems and developing effective and efficient health care interventions with a sound scientific basis. This process should be subject to monitoring and evaluation in order to learn lessons for existing programmes and to identify further problems.

Box 1: ICDDR,B Mission Statement

The fundamental mission of the Centre is to develop and disseminate solutions to major health and population problems facing the world, with emphasis on simple and inexpensive methods of prevention and management.

This leads to the cyclical nature of research - a process operating within social, cultural, political and financial constraints, all of which influence the outcome.

One of the major problems normally associated with conducting research in developing countries is the lack of reliable data. ICDDR,B therefore has a comparative advantage and Matlab Project findings have made a considerable contribution to the understanding of global health issues. The MHDSS in particular has a pivotal role in the research process, both at the stage of problem identification and in the evaluation of interventions. The research cycle in Matlab typically involves the following stages (see Figure 2):

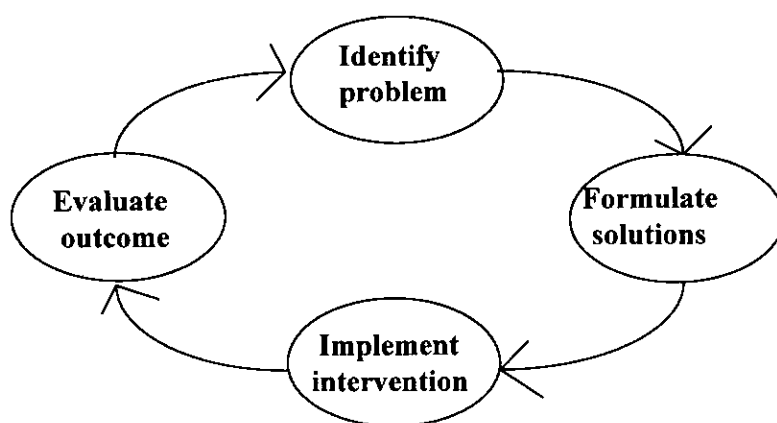


Figure 2: Model of the Research Cycle

- **Identify problems** - assess particular health needs and population problems from MHDSS data.
- **Formulate solutions** - design interventions to address problems.
- **Implement interventions** - introduce interventions in Matlab.
- **Evaluate outcomes** - assess impact of interventions from MHDSS data, learn lessons for existing programmes, identify new problems and draw conclusions for health policies at the national level.

The MHDSS data are, therefore, used in the first and fourth phase of this research cycle:

- I. to identify population and health problems (using existing DSS and RKS data) and their social, economic and environmental causes; and
- II. as an indispensable tool in the evaluation of the impact of health interventions by providing data on numerators of rates to be calculated (e.g., number of contraceptive users from RKS) and denominators of rates (e.g., number of married women 15-49 years old, all live births, population 1-4 years old).

It is in this connection worth mentioning that in the Matlab project population and health problems have not only be studied through MHDSS. Over the years several cross-sectional sample surveys have been conducted complementing MHDSS. Examples are the two Knowledge Attitudes Practice Surveys of 1984 and 1990, the Matlab Demographic and Health Survey of 1993 and the Matlab Health and Socio-economic Survey of 1996. (For details of this last survey, see Chapter 4).

The duration of the study period and the quality of MHDSS data allows a unique opportunity for testing health interventions in a rural Bangladesh setting. It is also

important to keep in mind that demographic and health changes which have taken place in Matlab are often not only the result of the health interventions which were introduced, but also due to secular social and economic changes. In view of the rich data sets which have been accumulated in Matlab over the years it is in many cases possible to separate the impact of the health programmes from the social and economic changes.

The MHDSS provides information on a well defined and documented population which makes it possible to implement studies which have the potential to benefit millions of people, in Bangladesh and beyond. A good example is the large scale and long term MCH-FP programme, which has been ongoing since 1977. The results achieved with a number of interventions which were initially designed and tested in Matlab in the late 1970s and 1980s led to modifications in the government health and family planning programme. Examples of components of the government programme which were changed are definitions of the tasks of Family Welfare Visitors, use of record books of Family Welfare Assistants, provision of a broad choice of contraceptive methods, introduction of injectable hormonal contraception, provision of outreach immunisation services, introduction of measles vaccination, introduction of oral rehydration therapy and management of acute lower respiratory infections at the community level. (For an overview of these contributions, see Chen, 1986; Fauveau, 1994; Phillips, 1994).

Several of the interventions which were initially tested in Matlab were later implemented in larger areas of Bangladesh through ICDDR,B's MCH-FP Extension Project (Rural) (Phillips, 1994). This project has started in several rural thanas and districts in 1982 with a population of about one million and is still continuing today (Khuda, et al., 1997 and Kane, et al., 1997).

In the following chapters, the contributions of MHDSS are illustrated by examples of some important findings, focusing on the period 1977-96. In the next chapter some examples of population problems and health needs, identified from MHDSS data, are described. In Chapter 3 we will give several examples of how MHDSS data have been used in the evaluation of the impact of health interventions implemented in Matlab on e.g., contraceptive use, fertility and mortality. In Chapter 4 examples of current studies are provided dealing both with identification of problems and assessment of outcomes of interventions. Finally, future plans for the MHDSS are discussed in the concluding chapter.

CHAPTER TWO

POPULATION DYNAMICS AND POLICY IMPLICATIONS

In this chapter we present population data from Matlab for the period 1977-1996 which shed light on population and health problems existing in that area. The data are unique and important because they are considered to be accurate and they are detailed. In no other area of Bangladesh - or in other Asian countries - are such detailed data available. Therefore, they complement the information available at the national level collected by agencies such as the Bangladesh Bureau of Statistics. The data to be presented here are fairly representative for rural areas of the country as a whole, we do not claim that they are fully representative. We will only give a number of illustrations of use of the Matlab data. For more information, the reader is referred to the References at the end of this publication.

Results of the MCH-FP and Comparison areas are combined. This will to some extent influence the representativeness of the findings in this chapter. The operation of the MCH-FP programme in one part of the study area has influenced birth and death rates. There was, however, no such programme in the Comparison area.

1. *Population Growth*

The population of the DSS area in Matlab thana increased from 173,444 in the middle of 1978 to 211,306 in 1996. This means a growth of 22 percent in 18 years or an average of 1.2 percent per year. The **total population growth** depends on both **natural growth** (the difference between the number of births and deaths) and **net migration** (the difference between in and out-migration). See Figure 3.

Population growth reached a peak in 1982, followed by a dramatic decline. From the figure it can be seen that 1984 was an exceptional year for Matlab; population growth was close to zero due to a combination of high mortality (attributable to a Shigella epidemic) and high out-migration. Since 1987 the growth rate has fallen gradually to a level of about 6 per 1000 in 1996.

In most years between 1978 and 1990 the natural growth was on average 25 per thousand inhabitants. Since 1990 this has declined to about 17 per thousand due to a combination of the impact of family planning programmes and various social and economic changes which have taken place in Matlab. Some of these changes include increased education opportunities for girls, economic improvement programmes and better communications. It is worrying that in spite of all these changes the natural growth rate is still high.

The population of Matlab is in the middle of **demographic transition** - from a situation of high birth and death rates and little population growth to a situation of low birth and death rates, when there is also little growth and stable population size. In between there is

a period of rapid population growth, as the death rate falls sharply before the birth rate begins to decline.

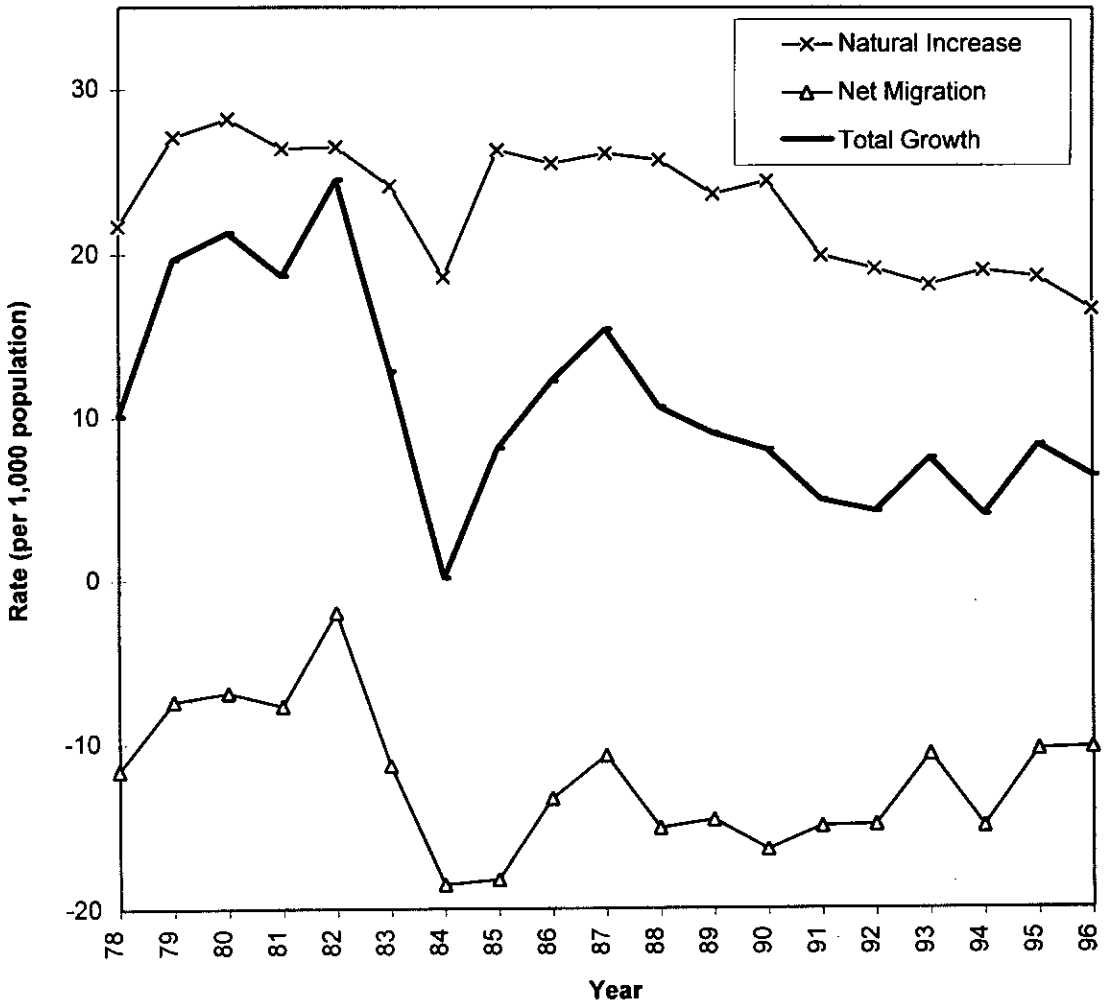


Figure 3: Total Growth, Natural Increase and Net Migration in Matlab, 1978-96

Another feature illustrated in Figure 3 is that, between 1978 and 1996, more people moved away from Matlab than settled there. Since 1983 this net out-migration has amounted to 10 to 14 inhabitants per thousand each year. These are impressive figures: every year more than one percent of this rural population leaves permanently to settle, in particular, in cities such as Dhaka. This trend is not exceptional and one which can be observed in many developing countries. This contributes to the explosive growth of many Third World mega-cities, which creates opportunities, but also a host of problems.

A substantial proportion of the out-migrants consist of families who have become landless. They move to the cities where they join the large numbers of people living at or below the poverty line. Quite a number of the Matlab out-migrants are Hindus, many of whom leave to settle in India. Between 1974 and 1996 the proportion of Hindus in Matlab has fallen from 15.9 percent to 12.3 percent (Table 1).

Census	Muslim	Hindu
1974	84.1	15.9
1982	85.0	15.0
1993	87.3	12.7
1996	87.7	12.3

Table 1: Percentage Distribution of Matlab Population by Religion

2. Population Composition

The age composition of a population is important for several reasons, not least because current age composition affects future population growth. The size of a population may continue to increase, despite a reduction in average family size, due to a large group from the youngest generation reaching child bearing age.

Table 2 shows that the percentage of children below 15 years of age in the DSS area has declined from 43.4 percent in 1978 to 38.4 percent in 1996.

