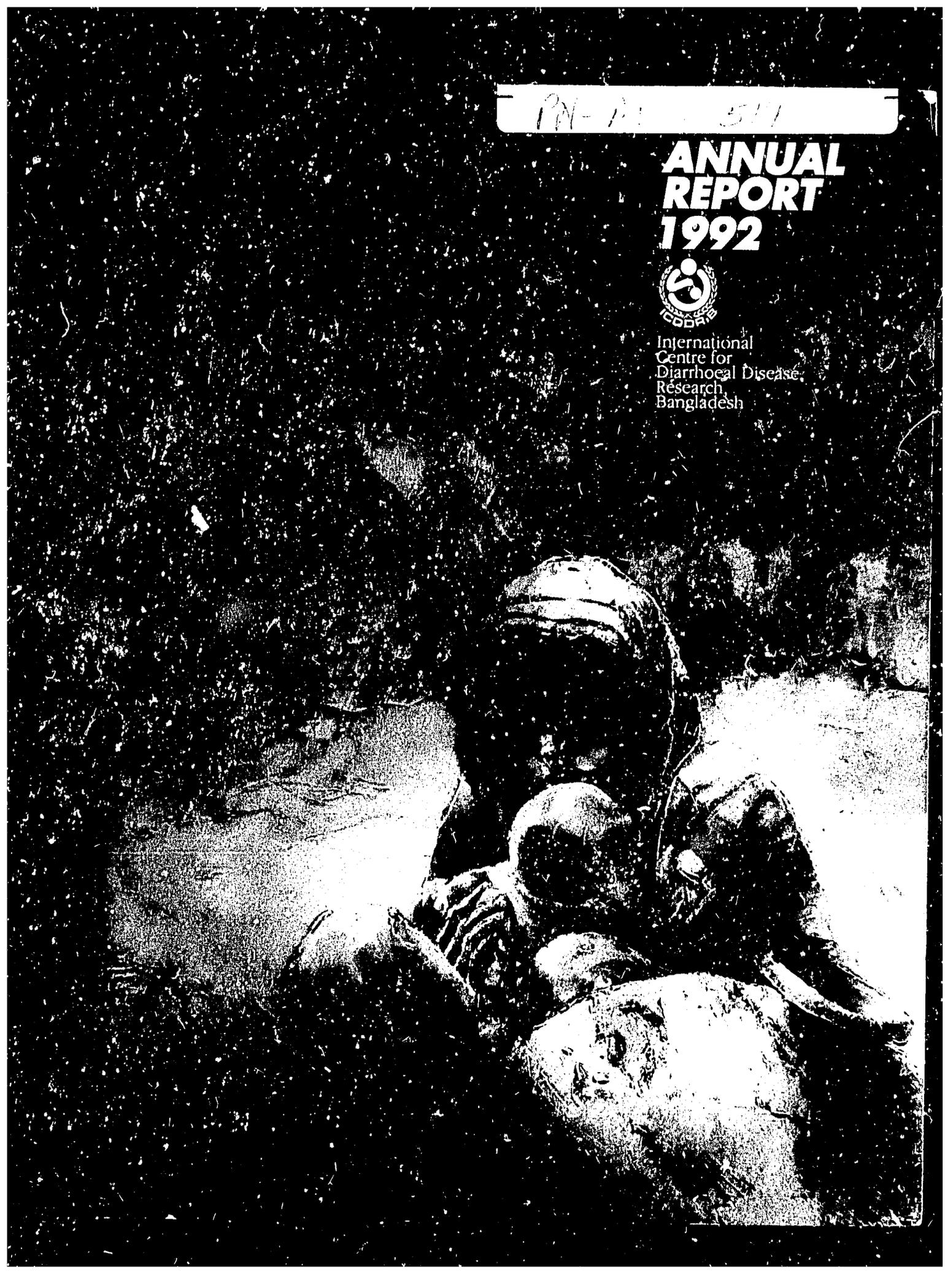


PN-71-511

ANNUAL REPORT 1992

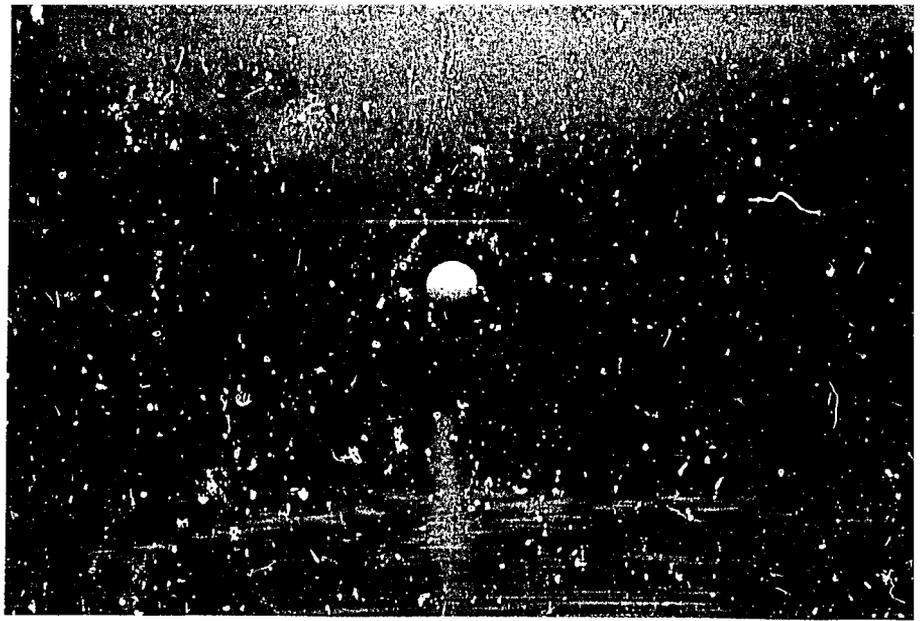


International
Centre for
Diarrhoeal Disease
Research,
Bangladesh



ACRONYMS AND ABBREVIATIONS

| | | | |
|---------|--|-----------|---|
| A&PD | Administration & Personnel Division | LSD | Laboratory Sciences Division |
| ARI | Acute respiratory infections | MCH/FP | Maternal and Child Health -- Family Planning |
| BADC | Belgian Administration for Development Cooperation | MH&RC | Matlab Health and Research Centre |
| BIRDEM | Bangladesh Institute of Research Rehabilitation in Diabetes, Endocrine & Metabolic Disorders | MUAC | Mid - upper - arm circumference |
| BRAC | Bangladesh Rural Advancement Committee | NGO | Non - governmental organisation |
| CDC | Centers for Diseases Control | NIPSOM | National Institute of Preventive and Social Medicine |
| CHD | Community Health Division | NORAD | Norwegian Agency for Development |
| CHP | Child Health Programme | NRU | Nutrition Rehabilitation Unit |
| CHW | Community Health Worker | ODA | Overseas Development Administration (UK) |
| CIDA | Canadian International Development Agency | ORS | Oral rehydration salts; oral rehydration solution |
| CIS | Computer Information Services | ORT | Oral rehydration therapy |
| COTC | Community operated Treatment Centres | PCC | Programme Coordination Committee |
| CPR | Contraceptive Prevalence Rate | PCR | Polymerase Chain Reaction |
| CRSC | Clinical Research and Service Centre | PI | Principal Investigation |
| CSD | Clinical Sciences Division | PSED | Population Science and Extension Division |
| DANIDA | Danish International Development Agency | PSC | Population Studies Centre |
| DISC | Diarrhoeal Diseases Information Services Centre | RCC | Research Review Committee |
