STRATEGIC PLAN TO THE YEAR 2010

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GLOBAL LIFESAVING SOLUTIONS

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Vision

All people, especially the poor, can become healthier and can reach their full potential through the application of new knowledge

Mission

To develop and promote realistic solutions to the major health, population and nutrition problems facing the poor people of Bangladesh and other settings

Guiding Values

- Excellence in Research, Training and Service
- High Ethical Standards
- Gender Equality
- Responsive to Change
- Promote Partnerships
- Prioritizes the Needs of the Poor and Vulnerable
- Promote Equity and Diversity
- Transparency and Accountability
- Effective Use and Development of Resources
- Fiscal Prudence

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LIST OF ACRONYMS

ADB	Asian Development Bank
ALRI	Acute Lower Respiratory Infection
ARI	Acute Respiratory Infection
AVU	Audiovisuals Unit
BINP	Bangladesh Integrated Nutrition Programme
BIRDEM	Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders
BNNC	Bangladesh National Nutrition Council
BOT	Board of Trustees
BRAC	Bangladesh Rural Advancement Committee
CDC	Centers for Disease Control and Prevention
CGEC	Centre Gender Equality Committee
CHE	College of Home Economics
CISU	Computer Information Services Unit
CRL	Cholera Research Laboratory
DALYs	Disability Adjusted Life Years
DISU	Dissemination and Information Services Unit
DOTS	Directly observed treatment short therapy
DFID	Department for International Development
DMCH	Dhaka Medical College Hospital
DSH	Dhaka Shishu Hospital
ELISA	Enzyme Linked Immunosorbent Assay
EOC	Emergency Obstetric Care
ERID	External Relations and Institutional Development
ESP	Essential Services Package
EU	European Union
FHRP	Family Health Research Project
FP	Family Planning
GEGA	Global Equity Gauge Alliance
GHEI	Global Health Equity Initiative
GIS	Geographical Information System
GoB	Government of Bangladesh
HDSS	Health and Demographic Surveillance System
HFPSP	Health and Family Planning Systems Programme
HNPSP	Health, Nutrition, Population Sector Programme
HPSP	Health and Population Sector Programme
HR	Human Resources
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
ICMH	Institute of Mother and Child Health
IDU	Injecting Drug Users
IMCI	Integrated Management of Childhood Illness
INDEPTH	International Network of field sites with continuous Demographic Evaluation of Populations and Their Health in developing countries
INFS	Institute of Food Sciences
IPHN	Institute of Public Health Nutrition
IPO	International Professional Officers
ISD	Information Sciences Division
IT	Information Technology
LWB	Low Birth Weight
MCH-FP	Maternal and Child Health and Family Planning
MDG	Millennium Development Goals
MIS	Management Information System
MOHFW	Ministry of Health and Family Welfare
NGO	Non-Governmental Organization
NIH	National Institutes of Health
NIPORT	National Institute of Population Research and Training
NSDP	NGO Service Delivery Project
ORS	Oral Rehydration Solution
PATH	Program for Appropriate Technology in Health
PC	Personal Computer
PEM	Protein Energy Malnutrition
PSKP	Progoti Samaj Kalyan Prothistan
P&G	Proctor and Gamble
QOC	Quality Of Care
RTI	Reproductive Tract Infection
SCF	Save the Children Fund
SIDA	Swedish International Development Cooperation Agency
STI	Sexually Transmitted Infection
TEU	Training and Education Unit
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VTCU	Voluntary Testing and Counselling Unit
WHO	World Health Organization

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Photo: © ICDDR,B / P.O.Sevel

FOREWORD

In June 2000, the Board of Trustees (BoT) asked the Centre to develop a Strategic Plan for the next ten years. A Strategic Planning Core Group was instituted and headed by the Associate Director and Head, Policy and Planning.

Development of the Strategic Plan included three stages: (1) situation analysis; (2) formulation of vision statement and future directions; and (3) formulation of Strategic Plan/proposed actions. At the June 2001 BoT meeting, a draft Strategic Plan was presented. Discussion followed and the Plan was modified accordingly. The second draft was considered at the June 2002 BoT meeting. After additional input and approval by the Government of Bangladesh (GoB) and the Donor Support Group, the BoT approved the Strategic Plan in November 2002 contingent on some final modifications that have since been made. A salient feature of the Strategic Plan is its participatory nature with the involvement of the Centre staff at different levels, the BoT, the GoB and donors.

With the finalization and approval of the Strategic Plan, the process of developing a mechanism to assess performance has been initiated. Monitoring tools have been developed to provide updates every four months on deliverables, key findings, scientific presentations and publications and implications for policy and action.

EXECUTIVE SUMMARY

ICDDR,B: International Centre for Diarrhoeal Disease Research, Bangladesh, is a non-profit, international research, training and service institution based in Dhaka, Bangladesh. Originally established as the Cholera Research Laboratory in 1960, today the Centre's work encompasses a full spectrum of issues related to child health, infectious diseases and vaccine sciences, reproductive health, nutrition, population sciences, health systems research, poverty and health, HIV-AIDS and safe water.

The Centre remains the only international health research centre based in a developing country.

As one of the world's most densely populated and poorest countries, Bangladesh provides the Centre a unique opportunity for research in the diseases and health challenges facing developing countries worldwide. The Centre conducts research to promote realistic and cost-effective solutions, and its contributions to the field of international health have been significant.

Accomplishments

- The Centre was integral in the discovery and further development of oral rehydration solution (ORS). ORS has been recognised as one of the most outstanding medical discoveries of the last century. It was responsible for saving the lives of 40 million children with diarrhoea during the last two decades. In recognition of this, the Centre was awarded the "first-ever" Gates Award for Global Health in May 2001 with a prize of $1 million and the Government of Bangladesh provided an equivalent matching grant.

- The Centre's findings on the proper management of enteric infections, antibiotic resistance, and epidemiology of diarrhoeal diseases have formed a knowledge base for health professionals worldwide.

- Services provided to the Bangladeshi community, particularly the poor, at the Centre's Dhaka and Matlab Hospitals have saved the lives of over 200,000 patients over the last 20 years at a cost of about US$10 per patient treated.

- The Centre's population-based Matlab field site is a model for public health strategies around the world. Public health decision makers often refer to Matlab to understand underlying factors that are important for making decisions regarding intervention design.

- The development of appropriate and successful family planning strategies has made Bangladesh a family planning success story and resulted in a current population that is 50 million fewer than it would have been if the Centre's MCH-FP programme had not been started. These strategies are now being used around the world.

- Immunization research has shown that routine and new vaccines can decrease illness and death rates in developing countries. This research continues to guide the use of vaccines around the world.

- The Centre's combined programmes in child health and family planning have contributed to a 75% reduction in the annual number of childhood deaths in the last 25 years in its Matlab field area.

- Advances made by the Centre in the treatment of children with severe malnutrition have shown that severe malnutrition is a treatable and not fatal disease and that treatment can be implemented even when hospital care is not available. Findings on the benefits of micronutrients have led the way to further improvements in the health of children.

- The Centre serves as a model of collaboration with the government and people of Bangladesh in a way that respects and supports each other and ultimately benefits the people of Bangladesh and other countries.

- The Centre successfully transitioned from a laboratory highly focused on cholera, to a fully-fledged comprehensive health centre of research, service and training. Furthermore, it has shown how an institution with vision, purpose and principles can thrive through changes in governments, donor priorities, and senior staff. In short, it has matured into a world-class institution.

Expected Accomplishments During the Coming Decade

The Centre is proud of its achievements in the past. As we look forward and take into consideration expected scientific developments, and the Centre's mandate, expertise, and capacity, we expect that the following major contributions could realistically result in success stories with dramatic impact on health and welfare. We will build on our strengths and opportunities to gradually expand the Centre's role in the international health field. These are not goals, hopes, or dreams; these are advances that can be made within the strategic plan period, through the efforts of the Centre's staff, in partnership with others including the Government of Bangladesh and national research institutions.

THESE ARE NOT GOALS, HOPES, OR DREAMS; THESE ARE ADVANCES THAT CAN BE MADE

1. Contribute to the introduction of cost-effective strategies for zinc therapy in diarrhoea.

The Centre's scientists in collaboration with Johns Hopkins University and the World Health Organization have documented the effectiveness of zinc therapy when used during the management of diarrhoeal episodes in children. Findings indicated zinc therapy reduces the duration of diarrhoea, lessens the chance it will become chronic, and lowers the overall number of deaths by 50%. The work of the Centre will now focus on scaling-up this intervention and validating the effectiveness of zinc in other conditions.

2. Help reduce maternal morbidity and mortality and improve perinatal and neonatal health.

The Centre will conduct research to improve the treatment of women during pregnancy, delivery, and following delivery. The Centre will continue to research best methods of reproductive health service delivery in urban and rural settings.

The Centre's scientists have helped identify and document the factors that lead to high maternal mortality and have developed a model programme for reducing this through prenatal clinics, subcentres, safe delivery with trained midwives, and follow-up of women after delivery. The task for the Centre now is to translate this model into a workable system for routine care of women.

Help to improve the health of newborns. In Bangladesh, more than 70% of all infant deaths occur in the first 28 days of life. To improve overall infant mortality, we must learn how to reduce deaths in this age group. The Centre is now embarking on major projects to find solutions to high neonatal mortality that are cost-effective and reproducible. With the interventions that the Centre is piloting we expect a decrease in neonatal mortality of 50% in our study sites.

3. Develop an effective package for the preventionof foetal growth restriction.

Forty-five percent of newborn children in Bangladesh weigh less than 2500 grams (the recognized cut-off for low birth weight). This proportion is the highest in the world. The Centre has recently initiated major interventions to understand how to increase birth weight. While the initial project will require four years to complete, the long-term studies will continue to have rewards for at least 20 years as we learn the long-term consequences of low birth weight and the benefits of our interventions.

4. Help identify a package of suitable vaccines for diarrhoea and acute respiratory infections (ARI).

The Centre has documented that vaccines given during childhood and pregnancy save lives and reduce illness. The Centre's work will now be to assist in the development and evaluation of new vaccines for diarrhoea and ARI.

5. Define the burden of tuberculosis and identify effective strategies for prevention and control.

The Centre has initiated studies on tuberculosis to understand its antibiotic resistance and epidemiology in a defined rural area. The Centre will continue its work on tuberculosis by conducting research on the spread in urban areas, improving the effectiveness of DOTS therapy, early detection, and improving diagnosis and treatment of children. The Centre also will build the capacity for conducting field trials of new therapies and improved vaccines.

6. Address the stagnation of fertility decline.

The decline in total fertility in Bangladesh from 6.5 children per woman in 1975 to 3.3 in 1994 has now levelled off. The Centre will conduct studies to understand the reasons for this plateau in fertility in order to help the nation reach replacement fertility by the end of the decade.

7. Help prevent the epidemic of HIV/AIDS and RTIs/STIs.

Bangladesh faces an HIV/AIDS epidemic but at this point it is still considered to be a "low prevalence" country. The Centre currently conducts the sero-surveillance of HIV/AIDS for the Government of Bangladesh (GoB) as well as additional surveillance for RTIs/STIs. The Centre will continue to conduct surveillance and work with the GoB and NGOs to prevent a potential HIV/AIDS epidemic and, to formulate a preventive strategy for low prevalence countries. Special emphasis at the Centre will be on adolescent populations, voluntary counselling and testing, and mother-to-child transmission.

8. Contribute to knowledge that can impact the burden of vector-borne diseases.

The Centre's research on dengue fever has documented the serotypes and the epidemiology of the infection in the country. More advanced research is planned to improve case management, reduce incidence through innovative mosquito reduction strategies and evaluation of new vaccines. The Centre has also begun to document the burden of disease of multi-resistant *P. falciparum* malaria in Bangladesh. This infection threatens 10 to 15 million Bangladeshis (more than most African countries). The Centre will develop community-based strategies for controlling malaria using the Chakaria field area to develop models that will be useful for all of Southeast Asia. The Centre's research in these areas will provide the knowledge that can impact the burden of vector-borne diseases.

Institutional Development

Institutional resources are critical to accomplishing the Centre's programmatic goals. Infrastructure will need to be upgraded, computer technology modernized, staff capacity built and financial management maintained.

The Information Sciences Division will continue to be the major channel through which the Centre disseminates research findings and technical information. New technology will be applied to upgrade communication capabilities and enhance database and electronic information resources. Training courses will incorporate distance learning and credit-for-degree capabilities and new training courses will be developed in areas in which the Centre has expertise. The Centre's library, currently the largest and the best source of medical and health materials in the country, will upgrade computer facilities and increase access to periodicals and external reports in electronic format.

Administrative Services will carry out the Centre's Master Plan that includes completion of the Dhaka Hospital from its current 3 floors to 8 floors. This expansion will accommodate the overcrowded hospital inpatient wards, short-stay wards, and outpatient facilities. It will also house a new and expanded library, new laboratories, additional office space, expanded training and computer facilities, and dining and activity facilities. Urban and rural field sites will also require maintenance and upgrades.

The Human Resources (HR) Department will assist the Centre in transitioning from a UN-based system to a merit-based system. The HR agenda aims to increase emphasis on internal training, cross training, development of career tracks, and staff development to allow professionals and skilled workers to reach their full potential. At the same time, the agenda encourages economy of human resources so that more productive work is accomplished with fewer staff. This can be accomplished by cross training, out-sourcing, increasing automation, and selecting highly qualified staff.

An important focus of the HR Department will be to mainstream gender in the Centre's staffing structure. Currently, women constitute 46% of the Centre's staff but 90% are in the lower staffing categories and only 10% are in the professional category. By 2010 the HR Department seeks to have at least 40% of the Centre's staff in the professional categories women.

During the coming years, the Centre will adopt a new computerized financial package, coordinated with HR, to manage all of its financial and HR functions. A critical feature of the unified MIS system is to have information on which to base sound management decisions. As a part of the Strategic Plan, each of the Centre's units will be reviewed to examine ways in which to cut costs to enable the Centre to become as cost-efficient as possible.

Resource Mobilization

Many of the objectives outlined in the Strategic Plan, both programmatic and institutional, have secured partial or complete funding. However, new funding will be necessary to achieve all objectives and to establish economic security for the Centre. The External Relations and Institutional Development (ERID) Office will work in close collaboration with the Centre's Director and Scientific Management to implement the Centre's Resource Mobilization plan that seeks to diversify and expand the Centre's current funding base. The Centre's budget will need to increase by about $1 to $2 million annually until it reaches $30 million in 2010.

Strategies

In achieving the expected accomplishments during the coming decade, the Centre will pursue a number of strategies, including optimum use of available funding and human resources, mobilization of additional resources, continued use of existing field and surveillance sites, and continued and expanded collaboration with national, regional and international institutions.

THE LESSONS LEARNED FROM BANGLADESH CAN BE APPLIED TO ICDDR,B'S RESEARCH INTO THE DISEASES AND HEALTH CHALLENGES FACING DEVELOPING COUNTRIES WORLDWIDE.

BACKGROUND

The Centre was originally established in 1960 as the Cholera Research Laboratory (CRL) under the Pakistan-SEATO agreement to study the epidemiology, treatment and prevention of cholera. CRL conducted research that now forms the core of global knowledge on diarrhoeal diseases, and led to the development of ORS which is used worldwide and is estimated to save 3 million lives annually. The pioneering work of the Centre in the development of ORS has been acclaimed internationally, and in May 2001 the Centre received the first Gates Award for Global Health recognizing this achievement.

In 1978, the Government of Bangladesh passed an Ordinance making CRL an international institution and renamed it the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). Under the Ordinance an international Board of Trustees was instituted and global health priorities, as well as national, were established to guide the Centre's programmes. Today the Centre remains the only international health research centre based in a developing country.