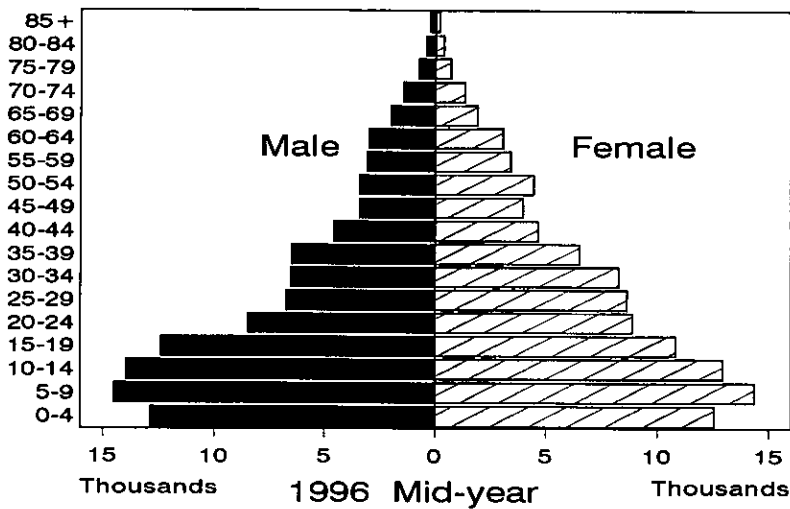
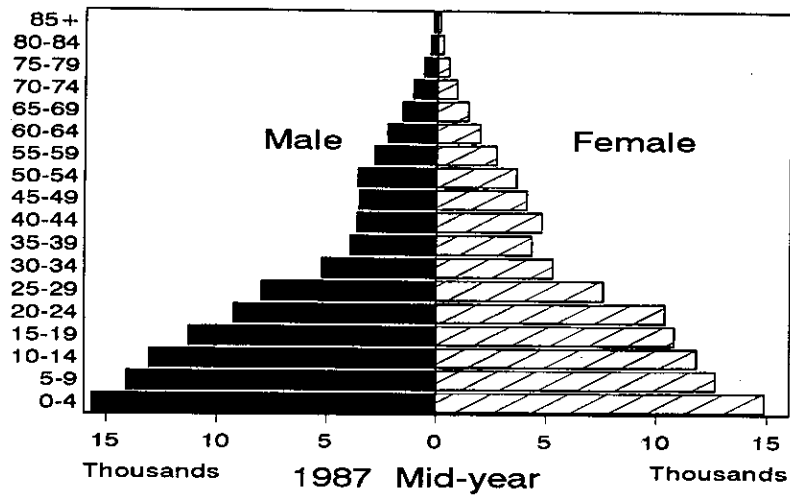
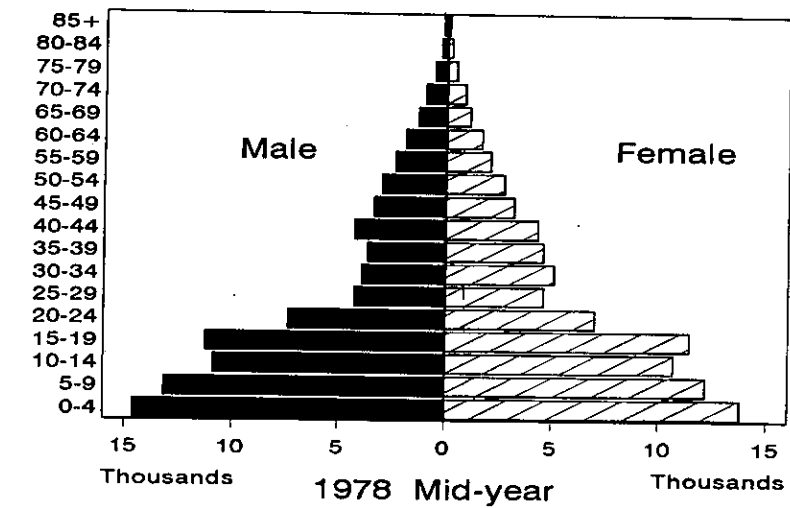
Age	1978	1996
0-14	43.4	38.4
15-49	45.1	47.5
50+	11.5	14.1
Total	100.0	100.0
Mid Year Pop.	175,443	211,306

Table 2: Percentage Distribution of Matlab Population by Major Age Group

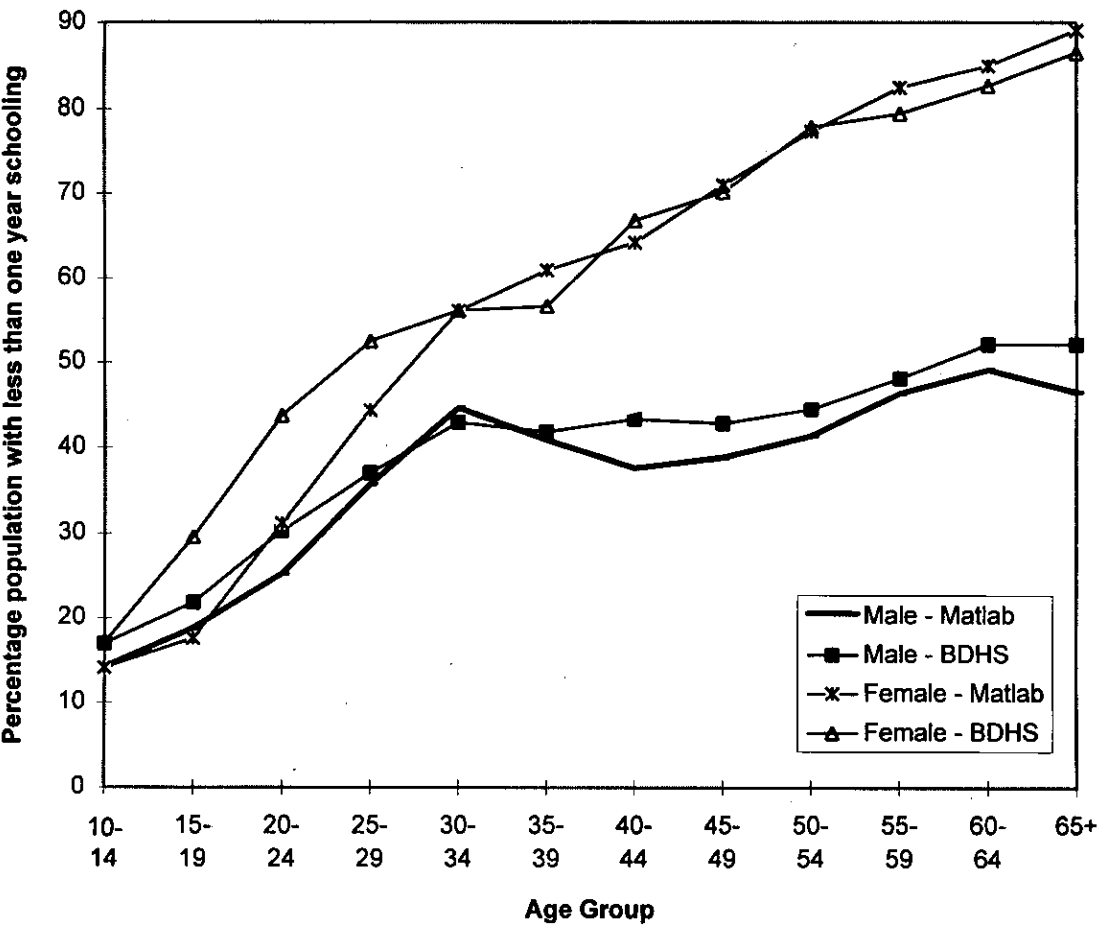
The success of the ICDDR,B and government family planning programmes have undoubtedly contributed to this success (see Chapter 3), while the process of social and economic development has also played a role. It is important to realise that in spite of this relative decline, the number of children in absolute terms has actually increased in the past 18 years: from 76,142 in the middle of 1978 to 81,144 in the middle of 1996. The population in the age group 15-49 years has increased both in relative terms as well as in absolute numbers. This is the consequence of previous high fertility which has led to a large group of men and women who have now reached reproductive age and who will now get children on their own.

Figure 4 illustrates more clearly the changes in age structure between 1978 and 1996. Especially noteworthy is the decline in the youngest age groups in absolute numbers and as a percentage of the overall population.

Figure 4: Age Pyramids in 1978, 1987, 1996



Considerable changes in social and economic status have taken place in Matlab since the 1970s. One indication of this worth mentioning is the improvement in education, especially of girls (Figure 5). The percentage of the population with formal education has increased, especially in the younger age groups; it is now similar for boys and girls who are between 10 and 15 years old.



Source: BDHS, 1998 (national data)

Figure 5: Percentage of Population with Less Than One Year of Schooling by Age Group, Matlab and Bangladesh

Figure 5 also shows if and to what extent Matlab is similar to the country as a whole. The percentage of male children and adolescents between 10 and 20 years old without any form of formal education is a little lower in Matlab than in the country as a whole. The difference is larger for female adolescents and young women between 15 and 30 years old. In the older age groups there are no major differences in the level of education between Matlab and the county as a whole. There is a tendency for illiteracy to be higher among Matlab women who are 35 years and older than in the country.

The reason for the lower illiteracy in Matlab in the younger age groups compared with the country as a whole is probably the existence of the BRAC-ICDDR,B project which is in operation in Matlab and which is discussed in more detail in Chapter 4.

The DSS data from Matlab presented above have implications for the best way for Bangladesh to go through the process of demographic transition. The last phase of this transition can best be reached and as quickly as possible through vigorous implementation of a combination of health and family planning programmes. Improvements in economic and social conditions in general and in education in particular will be just as or even more crucial.

3. *Age at Marriage and Fertility*

In a society where marriage is universal and few births take place outside of marriage, as in Bangladesh, age at marriage is an important determinant of fertility. The earlier a woman begins child bearing, the greater the potential number of children she can have during her reproductive life. Another important factor related to age at marriage (or actually age of mother at first birth) is the length of a generation - a measure of how quickly a generation replaces itself. This affects the rate of population growth independent of the number of children born.

Year	Age at marriage Male	Age at marriage Female	Age at First Birth	TFR
1976	24.4	16.7	18.5	6.2
1979	24.8	17.6	19.2	5.9
1984	25.3	18.0	19.8	4.5
1989	25.7	18.4	20.9	4.1
1992	25.8	18.6	21.3	3.5
1996	26.0	18.9	21.6	3.0

Table 3: Mean Age at First Marriage, First Birth and Total Fertility Rate in Matlab

From Table 3 it can be seen that the mean age at first marriage for women has increased from 16.7 years in 1976 to 18.9 years in 1995, with a corresponding increase in age at first birth. The effect of this trend is to slow down the rate of population growth, even in the absence of fertility decline, although the impact of this small increase is likely to be slight. These averages, however, also disguise the fact that 66 percent of first marriages which took place in Matlab in 1995, were of women under 20 years of age and four percent of these were of girls under 15 years old. In addition, 18 percent of divorced women marrying for a second time were under twenty.

Another finding from Matlab is that pregnancy in very young women is associated with higher rates of both neonatal, infant and maternal deaths (Mostafa, et al., 1991).

Therefore, policies which encourage women to delay child bearing would lead to a reduction in maternal and infant mortality as well as an increase in generation length. Such policies would include extending education and employment opportunities for young women to encourage later marriage. In addition, providing information on reproductive health and family planning to adolescent girls and enhancing the status of women, would allow couples to choose how soon after marriage they begin their families as well as how many children they have.

Table 3 also provides data on the **Total Fertility Rate (TFR)**, the average number of children a woman is likely to have by the time she reaches the end of childbearing age. It can be seen that in the Matlab area fertility has continuously declined in the last two decades from 6.2 in 1976 to 3.0 in 1996.

4. Mortality Trends in Children Below Five

One of the most important features of the demographic trends revealed by the DSS is the rapid decline in under five mortality since the early 1980s. Between 1979 and 1983 the average mortality rate for the under five age group in Matlab was similar to the national average of around 180 per 1,000 live births. By 1996 the rate in Matlab had fallen by over 50% to 86 - significantly lower than the national rate of 116 per 1,000 live births.

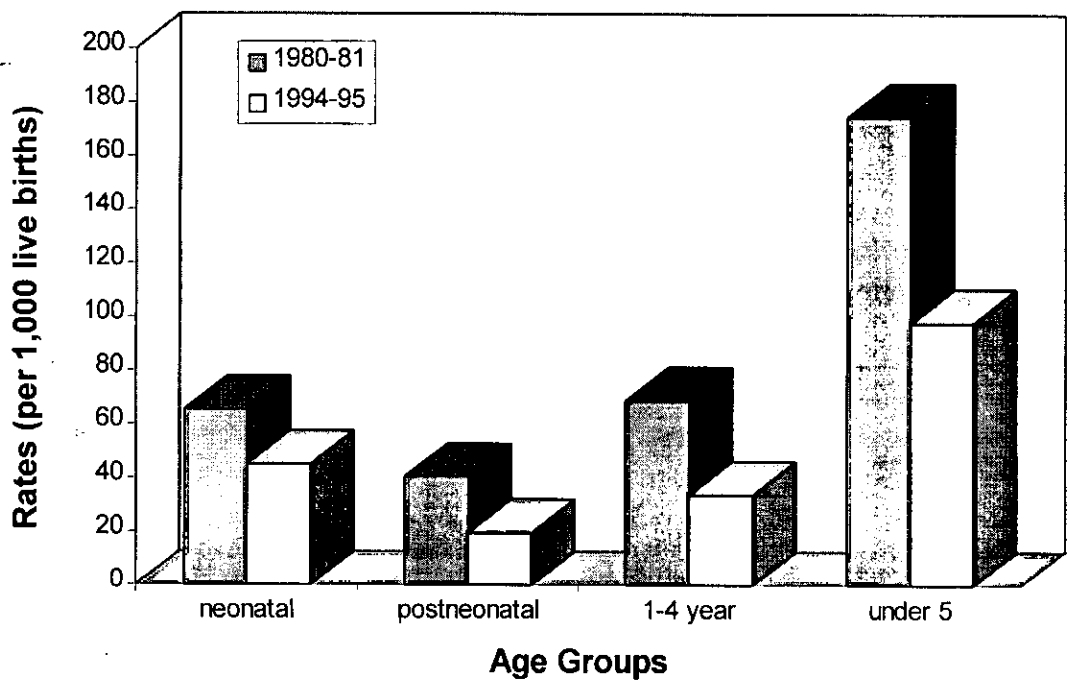


Figure 6: Mortality in Children Below Five Years by Age Group, Matlab 1980/81 and 1994/95

Figure 6 shows that over a 15 year period, mortality rates in Matlab fell by more than 50 percent for both the post neonatal and 1-4 year age groups. Deaths rates in the 1-4 year age group fell from around 69 in 1980/81 to under 34 per 1,000 live births in 1994/95. Neonatal mortality, on the other hand, declined by only 31 percent from just over 65 to 45 per 1,000 over the same period.