While international in focus, the health and health sector of Bangladesh are a Centre priority. The Centre provides medical services to over 120,000 patients annually in its Dhaka and Matlab hospitals and to thousands of others through its urban and rural field sites. About 97% of the scientific staff are Bangladeshi nationals and the Centre routinely secures full or partial scholarships for its scientific staff to complete graduate and doctoral degrees and post-doctorate work at some of the most prestigious institutions in the world. In addition, the Centre holds annual Bangladesh-specific trainings and workshops to build the capacity of local NGO and government staff and assist these agencies in addressing emerging health needs. The Centre regularly works in collaboration with Bangladeshi NGOs, universities, research institutions and the Government of Bangladesh.

Since its founding the Centre has progressed considerably in expanding its research agenda. Originally focused on cholera and diarrhoea, it now encompasses a full spectrum of issues related to child health, reproductive health, infectious diseases and vaccine sciences, nutrition, population sciences, health systems research, poverty and health, safe water, and HIV/AIDS. Additionally, it has expanded its research tools to include disciplines of anthropology, economics, medical geography, and other social sciences.

Photo: © ICDDR,B / Asem Ansari | 1980

The development of Oral Rehydration Solution (ORS) remains one of ICDDR,B's greatest achievements. ORS has been credited with saving over 40 million lives over the last 20 years.

CONTEXT

Global Setting

In 1998, the world's population was growing at 1.3 percent per year, an annual net addition of 78 million people. Ninety seven percent of this increase took place in the less developed countries. Every year, the population of Asia increases by 50 million, the population of Africa by 17 million, and that of Latin America and the Caribbean by nearly 8 million. In 2000 the world population was 6.1 billion people. It is projected to increase to 7.2 billion by 2015 and to 8.9 billion by 2050. This highlights the continued need to pursue strong family planning programmes and research in issues relating to cost-effective and sustainable population strategies.

Financing of these important activities is a major problem. Expenditure on family planning in developing regions was US$ 9.9 billion in 1996, of which about 8.0 billion was contributed by national governments and US$ 2.0 billion by donors. Funding requirements will rise about three-fold to US$ 21.7 billion by the year 2015, as the number of eligible couples increases[1].

Global demographic trends are exhibiting new challenges for both developed and developing countries. Some of the emerging issues for developing countries relate to rapid urbanization, environmental degradation, malnutrition and a notable increase of older people in the overall population structure. If not properly addressed, in combination with underdevelopment and limited resources, both human and financial, such problems can become almost insurmountable and tie countries down in vicious cycles of further poverty and violence.

Of the estimated 1.4 trillion Disability Adjusted Life Years (DALYs) lost in 1990, industrial countries accounted for just 7 percent. Of these 81 percent were attributable to non-communicable diseases. Developing countries, which accounted for 93 percent of the global disease burden, had a rather different disease profile. Except for countries in Europe and Central Asia which have demographic and epidemiological profiles similar to those in industrial nations, nearly half of the DALYs lost in developing countries were caused by communicable diseases, mainly among children.

Aging populations and the rising incidence of non-communicable diseases will continue to raise the cost of patient care.

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In industrial countries, a large portion of health spending is used for a small percentage of patients in the final years of their lives. Most of these patients are suffering from some form of non-communicable disease. Over the next three decades, developing countries will undergo a major demographic and epidemiological transition, with significant increases in the burden of injuries and non-communicable disease. Epidemics of non-communicable diseases such as cardiovascular diseases, neuro-psychiatric conditions, and chronic respiratory infections, as well as the growing burden of violence and injuries, are increasing in low-income countries[2]. These diseases are more expensive to treat and harder to prevent. This transition will re-orient demand for health services, including research and increase pressures for new investment in health care and health systems development.

Increased trade, new technologies, foreign investments, expanding media and Internet connections are expected to fuel economic growth and human advance. All this offers enormous potential to eradicate poverty and create an enabling environment for people to enjoy long, healthy and creative lives. However, experience over the last two decades indicates that the benefits and costs of globalisation are unevenly distributed, with developing countries facing special difficulties in meeting this challenge[3]. These countries are becoming even more marginalized. Inequality has been rising in many countries since the early 1980s. Globalisation was predicted to result in convergence; in fact, disparities have been widening between the developing and developed economies. For instance, by the late 1990s, one-fifth of the world's population had 86 percent of the world's GDP, while the bottom one-fifth had only 1 percent. In 1993, just 10 countries accounted for 84 percent of global research and development expenditures and controlled 95 percent of the US patents of the past two decades[4]. To overcome this problem, the Report of the Commission on Macroeconomics and Health (WHO, 2001) endorsed the establishment of a new Global Health Research Fund, with disbursements of about US$1.5 billion per year to support basic and applied biomedical and health sciences research on the health problems affecting the world's poor and on the health systems and policies needed to address them.

Since the 1978 Declaration of Alma Ata, which followed the promise of "Health for All by the Year 2000", there has been progressive physical and social deterioration of communities, countries and the environment, with increasing polarization of wealth distribution. This has resulted in a decline in the health of the world's poor, characterized by a high burden of disease, death and disability associated with a number of new and re-emerging conditions including HIV/AIDS, drug-resistant malaria and tuberculosis. For the majority of people, this has been accompanied by lack of access to decent affordable health care. The World Summit on Sustainable Development recommended the need to strengthen the capacity of health care systems to deliver basic health services to all in an efficient, accessible and affordable manner aimed at preventing,

Photo: © www.Poffet.net

The era of globalisation is expected to provide many opportunities for millions of people around the world.

controlling and treating diseases and to reduce environmental health threats.

The dismal state of the health of the poor takes place against a background of political uncertainty, social and economic upheavals and cultural change. At the same time, rapidly increasing globalisation, and the revolution in information and communications technology, has made this world a global village which means that what happens in one country potentially affects every other.

Nowhere is this clearer than in health where the rapid spread of communicable diseases has emphasized once again our interdependence – and vulnerability – in the face of these global threats. At the same time, major scientific developments and breakthroughs, and innovative technologies have accelerated drug and vaccine development. Evaluative frameworks are now available to appraise health reform efforts and the performance of national health systems[5]. These hold the promise of more effective prevention, management and treatment for an array of critical health problems. However, the inherent danger in the powerful forces of globalisation and the revolutionary applications now arising from new genetic understanding, is their potential to accentuate inequality. While their fruits are enjoyed by those nations and groups with the means of access, they are generally not available to the world's poor who, instead, progressively crowd the margins behind barriers that are ever more difficult to penetrate[6].

The resources devoted to health systems are unequally distributed and not in proportion to the distribution of health problems. Low- and middle-income countries account for only 18 percent of world income and 11 percent of global

health spending (US$250 billion or 4 percent of GDP in those countries). Yet 84 percent of the world's population live in these countries, and they bear 93 percent of the world's disease burden. These countries face many difficult challenges in meeting the health needs of their populations, mobilizing sufficient financing in an equitable and affordable manner, and securing value for scarce resources[7]. Overall, the world macroeconomic situation appears to be quite dismal. Poor countries are becoming poorer, debt burdens are soaring, and it is becoming increasingly difficult for them to retire or service debts. As a result, they are forced to cut their budgets and expenditure, and health and social services are the usual casualties in this exercise.

Added to the above are the issues of allocative inefficiency. Global spending on health research for both the public and private sectors amounts to about US$56 billion per year (1992 estimate).

However, less than 10 percent of this is devoted to 90 percent of the world's health problems – a misallocation often referred to as "the 10/90 gap." It has been estimated that pneumonia, diarrhoea, tuberculosis and malaria, which together account for more than 20 percent of the global disease burden, receive less than 1 percent of the total public and private funds devoted to health research. The human and economic costs of such misallocation of resources are enormous[8].

In 1994, global spending on all health activities totalled US$2,330 billion, or about 9 percent of global income. Of this, high-income countries accounted for 89 percent of the total health expenditure, while their populations accounted for just 16 percent of the global population. The extreme disparity between the amount of resources that low- and middle-income countries and high-income countries devote to health care reflects the widely varying capacities of these country groups to provide health services.

To close the resource gap, developing countries will have to make sizeable investments in health services and increase spending at rates faster than those of high-income countries. Thus, policymakers will continue to face the perpetual challenge of raising sufficient revenue for the health sector in an equitable and efficient way. Although most countries recognize that health care is a right of all citizens – as embodied in the WHO goal of "Health for All by the Year 2000" – there are no clear guidelines on how this objective translates into health service delivery, and whether such services are affordable[9].

Bangladesh Setting

134 million and the highest population density in the world. It is one of poorest countries in the world with a per capita income of around US$380. As a result of overcrowding, poverty, and poor access to health services, infectious diseases and malnutrition are common[10].

Population growth is also a major development challenge in Bangladesh and places a heavy burden on health care and social services. The current average fertility level in Bangladesh is over three children per woman of reproductive age, and it has remained at this plateau for the last several years.

Seventy-five percent of total DALYs in Bangladesh are accounted for by seven conditions: respiratory diseases, perinatal conditions, diarrhoeal diseases, accidents, malnutrition, cardiovascular diseases, and child birth related complications. Although infant and under-five mortality rates have declined considerably, they are still high. The maternal mortality rate in Bangladesh is one of the highest in the world.

Malnutrition is a major cause of Years Lived with Disability in Bangladesh. Half of all babies born are of low birth weight and more than half the children are malnourished. About half the deaths among children under the age of 5 occur in the first month.

There are marked health inequalities in Bangladesh. The probability of infants dying in poor households is 1.7 times higher than in wealthier households. Twice as many children in poor households suffer from stunted growth than in wealthier households. Severe under-weight is five times as pronounced among poor children than among wealthy children. Communicable as well as non-communicable diseases are more prevalent in poor households.

With demographic transitions taking place the disease patterns of the past century are changing. In the future death caused by communicable, perinatal and pregnancy-related complications will decline in Bangladesh from about half to less than one-third of all deaths. By contrast, non-communicable diseases will account for over half of all deaths. This transition will be reflected in other developing countries as well. Thus, Bangladesh provides the Centre a unique opportunity for research into the diseases and health challenges that affect developing nations now and in the future.

Footnotes: [1]Bulato RA, Reproductive health commodity requirements and costs in developing regions, 1999-2005, New York, United Nations Population Fund (UNFPA), 1999. [2] The 10/90 report on health research 2001-2002, Geneva, Global Forum for Health Research, 2002. [3] Report of the World Summit on Sustainable Development 2002, New York, United Nations, 2002. [4] Overview: Globalisation with a human face: Human development report 1999, New York, Oxford, 1999. [5] The world health report 2000—Health systems: Improving performance, Geneva, WHO, 2000. [6] International Conference on Health Research for Development—Conference report, Bangkok, October 2000. [7] The world health report 2000—Health systems: Improving performance, Geneva, WHO, 2000. [8] The 10/90 report on health research 2001-2002, Geneva, Global Forum for Health Research, 2002. [9] Innovations in health care financing, World Bank Discussion Paper no. 365, 1997. [10] For more detailed discussion on the Bangladesh setting, see World Bank, Health futures in Bangladesh: Some key issues and options, Dhaka, 2001.

Bangladesh is the eighth most populous country in the world

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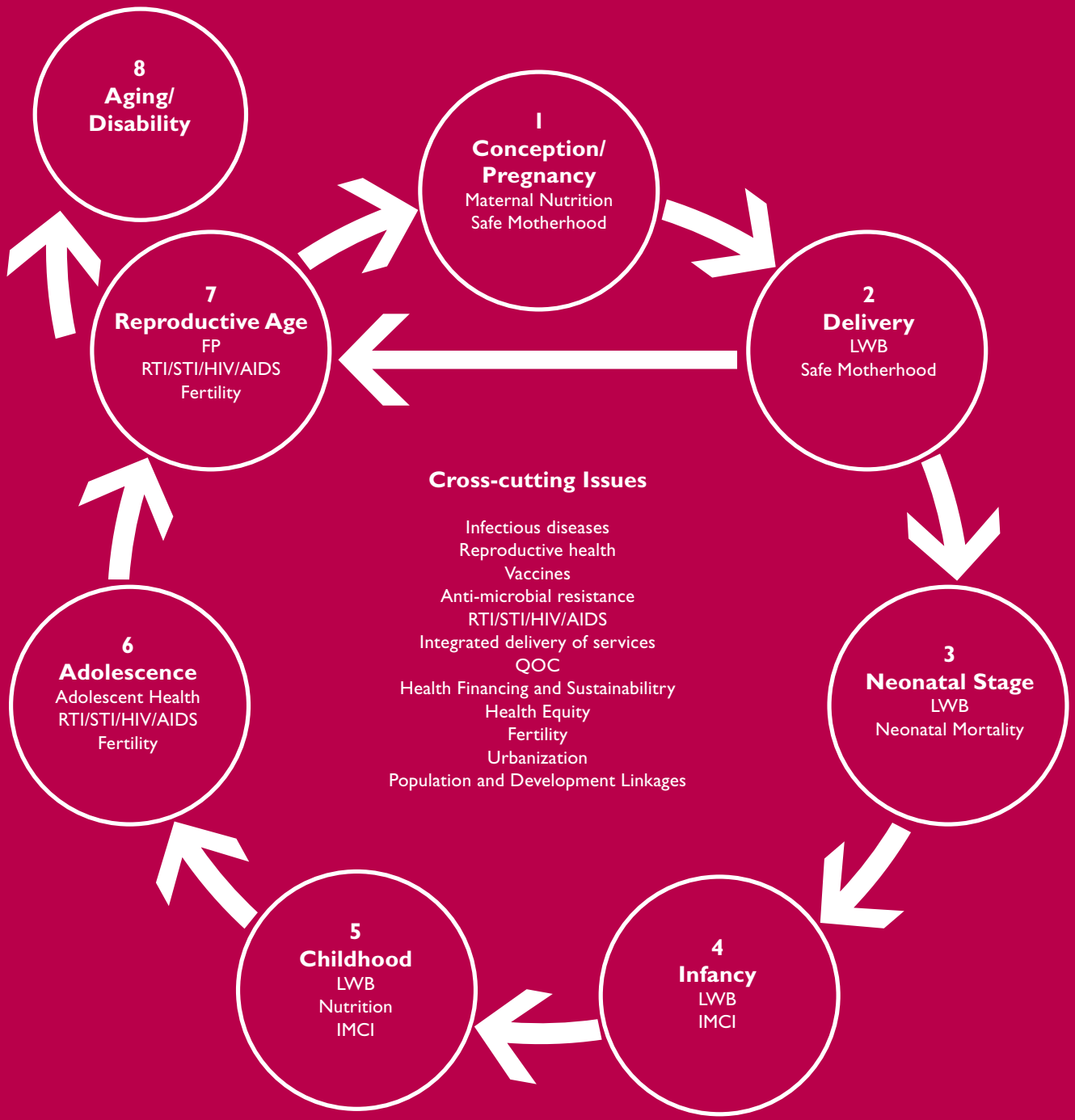
LIFE CYCLE APPROACH TO PRIORITIZATION OF ICDDR,B RESEARCH



PROGRAMMATIC DIRECTIONS

Priority Setting

Priority setting at the Centre represents a complex interaction of numerous factors, but begins with the Centre's mission, the regional burden of disease, and the local burden of disease as measured in our field areas, as well as the Centre's relative strengths.

The Centre also incorporates many of the UN Millennium Development Goals when setting its priorities for research: (1) eradicate extreme poverty and hunger; (3) promote gender equality and empower women; (4) reduce child mortality; (5) improve maternal health; (6) combat HIV/AIDS, malaria and other major diseases; (7) ensure environmental sustainability; and (8) develop a global partnership for development.

The Centre primarily attempts to carry out applied and downstream research but it does not shy away from using state-of-the-art tools to provide a better understanding of the issues it studies. For example, studies on cholera range from molecular studies of the bacterial genes, to clinical studies on new treatments, epidemiologic and vaccine studies, and economic analyses, and eventually to public health application. The conceptual framework shows the direction of resources from basic research to efficacy and effectiveness studies and eventually to translation of research results into policy and action, with the Centre, national institutions and the government involved in implementing the research agenda at different stages.