Between 1978 and 1982 under five mortality remained at roughly the same level, followed by a peak in 1984, corresponding with an epidemic of *Shigella*. The fairly rapid decline from 1985 to 1990 was due mainly to a reduction in deaths in the 1-4 year age group. Since 1990 this has remained relatively stable, at around 30 per 1,000 live births, which suggests that current interventions aimed at this age group have been maximally effective.

Conversely, infant mortality declined only slowly between 1986 and 1993 after falling rapidly in the early 1980s. In fact there was an upsurge in the death rate in 1991, but more recently the trend has again been in decline, leading to an overall reduction in infant mortality from 109 to 65 per 1,000 live births between 1981 and 1995.

Despite this reduction in childhood mortality, almost one in ten children in Matlab will die before the age of five, the majority of them before reaching their first birthday. Child survival strategies may need to be modified or new interventions introduced, based on an assessment of the current major causes of death, if further reductions in child mortality are to be achieved. More research is needed into the causes of infant, and in particular neonatal, mortality in order to design appropriate interventions that will effectively target this vulnerable group. (Mosley and Becker, 1991)

Despite the downward trend in under five mortality, as Figure 7 shows, until about 1989 death rates for girls were persistently and significantly higher than those for boys. This is a reversal of the pattern in most other countries, where male mortality below five is usually higher. In 1990 the figure for female mortality dipped below that for male mortality in this age group for the first time. Since then the two rates in Matlab have been almost identical, but even this relatively greater improvement in female mortality still implies a degree of discrimination against girls, as rates for girls should be lower than those for boys for biological reasons.

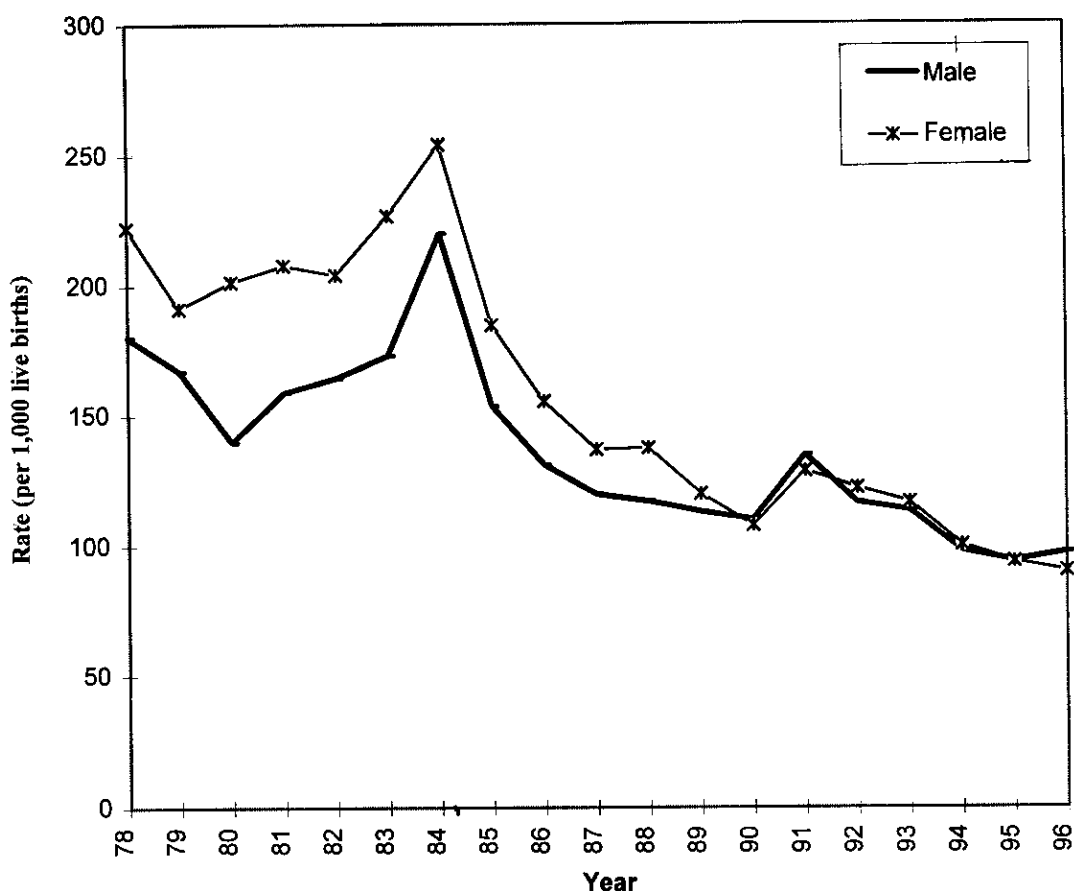


Figure 7 : Mortality in Children Below Five Years by Sex in Matlab, 1978-96

5. Trends in Life Expectancy

It is well known that in rural Bangladesh the social status of women is much lower than that of men. In countries where the status of men and women is more equal, male mortality is usually higher than female mortality in all age groups. Until 1988, however, mortality for women in Matlab was higher than for men in most age groups. This is proof of the disadvantaged position of women in Bangladesh society. The higher mortality among girls is an indication that they are discriminated against in terms of distribution of resources such as food and health care. Research has shown that this differential mortality is exacerbated during times of crisis, such as the 1974 famine.

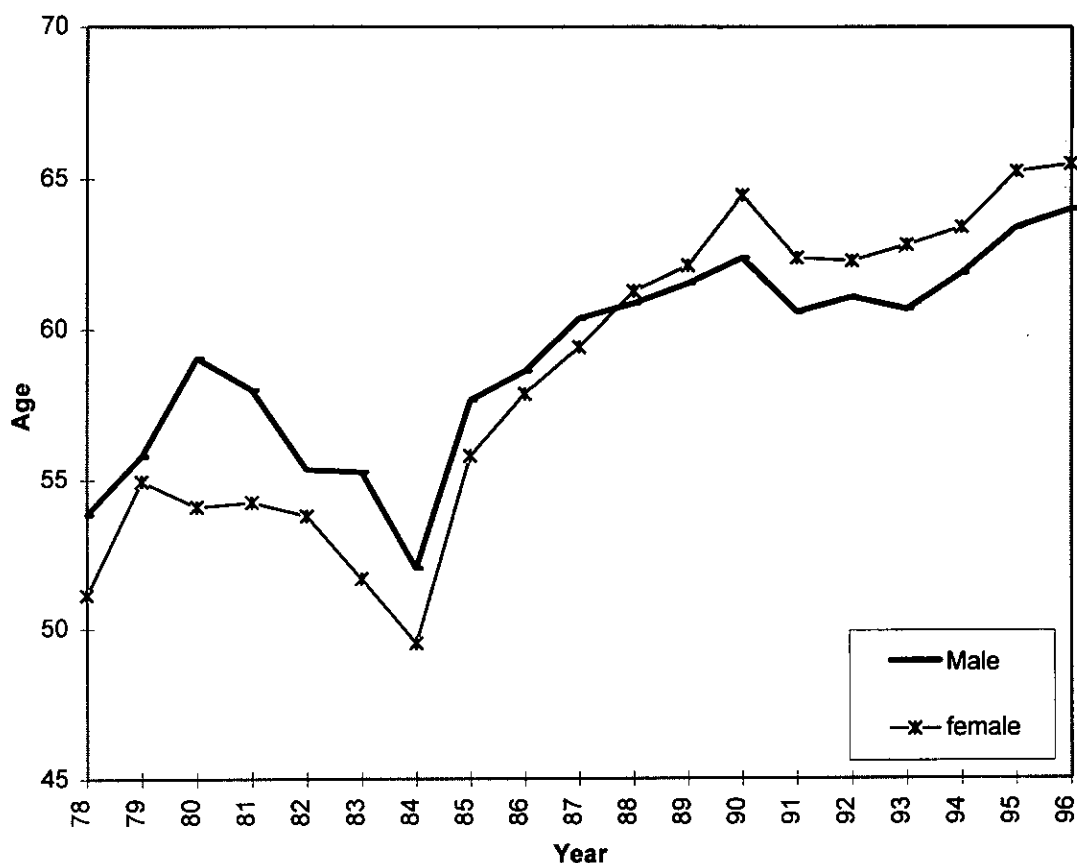


Figure 8: Life Expectancy at Birth in Matlab, 1978-96

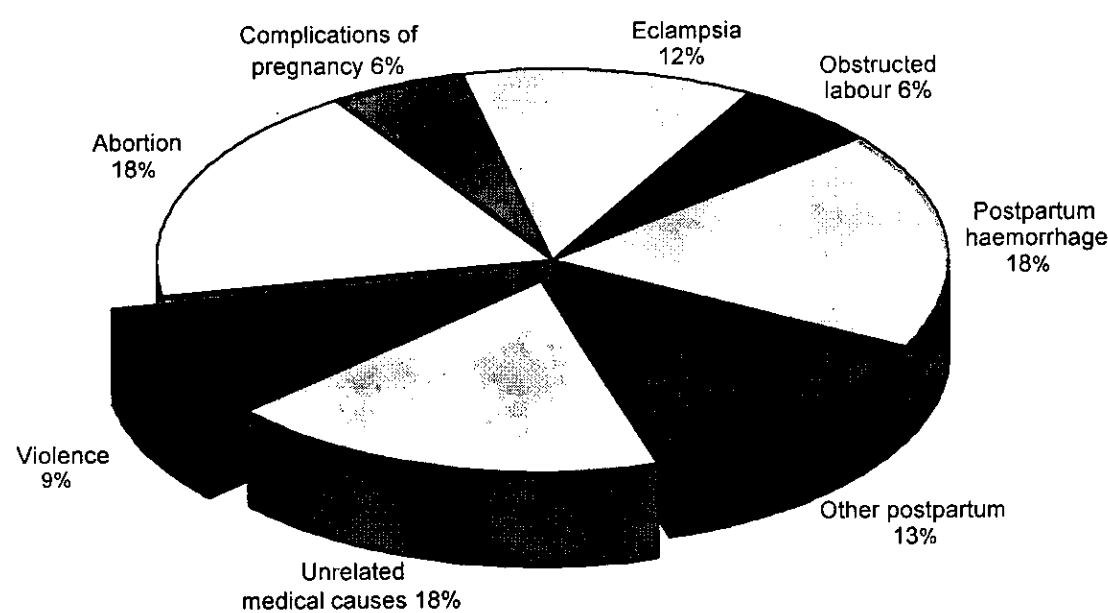
The data on trends in life expectancy presented in Figure 8 make it clear that since 1988 there has been a considerable change in Matlab. In 1993-95, life expectancy at birth for a female was 63.8 years, 1.8 years longer than her male counterpart. This reversal is related, among other things, to the improvement in the social status of women, provision of health care and improvements in economic and social conditions in general. There has undoubtedly been important progress, especially in the education of girls, but in spite of these improvements, women continue in many ways to be disadvantaged in comparison to men in Bangladesh (Bairagi and Chowdhury, 1994).

6. Maternal Mortality

The WHO estimates that world-wide as many as half a million women die each year from complications of pregnancy and delivery. The maternal mortality rate in Bangladesh has been estimated to be between 4 to 6 per 1,000 live births - one of the highest in the world. A retrospective study in Matlab between 1976 and 1985 found a maternal mortality rate of 5.5 per 1,000 live births (Koenig *et al.*, 1988).

Using a definition of maternal mortality which includes all deaths to women while pregnant or within 42 days of the pregnancy ending, the DSS records up to 1989 show that 35 percent of deaths in women between the ages of 15 and 44 were pregnancy related. The distribution of maternal deaths attributable to various obstetric and other causes is illustrated in Figure 9.

Direct obstetric complications account for 73 percent of maternal deaths, which could have been averted only by intervention from skilled health personnel together with well-equipped facilities to carry out surgical procedures and blood transfusion. Therefore, having identified the actions needed to prevent many of these deaths, the question of how best to effect increased access to emergency obstetric services in rural Bangladesh needs to be answered. This is being addressed through the maternal care programme discussed in the next chapter.



Source: Fauveau and Chakraborty, 1994
Figure 9: Causes of Maternal Death in Matlab, 1976-89

A recently conducted analysis of causes of maternal deaths in the period 1987-1993 came to nearly the same findings as presented above (Ronsmans et al., 1998). The percentage of direct obstetric mortality was somewhat lower (65) and the percentage of other causes somewhat higher (35). This last category consists of injuries and violence (8 percent) and indirect obstetric deaths (22 percent).

Very young mothers have higher than average maternal mortality, often due to obstructed labour, and therefore measures which discourage early child bearing will reduce the number of maternal deaths from this cause. Women who have large numbers of children are also at increased risk. Access to family planning services is therefore an important component of any Safe Motherhood initiative.

One alarming feature of these DSS data is that 18 percent of maternal deaths are the result of unsafe abortion. This is particularly disturbing as Menstrual Regulation (MR), considered as a “means of ensuring that a woman at risk of pregnancy is not actually pregnant”, has been legal in Bangladesh since 1978 and is practised within the government health services. This high death rate leads to the conclusion that large numbers of women turn to traditional abortionists, using indigenous practices to terminate unwanted pregnancies (Ahmed, et al., 1998). Research is needed to establish the reasons why women continue to undergo unsafe abortions and the measures required to render the services of illegal practitioners unnecessary.

More disturbing still is the proportion of deaths in pregnancy due to violence and injury. This is perhaps the least recognised and most insidious manifestation of gender inequality in a society. Many of these deaths, which include suicides, are of young unmarried girls. More research is needed into violence, particularly related to pregnancy. Policies for improving access of adolescent girls to sex education and family planning are particularly relevant, as will be strategies to mobilise communities against violence directed at women.

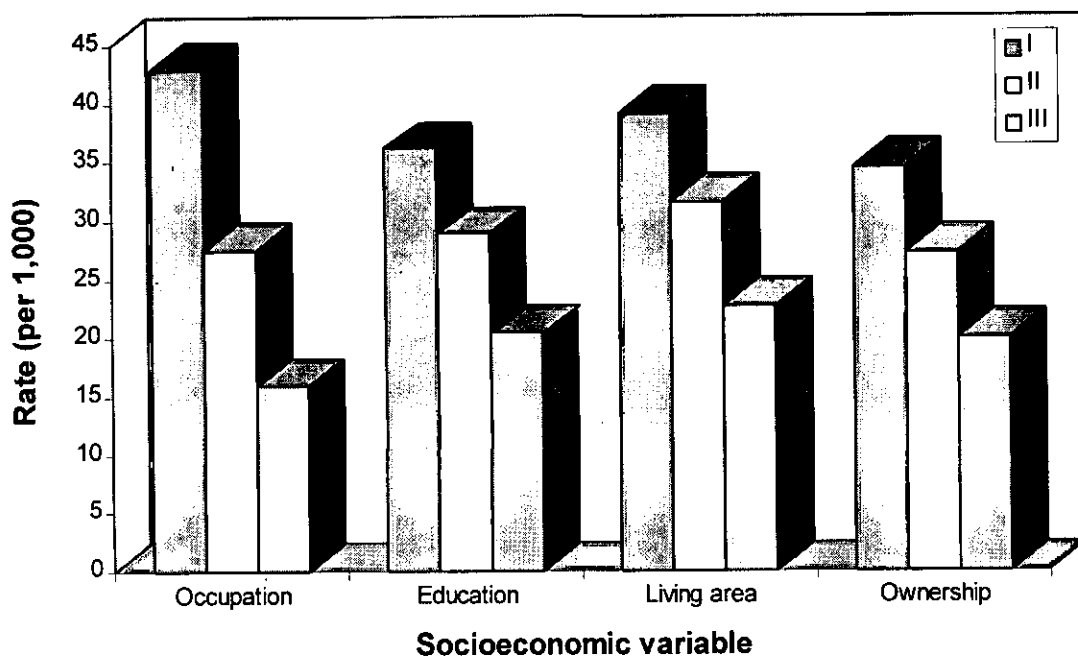
7. *Demographic and Socioeconomic Determinants of Mortality*

Various demographic factors have been shown to affect childhood mortality. Infants of very young mothers have a reduced chance of survival, as do infants of older women with several children. Child mortality also increases with the mother’s age and the number of children she has. Children with a younger sibling are especially at risk if the interval between the births is short, probably because breast feeding stops early.

Relatively more important as determinants of child mortality are socio-economic factors. D’Souza and Bhuiya have analysed DSS data on this topic dealing with children 1-4 years old combining information from the 1974 census with mortality figures in the period 1974-1977 (D’Souza and Bhuiya, 1982). The 1974 census made it possible to assemble figures for four measures of socio-economic status shown in Table 4. The variables occupation and education refer to the head of the household in which the 1-4 year old children lived while the variables size of living area and ownership of cows are characteristics of households.

Category Variable	I	II	III
Occupation	Labourer	Worker/Owner	Landowner
Education	None	1-6 Years	7+ Years
Living Area	Small	Medium	Large
Ownership	No Cows	1-2 Cows	3+ Cows

Table 4: Categories of Socio-economic Status



Source: D'Souza and Bhuiya, 1982

Figure 10: Mortality in Children 1-4 Years by Socio-economic Characteristics, 1974-77

Each of these variables was divided into three categories, representing low (I), medium (II) and high (III) socioeconomic status. Figure 10 shows that each of the variables was strongly related to mortality; the higher the socio-economic status, the lower the child mortality. It should be borne in mind that groups I and III are small in comparison with group II. This means that the differences by socio-economic status shown in Figure 10 are larger than in the situation in which groups I, II and III are of similar size.

Divorced, abandoned and widowed women in Matlab account for 16 percent of all women over the age of 15. They face particular difficulties because of the cultural constraints on women's mobility and lack of employment opportunities. The monthly income of female headed households is estimated to be only 55 percent of the average and the mortality of children of these women is also higher than the average. Programmes need to be initiated focusing on this vulnerable group of women and children and addressing the issues of poverty and the low status of these women (Bhuiya and Chowdhury, 1997 and Hossain and Huda, 1995).

CHAPTER THREE

HEALTH INTERVENTIONS: IMPACT AND POLICY IMPLICATIONS

In this chapter, results of a number of health interventions are summarised which have been implemented in Matlab. The impact of these interventions is measured in terms of changes in mortality, morbidity, fertility and prevalence of use of contraceptives and these data are derived from DSS and RKS. Five illustrations of use of DSS and RKS data will be given dealing with five interventions: testing of cholera vaccines, implementation of the child health and family planning programmes, measuring the impact of measles vaccination and implementation of the maternity care programme. An overview of the various interventions introduced with respect to child and reproductive health in Matlab since 1977 is provided in Box 2.

1. *Cholera Vaccine Trials*

The main impetus for establishing a field site in Matlab was to conduct cholera vaccine trials and to determine their efficacy. The DSS made it possible to identify cohorts who participated in the trials and to determine cholera mortality rates before, during and after a trial. At the same time morbidity surveillance systems were installed to determine cholera morbidity rates before, during and after a trial.

The first trial of injectable cholera vaccine, conducted in 1963, and several subsequent trials, showed that it provided only short-term protection for one or two years (e.g., Mosley, et al., 1972). The largest trial took place in 1974 involving 93,000 participants. Volunteers in this trial received either a cholera toxoid vaccine or diphtheria-tetanus toxoid vaccine as a control. (Curlin, et al, 1978). Unfortunately this cholera vaccine was shown to confer only 40 percent protection which lasted for about three months. The control vaccine proved to be much more successful: analysis of the DSS data showed that infants born to women immunised by the diphtheria-tetanus toxoid vaccine were protected against neonatal tetanus. Mortality in neonates was reduced by an estimated 20 per 1,000 live births (Black, et al., 1980).

In 1985 63,000 children and women took part in another trial of two oral vaccines based on killed whole cholera vibrios, one of which included the B subunit of cholera toxin. Both proved to provide about 50 percent protection for three years, while in children under five a much lower protection rate was observed (26 percent and 23 percent for the two vaccines) (Clemens, et al., 1990). Unfortunately this is not adequate to protect the population at risk from cholera and especially young children. Up to now no vaccine has been shown to be effective for all population groups at risk.

Another problem was that these oral vaccines provided less protection against the El Tor strain than against classical cholera (about 40 percent for the two vaccines after 3 years)

Box 2: Interventions in Child and Reproductive Health		
Year	Month	Activity
1977	Nov	Home-based services
1978	Mar	Tetanus toxoid vaccination to all pregnant women
	Oct	ORS bari mothers
1981	Dec	Tetanus toxoid vaccination to all women of reproductive age (Blocks A + C)
1982	Mar	Measles vaccination to all children (Blocks A + C)
1983	Mar	IUD home insertion
1985	May	Oral cholera vaccine trial
	Dec	Tetanus toxoid vaccination to all mothers (Blocks B + D)
		Measles vaccination to all children (Blocks B + D)
1986	Mar	DPT and polio vaccination to all children (Blocks A+B+C+D)
	Mar	Screening for malnutrition
		Diarrhoea morbidity surveillance (point prevalence)
1987	Jan	Vitamin A distribution (Blocks A+B+C+D)
	Mar	Maternity care (Blocks C + D)
1988	Apr	ALRI detection and management with penicillin (Blocks B +D)
	Sep	Nutritional relief - post-flood
1989	Apr	Dysentery management at home with nalidixic acid (Blocks B + D) till December
	Oct	Nutrition surveillance system (Blocks A+B+C+D)
1990	Feb	ALRI management with oral cotrimoxazole
	Apr	Maternity care (Blocks A+B)
1991	Feb	Antenatal check-up introduced
	Feb	Education intervention to reduce ALRI mortality
	Jun	Vitamin A supplementation using EPI entry point
1992	Mar	Maternal vitamin A supplementation after delivery
	Jun	Geographic Information System introduced
1993	Jan	Maternal supplementation with beta-carotene
1994	Jun	Reproductive Tract Infections detection and management
1995	Jan	Male clinics to test reproductive health diseases
1996	Oct	Health Centre assisted deliveries (Block C)
1997	Jan	Reproductive Health Programme initiated

(Clemens, et al., 1989). This is particularly important in view of the fact that a new mutant strain of cholera emerged in 1992, so any future vaccine would need to be effective against a range of cholera causing agents (Albert, et al., 1993).

2. *Impact of the Child Health Programme*

One important ICDDR,B project is an innovative Maternal and Child Health/Family Planning programme which started in Matlab in 1977. As previously mentioned, intensive health care is provided in the MCH-FP Area by CHWs visiting each household every two weeks to give advice, immunisations, simple treatment and contraceptive methods. There are also a number of clinics in the area for mothers and children. In the Comparison area health care is provided by the government programme. However, CHWs collecting demographic data also provide limited advice and services, such as oral rehydration solution (ORS) packets. The Matlab hospital is open to all patients with diarrhoeal and related diseases who live in the DSS and neighbouring areas.

Interventions were introduced into the MCH-FP area in phases. Initially maternal and child health interventions were limited to CHWs giving nutritional advice, instructing on the preparation of ORS, administering tetanus toxoid vaccine and giving iron and folic acid tablets to pregnant women, but gradually the programme was expanded. See Box 2.

Even the limited interventions introduced at the beginning of the programme seem to have had a positive effect. Prior to the start of the programme, under five mortality was around 200 per 1,000 live births in both areas, but by 1980 it was significantly lower in the MCH-FP area, as Figure 11 shows.

Apart from 1984, the year the *Shigella* epidemic peaked in Matlab, a general decline in under 5 mortality took place until 1990, with the rate in the Comparison area consistently about 30 points above the rate for the MCH-FP area. After a slight increase in 1991 and 1992, mortality rates in the MCH-FP area declined slightly to 88 per 1,000 live births in 1996. The downward trend in the Comparison area also continued after an upsurge in 1991, with mortality down to 96 per 1,000 live births by 1996.

Figure 11 also shows mortality rates in children below five for Bangladesh as a whole derived from cross-sectional demographic and health sample surveys. The trend in the Comparison area of Matlab is very similar to the country as a whole.

Health interventions, originally tested in Matlab and subsequently transferred to the national programme, have undoubtedly played an important role in the dramatic decline in under five mortality. It is likely, however, that social and economic changes have also contributed to this decline.