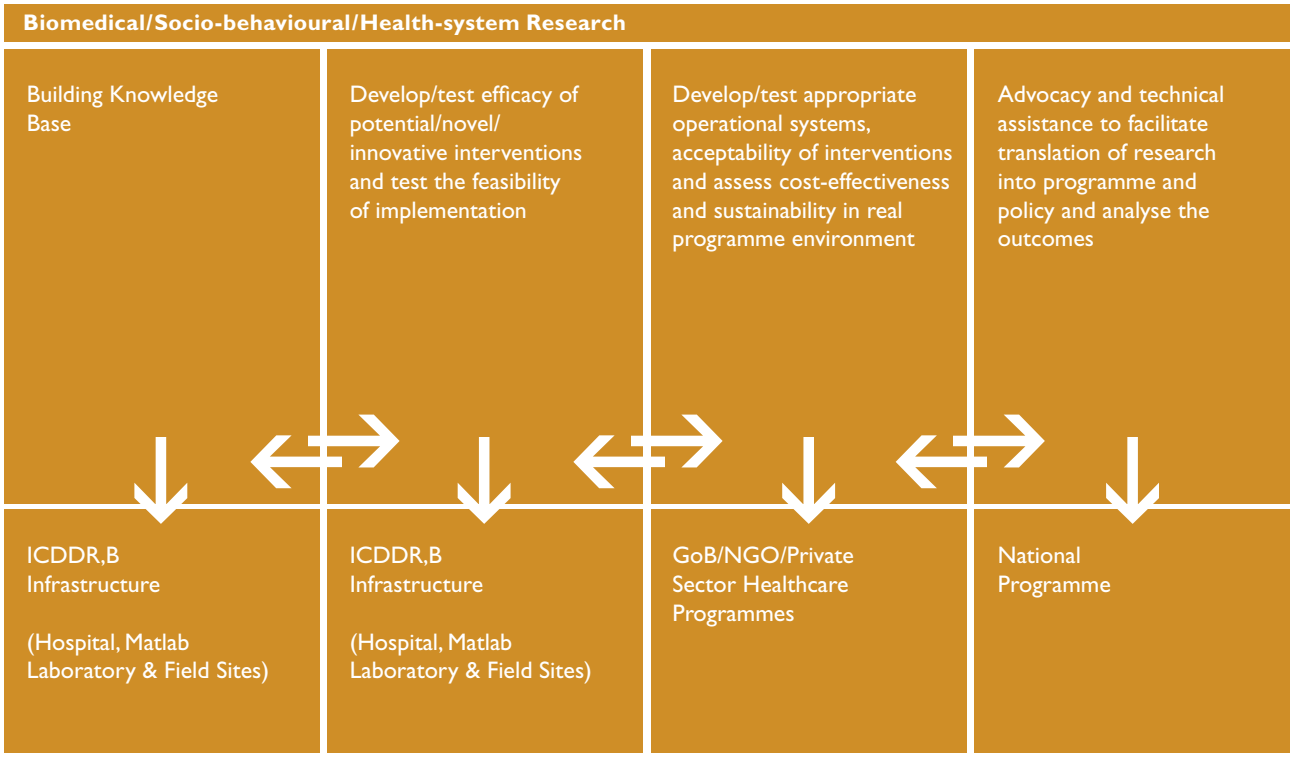
Life Cycle Approach

In general, the "life cycle" approach conceptualises the health and development priorities of individuals and families and suggests intervention points where efforts can have maximum impact. For example, the Centre places great emphasis on the time immediately prior to pregnancy, the pregnancy itself, the delivery of the newborn infant and infancy, thus providing a systemic view of the priorities.

While using the life cycle model and emphasizing certain critical stages, this does not exclude other periods of life (later childhood, adolescence, later adult years), but it suggests that most efforts should target particularly vulnerable stages. Interventions for these stages of increased risk will have the greatest payoff in terms of cost-effective and long-term improvements in health and development. The "life cycle" approach also suggests that the rewards of intervening at these crucial periods are likely to have major benefits for future generations.

Conceptual Framework

In conducting this priority research, the Centre will follow the conceptual framework, as shown.



Programme Priorities

The priorities that follow are grouped according to the major programme areas, but many are cross-cutting. Thus, they are not owned by any division or programme but are the collective priorities of the Centre.

Programmes will assist scientists in the planning, execution, and analysis of the research in order to adapt findings into programmes if evidence supports meaningful public health benefit. Translation of research findings into policy and programmes is an important aspect of the research conducted in the Centre.

In conducting the research, the Centre's scientists are guided by issues of equity and gender. Understanding the relationships amongst poverty, gender and health are fundamental to gains in health as well as economic development. New interventions need to narrow the gap between rich and poor and they need to be developed so that they will especially benefit the poor.

Child Health

Problems identified.
Child mortality rates have decreased in recent years, however rates are still very high. Among child deaths, those that occur during the first month represent an increasing proportion as child health interventions have been more effective for older infants and children above one year of age. Currently more than 70% of all infant deaths are occurring in the first 28 days of life. Thus, if we are to improve overall infant mortality, we will have to learn how to reduce the deaths in this age group. Early deaths are often associated with unsafe delivery practices and specific care practices need to be introduced and adopted. Among interventions introduced, the one with most impact has been immunization of mothers with tetanus vaccine to prevent neonatal tetanus, but additional research is needed to save newborn lives.

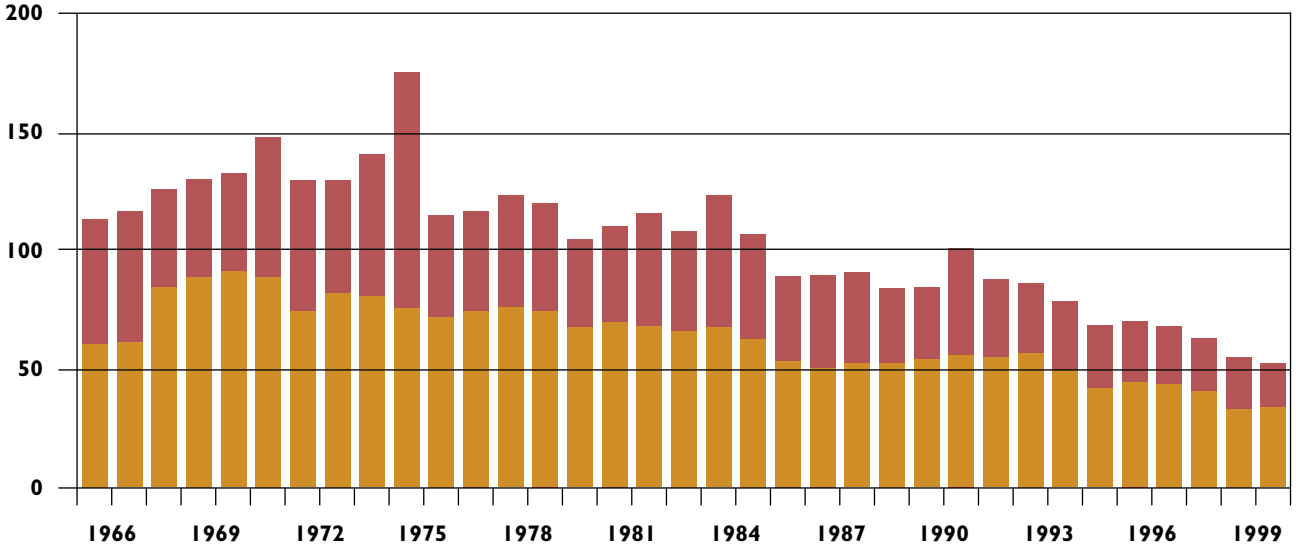
Acute infectious diseases continue to cause many infant and child deaths, and many of these can be easily treated or prevented. Diarrhoea, pneumonia and malnutrition are major causes of morbidity and mortality.

Health services for infants and children in developing countries remain constrained by limited availability and access, poor quality and utilization. The Integrated Management of Childhood Illness (IMCI) strategy has been designed to provide good quality health care services for children through primary health systems for the most common and important illnesses. IMCI also focuses on improving health systems and community and family practices, though there are still some questions about the design, content, delivery and effectiveness of IMCI.

New problems are being recognized as increasingly important, such as drowning which is now a leading cause of death among 1-4 year old children in Bangladesh. Child development is another emerging area as the focus shifts from mere child survival to the development of these children to their full potential through appropriate caring practices.

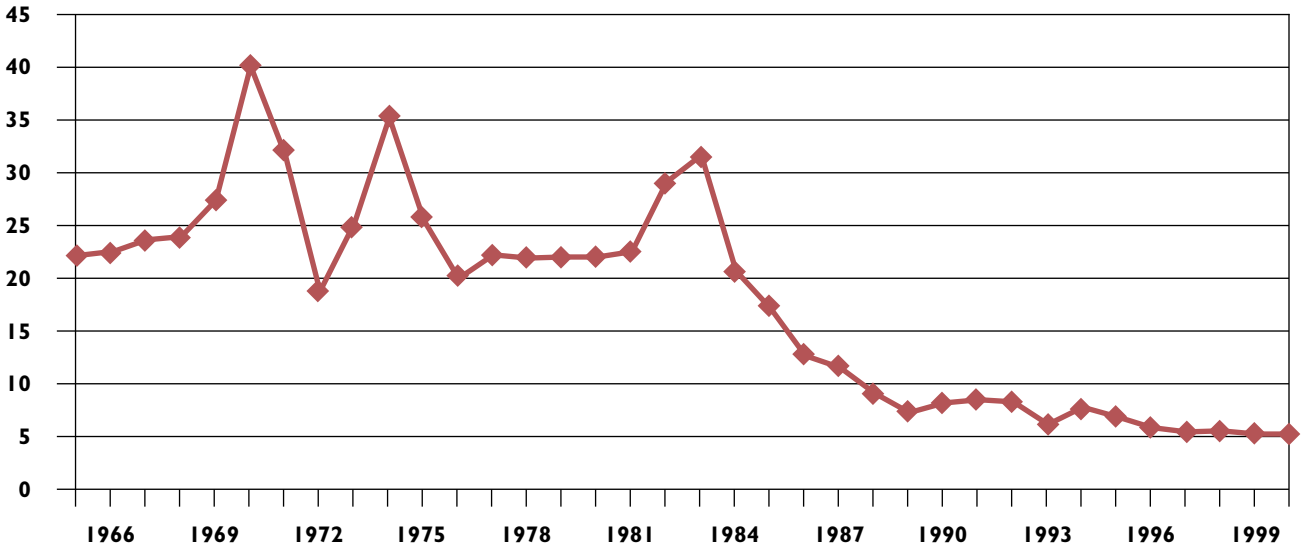
Opportunities.
Neonatal deaths are largely due to infections, asphyxia, birth trauma, and improper care of the newborn. The Centre believes that with community based strategies many neonatal deaths can be prevented if proper care is given in a timely manner. With training, community workers can recognize and manage neonatal infections and begin early treatment. Mothers and caretakers can be trained to improve routine newborn care, such as feeding the baby and keeping it warm.

Neonatal and postneonatal deaths (rate per 1000)



The reduction in neonatal and postneonatal deaths in Matlab started in 1966, and demonstrates the higher relative importance of neonatal deaths in recent years. *Neonatal deaths* *Postneonatal deaths*

Childhood Mortality (rate per 1000)



The peak times of mortality occurred during the war (1971), the famine (1974) and the Shigella epidemic (1984). Since the Child Health Programme started in Matlab in 1983, childhood mortality has dropped dramatically.

Linkages with safe-motherhood interventions can prevent asphyxia and birth trauma. The Centre is now embarking on major projects to find solutions to high neonatal mortality that are cost-effective and reproducible. With the interventions that the Centre is now piloting, we expect a decrease in neonatal mortality of 50% in our study sites.

Furthermore, treatment of children with common acute life-threatening illnesses can be improved. The prototype of this category of illness is acute diarrhoea, but other acute illnesses should be included: pneumonia, dengue, malaria, typhoid and severe malnutrition. We have shown that a treatment costing US$10 can save the life of a patient with diarrhoea who would otherwise have died. We will examine how to treat these other life threatening illnesses in a similar cost effective way, by determining the needs for facilities, treatments and training necessary to accomplish this.

The Centre's scientists have improved the standard case management for diarrhoeal diseases with rice-based ORS and low osmolar ORS. The work of the Centre now is to further improve ORS and case management of common enteric illnesses with some of the newer drugs and nutrients that are being developed at the Centre. It is expected that these solutions will further hasten the recovery of children with diarrhoea and improve their nutritional rehabilitation.

The Centre's scientists have been instrumental in introducing IMCI (Integrated Management of Childhood Illness) in Bangladesh evaluating its effectiveness in real conditions in a rural area. The work of the Centre will now be to continue the evaluation and improve its cost effectiveness in the community and first level health facilities.

There is increasing interest and experience with improving child development through child caring, stimulation and nutritional interventions.

Many neonatal deaths can be prevented if proper care is given in a timely manner.

Relative strengths.
The Centre has many resources to address issues of child health. There is an experienced pool of professionals with varied and complementary skills. It has field areas where strategies can be tested and their success documented. Through government and NGO partners, specific interventions for improving newborn care and recognizing and treating neonatal infections can be developed. Working with collaborating partners, the Centre can develop and evaluate strategies for improving child caring and stimulation interventions. The Matlab field area with its community-based programmes and demographic surveillance system holds a unique position for testing strategies for increasing birth weight and for assessing nutritional interventions on the subsequent health of the children. Its relations with the Ministry of Health and Family Welfare and local health programmes allow for testing the efficacy of IMCI strategies in a manner that is not possible in any other site in the world. This will allow for further refinement and adaptation of the IMCI strategy for Bangladesh.

The Centre's hospital and laboratory facility provides an ideal setting for conducting clinical trials of new agents, drugs and ORS solutions.

Priorities.

Based on continuing challenges, opportunities, and relative strengths, the Centre has identified the following priorities for improving child health.

1. Sustain surveillance for indicators of child survival and ill health, simplify these indicators so that others can assess the health status of children, and help guide policy with appropriate information.
2. Test strategies to reduce neonatal mortality through community-based strategies to improve routine and sick newborn care.
3. Conduct research to improve management of children with common acute life-threatening illnesses, strengthen and evaluate integrated management strategies, and develop the health systems for delivering and scaling up these strategies. Foremost on the agenda is the scaling up of zinc therapy in diarrhoea.
4. Continue to improve clinical treatments for common childhood illnesses by testing improved ORS solutions, anti-secretory drugs, antibiotics and new treatments for pneumonia.
5. Strengthen child health and development interventions through research on effective child caring, stimulation and health-seeking practices in the homes.

Strategies.
Funding is currently available from several agencies to support most activities under the priority areas. This will have to be sustained and complemented as new research questions emerge. Umbrella funding will be essential for priority 4 and additional funding is required to cover all aspects of priorities 3 and 5. Potential donor agencies will be identified. Several research protocols are currently underway or will start soon. It is anticipated that results of these initial studies will generate additional research and operational questions that will require new research protocols. In addition, protocols will need to be developed to address aspects of priorities 4-5, and priority 6. To track and analyse trends in indicators, the programme will collaborate with health indicator surveys and surveillances within and outside the Centre.