It is remarkable that the decline in child mortality was not limited to the MCH-FP area, but also occurred in the Comparison area. (The same phenomenon can be observed with respect to fertility to be discussed next.) The question has to be raised how this is

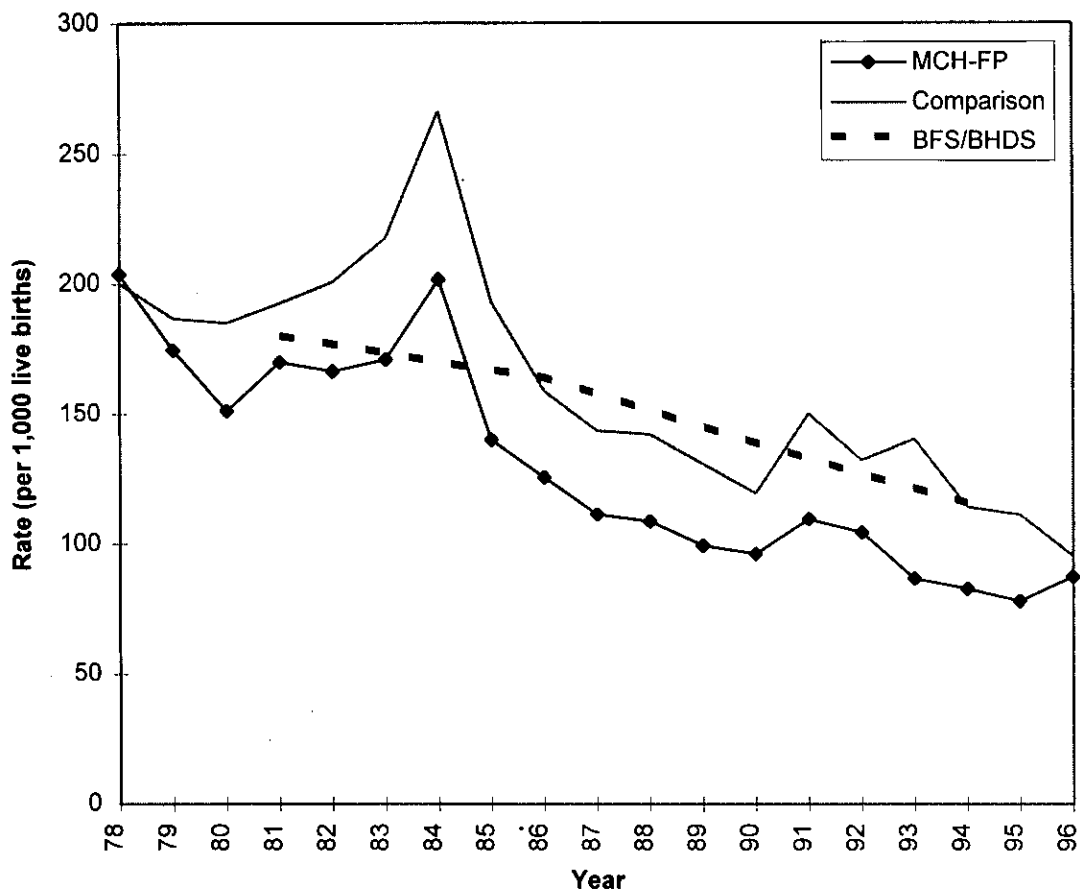


Figure 11: Mortality in Children Below Five Years, 1978-96

possible in view of the less intensive MCH (and FP) programme in the Comparison area. Several reasons can be cited. First, the population in the Comparison area has benefited from the services, although limited in scope, provided by ICDDR,B. Second, the programme of the Ministry of Health and Family Welfare became more and more successful (especially after 1990). Finally, the population in the Comparison area has learned and benefited from the experiences gained by the population in the MCH-FP area. A certain amount of contact and exchange of information has always existed between the two areas and the cumulative effect of this over time is likely to be substantial

Up to now, the main targets of child health interventions in Matlab have been the four major diseases affecting infants and children world-wide. These are; diarrhoeal diseases (including dysentery and cholera), acute respiratory infections (ARIs) (including pneumonia, whooping cough and influenza), measles and tetanus. Many children, however, die from a combination of these diseases and in such cases, allocation to a particular category is likely to be arbitrary. (Fauveau, 1994). As Figure 12 shows, mortality attributed to each of the four major disease categories fell significantly in the MCH-FP Area between 1980 and 1995.

In 1980/81 nearly 60 percent of deaths in children below five in the MCH-FP Area were attributable to these four disease categories (including immunizable diseases). The most obvious changes which have taken place in the course of the ensuing decade were the virtual eradication of neonatal tetanus and the very large decline in deaths due to other immunizable diseases. These rapid declines are due mainly to the spread of tetanus toxoid immunisation of women and children and measles vaccination.

Figure 12 shows that deaths due to "other causes of neonatal deaths" have only decreased slightly and currently account for about 40 deaths per 1,000 live births or about half of all deaths in children under five. Prominent in this category are the complications associated with prematurity, low birth weight and birth trauma. Measures to reduce this neonatal mortality will require interventions to improve the health of the mother during pregnancy, as well as access to health facilities able to provide emergency obstetric and neonatal care.

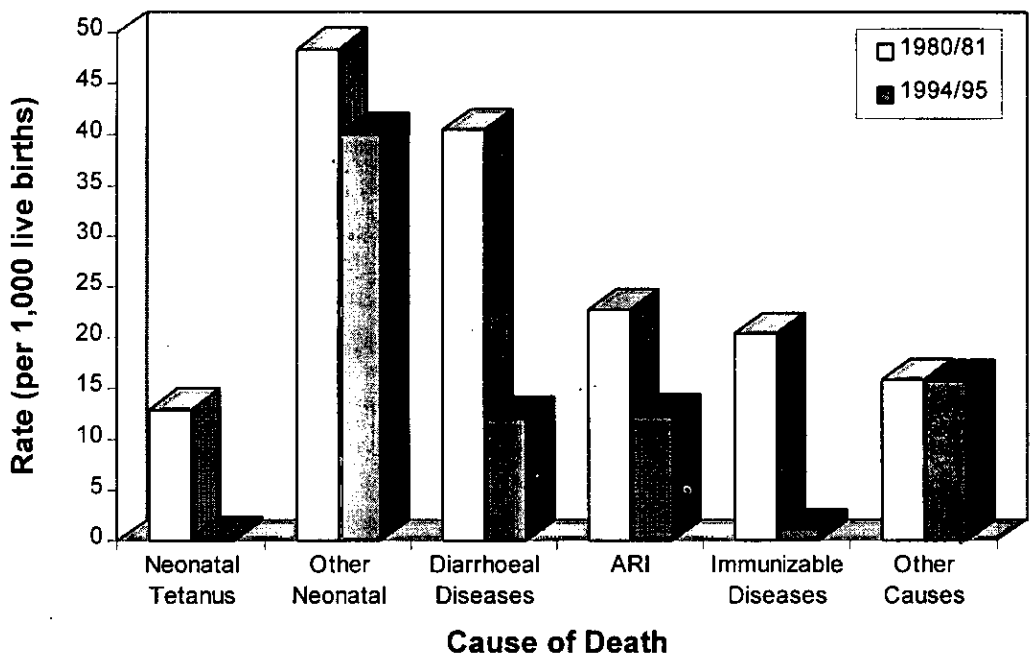


Figure 12: Mortality in Children Under Five by Cause of Death in MCH-FP Area, 1980/81 and 1994/95

The relative overall decline in child mortality has been appreciably greater than the decline in infant mortality over the same time period. The rate of deaths in almost all categories has fallen, with a significant reduction in Measles and Diarrhoeal Diseases. ARI mortality has fallen to a lesser extent, but the number of child deaths from "other causes" has remained unchanged and these now account for 40 percent of all mortality in under five children, excluding neonates. Notable in this category of cause of death are accidents and, in particular, drowning.

The possible misclassification of measles deaths may be a partial explanation for some of those counted in the categories ARI and diarrhoeal diseases, as these are frequent, and often fatal, sequelae. Increased coverage of measles vaccination could therefore be expected to further reduce the mortality rate in all three categories. Current interventions aimed at reducing ARI and diarrhoea deaths may need to be modified or expanded in the light of MHDSS data to increase effectiveness. However, as nearly seven out of ten deaths in children below five years are now due to “other causes”, efforts to reduce overall mortality will need to be focused on developing a broader strategy for child survival.

3. *Impact of the Family Planning Programme*

The rapid decline in fertility in Matlab during the 1980s and early 1990s is perhaps the most important and striking feature to emerge from the DSS (see Figure 13). Between 1976 and 1996 total fertility fell from 6.6 to 2.7 births per woman in the MCH-FP area and from 7.0 to 3.5 in the Comparison area. It should be noted that pre-programme TFRs were similar in both areas at around seven, but fell more rapidly in the MCH-FP area.

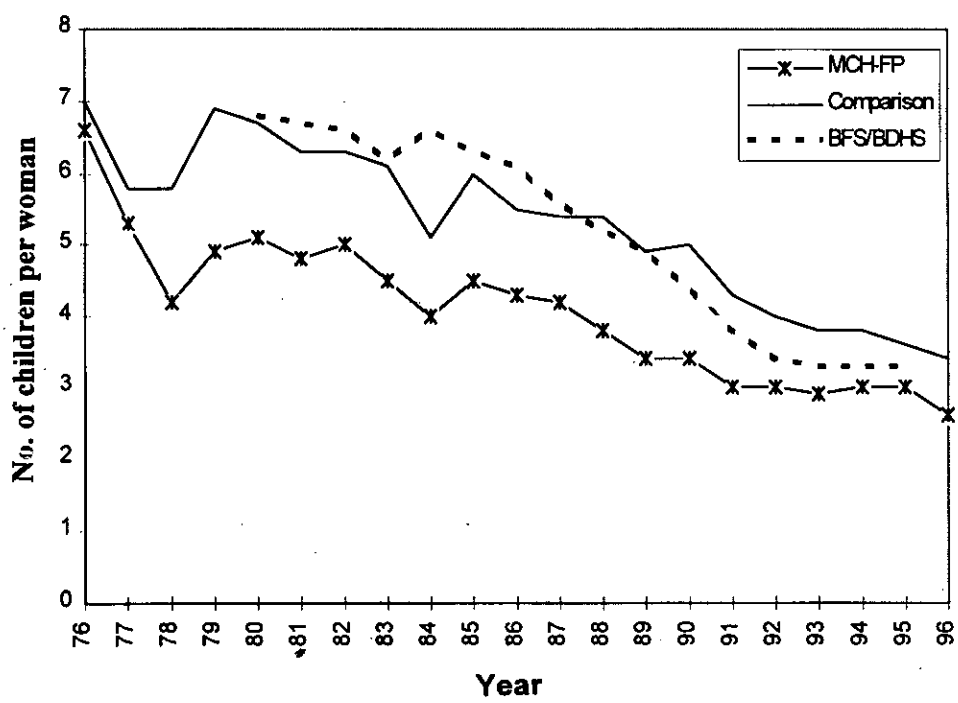


Figure 13: Trends in Total Fertility Rates, 1976-96

It is interesting to note that the TFR for Bangladesh as a whole fell more quickly than it did in rural Matlab, from 6.8 in 1980 to 3.3 in 1995. The early success of the family planning services in Matlab provided a model for the national programme, which employs female Family Welfare Assistants (FWA) to provide similar (though less comprehensive) services than the one provided by CHWs in the MCH-FP area. Since 1991, the decline in the TFR in the MCH-FP area has slowed.

Analysis of DSS records show that the main difference between the MCH-FP and Comparison areas was a dramatic reduction in the proportion of women having large numbers of children, apparently as a direct result of using contraceptive methods to limit family size (Phillips *et al*, 1982).

The trend, evident from the Figure 13, shows the decline in TFR slowing down in the early 1990s in the MCH-FP area and Bangladesh. This may be because couples are attaining their desired family size and indeed this seems to be the case. In 1975, the "ideal" family size in Matlab was 4 or 5 children, with two or three sons, but actual family size was seven children. By 1990, TFR in the MCH-FP area had fallen to 3.4, compared with an ideal family size of 3.1 children, two of them boys. In the Comparison area, where ideal family size in 1990 was 3.2, a TFR of 3.4 was not attained until 1996. In these circumstances, TFR is only likely to fall further if social expectations of "ideal" family size change.

There is evidence from Matlab that son preference does not have a significant impact on the use of temporary contraceptive methods, but does affect family size, as couples are unwilling to limit the number of children until they have at least one boy. Reducing gender preference, by enhancing the value of girl children, could be expected to result in a further decline in TFR. More research into this area is needed, in order to maintain the momentum of what has been a remarkably successful family planning programme, if fertility is to continue to fall and the demographic transition to be completed.

Figure 14 shows trends in **Contraceptive Prevalence Rates (CPR)** in Matlab and in Bangladesh. Especially noteworthy is the rapid increase in CPR in the MCH-FP area. The CPR was below 10 percent in the MCH-FP area prior to the start of the project and increased rapidly to 28 percent in 1978, 46 percent in 1984, 63 percent in 1993 and 66 percent in 1995 and 1996. Over the same time period, government and private family planning services rapidly expanded leading to an increase in the CPR to 49 percent in 1996. The trend in the Comparison area was very similar as that of the national programme reaching 47 percent in 1996.

A comparison of Figure 14 with 13 shows an inconsistency. In view of the fact that the CPR in the Comparison area is much higher than in the Comparison area and in Bangladesh as a whole one would expect a much lower fertility rate in the MCH-FP area than shown in Figure 13. The probable reason for this is an over estimation of the CPR in the MCH-FP area. The CPR in the MCH-FP area is derived from RKS which is a system based on service statistics while the CPRs in the Comparison area and the country are derived from demographic and health sample surveys. It is well known that there is a tendency in service statistics to overreport contraceptive use.