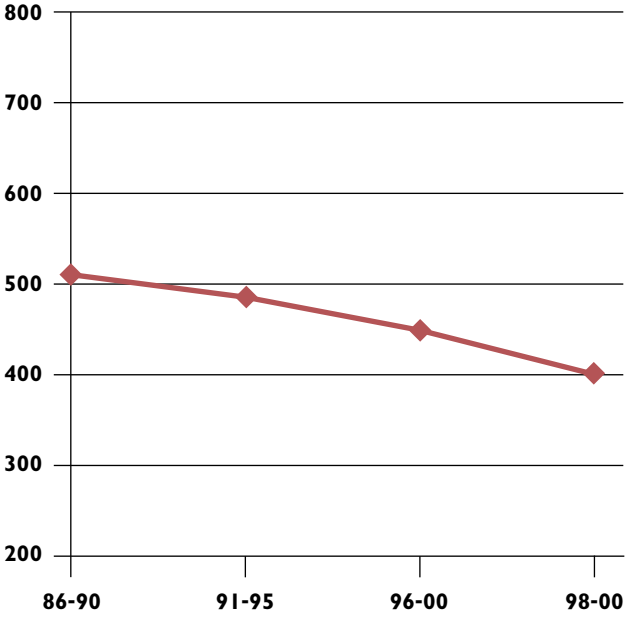
The Matlab field site will continue to be a significant data collection area and the newer sites in Sylhet and Mirzapur will continue to be maintained. Activities may expand to other sites depending on need and partner activities. Achievement of priorities will require an expansion in skilled professional staff, especially in the fields of health systems and community-based interventions, behavioural sciences, neonatologists and obstetricians, nutritionists, epidemiologists and child development experts. This will have to include the training of existing staff, but more importantly, new recruitment. Some additional office space will be sought.

Continued and expanded collaboration with national and international agencies and institutions will not only strengthen the capacity of the Centre to undertake these activities, but are prerequisites for success.

Reproductive Health

Problems identified.
Although the Centre has been involved in increasing the rates of contraceptive methods for many years, it recognizes that reproductive health encompasses a wide variety of issues that are important to families. High maternal mortality rates continue in Bangladesh and over 90% of deliveries take place at home without skilled attendance.

Maternal Mortality Ratio per 100,000 live births[11]



There has been a slow decrease in maternal mortality rates in Bangladesh. These high rates continue to be a major public health risk.

High maternal mortality rates continue in Bangladesh and over 90% of deliveries take place at home without a skilled attendant.

Because of unwanted pregnancies, induced abortions will continue. Complications from abortion are common and there is a need to improve management of post-abortion complications like infection, perforation and bleeding. On the other hand, high quality family planning programmes reduce rates of abortion in Bangladesh, and this is likely to occur globally.

Sexually transmitted infections (STIs) are becoming increasingly recognized. While STIs are especially common among commercial sex workers, they are also occurring in families not normally considered high risk. While about 35% of sex workers were positive for syphilis, about 4% of pregnant women attending a prenatal clinic in Dhaka were similarly positive. Antibiotic resistance is also increasing. The proportion of *N. gonorrhoeae* isolates resistant to ciprofloxacin (the most commonly recommended antibiotic) has risen from 7% to 87% in the last 5 years; this rate of resistance is among the highest in the world.

HIV/AIDS is a major threat in Bangladesh because of the high-risk behaviour in many groups. Many of the individuals that share needles and purchase sex commercially also have spouses suggesting that the virus may rapidly spread from the high risk to the general population. These networks have already led to the development of high rates of syphilis and hepatitis C, which is a likely indication for an explosive HIV epidemic in the near future.

The public health community has identified the involvement of men as being critical to the overall success of reproductive health. There is a need to increase the scope of male involvement and identify ways to make it meaningful on a wide scale.

The Centre's scientists have found that adolescents have insufficient knowledge regarding reproductive health and practice risky sexual behaviours.

Opportunities.
Although deliveries generally take place at home, women are willing to use delivery facilities, especially for emergencies. The Centre's scientists have contributed to the identification and documentation of the problems leading to high maternal mortality. Our projects have demonstrated how to improve basic obstetric facilities and to make them acceptable and effective at low cost. These include prenatal clinics, subcentres, safe delivery with trained midwives, and follow-up of women after delivery. The improvements prepare families for possible obstetric emergencies, including post abortion complications.

The Centre will conduct research to improve the way women are treated during pregnancy, during delivery, and following their delivery. The Centre will also need to learn how reproductive health services can best be delivered to people in rural and urban areas translating its model into a workable system for routine care of women.

Most families are now using contraceptives, but they need assistance in using them appropriately. There is opportunity for improving the method mix to more closely adapt to the changing needs of families (e.g. longer acting methods for those who have completed their families).

STI prevention will require behaviour changes and increased use of condoms, but the treatment of current infections will also be required. Antenatal clinics will need to screen women for STIs in order to prevent complications (pelvic infections and transmission of infection to the newborn). Drug-resistant STIs are increasing rapidly and present a real danger.

Bangladesh has an opportunity to avoid the HIV/AIDS epidemic if the issue can be addressed rapidly. The nation already has a good surveillance system in place, and through coordinated interventions, the HIV epidemic might be avoided, but the window of opportunity is rapidly closing.

Adolescents are eager to learn about reproductive health and the new awareness of the need to educate the younger generation provides a new opportunity to improve the lives of the next generation.

Relative strengths.
The Centre has considerable expertise in developing successful family planning programmes. More recently the Centre developed a model reproductive health programme in Matlab that can be used to test strategies to improve services and reduce maternal mortality. Being in Matlab it can then be used for training and extension of the lessons learned to other areas of the country and elsewhere in the developing world. The Centre has also acquired considerable expertise in adolescent health especially in relation to communication and reproductive health education.

The Centre's microbiology laboratories are excellent resources for documenting the burden of STIs. Furthermore, the Centre is able to collaborate with many of the NGOs working with commercial sex workers to help them improve their programmes.

Priorities.

Based on continuing challenges, opportunities, and relative strengths, the Centre has identified the following actions for improving reproductive health:

1. Help reduce maternal morbidity and mortality by improving emergency and essential obstetric care and safe motherhood.
2. Develop and test strategies for improving knowledge and practices regarding reproductive health in adolescents.
3. Improve surveillance for and prevention and management of, sexually transmitted and reproductive tract infections and HIV/AIDS.
4. Minimizing the need for and improving post-abortion care.
5. Understanding the issue of violence against women in the social context and developing public health strategies to reduce this.
6. Operationalizing "male-involvement" in reproductive health and monitoring this involvement.

Strategies.
Current funding for priority areas 1 to 3 and 5 and 6 is provided through the Asian Development Bank, DFID, European Union (EU), Governments of Bangladesh and Japan, USAID, UNICEF, UNDP, and WHO. Three new protocols are currently being developed in priority area 1 and one protocol in priority area 3, and discussions with donors are ongoing.

Matlab will continue to be a significant study site, however other sites such as Chakaria, Mirsarai, and Abhoynagar will also be utilized. Additional expansion to other field sites is dependent on new funding. The Centre is in the process of hiring new staff under the RH Programme to implement new protocols and/or develop additional protocols. In addition, training of new staff is ongoing to increase the programme's capacity to address the priority areas.

Maternity clinics and male clinics are now in place in Matlab for providing services and for studying the process and impact of interventions. A maternity unit for comprehensive emergency obstetric care services has been established as a government facility for referral. Current equipment is available for making accurate assessments of foetal development for the study of maternal nutrition and birth weight. Additional office space is being sought.

The Centre is collaborating with the Government of Bangladesh on a number of projects in addition to ongoing and planned collaborations with NGOs. Current activities with NGOs include assessment of their effectiveness and impact.

Nutrition

Problems identified.
Malnutrition is central to many of the health issues in Bangladesh, as it is in many developing countries, with attendant poor growth, susceptibility to infections, slow cognitive development and low birth weight. Protein energy malnutrition (PEM) is the most obvious, but other specific deficiencies are also common, including vitamin A, iron, zinc and iodine deficiency. Because so many children are small, PEM may not be recognized as abnormal. Similarly, health care providers do not always recognize children as malnourished when they come for treatment of common illnesses.

In Bangladesh 45% of newborn infants weigh less than 2500 grams. This proportion is the highest in the world. The high incidence of low birth weight is viewed as a major obstacle to improving child health and development. Large-scale nutrition programmes attempt to improve the nutrition of pregnant mothers with the goal of increasing birth weight, but the efficacy of such programmes and the optimal nutritional supplements are not well defined, nor are the roles of other environmental and individual level factors such as infections, stress, workload, etc.

Though breastfeeding is universal in Bangladesh, most mothers still do not exclusively breast feed for five/six months, and often they begin supplemental feeding at an early age, making their infants more susceptible to infections and malnutrition. Effective peer-counselling strategies, which were developed and evaluated by the Centre in small-scale study settings, need to be scaled up.

An equally important problem relates to inadequate and inappropriate complementary feeding from six months of age. Our knowledge about actual feeding practices in older infants and children is limited and much less is known about effective interventions.

As our knowledge about micronutrients has increased, so has the complexity of the issues relating to micronutrients. Micronutrients interact in surprising ways and the benefits of supplementation depend on a variety of factors, including nutritional status and other micronutrients.

Opportunities.
Malnutrition is a condition that can be treated, but it requires a comprehensive approach. The Centre's scientists have demonstrated the effectiveness of a protocolized management of severe malnutrition, and have lowered the fatality rate from this life-threatening condition by 75% at the Dhaka Hospital. The Centre will now work to demonstrate how this simple standard treatment may be extended to all children who need it in Bangladesh and the region.

Although vitamin A is distributed routinely in Bangladesh, there are opportunities for improving the vitamin A intake of children through identifying foods rich in vitamin A as well as food fortification. Centre scientists have documented the effectiveness of zinc therapy when used during the management of diarrhoea episodes in children. Zinc therapy reduces the duration of diarrhoea, lessens the chance it will become chronic, and lowers the overall number of deaths in children by 50%. The work of the Centre will now focus on validating the effectiveness of zinc in other conditions and scaling up the administration of zinc during diarrhoea.

The Centre's scientists have already learned how to improve rates of correct breastfeeding in the community and will learn how these can be scaled up so that all children can benefit from this healthy start.

The Centre's scientists have initiated major interventions to increase birth weight. While the initial project will require four years to complete, the long-term studies will continue to have rewards for at least 20 years as we learn the long-term consequences of our interventions.

Relative strengths.
The Centre's clinical (including a metabolic balance ward) and field resources are ideal for identifying and treating children with malnutrition, and for developing new strategies which will address the needs of families with malnourished children. It also has an excellent nutritional biochemistry laboratory for conducting nutrition research. Based on the successful experience with managing severe PEM, the Centre has opportunities for training and extension of the successful methods. The Centre also has strong collaboration with nutrition centres around the world.

Priorities.

Based on continuing challenges, opportunities, and relative strengths, the Centre has identified the following actions for improving nutrition:

1. Conduct studies to evaluate the effect of improving maternal nutrition as well as non-nutritional interventions on foetal growth and birth weight.
2. Prevention and management of severe and moderate malnutrition, including incorporation of nutrition screening and appropriate treatment in the Essential Services Packages.
3. Improving child feeding including increasing rates of exclusive breastfeeding and appropriate and adequate complementary feeding.
4. Improving micronutrient nutrition through zinc supplements with diarrhoea episodes, food fortification and other strategies.
5. Understanding the interaction between infectious diseases and nutrition and learning how to break the malnutrition – infectious disease cycle.

Strategies.
Current funding for priority areas is provided by UNICEF, ADB and P&G, Allen Foundation, Fogarty International, NIH, SCF (USA), SIDA, Thrasher Research Fund, USAID, World Bank/BINP, WHO and Gates Foundation. Continued efforts are being made to identify funds for new projects including research in micronutrients, child development, malnutrition, child feeding practices, infection and immunity and maternal nutrition and low-birth weight.

Field sites will include Dhaka-based clinics and peri-urban sites and Matlab for intervention and data collection purposes. Capacity building and hiring of new staff will be continued to meet programme needs. New office space for the Nutrition Programme has been allocated and laboratory support has been improved in the biochemistry and nutrition lab with new equipment.

The Nutrition Programme collaborates with leading international institutions for technology support and transfer. National institutions also form a large part of nutrition collaboration, they include BNNC, BRAC, CHE, DMCH, DSH, INFS, IPHN, ICMH, MOHFW, NIPORT, and PSKP among others.

Infectious Diseases and Vaccine Sciences

Problems identified.
Infectious diseases continue to be the major cause of morbidity and mortality worldwide. There is further need for enhanced prevention, diagnosis and management of a wide array of diseases with infectious aetiologies. These include pneumonia, diarrhoeal diseases, tuberculosis, measles, and vector-borne diseases, like dengue, malaria, visceral leishmaniasis (kala azar) and filariasis.

Drug-resistant infectious diseases will continue to strain resources and threaten existing methods for effective therapy. Of added concern are serious diseases for which effective prevention strategies already exist but remain a problem for much of Bangladesh, such as measles (for which existing affordable vaccines are under-utilised) and *Haemophilus influenzae* type B (Hib), hepatitis B, typhoid, and pneumococcal diseases (for which safe and effective vaccines exist, but cost is a barrier to their introduction, acceptance, and use).

In 1992, the Centre's scientists identified a new strain of cholera, *V. cholerae O139* (Bengal), and traced its evolution. This is the first time that scientists have been able to watch a new pathogen emerge and evolve prospectively. We expect that this strain will be the next (8th) pandemic strain. The Centre

A remaining problem for much of Bangladesh are serious diseases for which effective strategies already exist.

is in a position to prepare the world for how to deal with this new pandemic strain, and potentially develop a vaccine that would decrease the number of deaths caused by past cholera pandemics.

Opportunities.
Childhood and adult mortality can be reduced dramatically through improved management of infectious diseases and prevention via introduction of vaccines and behaviour modification.

New technologies are providing opportunities for rapid, practical diagnostic tests which will improve management; vaccines which can provide prevention opportunities; options for treatment including an enhanced "super ORS"; and novel antimicrobial therapies.

The Centre's scientists have already shown how vaccines given during childhood and pregnancy save lives and reduce illness. The work of the Centre will now be to assist in the development and evaluation of a package of new vaccines for diarrhoea and pneumonia.

The Centre's scientists have been conducting surveillance for other emerging infections and in cooperation with the Government of Bangladesh and the World Health Organization, are prepared to respond to these new threats. These include, but are not limited to, influenza, leishmaniasis, and Nipah virus.

The Centre's scientists have initiated studies on tuberculosis to understand its antibiotic resistance and epidemiology in a defined rural area. The Centre continues its work on tuberculosis by conducting research on the spread in urban areas, improving the effectiveness of DOTS therapy, early detection, and improving diagnosis and treatment of children. This will also build the capacity for conducting field trials of new therapies and improved vaccines.

The Centre's scientists have conducted research on dengue fever and documented the serotypes and the epidemiology of the infection in the country. More advanced research is planned to improve case management, reduce incidence through innovative mosquito reduction strategies and evaluation of new vaccines. We have also begun to document the burden of disease of multi-resistant *P. falciparum* malaria in Bangladesh. This infection threatens 10 to 15 million Bangladeshis (more than most African countries). The Centre will develop community-based strategies for controlling malaria and using the Chakaria field area to develop models that will be useful for all of Southeast Asia. Within the malaria research arena, it seems that Asian malaria has been relatively neglected, and our field area is ideal for evaluating community-based interventions.

The control of infectious diseases requires an understanding of basic mechanisms and the Centre's scientists have undertaken studies of how certain bacteria survive in the environment, how they spread to people, what genetic properties they possess that allows them to be pathogenic, and the immune responses that protect people. The Centre will continue to conduct this type of basic research that is vital to a complete understanding of host-infection interaction and eventual control of diseases. This is especially true for cholera, amoebiasis, and other enteric infections.