Apart from CPR, the major difference between the two areas of Matlab is in the choice of contraceptive methods used. Figure 15 shows that in the MCH-FP area in 1996 35 percent of all married women in reproductive age used the injectable contraceptive method compared to the national figure of 6 percent. The explanation probably lies in the "doorstep delivery" employed in the MCH-FP programme, making the method easily available without women having to leave the *bari* to visit a health centre, as they have to

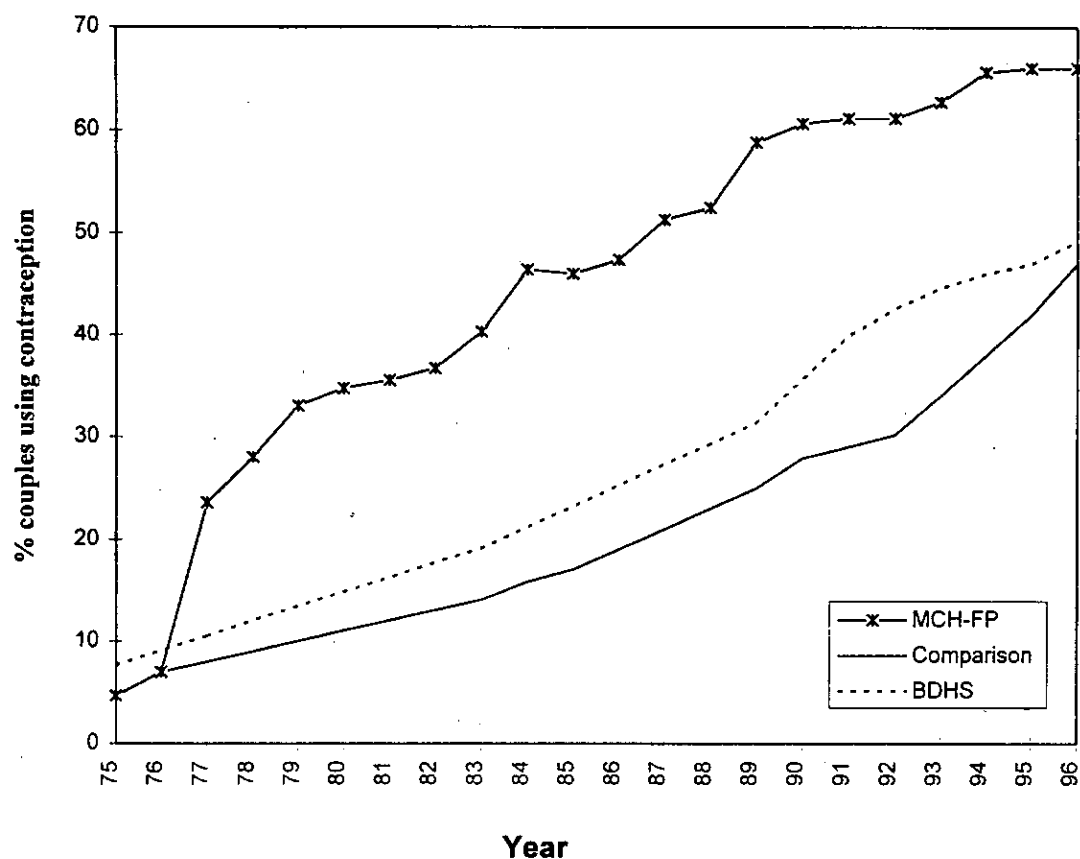


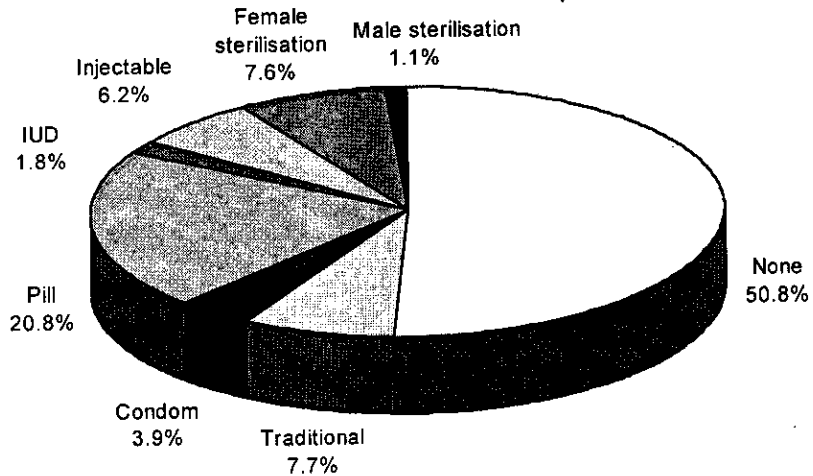
Figure 14: Trends in Contraceptive Prevalence Rates, 1975-96

do under the government programme. The second most common method in the MCH-FP area was the oral contraceptive (15.8 percent) while this was the most popular method in the national programme (20.8 percent). Almost 8 percent of couples use unreliable traditional methods in the national programme, a much larger percentage than in the Matlab MCH-FP area.

Detailed analysis of the RKS data shows that there are high rates of discontinuation of family planning methods. The most common reason for a woman to stop using any method is experience of side effects. Research is needed into the management of side effects and other ways of increasing continuation rates.

Contraceptive failure resulting in unplanned pregnancy is also a serious problem. The cumulative failure rate in the first year of use has been estimated to be 1 percent for injectables, 3 percent for Intrauterine Device (IUD) and 15 percent for the pill and other temporary methods. High failure rates were shown to be associated with the quality of service provided by the CHWs. Improved training of health workers will, therefore, contribute to more reliable contraceptive use. More research is needed into causes of contraceptive failure in order make changes in the current contraceptive delivery programme expected to lead to a reduction in the number of unwanted pregnancies (Bairagi and Rahman, 1996).

Contraceptive Use in Bangladesh, 1996/97



Contraceptive Use in the MCH-FP Area, 1996

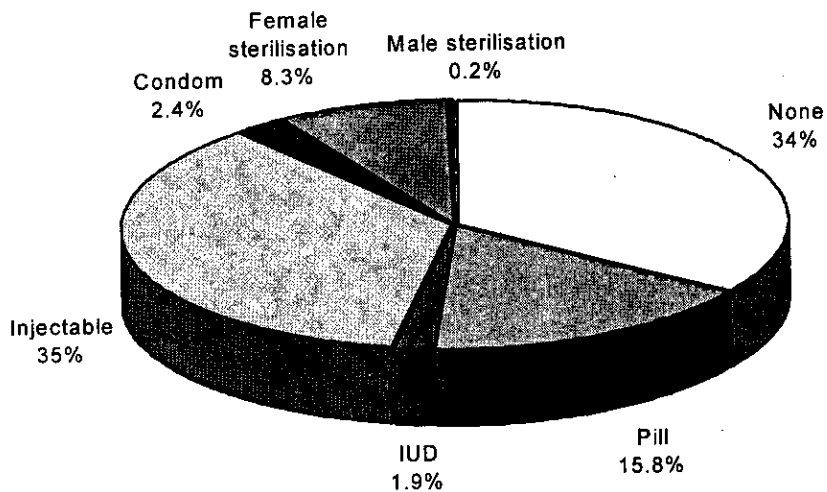


Figure 15: Comparison of Contraceptive Use by Method in Bangladesh and MCH-FP Area, 1996/97

It is estimated that in Matlab between 1982 and 1991 there was an increase in induced abortion of about 9 percent per year. The rate of induced abortion was higher in the Comparison area than the MCH-FP area (33 compared with 20 per 1,000 live births). Women who became pregnant due to contraceptive method failure were more likely to resort to abortion than those not using family planning methods. As predicted from the contraceptive failure rates, abortion rates were highest amongst women using condoms and traditional methods and lowest for those using injectable contraceptives. (Ahmed, et al., 1996)

Women who became pregnant within twelve months of the birth of a previous child and those with several living children had higher than average rates of induced abortion. Women with no education and low socio-economic status were more likely to continue with an unplanned pregnancy than educated women. There is insufficient information regarding the utilisation of legal menstrual regulation (MR) services and traditional abortion practitioners and the factors that influence the decision for pregnancy termination. Research into ways of reducing the need to resort to induced abortion, through the provision of improved family planning services, is urgently needed. The promotion of legal MR services carried out in well equipped facilities by well trained staff should lead to a decline in the number of unsafe abortions currently being carried out.

4. *Impact of Measles Vaccine on Mortality*

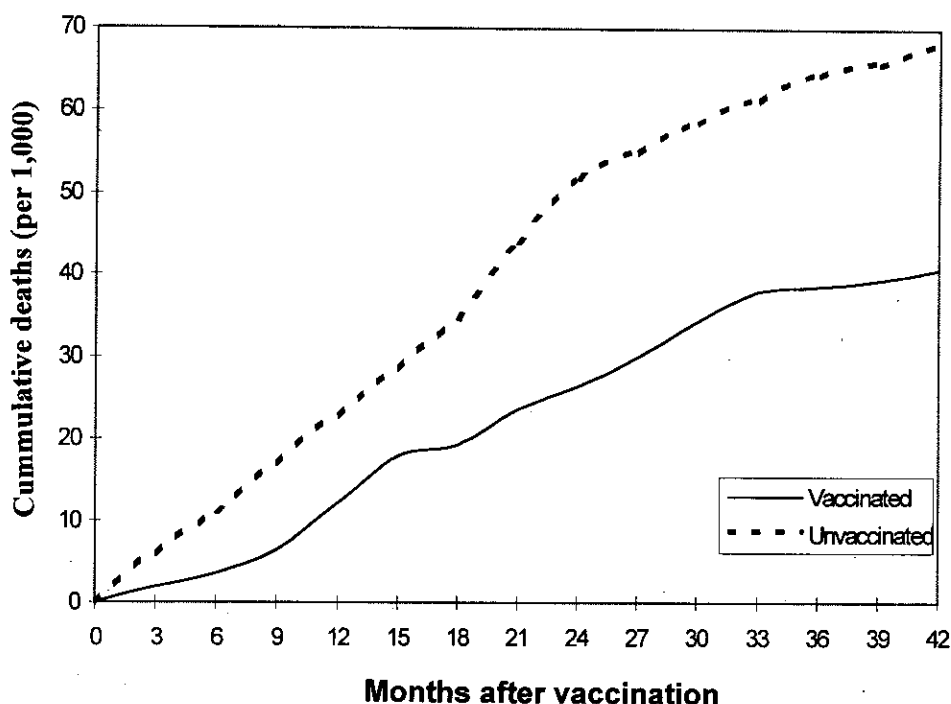
As part of the Maternal and Child Health programme, measles vaccination was introduced in 1982. In spite of the fact that measles immunisation has been an integral part of most primary health care programmes in developing countries, there has been considerable uncertainty about its effectiveness in reducing childhood mortality. This is partly because the impact can only be determined from longitudinal data and partly because of a lack of reliable data on causes of death.

Analysis of the longitudinal DSS data, comparing the mortality rates of vaccinated with unvaccinated children, clearly showed that measles vaccination is associated with about a 45 percent reduction in the risk of dying. Figure 16 shows that an effect is clearly discernible at 12 months after vaccination and reaches its maximum at about 24 months after vaccination. Between 24 and 42 months after vaccination the difference in mortality between vaccinated and unvaccinated remains the same.

The long-term impact of measles vaccination was much larger than expected. One can reasonably expect that measles vaccination will lead to the elimination of all measles deaths between 1 and 5 years after birth. It means that in the age group 1-4 years the death rate will decrease by 13 percent since 13 percent of all deaths in this age category are due to measles. Figure 16 makes it clear that the impact of measles is, however, much larger (namely a decline in mortality of 45 percent). This means that measles vaccination also reduces the risk of dying from other causes in particular diarrhoea and respiratory tract infections which are often complications of measles. The figures quoted above probably overestimate the impact of measles vaccination somewhat, because there is no allowance for the impact of competing causes of death: preventing a child from dying from one cause may not prevent subsequent death from competing causes (Clemens et al., 1988; Koenig et al., 1991). Even when the impact of competing causes of death is taken into account, it is very likely that there is still a remarkable long-term impact on mortality due to measles vaccination.

These findings helped to speed up the adoption of a widespread measles vaccination programme by the Expanded Programme on Immunisation in Bangladesh and other developing countries. In the MCH-FP area, where CHWs administer vaccinations during

home visits, coverage was over 80 percent among children 9 to 59 months in 1990. Immunisation coverage in the Comparison area, where vaccination sessions were held at clinics, was only 34 percent for the same age group. Outreach immunisation services, a modified version of the Matlab “doorstep” delivery system, now ensure access to immunisation provided by MOHFW to large numbers of children in Bangladesh.



— Source: Koenig et al., 1990

Figure 16: Cumulative Mortality Rates by Measles Vaccination Status in MCH-FP Area, 1982-85

These studies also underlined the fact that this reduction is confined to mortality in the one to four year age group and that measles immunisation has no significant effect on infant mortality. The obvious reason is that measles vaccine is not given until the age of nine months and vaccination coverage has to be very high to attain herd immunity (Koenig et al., 1991). A considerable number of measles related deaths occur in infants below the current age of vaccination. A two year study concluded in 1991 found that 14 percent of measles cases in children under five occurred below the age of vaccination and this data supports a policy to modify immunisation strategy by the introduction of a vaccine at 5 months (de Francisco et al., 1994).

5. Maternity Care Programme

A retrospective study of DSS data on maternal mortality, discussed in the previous chapter, showed that 73% of deaths were directly related to obstetric complications. The

majority of these deaths occur during labour or immediately after delivery. In Matlab and other rural areas of Bangladesh almost all deliveries take place at home, far from facilities and personnel equipped to deal with obstetric emergencies. These findings led to the implementation of a maternity care programme, aimed at reducing maternal mortality, which was initiated in part of the MCH-FP area in 1987 (Fauveau et al., 1991).

Government-trained nurses/mid-wives were posted in the two subcentres where the intervention took place. The midwives were supported by two other components of the programme namely development of a referral chain and installation of a maternity clinic at Matlab. Patients arriving at the Matlab clinic requiring a caesarean section or blood transfusion were further referred by ambulance to the district hospital.

To examine whether this maternity care programme played a role in the decline of direct obstetric mortality, the intervention was compared with a control area. The years were grouped into three periods representing the period 1976-86 before introduction of the maternity care programme, the period 1987-89 coinciding with the introduction of the programme in the northern part of the MCH-FP area and the period 1990-93 when the entire population of the MCH-FP area had access to the maternity care programme. The Comparison area did not receive any specific programme inputs and was divided into a northern part and a southern part reflecting differential access to essential obstetric care. The Comparison area south had better access than the Comparison area north.