Relative strengths.
Bangladesh is unfortunately home to many of the infectious diseases and these occur at high rates in the Centre's field sites. However, this means that the Centre has a unique epidemiological strength to conduct studies on disease incidence and burden as well as to study prospective interventions to control disease. It also has excellent laboratory facilities and laboratory scientists who can carry out the basic and applied studies to describe the epidemiological, clinical and pathophysiological characteristics of the disease pathogens. The Centre's several field areas, epidemiologic expertise, and state-of-the-art laboratories, gives it a distinct advantage for conducting all phases of vaccine evaluations for enteric and respiratory infections, as well as new vaccines for tuberculosis and dengue.

Priorities.

Based on continuing challenges, opportunities, and relative strengths, the Centre has identified the following actions for infectious diseases and vaccine sciences:

1. Define the epidemiology and burden of selected infectious diseases and identify effective strategies for prevention and control. These include tuberculosis, diarrhoea, ALRI (pneumonia), typhoid fever, dengue, malaria, kala azar, and drug-resistant infections.
2. Develop and/or evaluate rapid or simple diagnostic tests to improve case detection and surveillance.
3. Define the need for selected vaccines, e.g. hepatitis B, and evaluate promising new vaccines for enteric (rotavirus, cholera, ETEC, typhoid) and respiratory infections (H. influenzae, S. pneumoneae, viral influenza, RSV), dengue, and tuberculosis. Conduct trials of relevant new vaccines including phase 1, 2 and 3 trials.
4. Enhance the capacity to investigate, study, and manage outbreaks of communicable diseases in the region.
5. Assist with technology transfer to allow other countries to manage the emerging infectious diseases, especially related to cholera and rotavirus (world-wide), and HIV/AIDS in the region.
6. Exploit the huge databases that have been generated on genomes of bacterial, viral and parasitic pathogens to understand and dissect differences in pathogenic microorganisms isolated in this part of the world.

Strategies.
Current funding for protocols is provided by the Centers for Disease Control and Prevention (CDC), WHO, DFID, International Vaccine Institute, National Institutes of Health and USAID. Additional funding is being sought from CDC, Program for Appropriate Health Technologies (PATH) and Wyeth Corporation. New protocols will be developed for vaccine trials in dengue, TB, and diarrhoeal diseases. In addition,

future protocols will be developed to build on knowledge gained from current protocols.

Programme activities will be conducted at Kamalapur (urban), and Mirpur (peri-urban) field sites with future studies conducted at Abhoynagar and Mirzapur (peri-urban), and Matlab (rural). At least two additional epidemiologists and one dedicated medical anthropologist will be required. In addition, research investigators will need to build on their current epidemiological skills with some formal training. Virology lab capacity has been strengthened with recent training in viral isolation, neutralising antibody detection, and new enzyme-linked immunosorbent assay (ELISA) equipment, for both vector-borne and respiratory viruses. Extra laboratory personnel are being recruited for bacterial isolation and typing, and other more sophisticated assays. Furthermore, additional office space is being sought for epidemiology, medical anthropology, and research investigator staff.

International collaboration to achieve priorities 1, 3 and 4 will include the Armed Forces Research Institute of Medical Sciences, CDC, Johns Hopkins University, Massachusetts General Hospital, and Queensland University of Technology. National collaboration includes Chittagong Medical College Hospital, Dhaka City Corporation, Dhaka Medical College, Dhaka Shishu Hospital, and Holy Family Red Crescent Hospital. National collaborations will continue with increased ties to the Health Ministry of the Government of Bangladesh.

Health and Family Planning Systems

Problems identified.
Health services are urgently needed yet the resources available are extremely limited. Funds for health services through the government of Bangladesh are about US$4 per capita per year, so the majority of health services are obtained from non-government and private sources. Services provided are often of low quality and are especially inaccessible for the poorest groups of society even though they are intended to reach the poor.

Past programmes were "doorstep" deliverable, however, while these were considered to be effective they were also considered to be too expensive to continue. Instead, community clinics were initiated in an attempt to provide services in a more cost-effective manner. The experience with community clinics has been mixed and the withdrawal of doorstep services without effective alternatives has had some negative impact on programme performance, such as with family planning and immunization. This has prompted some re-thinking of the overall strategy. NGOs and the private sector contribution to health care is increasingly being debated and these discussions will benefit from evidence from operational and health systems research.

Most families wish to limit the number of children or to space their pregnancies using contraceptives, but many families still experience difficulty in using them. The use of long acting, low cost clinical methods of contraception are declining, and temporary methods have high discontinuation rates. The effect of this is seen in a high proportion of families who discontinue their family planning method sometimes because of perceived side effects. Unintended pregnancies are still common. Family planning programmes now approach this issue as a way to assist families achieve their desired family size rather than as a method for "population control"; however, the issue of providing appropriate family planning services is obviously of crucial importance to national strategies to achieving replacement fertility in the near future. Better systems are needed to increase longer acting family planning methods and to improve continuation of temporary methods.

Decisions regarding the allocation of limited resources should, whenever possible, be based upon scientifically supported evidence. Evidence applicable to such decision-making is very limited and what does exist is not effectively disseminated to the decision makers. These represent the major challenges of the programme: to produce relevant knowledge and to appropriately communicate the findings.

Opportunities.
The Centre works closely with the Ministry of Health and Family Welfare and is in a position to influence decisions that will shape the health sector programme (to be named the HNPSP – Health, Nutrition, Population Sector Programme). Within the NGO sector, the formerly separate rural and urban service delivery programmes have been united under a single National Service Delivery Programme (NSDP). There are tremendous opportunities to work with the NSDP, both in terms of evaluating current programmes as strategies (such as depot-holders) and identifying new direction and knowledge-based interventions.

The Centre's scientists understand the difficulties in providing health care services at a low cost. The Centre is documenting the costs of IMCI, ESP and nutrition services. It is also exploring alternative ways to fund these services. The Centre is also working with communities to see if there can be a community-based health cooperative model that will be more responsive to community needs and will allow for more community control and input.

Within the SE Asia region and internationally there is increasing interest and support for multi-national collaborations. Because of the Centre's reputation and long-term work with institutions throughout the world, it is well positioned to play an active role in promoting international cooperation and in participating in joint operational research activities.

Relative strengths.
The Centre has considerable experience in conducting operations research to strengthen health and family planning services and, in evaluating these services. Building on what has been learned from intensive studies in its hospital and field sites (e.g. Matlab), programmes may be recommended for implementation in the MOHFW or NGOs. Additional studies may be undertaken to assess their acceptability, cost, impact, and sustainability. These may then be scaled up, further evaluated, and improved. This was the case with ORS, Family Planning Programme and may also be applicable for other interventions.

Priorities.

Based on continuing challenges, opportunities, and relative strengths, the HFPSP has established the following priorities:

1. Evaluate alternative service strategies and provide evidence to better define health service strategies and conduct economic analysis of programmes.
2. Identify disparities in health within populations and provide explanations for such disparities.
3. Improve family planning services and help families achieve desired family size.
4. Establish participatory research partnerships with communities, the NGO sector, the private sector, and the MOHFW.
5. Improve health information systems and evidence-based decision making.
6. Assist all Divisions in the Centre to move research to the level of application and effective integration into public and private sectors.

Strategies.
Current activities are supported by a USAID/Dhaka cooperative agreement. Additional funding will be sought to carry out health and family planning systems research. The programme will identify fields of comparative advantage with the Centre and then devise short and longer term work plans for the formative and operational research needed to scale up promising interventions and programmes. Present examples include zinc supplementation as a treatment and environmental health interventions. Furthermore, the programme will strengthen the linkage of the targeted research protocols to the demographic surveillance data collected in the Centre's field sites.

Most families wish to limit the number of children or to space their pregnancies.

Under the USAID/Dhaka cooperative agreement, the Centre has been able to hire two additional international operations research scientists. This will further strengthen the HFPSP capacity. In addition, plans are underway to initiate a two-year fellowship programme in health systems/operations research. The programme will take on one new trainee each year with the goal being that these individuals will join the HFPSP as independent researchers. The programme will also identify a mechanism for hiring a biostatistician.

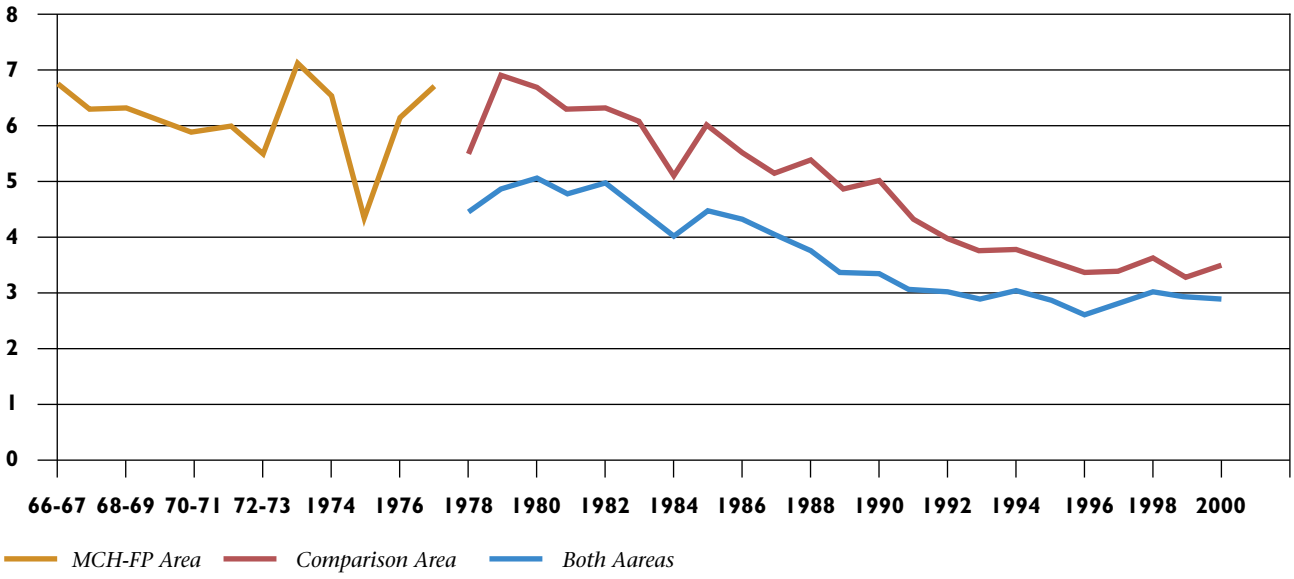
The programme will strengthen the Centre's collaboration with private sector organizations involved in social marketing and behavioural change communication and establish a more deliberate and consistent communication and dissemination plan with the MOHFW and NGO sectors.

Population Sciences

Problems identified.
The Centre has contributed to the success of the national family planning programme in reducing fertility and the consequent growth rate. The Centre's scientists have observed that the dramatic decline in fertility in Bangladesh (down from 6.5 children per woman in 1975 to 3.3 in 1994) has now levelled off. If fertility could be reduced to below replacement levels soon, the final population could be as much as 60 million fewer than otherwise. Further research is required to understand the apparent obstacles to further decline in fertility levels. Given the large cohort of people between the ages of 15-30, it is important that policies are formulated to address the possible impact that this may have on population growth. Regarding social policy, research suggests that increased opportunities for young women to be educated and employed in the formal sector results in delayed marriage, hence delayed pregnancy and that this may reduce overall fertility. This decline in fertility, while beneficial for slowing population growth, has other less desirable consequences. The elderly population (over 60 years) will multiply almost ten-fold, from 6.8 million to 65 million, raising the elderly from 5% of the population to 26%. The (dependency) ratio of working age to elderly population will decline from eleven to two creating an enormous burden on the workforce. Thus the needs of the elderly will become increasingly important during the 21st century.

Arguably the major demographic phenomena of this century will be the massive increase in the numbers of urban poor. This global migration is driven by a search for employment. In rural areas urban migration will change the nature of nuclear families. There will be less family support available for the elderly if left behind, an increase in sexually transmitted infections, and safety and security problems. In the cities it will accentuate infectious diseases, complicate provision of affordable health services and compound family instability, alienation, lawlessness, drug use, etc.

Total fertility rates in Matlab by Area: 1966-2000 (rate per Woman)



The decline in fertility which was so dramatic in Bangladesh during the 1975-94 period has now levelled off. To reach "replacement fertility", the total fertility rate will need to drop to about 2.1 by the end of the decade.

Opportunities.
The Centre has initiated studies to understand the reasons for the current plateau in fertility. Through its operations research programme the Centre has demonstrated how fertility rate can be reduced in a culturally acceptable manner. Surveys show that Bangladeshis desire smaller family sizes. Thus continued efforts to improve family planning programmes with appropriate targeting of services are likely to be effective. Increased female education, along with other social changes, will likely favour lower fertility.

Research into urbanization and the inherent social changes that may happen will be undertaken, particularly to look at the possible adverse impacts these may have on health. If the dynamics of urbanization are better understood then health services can be planned more effectively.

Relative strengths.
ICDDR,B has several large rural and urban demographically defined field sites. The demographic surveillance systems at these sites collect vital event data and provide a sampling frame for more intensive studies. Health interventions allow the Centre's scientists to determine burden of disease, test health interventions (e.g. micronutrients, vaccines, systems), and conduct social science research in order to understand the dynamics of population shifts. The longitudinal data collection systems at the Centre are unique and are the basis on which other demographic systems are formed elsewhere in the world

Priorities.

Based on continuing challenges, opportunities and relative strengths, the Centre has identified the following actions for population sciences:

1. Investigation of the stagnating fertility decline in Bangladesh, understanding how to reduce fertility rates to replacement level or below, and how to minimize the impact of population momentum through social interventions.
2. Understanding adult health problems, including non-communicable diseases, and how families provide the necessary resources, both in terms of financial and social support, to deal with the growing health demands of an aging population.
3. Understanding the economic and social forces motivating out-migration from rural areas. This understanding is linked to monitoring changes in family structure, especially in terms of social and financial support for family members remaining behind in the rural communities.
4. To collaborate with other surveillance systems through the INDEPTH network to improve the capacity of such systems to develop and monitor interventions for better managing health and population challenges in other areas of the world.
5. Understanding the relationship between family planning and abortion in order to minimize the latter.
6. Understanding health equity and developing tools for monitoring health equity, especially in relation to rapid population growth and urbanization.

Strategies.
Priorities 1, 2, 3 are funded under a Cooperative Agreement with USAID/Dhaka. Priorities 4, 5, are funded under a five-year DFID grant. Priority 4 is supported by internal HDSS funds. Protocols are currently being developed on causes of death in children. The Matlab and FHRP field sites continue to provide valuable data for most of the priorities. Current staff resources are, by and large, adequate for conducting the studies indicated. As we move into newer areas, such as poverty measurement, and more dynamic aspects of poverty and health, we are utilizing other resources available within the Centre. We plan to upgrade our GIS capacity as soon as possible. We are also increasingly collaborating with other institutions with relevant expertise, for example BIRDEM Hospital on diabetes studies and the Karolinska Institute, Sweden, for studies on the elderly. Research will continue to be conducted with partners and sponsors from DFID, USAID/Dhaka, RAND Corporation, Pathfinder International, London School of Hygiene & Tropical Medicine, Medical Research Council, UK, World Bank, Rockefeller Foundation, and the INDEPTH Network. The HDSS component also provides datasets to numerous collaborators from within the Centre, who are working with other sponsors and partners and it also provides much of the data for studies undertaken within the Population Programme. The HDSS currently relies on a SUN Enterprise system using Solaris software. Plans are developed for upgrading the SUN hardware and software, and the Solaris software. In addition, HDSS is increasingly turning to NT servers in Dhaka and Matlab to spread the databases to achieve greater efficiency and stability.

Poverty and Health*

Problems identified.
Poverty reduction, improvement of health, especially of the poor and minimizing socio-economic inequities have been the major focus of development strategies in the developing world during recent years. Poverty and ill health are interrelated as poverty results in ill health and ill health leads to poverty.

The health and poverty situation in Bangladesh is typical of that of a poor country. Nearly half of the Bangladesh population lives below the poverty line. The life expectancy at birth is around 60 years and is characterized by high infant and childhood mortality. The maternal mortality ratio is around 380 per 100,000 live births. Under-nutrition remains a major problem. Despite improvement in health outcomes in the recent past, socio-economic, gender, and geographical differences in health and in utilization of health care services still persists. This implies that the health of the disadvantaged (economically, gender, or otherwise) segment of the population is still worse than the more advantaged sections of society and research would suggest that this trend is likely to continue.

The major demographic phenomenon of this century will be the massive increase in the numbers of urban poor.

WHAT IS POVERTY?

Poverty is hunger;

Poverty is lack of shelter;

Poverty is being sick and not being able to see a doctor;

Poverty is not being able to go to school and not knowing how to read;

Poverty is not having a job, fear for the future, living one day at a time;

Poverty is losing a child due to unclean water.

Poverty Net, World Bank

*Since 2003 when the Strategic Plan was first published, the Centre has added two additional programmes: Poverty and Health, and HIV/AIDS.

Public health services are believed to have a significant positive role in the improvement of health in developing nations. Thus, ensuring equitable access to health services is a way towards achieving equitable health. Socio-economic development programmes on the other hand may also have positive health impact by empowering participants in terms of purchasing power, education, mobility and awareness about and openness to modern health services. Thus, an understanding of the barriers faced, particularly by the most disadvantaged, in accessing health and development services is imperative for planning more effective programmes for improving health, reducing poverty and inequities.

It is important to monitor progress in health and development in terms of reaching the poor or disadvantaged compared to the more advantaged. This necessitates identification of the poor and establishment of effective monitoring systems. This may only be accomplished if the necessary information is obtained for analysis by socio-economic status or some other relevant indicators of poverty. Keeping in mind the MDGs, particularly those directly and indirectly related to health issues, the programme has been designed to enable the Centre to work towards achieving these goals.

Opportunities.
The Centre, being located in Bangladesh, is in a unique position to generate knowledge to improve the health of the poor and reduce poverty and inequities. Its various rural and urban field sites, where data is regularly collected and analyzed not only provides a rare opportunity to monitor progress in terms of improving health, especially of the poor but, they also serve to assess the equity impact of public health and development programmes. The Centre's collaborative project with BRAC, a development NGO in Matlab since 1992, provides a unique opportunity to study the independent, and combined, impact of health and non-health interventions on health and human well being and on reducing inequities.

The Centre's work with INDEPTH in Ghana, GHEI of the Rockefeller Foundation, GEGA in South Africa and, through its involvement with BRAC, BBS and BIDS in co-ordinating the Bangladesh Health Equity Watch, also provides an opportunity for the Centre to contribute to improved health for the poor.

Relative strengths.
As already mentioned above, one of the major strengths of the Centre lies in its extensive data collection systems and health activities carried out through its rural and urban field sites. This information may be used to inform programme planning and design. Another strength is its credibility as an international health research centre and the mix of professionals, from all the sciences, who work at the Centre. The ongoing activities, as outlined above, also places the Centre in a relatively stronger position than many others to contribute in the field of poverty and health.

Priorities.

Based on continuing challenges, opportunities and relative strengths, the Centre has identified the three main priority areas for Poverty and Health programme: research, capacity development, and dissemination and advocacy.

Research.

1. Develop indicators and methods to identify and better characterize the poor, measure poverty, and well being; and help adoption of the poverty measures and other development indicators in the Centre's Health and Demographic Surveillance Systems and in other data collection efforts.
2. Develop methods to involve the poor in identifying gaps in knowledge and develop appropriate programmes to improve their condition and assess the impact of knowledge-based programmes on the health and well being of the poor.
3. Monitor and/or compile trends in socio-economic inequalities in mortality, morbidity, nutritional status and utilization of health services, monitor the MDG indicators in urban (slum, non-slum) and rural areas, including ICDDR,B field sites; and develop efficient ways to enable the poor to have access to modern health and development services.
4. Examine the adequacy of the resources allocated for the improvement of the condition of the poor and assess the effectiveness of allocated resources and the health and development programmes on the health and well being of the poor.

Capacity Development.

5. Organize training courses and workshops on poverty and health (measurements, data analysis and other substantive issues).

Dissemination and Advocacy.

6. Disseminate poverty and health related findings among the relevant parties to generate discussions, establish networks, formulate and implement appropriate actions.

Strategies.
The programme will play a strategic role in reinforcing "health improvement of the poor and reduction of poverty" as a guiding value of all ICDDR,B activities. In addition to carrying out specific research activities in the Social and Behavioural Sciences Unit, the programme will facilitate the development and conduction of poverty and health related research by scientists of other divisions and, the inclusion of socio-economic indicators in the existing and relevant new studies internal and external to the Centre. Capacity development activities will be carried out in collaboration with the Centre's Training and Education Unit and other outside organizations for the Centre's staff as well as for non-staff. Partnerships will be developed with relevant organizations/institutions, at national, regional and international level to develop new studies and to enhance staff training. Dissemination activities will be carried out through traditional channels such as journal articles, working papers, newsletter, conference presentation, and seminars. The programme will organize seminar series on the topics of poverty and health in its attempt to promote discussion among the relevant stakeholders.

HIV/AIDS*

Problems identified.
Although Bangladesh currently has a low prevalence of HIV/AIDS all the factors that may allow rapid spread of infection leading to an epidemic are present. These factors include high-risk behaviour, lack of awareness, mobile populations and being surrounded by countries that have a higher prevalence of HIV. Biological markers serving as surrogates of risk behaviour such as sexually transmitted infections (STIs) for sexual risk and hepatitis C for transmission through blood, are very high in some of the key vulnerable groups including sex workers and injecting drug users (IDU). STIs are low in the general population but are higher in the bridging population groups such as truckers, and highest in sex workers. More recently, the risk of an impending concentrated HIV epidemic among IDU has been documented in a city of Central Bangladesh where HIV prevalence has dramatically risen to 4% from 1.7%. Sharing of injection equipment is common in most IDU surveyed and the IDU are not isolated as they have sex partners (eg both commercial and non-commercial) rarely use condoms and some sell blood. IDU are also mobile travelling from one city to another and sharing injection equipment in different cities. Passive case reporting suggests that another population group vulnerable to HIV may be migrants returning from jobs overseas or through cross-border traffic to regions of high prevalence. On World AIDS Day 2003 the GoB reported that so far 363 people have been diagnosed with HIV in the country. ICDDR,B contributes to this data recording through its Voluntary Testing and Counselling (VCT) Unit. In 2003, ICDDR,B diagnosed 26 people with HIV of whom 16 were migrants who had returned from different countries. The major challenge faced by Bangladesh at present is to keep the prevalence of HIV low.

Opportunities.
Bangladesh is fortunate to have this window of opportunity to prevent an HIV epidemic and it is imperative not to waste this opportunity by ensuring that appropriate interventions are in place. Although many interventions for preventing HIV have been in place for many years in Bangladesh, data suggest that these have not been very effective at promoting safer behaviours. Interventions can be made more effective if they are evidence based. ICDDR,B is suitably placed to provide data that will enable monitoring of the epidemic and identify possible new groups that may be at risk. The Centre can also provide an understanding of the dynamics of certain behaviours and conduct laboratory studies on STIs, HIV and hepatitis. This will provide microbiological and virological data necessary for treatment and prevention.

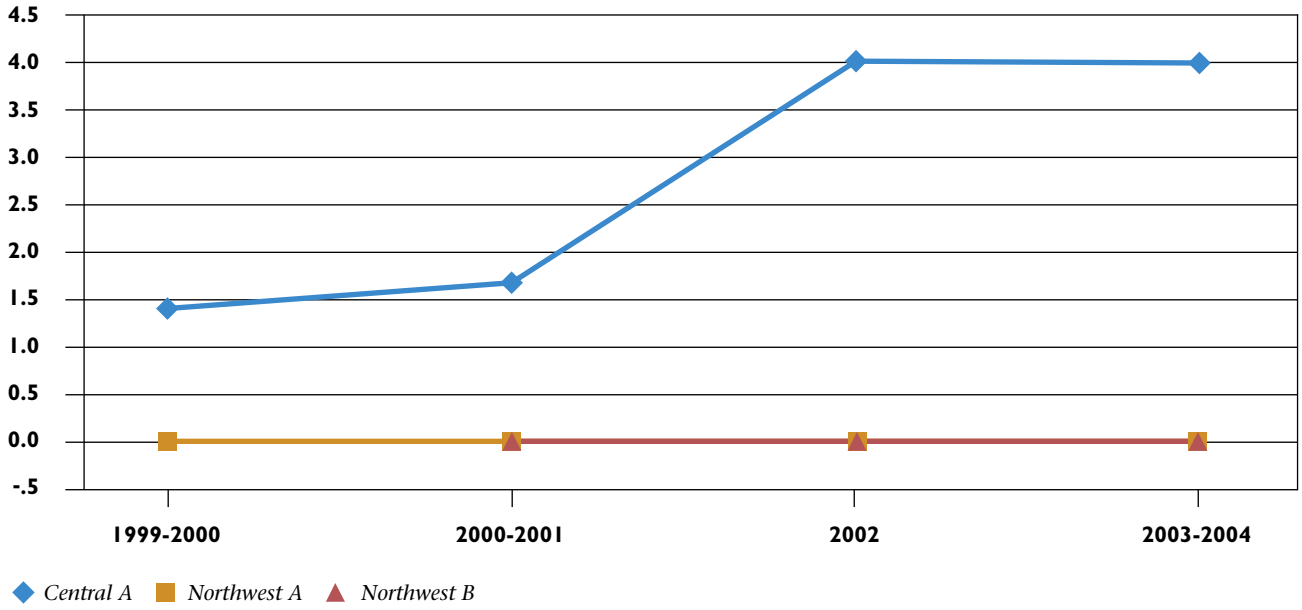
A group of injecting drug users in Bangladesh

ICDDR,B has been conducting 2nd Generation Surveillance for HIV in the country on behalf of the GoB in collaboration with other partners. The data from surveillance have been used to monitor the progress of the epidemic and changes in risk behaviour over time and these data have also been used effectively in mobilising and directing resources appropriately.

To prevent a major epidemic, Bangladesh needs to address HIV/AIDS using a multi-pronged strategy. Firstly the onset of the epidemic has to be slowed in the immediate future by concentrating on groups most vulnerable to the infection; secondly a longer term generalised epidemic has to be avoided by working with the general population; and thirdly, care and support to those already infected and affected by HIV/AIDS has to be provided. ICDDR,B has developed and is developing projects addressing all three approaches. For the most vulnerable groups, projects on risk behaviours, anthropological studies, epidemiological studies, STI and virological studies are being launched among IDU, migrants, sex workers, and other vulnerable groups such as fishermen and ethnic minority populations. Cohorts of IDU are being developed for future studies. For the general population, studies are planned to target adolescents, to understand their needs to help them adopt safe behaviours and to monitor changes in their behaviours. A national survey is also planned to target adults in urban and rural areas to assess their risk behaviour. Findings from all studies are expected to assist in strengthening intervention programmes. For care and support Voluntary Counselling and Testing (VCT) services have been established and will be expanded to more cities. Through the VCT, services of physicians are available and this availability will be expanded to include more specialist physicians, clinics and hospitals. Laboratory support such as measurement of absolute CD4 counts is available at the Centre. Efforts are being made to make a more comprehensive network of services available to people affected and infected by HIV/AIDS.

Relative strengths.
The Centre has resources to address many of the issues around HIV/AIDS. The Centre has experienced epidemiologists, laboratory scientists, behavioural scientists and operational research scientists. Success in different fields using this expertise has already been documented. The Centre has well-equipped laboratories, a well-established hospital and field sites. To enable more effective use of date, close collaboration with NGOs is essential and the Centre has a good reputation for working with a large number of NGOs in the field of HIV/AIDS/STI. Most importantly, the Centre has a good and close working

HIV prevalence in injecting drug users from three cities in Bangladesh over four years: surveillance data



relationship with the Directorate General of Health Services and the National AIDS/STD Programme, which is exemplified by the HIV surveillance that the Centre is conducting on behalf of the GoB. The Centre has also worked in different countries in the region including Nepal, Sri Lanka and Pakistan, in developing the capacity of laboratories on STIs and HIV as well as on providing input into these countries for their HIV surveillance systems.

Priorities.

Based on the problems and challenges of HIV/AIDS in the country, the opportunities available and the relative strengths of the Centre, the following priorities have been identified for the HIV/AIDS programme:

1. Monitor HIV/STIs epidemics and risk factors that enhance HIV transmission.
2. Conduct research that leads to a better understanding of the risk factors of transmission of HIV/STIs among the most vulnerable population groups, e.g. injecting drug users, sex workers, and others.
3. Conduct research to identify factors that lead to increased vulnerability to HIV/AIDS in adolescents and youths.
4. Determine routes of transmission between high-risk groups and the general population to limit the wide spread of HIV to the general population.
5. Develop strategies for care and support of HIV-infected people in Bangladesh.
6. Coordinate our research findings with other groups active in HIV/AIDS and assist them in advocacy and strategy development.

Strategies.

The Programme will concentrate its efforts on research, care and support and promotion of the use of the research findings by policy-makers and intervention organisations so that interventions can become more evidence based. Capacity development will be necessary for the expansion of the programme and this will be done actively utilising the Centre's staff and resources from other organisations. The Centre can also play a role in developing capacity of other national and regional organisations. Dissemination will play a key role in promoting the use of research findings as well as advocating for appropriate care and support services. This will be done through reports, seminars, workshops, meetings, journal articles and also the media. Advocacy efforts will be undertaken jointly with other organisations.

INSTITUTIONAL DEVELOPMENT

The Centre's institutional resources are the foundation on which research, service and training are conducted. Resources include hospitals, field sites, laboratories as well as the Information Sciences Division, Human Resources and Finance Departments. Without these resources, the Centre's work would not be possible; they are in many respects the backbone of the organization.

Finishing the Master Plan

During the decade the Centre will upgrade its physical facilities outlined in the Master Plan. Progress to date includes completion of a new outpatient clinic that houses the Progoti Samaj Kallyan Protisthan (PSKP) clinic and additional space for the Centre's Clinical Sciences Division and the Nutrition Programme. Additional physical changes will include more space for laboratories, renovated staff clinic, staff crèche, offices and conference rooms and improved grounds and gardens.

The major project for the Master Plan will be to complete the Centre's main building in Mohakhali that will be extended to eight floors from its current three. This expansion will accommodate the overcrowded hospital inpatient wards, short-stay wards, and outpatient facilities. It will also house a new and expanded library, new laboratories, additional office space, expanded training and computer facilities and dining and activity facilities. A utilities building will be needed to house the maintenance units and new electrical generation equipment. During a subsequent building phase, a second building will be constructed to house additional offices. This new building will replace several temporary buildings that have already outlived their expected life by many years.

Expanded Services at the Dhaka Hospital

The Dhaka Hospital, originally established as a clinical research centre, provides services daily to over 250 patients suffering from diarrhoeal diseases, complications from acute respiratory infections, and severe malnutrition among other illnesses. With no hidden costs and high quality services and equitable treatment to all patients, the Dhaka Hospital has become well known and trusted within the community especially among the poor. One of the lessons learned from the hospital is that common, life-threatening illnesses such as diarrhoea can inexpensively and easily be treated once the appropriate case management system has been developed. Over the next ten years, the Hospital will develop a model for treating at low cost other common life threatening diseases including pneumonia, severe malnutrition, malaria, and dengue[1].