Trends over time in direct obstetric mortality by area are shown in Table 5. Before the start of the maternity care programme, direct obstetric mortality was similar in all four areas. Mortality declined in MCH-FP north where the programme was initiated (in 1987), but not in MCH-FP south. After 1990, when the programme was expanded to the entire MCH-FP area, the southern part showed a downward trend (but not statistically significant). An unexpected finding was that direct obstetric mortality also fell in the southern part of the Comparison area without the intense maternity care programme (Ronsmans et al., 1997).

	1976-86	1987-89	1990-93
MCH-FP north (intervention from 1987)	427	212	163
MCH-FP south (intervention from 1990)	411	441	301
Comparison north (no intervention, far from EOC)	474	368	472
Comparison south (no intervention, close to EOC)	408	198	195

Source: Ronsmans et al., 1997

Table 5: Direct Obstetric Mortality Ratio per 100,000 Live Births in Matlab, 1976-1993

The study illustrates the difficulties of effective evaluation of Safe Motherhood programmes. The introduction of the maternity care programme in the intervention area led, as expected, to a decline in direct obstetric mortality. Unexpected was, however, that there was also a strong decline in mortality in one part of the Comparison area. The authors of this analysis hypothesise that access to EOC is in itself already an important factor determining maternal mortality (Ronsmans et al., 1997).

CHAPTER FOUR

EXAMPLES OF CURRENT STUDIES

Priorities in health and population policies have changed in the past few years as a result of recent international and national developments. An important event on the international scene was the 1994 **International Conference on Population and Development (ICPD)** in Cairo where consensus was achieved on a Programme of Action (POA) for sustainable development. The agenda was broad ranging, encompassing women's rights, poverty and environmental protection. Major objectives are highlighted in Box 3.

Central to the POA are reproductive and sexual health and the rights of women - key areas of MHDSS research. There is a great deal of existing DSS and RKS data still to be accessed, by appropriate analysis, as well as new initiatives, which will contribute to finding ways to meet the ICPD objectives.

An important recent event on the national scene is the development and adoption of the **Fifth Health and Population Programme 1998-2003 (HAPP-5)**. Research currently carried out in Matlab will certainly make a contribution to this five-year plan and future research should also make a contribution.

In this section a few examples of current studies are outlined. Many of them are ongoing and therefore results are not yet available. All of them make use of DSS and RKS data and all are expected to have implications for public health policies.

Box 3: Major ICPD Objectives

- improving the status of women;
 - increasing access to education especially for girls;
 - improving the health of children;
 - providing access to sexual and reproductive health care, including family planning;
 - involving men in family planning;
 - eradicating poverty;
 - eliminating violence against women;
 - empowering women through gender equity;
 - integrating population policies with those of socio-economic development.
- Source: United Nations, 1995

1. *Analysis of Existing MHDSS Data*

Although considerable use has already been made of DSS and RKS data, still much needs to be done. Below a number of examples are given of projects which are currently being carried out or will be carried out in the future dealing with various aspects of MHDSS data.

- Levels, trends and determinants of child mortality, adult mortality and mortality in the elderly population.
- Levels, trends and determinants of maternal mortality and induced abortion.
- Levels, trends and determinants of infertility.
- Violence against women: analysis of data on causes of death dealing with violence, accidental deaths, etc.
- Reasons for discontinuation of use of contraceptive methods, method failure and side effects.
- Impact of contraceptive discontinuation or failure on induced abortion.
- Effects of desire or no desire for more children and of son preference on contraceptive use, abortion, and fertility.
- Impact of socio-economic changes between 1974 and 1996 on desire for more children, contraceptive use, fertility, mortality and migration (using data of censuses of 1974, 1982, 1993 and 1996).
- Impact of birth care practices on neonatal mortality.
- Levels, trends and determinants of age at marriage, marriage, divorce, remarriage and widowhood.
- Levels, trends and determinants of in-migration and out-migration (including inter-village movements).
- Impact of the introduction of vitamin A supplementation to mothers and their infants on morbidity and mortality.
- Evaluation of the case-management strategy for Acute Lower Respiratory Tract Infections, including impact on morbidity, referral system and mortality.
- Interactions between infectious diseases and malnutrition.
- Evaluation of the syndromic management strategy for the detection and treatment of reproductive tract and sexually transmitted infections.

2. BRAC-ICDDR,B Project

Analysis of DSS data has shown that the decline in fertility and child mortality is slowing down in recent years (see Chapter 2). This suggests that the current, largely medical interventions have achieved their maximum impact.

Further reductions in fertility and child mortality require new initiatives focusing on socio-economic improvements. Research is currently underway to evaluate the impact of the Bangladesh Rural Advancement Committee (BRAC)-ICDDR,B Rural Development Programme (RDP) initiated in Matlab in 1992/3. This joint project introduced a package of interventions including formal and informal education, credit schemes, income generating projects and consciousness raising. The effect of these activities will be determined on contraceptive use, fertility, mortality and other indicators of child and reproductive health.

Preliminary results show that household income and food consumption is higher for BRAC members than for non-members. Similarly there is increased use of health services, although rates of illness remain the same in both groups. In addition there is a tendency for women members of BRAC to defer pregnancy. These preliminary findings are currently being validated, but more time will be needed before the long term impact of the project on nutritional status, child survival and the status of women can be assessed. Several complementary research projects will be carried out in 1998 dealing with measurement of the long-term effect of the socio-economic interventions. DSS plays an important role in this evaluation (Chowdhury and Bhuiya, 1995).

3. *Reproductive Tract Infections and Sexually Transmitted Diseases*

Until recently there has been very little research in Bangladesh regarding Reproductive Tract Infections (RTIs) and Sexually Transmitted Diseases (STDs). In fact, information on the scale of the problem was not even available. It has become imperative to remedy that situation, particularly in view of the threat posed by the HIV epidemic in neighbouring southeast Asian countries.

Studies are currently being undertaken in the Matlab DSS area to assess prevalence and risk factors for various RTIs/STDs. Male clinics have been established to improve men's access to health care. Information is also being collected on knowledge and attitudes of both men and women towards RTIs/STDs in order to develop appropriate health education messages and services.

The initial results of these studies indicate that endogenous reproductive tract infections are quite prevalent in the area, with at least half of the women suffering from some form of RTI. Sexually Transmitted Diseases, however, seem to be less prevalent. A problem identified by the study is the difficulty to discriminate RTIs and STDs in the absence of direct examination, i.e., using the WHO recommended syndromic management approach for vaginal discharge. The current algorithms have a low specificity for STDs, indicating that sexually transmitted infections could be over-diagnosed. The financial and social implications of this misdiagnosis are important and improved screening strategies should be evaluated.

4. *The Matlab Health and Socio-Economic Survey*

Adults in approximately 2,700 *baris* and 5,000 households living in the DSS area were interviewed in the months of May-August 1996. Data were collected on household composition and economy, labour force participation, fertility and contraception, adult health status, use of health services, migration and transfers of income, and goods and services to DSS households. The interviews were carried out by an outside organization, which is also in charge of data cleaning, entry and editing. The information from the survey will be linked to already existing information for the respondents of the survey derived from the DSS database. The whole dataset will then be assembled at the RAND Corporation and, together with proper documentation, will be released jointly by ICDDR,B and RAND as a public-use database in mid 1998. One of the main reasons why Matlab was chosen as the location for this health survey of adults is the existence of DSS which allows accurate determination of adults' ages and the possibility to link with data of other studies carried out previously.

5. *Requirements of Tetanus Toxoid Doses for Women of Reproductive Age*

Tetanus toxoid is an important intervention to protect mothers and neonates from the nearly always fatal tetanus infection. It is recommended that women of reproductive age receive at least 5 Tetanus toxoid doses during reproductive life, with two doses during the first pregnancy and three further doses at least three years apart. This inconvenient schedule leads to over-use, and sometimes under-use of vaccination, as recall of doses taken is generally poor in situations where record keeping is not available (de Francisco & Chakraborty, 1996). In addition, this situation is further complicated with the introduction of infant vaccination with DPT, which includes three doses of Tetanus toxoid. It is not known as yet if these early doses will decrease requirements for Tetanus toxoid in adulthood.

RKS has kept information on all doses of Tetanus toxoid given to women of reproductive age since the seventies. As such it can provide a profile of numbers and spacing of doses received by a given individual. In a cholera vaccine trial performed in Matlab in 1974, a total of 93,000 children below 5 years of age were vaccinated with Tetanus toxoid used as placebo to estimate cholera vaccine efficacy. RKS allows investigators to estimate the profile of doses of Tetanus toxoid for children who received Tetanus toxoid and for those who received cholera vaccine even twenty-four years after the mentioned vaccine trial. As such, a biological study is going on at present to determine if those children who received Tetanus toxoid during infancy are better off in terms of protection than children who did not in the light of subsequent vaccination experience. This unique study could not be performed if the information on doses of Tetanus toxoid received during the lifetime was not available.

CHAPTER FIVE

PLANS FOR THE FUTURE

The primary objective of MHDSS, as explained and illustrated in previous chapters, is to provide assistance to research projects in public health. In fact, none of these research projects could be carried out without MHDSS. A large number of public health research projects have already been completed or are nearing completion. (For an overview of projects completed before 1990, see Habte et al., 1990 and for the period 1990-1995, see ICDDR,B, 1997). In other words, most or nearly all of the objectives of major public health research projects started several years ago have now been achieved. This means that new objectives for activities in public health in Matlab are being formulated (Ross, 1996). By the end of 1997 several proposals in the field of child, reproductive and adult health were formulated and submitted for funding to various agencies and more will follow in 1998. The proposals deal in particular with WHO's initiative on Integrated Management of Childhood Illness, vaccine trials, nutrition in childhood, maternity care, male involvement in family planning, adolescent reproductive health, delivery of family planning services and case finding and treatment of tuberculosis.

A problem which has to be faced is whether all of these new projects should be implemented in the DSS area of Matlab thana or elsewhere. In particular in the MCH-FP area of Matlab the health situation has improved making it less representative for the country or of parts of the country. One can argue, in addition, that the population of that area has become more conscious of health matters than elsewhere as a result of the health programmes carried out there. Alternatives which have to be considered are the Comparison area in Matlab, the Non-DSS area of Matlab thana (with a population of about 300,000) or other areas.

At the same time, as also explained previously, MHDSS is an important data source in its own right. The existing data need to be thoroughly analysed by ICDDR,B staff. It is also important to realize that the MHDSS data set attracts researchers from outside ICDDR,B who want to collaborate with ICDDR,B scientists on the analysis of the data (MacFarlane and Graham, 1996). We expect, therefore, that MHDSS will also in the future continue to be relevant and useful and for these reasons a number of steps are taken or will be taken to modernise it and to ensure its usefulness in the future. In particular the following activities are being carried out or envisaged for the future.

1. **Continuation of analysis of data** of DSS, RKS and GIS by staff members of the Health and Demographic Surveillance Programme and other units of PHSD.
2. **Expansion of collaboration** with scientists in other organisations in Bangladesh such as universities, BBS and NIPORT and with scientists in other countries.
3. **Increasing access to the various data bases**, sample surveys and censuses by production of public use data diskettes or a CD-ROM. Such diskettes or CD-

ROM should be made available at minimal cost or, under certain conditions, free of charge.

4. **Integration of DSS, RKS and GIS** into one data collection system. It is likely that CHWs will be in charge of collection of both DSS and RKS data. The amount of information on vital event and other registration forms may be substantially reduced. Processing of the data of DSS and RKS will also be integrated.
5. **Renaming of RKS to Health Information System** which means that MHDSS will consist of three components namely DSS, HIS and GIS. GIS will have data from both DSS and HIS.
6. **Increasing the cost-effectiveness** of MHDSS. The following measures are under consideration: use of less staff than currently employed, introduction of hand-held computers, decrease in the frequency of visits, changing the definitions of in- and out-migrations (waiting period of 2 or 3 months instead of 6).
7. **Determining the topics, indicators and variables** in child and reproductive health on which information will be collected (Snow, 1998).
8. **Deciding on the location** of the surveillance system and **consultation with MOHFW**. Locations under consideration are: MCH-FP and Comparison areas of Matlab, Non-DSS area of Matlab or elsewhere.
9. **Upgrading of computer facilities in MHDSS-Matlab** through installation of a small network of PC-based systems. Not only data entry, but also data processing and a limited amount of routine analysis should take place in Matlab itself. One promising Data Base Management System under consideration for introduction is the Household Registration System developed at the Navrongo project in Ghana (MacLeod et al., 1997). Other DBMSs will be considered as well (Hoque, 1996; Klappe, 1998).
10. **Modernisation of computer facilities in MHDSS-Dhaka** and improvement of access to DSS and HIS data sets. Optimal use will be made of a newly installed miniframe and network of PCs and the existing DBMS will be modernized and made more user-friendly. Included here is improvement of transfer of data from MHDSS-Matlab to MHDSS-Dhaka and vice versa.

REFERENCES

(Included are a number of publications which have not been cited in the text, but were published in 1995-1998 or will be published later in 1998.)

Alam, N (1998). Infant and child mortality in Bangladesh: age-specific effects of previous child's death. *Journal of Biosocial Science* (accepted for publication).

Ahmed, K, Rahman M and van Ginneken J (1998). Induced abortion in Matlab, Bangladesh: trends and determinants. *International Family Planning Perspectives* (accepted for publication).