In order for the Centre's diarrhoea hospital to evolve into a new facility for dealing with these illnesses, a strategy will need to be developed. Several requisites of the strategy will include:

- Decrease in the number of diarrhoea patients to make room for other patients.
- Patient reimbursement scheme for sustainability.
- Clear statement of goals of the new facility as a research and model clinic.
- Franchising the treatment for diarrhoea, ALRI and severe malnutrition to other NGO clinics in Dhaka.
- Marketing of the new treatment facility.
- Proper physical facilities.
- Referral system for urgent care patients.
- Training of providers in the new strategy for care.

The new facility will plan for the efficient conduct of research, minimum costs, maximum cost effectiveness, cost recovery, and logistics. These are needed not only to make it sustainable for the Centre, but also to make it adaptable to the MOHFW and NGOs. A business manager will be recruited to assist in developing these areas and monitoring the facility once it has been upgraded. It is estimated that the budget for the facility will not exceed US$1 million annually for patient care activities. Research costs will be in addition to this amount, but will be covered by specific research projects.

Increase Revenue from the Clinical Laboratory and Diagnostic Unit

The Diagnostic Unit provides services to the greater Dhaka area to generate revenue for the Hospital. This facility will provide an increased range of services including sonography, radiology, endoscopy, histopathology and cytopathology, as well as testing the purity of water and food samples for arsenic and pathogenic bacteria. The range of clinical tests will continue to expand depending on demand. We anticipate additional laboratory requirements will be needed for managing patients with HIV/AIDS. Currently, the Centre's laboratory is one of the few laboratories with reliable HIV serology and flow cytometry.

Research Laboratories

The Centre's laboratories conduct studies in a variety of fields including enteric and respiratory microbiology, STI/RTI, environmental microbiology, immunology, parasitology, bacterial genetics and nutritional biochemistry. These laboratories have been extremely productive, however, some capabilities need to be added, especially in the areas of molecular biology, arsenic, and serology where Good Laboratory Practices methods can be carried out for vaccine trials. In addition, a modern serum bank with computerized and well-characterized specimens will be needed. Research laboratories will require more space to accommodate the additional protocols under way and also for those being planned. Six units have been renovated on the second floor to provide this extension, but more space will be added when the Master Plan is complete.

[1] Maternity cover could be added to this list, but is not included here to avoid confusion with regard to the focus on child health.

Monitoring children's growth is carried out routinely in the Matlab area. This allows community health workers to identify children who are becoming malnourished and refer them to the appropriate programme.

Urban and Rural Field Areas

Matlab.
Matlab remains the major rural field area of the Centre. With over 35 years of continuous demographic information on a population of over 200,000 people, the Matlab area is a major public health resource for the world. Crucial public health questions, including many that were not anticipated even five years ago, may be answered at Matlab.

The Centre has recently embarked on a major study on low birth weight and testing of nutritional interventions, in an attempt to reduce low birth weight and improve health and survival of infants. Other interventions are reproductive health, including sub centre-based emergency obstetric care (EOC) and male involvement, community-based IMCI, water filtration to prevent cholera, epidemiology of tuberculosis in rural Bangladesh, and measuring the health impact of arsenic in drinking water. An unforeseen need has arisen for a population database on which to evaluate the safety of routinely administered vaccines. Matlab is the most suitable site for conducting this evaluation in terms of its large sample size, long-term follow-up, and data quality. Anticipated vaccine studies include efficacy trials for cholera, enterotoxigenic *E. coli* and rotavirus.

Matlab is only 35 miles from Dhaka, but has felt isolated because of the 3-hour trip by car and speedboat to reach the site. This distance has been effectively made closer by the microwave link that was established in 2001 allowing data and voice transmission between Dhaka and Matlab and Internet access for Matlab. We anticipate that in the next ten years it will also allow for video-conferencing.

Plans for Matlab include completing expansion to the hospital building and implementing EOC services in the recently completed obstetric facilities in cooperation with the Government of Bangladesh.

Other Rural Field Areas.
The Centre works in several other field areas in additon to Matlab and each of these adds much-needed capabilities and resources. These include field areas in Abonagar, Mirsarai, Chakaria, Sylhet, Mirzapur and others. These field areas have unique attributes which contribute to the overall programme of the Centre.

Additional resources will need to be identified for the extension areas to continue operations. It is expected that support for new protocols implemented in the extension areas will be sufficient to sustain the sites.

Urban Field Areas.
The Centre's urban community projects are located in Kamalapur and Mirpur, Dhaka. Kamalapur is an urban slum area with a population of 140,000 (2000 census refers) and is rapidly becoming an "urban Matlab." The site has been used for studies on pneumonia, shigellosis, influenza, and dengue. In cooperation with the Urban Family Health Project, Kamalapur will be used for studies on urban health, including how best to provide health services, set up referral systems, and finance health programmes. Over the next ten years, we anticipate Kamalapur will be used for additional studies on communicable diseases, health systems research and vaccines.


Photo: © UNICEF / HQ97-0291 / Shehzad Noorani

Understanding the special issues of providing health services to people living in an urban slum is becoming increasingly important for the Centre. Virtually all the population growth in Bangladesh over the next century will occur in the cities.

Mirpur has been used for smaller but intensive studies of cohorts of children including epidemiology of amoebiasis using molecular techniques; Phase I/II studies of new vaccines for enterotoxigenic *E. coli* and rotavirus; and community-based interventions for malnutrition. It is anticipated that this field area will continue as the site for intensive community-based studies.

Institutional Support Services

Information Sciences.
The Information Sciences Division (ISD) was formed in 2001 as a means to bring together the Computer Information Services Unit (CISU), the Dissemination and Information Services Unit (DISU) the Training and Education Unit (TEU), and the Audiovisuals Unit (AVU) as well as to upgrade the information services to the Centre. Each of these units remains as a singular entity within the Centre but it is anticipated that they will increasingly act as a coordinated Division.

Training and Education Unit (TEU).
The TEU plays a key role in the Centre's strategy to disseminate research findings. Over 20,000 researchers, physicians, laboratory personnel, managers, trainers and students from 78 countries have received training at the Centre. Most come from the developing world, but trainees from North America, Europe and Japan have also participated. The objectives of the training programme are to promote human resources development by strengthening capacity in research techniques, management of diarrhoeal diseases and family planning services, and responding to new and emerging issues in health and population.

Over the next decade the TEU seeks to:
- Develop tools and techniques for making the Centre's courses available by distance learning to trainees around the world.
- Collaborate with national and regional universities to enable participants at the Centre's courses to gain credits for degree-level qualifications.
- Develop new training courses in areas in which the Centre has world-class expertise, such as demographic surveillance and severe infant malnutrition.
- Re-introduce a training fellowship scheme, enabling trainees to participate in Centre projects and gain first-hand experience of the Centre's methods and techniques.
- Make the training programme self-sufficient, by promoting and marketing the training courses to donors and potential participants around the world.

Dissemination and Information Services Unit (DISU).
DISU is the central gateway to the Centre for the two-way flow of information. It includes sub-units for information provision (library) and publications. The mission of DISU is to disseminate the results of global health, nutrition and population research to solve common problems especially in the context of the developing world.

Over the next decade the DISU seeks to:
- Evolve into an electronic information store by creating digitised archives of the Centre's publications, papers published by the Centre scientists, research project proposals and related materials, and training materials in support of the distance learning programme.
- Provide increasing access for Centre staff to periodicals and external reports in electronic format via the Internet and CD-ROM. 70 percent of the periodicals subscribed to by the library are available in electronic form on the Internet.
- Develop additional bibliographic databases, such as a bibliography of the Centre's external publications and a bibliography of material on Bangladesh related to health, population and nutrition and make these available on the Internet.
- Rearrange the layout in the library to provide programme information areas in which the main books and journals will be grouped together.
- Provide upgraded computer facilities for library users, enabling them to access DISU resources and the Internet.

Audiovisuals Unit (AVU).
AVU provides support to the Centre's scientists and members of the management team by preparing graphic material for their documents and audiovisual presentations. These include: slides, pictures, microphotography, gels, animal dissection photography, graphs, and charts. The Unit arranges audio- and video-recording of important meetings, seminars,

symposia, and conferences organized at the Centre, in addition to taking photographs of important visitors to the Centre. The Unit designs covers, lays out pages, and processes DTP output for the Annual Report, all issues of the English newsletter Glimpse and produces the Centre's calendar, brochures, posters, and other display materials. AVU is also active in providing support for fundraising activities.

Over the next decade, the Unit plans to:
- Digitize all photographs previously produced and improve the set up for digital production of all photographs.
- Digitize all previous graphic materials and improve the set up for creative graphic designing and production.
- Acquire modern equipment and tools for better and cost-effective production of illustrative publications.
- Set up digital video-production system.

Computer Information Services Unit (CISU).
CISU is responsible for the provision of modern IT services, including email and Internet, to all scientific and support divisions in the Centre. This includes maintenance and management of the local area network (over 500 PCs connected), development and maintenance support for applications used in the Centre, and training and assistance to users. The objectives of CISU are to develop a fully integrated IT infrastructure, based on existing and recognized technology standards, which is capable of managing and delivering information throughout the Centre in accordance with defined requirements; provide end-users with a seamless interface and connectivity to all applications; and provide direction and strategy in fulfilling these requirements.

Over the next decade the CISU seeks to:
- Develop an integrated management information system to provide the Centre's managers with predefined reports to assist in decision-making, monitoring and control.
- Introduce a data warehouse, an Internet application that will allow registered users to access and download special datasets derived from the Centre's demographic surveillance work.
- Enhance the Centre's Internet presence by providing features such as forms, database interfaces and distance learning modules on the Centre web pages.
- Standardize the software and hardware used by Centre staff for common office automation tasks and the provision of regular training courses, in cooperation with TEU.

Human Resources

The Centre's Ordinance specifies that the personnel system be similar to that of the United Nations. However over the years it has become clear that the UN system is not ideally suited for the Centre. The work of the Centre is primarily research and the market place for research does not allow for a civil service system like that of the UN.

The Board of Trustees asked the management to evolve toward a personnel system that is based on merit and increasingly based on the market. The Centre is working to identify a human resources (HR) system and has completed reclassification of all positions. The new system will adapt some components of a merit system, but will not completely abandon the UN system at present. For positions that are in high demand, however, the newer system will be more adaptable to market forces. For Bangladeshi scientists who have exhibited a keen sense of innovativeness and productivity, the Centre has instituted a plan that allows them to have international salaries in proportion to the grants they secure.

The HR agenda also aims to increase emphasis on internal training, cross training, development of career tracks ("job families"), and staff development to allow professionals and skilled workers to reach their full potential. At the same time, the agenda encourages economy of human resources so that more productive work is accomplished with fewer staff. This can be accomplished by cross training, out-sourcing, increasing automation, and selection of highly qualified staff.

The Centre formerly followed a "six-year rule" for international staff that was interpreted that International Professional Officers (IPO) staff may serve for a maximum of six years, at which point, they must leave the Centre or revert to a local staff salary. This rule has been changed for Bangladeshi scientists and is being reviewed for staff at international rank.

A major need in the HR agenda is an improved management information system to manage both finance and human resources in a unified fashion. A decision will be made during the next year to adopt such a system.

Staff Development.
The Centre's productivity is only as good as its staff. The staff development programme will continue to provide graduate-level training for professional staff in both scientific and administrative tracks. Much of the current leadership at the Centre has developed through the staff development programme and it has proved to be a worthwhile investment.

As many of the Centre's Bangladeshi scientists have already received their PhD (or equivalent), increasing emphasis will be on helping these scientists keep on top of their field through sabbaticals and other types of postdoctoral training. This is a change from the past practices in which there was little training or post-doctoral development following the doctoral degree. The Centre will also increasingly stress in-service training for its staff. The training will include software programmes, scientific methods, scientific writing, as well as skills such as group building and personnel supervision.

Gender Mainstreaming.
Women constitute 46% of Centre staff but 90% are at lower levels and only 10% are in the professional category. This illustrates the need to prioritize gender equality at all levels, and to work seriously towards this goal in the near future. By 2010, at least 40% of Centre staff in professional categories will be women.

The following steps will achieve this goal:

- The Centre's Gender Equality Committee (CGEC) will be expanded to include at least two male Centre staff, at least one at the Associate Director level.
- In early 2003 a training programme for the CGEC will be provided by a local NGO, which will be followed with training for the Director and Associate Directors.
- Following the training, members of the CGEC will draft a Gender policy for presentation to the Board of Trustees.
- Once approved by the Board of Trustees, the Centre's Gender policy will be disseminated to all employees.
- The training programme will also focus on how to incorporate gender issues into research projects and practical exercises in developing these proposals.
- Women will especially be encouraged to apply for professional and higher level positions.
- Performance appraisals and promotions will be tied to demonstrated gender sensitivity, for which a set of indicators will be developed.

These policies will be monitored and evaluated by the CGEC on the basis of guidelines developed in late 2002.

International and National Staff.
High quality scientific and other professional staff are always difficult to recruit, and Dhaka is not a particularly attractive location for many international experts who may have the option to locate in western capital cities. Though difficult, we have been fortunate in identifying and retaining excellent staff because of our reputation and the academic and humanitarian vision at the Centre. The Centre is also increasingly identifying highly qualified national professionals to assume leadership positions and our staff development programme has yielded very productive scientists. By recruiting highly qualified Bangladeshi scientists, we have found that we have not changed the essential international character of the Centre, but rather have made it even stronger and enhanced the national character of the Centre.

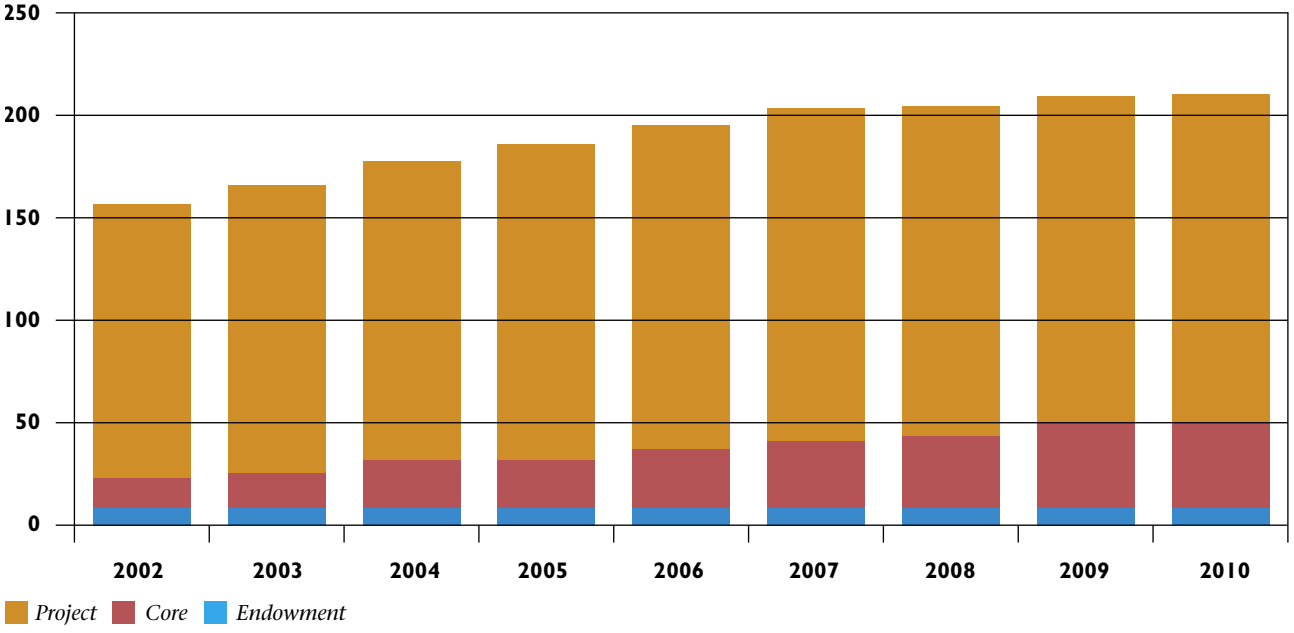
Financial Management

The Centre has a well-established Integrated Accounting system where the Centre maintains both Financial and Cost Accounts, which are fully computerized and harmonized with its budgetary controls. During the coming years, the Centre will be adopting a new computerized package integrating Finance, Human Resources and Project Monitoring functions.

A critical feature of the financial system is to have a sound information base which is helpful for management decisions. As part of the Strategic Plan, each of the units (Cost Centres) will be reviewed to examine ways to optimize costs and to make the Centre as cost-efficient as possible. Charge out rates for all service areas will also be scrutinized in the light of the present cost structure.

The Centre underwent a downsizing process in 1998, resulting in a reduction of about 200 permanent positions. The Centre continues to carefully monitor cost and this has paid off in terms of balanced annual budgets during the last four years.

Projected Annual Operating Budget (in millions of $US)*



**A more recent projection in 2006 suggests the budget should climb to $30 million by the year 2010*

Photo: © www.Poffet.net

RESOURCE MOBILIZATION

The current annual budget of the Centre is about $15.5 million – an increase from about $12 million just 3 years ago. This includes about $4 million for the basic infrastructure of the Centre and $11.5 million for specific projects. To meet the programme priorities and institutional development detailed in the Strategic Plan, the Centre's budget will need to increase by about $1 to $2 million annually until it reaches $20 million in 2010. To achieve this, a Resource Mobilization Strategy has been developed and will be implemented by the External Relations and Institutional Development (ERID) office in close collaboration with the Centre's scientific management and Director's Office.

The broad objectives of the Resource Mobilization Strategy are to diversify the Centre's resources so it can become more financially stable and less dependent on a few major donors. While the Centre fully appreciates the commitment of its major donors, and seeks to continue these critical relationships, without a broad financial base, discontinuation or reduction of these large grants can severely impact the Centre's financial stability and its work. Only with a broad financial base can the Centre respond quickly to new opportunities and emergencies. Over the next ten years, the Centre will seek to diversify and increase its funding base through the following objectives:

- Stewardship of traditional donors. Strong relationships with current and past donors are essential to maintaining support and commitment. The Centre seeks to be responsive to donor needs and actively promote the work funded by its donor agencies.
- Increase support from non-traditional donors such as public and private foundations, corporations and the local business sector. This will include continued efforts to promote 100 Partners, a special campaign to receive $10,000 from 100 corporations and donor agencies annually. In addition, the ERID office will identify and cultivate new donor agencies with strategies specific to each.
- Broaden the range of activities for our professional staff to provide consulting services such as technical assistance, training, and project evaluation.
- Increase support from individual donors. This strategy will initially focus on alumni and friends of the Centre through the *Circle Around the Centre Campaign*. Additional strategies such as direct mail and planned giving will be evaluated for cost and feasibility.
- Increase documentation of the Centre's research for dissemination and increased awareness. This will include continued presentations by scientific staff at conferences and workshops worldwide. Additional efforts will be made to document the Centre's work in simple formats for general audiences.
- Structure project budgets to ensure full recovery for the total costs of the project, i.e. indirect cost rate. For donor agencies that have specific limits for indirect cost rates that are below the Centre's, additional funding will need to be identified to carry out the research.
- Raise awareness of the Centre through contacts nurtured by the Centre's Board of Trustees, alumni and supporters. This will include recruiting Board members, alumni and supporters to host "profile raising" events.
- Build the capacity of ERID staff through attendance at fundraising and public relations workshops and conferences.
- Expand work with the US-based Child Health Foundation and the UK-based International Health Solutions Trust. These organisations can better facilitate the efforts of the Centre to receive support from the private sector and individuals in the United States and the United Kingdom.
- Increase income from fee-for-service activities (e.g. clinical laboratory and patient fees).
- Increase support to the endowments. Endowments ensure the Centre's stability, flexibility and responsiveness to adapt to changes in donor commitments and the global economy. During the last ten years, $9 million was raised for the Centre and Hospital Endowments. The goal for the next 10 years is to raise an additional $11 million reaching a total of $20 million. Growth of the endowments will depend on continued and new commitments from donors and success of special events including the annual Silent Art Auction and Hospital Endowment Fundraising Ball.
- Update the Centre's website to include credit card donation capabilities.
- Ensure that the senior management team and senior scientists know how to: (a) identify new resources, (b) utilize appropriate channels to secure new resources and, (c) present to the donor community a consistent and unified picture of the Centre's unique qualities.
- Maintain and strengthen the Centre's cooperation with the GoB. During the plan period, the Centre anticipates an increasing role as a partner with the GoB. In the past, the primary interactions were with regard to diarrhoeal disease, family planning, and health systems. In the future, the Centre anticipates more interaction with all of its scientific programmes and intends to (a) insure that the research findings are better known to Ministry officials so that they can result in policy and action, (b) insure that the research projects address practical questions of the health system, and (c) assist the Ministry in preparation of major projects and assist with their evaluations. Special emphasis will be given to working with the GoB with regard to tuberculosis, HIV/AIDS, malaria, dengue, pneumonia and other communicable diseases, malnutrition and micronutrients, safe motherhood, IMCI and neonatal mortality, and vaccination programmes.

The success of the Resource Mobilization Strategy will require additional resources for the office of External Relations and Institutional Development (ERID) including hiring public relations and fundraising consultants. In addition, scientific staff who are becoming increasingly responsible for funding of their programmes will receive training and capacity building in donor relations.

CONCLUSION

Our success and productivity over the last 27 years have been due to the generous commitment of our donors, dedication of scientists, staff and partners, and positive relations with the GoB and the people of Bangladesh.

The next decades will bring many new challenges. The Centre is not the same as it was almost three decades ago when it was highly focused on diarrhoeal diseases and population. The Centre now addresses issues of reproductive health, HIV/AIDS, dengue, arsenic toxicity, health equity, maternal and child health, health systems, violence, and aging communities among others. It must continue to evolve in a manner that is responsive to the evolving needs of poor countries.

Now, we turn to the donor community to renew our partnership for the benefit of the people who live in developing countries. Each of the 27 years has been a financial struggle and one wonders if financial stability will ever be possible for institutions like ours that work for the benefit of the poor. However, financial stability is not our goal, rather the goal is to be as productive as possible for the benefit of the health of those living in poor countries.

Sometimes research and public health programmes are seen as opposing ways to allocate resources. This is a false dichotomy. One cannot conduct programmes unless one first learns how to use the resources. Continuing to use "old knowledge" far past its relevance is wasteful, and failing to acquire new knowledge is imprudent. Just as programmes cannot do without research, research must also be coordinated with programmes. We are not in the business of acquiring knowledge just to publish papers but rather to develop the knowledge that will be useful and practical.

It took 10 years for ORS to progress from basic understanding to implementation. It has taken 15 years for the oral cholera vaccine to even begin to be used. These delays are too long. It is only through joint cooperation and communication between research and programmes that recipients will benefit from findings.

Sometimes people ask why is an International Health Research Centre located in Bangladesh. Why not Geneva or London or Washington DC? The answer is simple: this is where the problems are and this is where the problems can best be understood in all their complexities. This is where science and programmes meet and this is where they are integrated into practical and cost effective solutions. We trust that the donors will join with us in the coming years not just to provide financial stability, but to provide the needed financial resources so that the Centre, along with its partners, will live up to its potential.

COLLABORATION OF THE CENTRE

International

Educational Institutions

Australian National University, Australia; Albany Med College, USA; Aichi Medical University, Japan; Biotechnology Institute Baltimore, USA; Colorado State University, USA, Columbia University, USA; Cornell University, USA; Conservatoire national des arts et metiers, France; Dartmouth College, USA; Emory University, USA; Flinders University, Australia; Huddinge University Hospital, Sweden; Harvard Medical School, USA; Harvard University, USA; Institute of Child Health, University College, London, UK; Institut Pasteur, France; Indian Institute of Population Sciences, India; Indian Institute of Management, India; Johns Hopkins University, USA; Kyoto University, Japan; Karolinska Institute, Sweden; London School of Hygiene and Tropical Medicine, UK; Max Planck Institute for Infection Biology, Germany; Michigan State University, USA; Mahidol University, Thailand; Netherlands Interdisciplinary Demographic Institute, The Netherlands; New York University School of Medicine, USA; Northumbria University, Mozambique; Osaka Prefecture University, Japan; Oxford University, UK; Portland State University, USA; Queensland University; Australia; The Royal Veterinary and Agricultural University of Denmark, Denmark; Southampton University, UK; Stanford University, USA; Seibold University of Nagasaki, Japan; Tulane University, USA; University of Alabama at Birmingham, USA; University of Basel, Switzerland; University of California, Davis, USA; University of California, Berkeley, USA; University of Edinburgh, UK; University of Göteborg, Sweden; University of Leuven, Belgium; University of Maryland, USA; University of Newcastle upon Tyne, Newcastle, UK; University of Oslo, Norway; University of Pennsylvania, USA; University of Sussex, UK; University of Tokyo, Japan; University of Texas Medical Branch at Galveston, USA; University of Umeå, Sweden; Uppsala University, Sweden; University of Virginia, USA; University of Vermont, USA; Wagner College, USA; Wageningen Agricultural University, The Netherlands;

Research Institutions

Armed Forces Research Institute of Medical Sciences, Thailand; Creative Research Management, Inc., USA; Howard Hughes Medical Institute, USA; International Vaccine Institute, Korea; Institute of Health Sector Development, UK; Swiss Tropical Institute, Switzerland; Swiss Federal Institute of Technology, Switzerland; Swedish Institute of Infectious Diseases Control, Sweden; Statens Serum Institut, Denmark; Tuberculosis Research Centre, India;

Government Agencies

Centers for Disease Control and Prevention (CDC), USA; Canadian International Development Agency (CIDA), Canada; Department for International Development (DFID), UK; Japan International Corporation of Welfare Services (JICWELS), Japan; Kingdom of Belgium, Belgium; Kingdom of the Netherlands, Netherlands; Ministry of Health, Nepal; National Institute of Health (NIH), USA; National Institute of Child Health and Human Development, USA; National Institute of Cholera and Enteric Diseases, India; National Institute of Infectious Diseases, Japan; National Institute of Immunology, India; National Microbiology Laboratory (NML), Canada; Swiss Agency for Development and Cooperation (SDC), Switzerland; The Swedish International Development Cooperation Agency (Sida), Sweden; U.S. Agency for International Development (USAID);

NGOs and others

ACE Biosciences, Switzerland; Aventis Pasteur SA; Biological E. Limited, India; Bharat Biotech Inc., India; BioScale, Inc. USA; European Commission; CDM International Inc., USA; CISTEM Biotechnologies GmbH, Austria; CATO Research, USA; CERA Products Inc., USA; Child Health Foundation, USA; CARE International; Ellison Foundation, USA; Family Health International; European Commission; Glaxo SmithKline, Belgium; Global Nutrition, Sweden; GHEN Corporation, Japan; Health Systems Trust, South Africa; International Center for Research on Women, USA; Industrial Partners; International Health Solutions Trust, UK; INDEPTH Network, Ghana; IOMAI Corporation, USA; Institute of OneWorld Health, USA; International Atomic Energy Agency, Austria; Japan Health Science Foundation, Japan; JSI Research and Training Institute, USA; Kato Suishodo Pharmaceutical Co. Ltd., Japan; Lucas Hospital, The Netherlands; Macro International Inc., USA; Micro Science Limited, UK; Massachusetts General Hospital, USA; Nutriset, France; Nestle Foundation, Switzerland; Novartis Consumer Health SA, Switzerland; Nutrition 3rd World, Belgium; National Commission for Maternal and Neonatal Health, Pakistan; Partners in Population and Development, Bangladesh; PRISMA, Peru; Pathfinder International, USA; PATH, USA; Peace Corps Volunteers, USA; Plan International; Population Council; Proctor & Gamble, USA; RAND Corporation, USA; Rockefeller Foundation, USA; Royal London Hospital, UK; SBL Vaccines, Sweden; Seikagaku Pharmaceutical Co., Japan; Salix Pharmaceutical Inc., USA; Save the Children, USA; Swiss Red Cross, Switzerland; Tufts-New England Medical Center, USA; Thrasher Research Fund, USA; Unilever Research and Development Vlaardingen, the Netherlands; UN multilateral organizations; Welcome Trust, UK; Wyeth Pharmaceuticals, Inc., USA; WELL Inc., UK;

Bangladesh

Educational Institutions

American International School; Bangabandhu Sheikh Mujib Medical University; Bangladesh Agricultural University, Mymensingh; Chittagong Maa-Shishu O General Hospital; Chittagong Medical College & Hospital; Dhaka Med College & Hospital; Dhaka University; Jahangirnagar University; James P. Grant School of Public Health, BRAC University; Mymensingh Medical College Hospital; Rangpur Medical College Hospital; Sir Salimullah Med College & Hospital; Sylhet MAG Osmani Medical College Hospital;

Research Institutions

Bangladesh Institute of Development Studies (BIDS); Bangladesh Institute of Research on Diabetes and Endocrine Medicine (BIRDEM);

Government Agencies

Bangladesh Bureau of Statistics (BBS); Bangladesh Livestock Research Institute; Central Drug Treatment and Rehabilitation Centre; Central Skin and Social Hygiene Centre, Chittagong; Dhaka Shishu Hospital; Directorate of Nursing Services and College of Nursing, Dhaka; Directorate of Health Services; Directorate of Family Planning; Dhaka City Corporation; Institute of Public Health (IPH); Institute of Public Health and Nutrition (IPHN); Institute of Epidemiology and Diseases Control Research (IEDCR); Institute of Diseases of Chest and Hospital (IDCH), Dhaka; Institute of Mother and Child Health (ICMH), Dhaka; Ministry of Health and Family Welfare (MOHFW); National Institute of Population Research and Training (NIPORT); National Institute of Preventive & Social Medicine (NIPSOM); TB Control Laboratory, Shaymoli, Dhaka; Urban Primary Health Care Project (UPHCP);

NGOs and others

Associates for Community Population Research (ACPR); ACME Laboratories Ltd.; Bandhu Social Welfare Society; Bandhan Hijra Sangha; Bangladesh Association of Voluntary Sterilization (BAVS); Bangladesh Rural Advancement Committee (BRAC), Bangladesh Women's Health Coalition (BWHC); Bangladesh Center for Communication Programs (BCCP); CARE Bangladesh, Concern Bangladesh, Concerned Women for Family Development (CWFD); Durjoy Nari Shongho, Dhaka; Ekhlaspur Center of Health (ECOH); Family Planning Association of Bangladesh (FPAB); Gono Saystha Kendra; Holy Family Red Crescent Hospital, Dhaka; Health and Education for Less-Privileged People (HELP), Chittagong; Monowara General Hospital; Malik Compath, Dhaka; Marie Stopes Clinic Society; Medi-Aid Diagnostic Center, Dhaka; NGO Service Delivery Project (NSDP); Nari Moitree; Kumudini Welfare Trust (Kumudini Hospital); Mitra & Associates; Obstetrical Gynecological Society of Bangladesh; Peace Corps Volunteers, Bangladesh; Popular Diagnostic Center Ltd.; PRIP Trust, Dhaka; Population Council, Bangladesh; Pathfinder Bangladesh; Plan International, Bangladesh; Paricharja; Progoti Samaj Kallyan Protisthan (PSKP); Radda MCH-FP Centre, Dhaka; Save the Children (USA), Bangladesh; Salvation Army; Shishu Sasthya Foundation; Shimantik; Square Pharmaceuticals; Social Marketing Company; Shikkha Shastha Unnayan Karzakram (SHISUK); TREE Foundation.

Nature of Collaboration:

- Material support
- Scientific
- Technical assistance
- Exchange of ideas
- Financial support
- Technology transfer
- Expert advice

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