Albert, MJ, Ansaruzzman M, Barhan PK, Faruque ASG, Faruque SM, Islam MS, Mahalanabis D, Sack RB, Salam MA, Siddique AK, Yunus M, and Zaman K (1993). Large epidemic of cholera-like disease in Bangladesh caused by *Vibrio cholerae*-0139 synonym Bengal. *Lancet* 342(8868): 387-90.

Aziz, KMA and Mosley WH (1994). Historical perspective and cultural background of the Matlab Project. In: V. Fauveau (ed.) *Matlab: Women, Children and Health*, ICDDR,B Special Publication No. 35, ICDDR,B Dhaka.

Bairagi, R, Shuaib M and Hill AG (1997). Estimating childhood mortality trends from routine data: a simulation using the preceding birth technique in Bangladesh. *Demography* 34(3): 411-420.

Bairagi, R and Rahman M (1996). Contraceptive failure in Matlab, Bangladesh. *International Family Planning Perspectives* 22: 21-25.

Bairagi, R and Chowdhury MK (1994). Effects of parental gender preference on fertility and mortality in Matlab. In: V Fauveau (ed.), *Matlab: Women, Children and Health*, op.cit., p.309-322.

Bhuiya, A and Chowdhury M (1997). The effect of divorce on child survival in a rural area of Bangladesh. *Population Studies* 51: 57-61.

Bhuiya, A and D'Souza S (1994). Socioeconomic and demographic correlates of child health and mortality. In: V. Fauveau (ed.) *Matlab: Women, Children and Health*, ICDDR,B Special Publication No. 35, ICDDR,B Dhaka.

Black, RE, Huber DH and Curlin GT (1980). Reduction of neonatal tetanus by mass immunization of non-pregnant women: duration of protection provided by one or two doses of aluminium-adsorbed tetanus toxoid. *Bulletin of the World Health Organization* 58(6): 927-30.

Chen, L (1986). Primary health care in developing countries: overcoming operational, technical and social barriers. *Lancet* 2(8518): 1260-1265.

Chowdhury, M and Bhuiya A (1995). Proposals for Phase II of the BRAC-ICDDR,B Matlab Joint Project 1996-2000. Working Paper No. 6, BRAC-ICDDR,B Joint Research Project, Dhaka.

Clemens, JD, Stanton BF, Chakraborty J, Chowdhury S, Rao MR, Ali M, et al. (1988). Measles vaccination and childhood mortality in rural Bangladesh. *American Journal of Epidemiology* 128(6): 1330-9.

Clemens, JD, Harris JR, Kay BA, Chakraborty J, Sack DA, Ansaruzzman M, et al. (1989). Oral cholera vaccines containing B-subunit-killed whole cells and killed whole cells only. II. Field evaluation of cross-protection against other members of the Vibrionaceae family. *Vaccine* 7(2): 117-20.

Clemens, JD, Sack DA, Harris JR, van Loon F, Chakraborty J, Ahmed F, et al. (1990). Field trial of oral cholera vaccines in Bangladesh: results from three year follow-up. *Lancet* 335(8684): 270-3.

Curlin, GT, Levine RJ, Ahmed A, Aziz KMA, Rahman ASMM and Verwey WF (1978). Immunological aspects of a cholera toxoid field trial in Bangladesh. Cholera Research Laboratory Scientific Report No. 8, CRL, Dhaka.

de Francisco, A, Fauveau V, Sarder AM, Chowdhury HR, Chakraborty J and Yunus M (1994). Measles in rural Bangladesh: issues of validation and age distribution. *International Journal of Epidemiology* 23(2): 393-399.

de Francisco, A and Chakraborty J (1996). Maternal recall of Tetanus Toxoid vaccination. *Annals of Tropical Paediatrics* 16(2): 49-54.

D'Souza, S and Bhuiya A (1982). Socioeconomic mortality differentials in a rural area of Bangladesh. *Population and Development Review* 8(4): 753-769.

Fauveau, V and Chakraborty J (1994). Family Planning and Maternal and Child Health Services in Matlab. In: V. Fauveau (ed.) *Matlab: Women, Children and Health*, ICDDR,B Special Publication No. 35, ICDDR,B Dhaka.

Fauveau, V, Stewart K, Khan SA and Chakraborty J (1991). Effects on mortality of community-based maternity-care programme in rural Bangladesh. *Lancet* 338: 1183-86.

Fauveau, V (1994). Conclusions: what has been learned in Matlab? In V. Fauveau (ed.) *Matlab: Women, Children and Health*, ICDDR,B Special Publication No. 35, ICDDR,B, Dhaka.

Habte, D, et al. (1990). *Annotated Bibliography of ICDDR,B Studies in Matlab, Bangladesh*, Specialized Bibliography Series No.14, ICDDR,B, Dhaka.

Hoque, AR (1996). Modernization of DSS Database. Internal Report, ICDDR,B, Dhaka.

Hossain, N and Huda S (1995). Problems of women-headed Households. Working Paper No 9, BRAC-ICDDR,B Joint Research Project, Dhaka, Bangladesh.

ICDDR,B (1997). *Scientific Achievements of ICDDR,B, 1991-1995*. Special Publication No. 55, ICDDR,B, Dhaka.

Kane, T, Khuda B and Phillips JF (eds.) (1997). *Reproductive Health in Rural Bangladesh: Policy and Programmatic Implications*. Volume 1 and 2. ICDDR,B Monograph No. 7, ICDDR,B, Dhaka.

Khuda, B, Kane TT and Phillips JF (1997). *Improving the Bangladesh Health and Family Planning Programme: Lessons Learned through Operations Research*, ICDDR,B Monograph No.5, ICDDR,B, Dhaka.

Klappe, D (1998). Health and Demographic Surveillance System: Integrating DSS, RKS and GIS. Internal Report, ICDDR,B, Dhaka.

Koenig, MA, Fauveau V, Chowdhury AL, Chakraborty J, Khan MA (1988). Maternal mortality in Matlab, Bangladesh: 1976-85. *Studies in Family Planning* 19(2): 69-80.

Koenig, MA, Fauveau V and Wojtyniak B (1991). Mortality reductions from health interventions: the case of immunization in Bangladesh. *Population and Development Review* 17(1): 87-104.

LeGrand, TK and Phillips JF (1996). The effect of fertility reductions on infant and child mortality: evidence from Matlab in rural Bangladesh. *Population Studies* 50(1): 51-68.

MacFarlane, S and Graham W (1996). Review of the Demographic Surveillance System, ICDDR,B. Consultancy undertaken on behalf of ODA. Internal Report. Options, London.

MacLeod, BB, Phillips JF, Binka FN and Ngom P (1997). The rapid dissemination of demographic surveillance system with the Household Registration System. Presented at International Symposium in the Role of Longitudinal Community-Based Health Research, Heidelberg, July 1997.

Maine, D, Akalin MZ, Chakraborty J, de Francisco A and Strong M (1996). Why did maternal mortality decline in Matlab? *Studies in Family Planning* 27(4): 179-187.

Ministry of Health and Family Welfare (1998). *Fifth Health and Population Programme, 1998-2003*, MOHFW, Dhaka.

Mitra, SN et al. (1998). *Bangladesh Demographic and Health Survey 1996-1997*. NIPORT, Mitra Associates and Macro International, Dhaka and Calverton, Maryland, USA.

Mosley, WH, Aziz KM, Chowdhury AK, Ahmed A and Fahimuddin M (1972). Report of the 1966-67 cholera vaccine field trial in rural East Pakistan. 4. Five years of observation with a practical assessment of the role of a cholera vaccine in cholera control programmes. *Bulletin of the World Health Organization*, 49(4):229-238.

Mosley, WH and Becker S (1991). Demographic models for child survival and implications for health intervention programmes. *Health Policy and Planning* 6(3): 218-33.

Mostafa, G, Shaikh K, van Ginneken JK and Sarder AM (1998). *Demographic Surveillance System-Matlab: Registration of Demographic Events 1996*, Volume 28, Scientific Report No. 82, ICDDR,B, Dhaka.

Mostafa, G, Wojtyniak B, Fauveau V and Bhuiya A (1991). The relationship between socio-demographic variables and pregnancy loss in a rural area of Bangladesh. *Journal of Biosocial Science* 23(1): 55-63.

Muhuri, PK and Menken J (1997). Adverse effects of next birth, gender and family composition on child survival in rural Bangladesh. *Population Studies* 51(3): 279-294.

Muhuri, PK (1995). Health programs, maternal education and differential child mortality in Matlab, Bangladesh. *Population and Development Review* 21(4): 813-834.

Phillips, JF, Stinson WS, Bhatia S, Rahman M and Chakraborty J (1982). The demographic impact of the Family Planning-Health Services Project in Matlab, Bangladesh. *Studies in Family Planning* 13(5): 131-140.

Phillips, JF (1994). Matlab and the Bangladesh family planning and health programme. In: V. Fauveau (ed.) *Matlab: Women, Children and Health*, ICDDR,B Special Publication No.35, ICDDR,B, Dhaka.

Rahman, M (1998). A longitudinal study on the effect of child mortality on fertility regulation behaviour in rural Bangladesh. *Studies in Family Planning* (accepted for publication).

Rahman, M and DaVanzo J (1993). Gender preference and birth spacing in Matlab, Bangladesh. *Demography* 20: 333-352.

Rahman, O (1993). Excess mortality for the unmarried in rural Bangladesh. *International Journal of Epidemiology* 22(3): 445-56.

Razzaque, A (1996). Reproductive preferences in Matlab, Bangladesh: levels, motivation and differentials. *Asian-Pacific Population Journal* 11(1):25-44.

Razzaque, A (1998). Preference for children and subsequent birth in Matlab: does wife-husband agreement matter? *Journal of Biosocial Sciences* (accepted for publication).

Razzaque, A, Nahar L, Sarder AM, van Ginneken J and Shaikh K (1998). *Demographic Surveillance System-Matlab: 1996 Socioeconomic Census*, Volume 29, ICDDR,B Scientific Report No. 83, ICDDR,B, Dhaka.

Ronsmans, C, Vanneste AM, Chakraborty J and van Ginneken J (1997). Maternal mortality decline in Matlab, Bangladesh: a cautionary tale. *Lancet* 350(Dec 20/27): 1810-1814.

Ronsmans, C, Vanneste AM, Chakraborty J and van Ginneken J (1998). A comparison of three verbal autopsy methods to ascertain levels and causes of maternal deaths in Matlab, Bangladesh. *International Journal of Epidemiology* (to be published).

Ross, D (1996). The Future of the Matlab Health and Research Centre. Report of a Consultancy for the Community Health Division, ICDDR,B. Internal Report, ICDDR,B, Dhaka.

Shaikh, K (1997). Recent changes in marriage patterns in rural Bangladesh. *Asia-Pacific Population Journal* 12(3): 31-48.

Simmons, R (1996). Women's lives in transition: a qualitative analysis of fertility decline in Bangladesh. *Studies in Family Planning* 27(5): 251-268.

Snow, R (1998). Monitoring the Burden of Reproductive Ill-Health in Rural Bangladesh: Proposal for a Reproductive Health Surveillance System at Matlab. Internal Report, ICDDR,B, Dhaka.

United Nations (1995). *Population and Development, Vol. 1. Programme of Action adopted at the International Conference on Population and Development: Cairo: 5-13 September 1994*. United Nations, Dept. for Econ. and Social Information, New York.

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In the 38 years of its existence, ICDDR,B has evolved into a research centre whose scientists have wide-ranging expertise. Future research will be directed toward finding cost-effective and sustainable solutions to the health and population problems of the most disadvantaged people in the world. The Centre's Strategic Plan: "To The Year 2000" outlines work in the following key areas:

Child Survival: Priority areas for research in child survival include: improvement of the case management of diarrhoea; acute respiratory infections; risk factors for low birth rate and potential interventions; nutritional deficiency states (including micronutrients); immunization-preventable infectious diseases; and strategies for prevention, including modifications in personal and domestic hygiene behaviours, provision of appropriate water supply to and sanitation for the households, and the development of effective vaccines.

Population and Reproductive Health: The Centre played a key role in conducting pioneering research in the areas of population and family planning and raising the contraceptive use rate among women of reproductive age in Bangladesh to almost 45% through its technical assistance and operations research. The 1994 Cairo Conference hailed Bangladesh as a family planning success story, using Matlab as the model for MCH-FP programmes throughout the world. The Centre continues its research in maternal health and safe motherhood and has initiated community-based research on reproductive health and STD/RTI/HIV infections.

Application and Policy: The Centre recognizes, and has given a high priority to, the need to transform research findings into actions by replicating the successful interventions piloted in its projects and through its research and training activities. The Centre will increase its communication, dissemination and training in its efforts to influence international and national health policies in the areas of its expertise.

Centres of Excellence: As a means of addressing these new initiatives in child survival and population and health research and structuring our existing programmes into Centre-wide initiatives, five Centres of Excellence are proposed as the scientific research, investigative and training arms for key areas of activities. These Centres of Excellence are in the following areas: Nutrition; Emerging and Re-emerging Infectious Diseases; Integrated Management of Childhood Illnesses; Vaccine Trials; and Reproductive Health. The Centres of Excellence will be interdisciplinary with scientists from each of the four scientific divisions engaged in the dialogue of formulating policy, developing research protocols, and conducting clinical, hospital-based and community-based trials. Outputs will include research findings, policy development and training capacity that will be used locally and nationally and that can be applied regionally and globally.



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