| DMPA | Injectable Contraceptive | SAARC | South Asian Association for Regional Cooperation |
| DSS | Demographic Surveillance System | SAREC | Swedish Agency for Research Cooperation with Developing Countries |
| DTC | Diarrhoea Treatment Centre | SDC | Swiss Development Cooperation |
| ECPP | Epidemic Control Preparedness Programme | SRS | Sample Registration System |
| ELISA | Enzyme - linked immunosorbent assay | SWA | Staff Welfare Association |
| EPI | Expanded Programme of Immunization | TBA | Traditional Birth Attendant |
| ERC | Ethical Review Committee | TCB | Training Coordination Bureau |
| ETEC | Enterotoxigenic <i>Escherichia coli</i> | TMP - SMX | Trimethoprim sulphamethoxazole |
| GOB | Government of Bangladesh | UHEP | Urban Health Extension Project |
| ICDDR,B | International Centre for Diarrhoeal Disease Research, Bangladesh | UK | United Kingdom |
| ICHF | International Child Health Foundation | UNCDF | United Nations Capital Development Fund |
| IDRC | International Development Research Centre (Canada) | UNDP | United Nations Development Programme |
| IPGM&R | Institute of Post-graduate Medicine and Research | UNFPA | United Nations Fund for Population Activities |
| IV | Intravenous | UNICEF | United Nations Childrens' Fund |
| JDDR | Journal of Diarrhoeal Diseases Research | UNROB | United Nations Relief Organisation in Bangladesh |
| JHU | Johns Hopkins University | USAID | United States Agency for International Development |
| KAP | Knowledge, Attitude and Practice | USS | Urban Surveillance System |
| | | UVP | Urban Volunteers Programme |
| | | WHO | World Health Organization |
| | | WS/S | Water supply and sanitation |
| | | WUSC | World University Service of Canada |



ANNUAL REPORT 1992



International
Centre for
Diarrhoeal Disease
Research,
Bangladesh

EDITORIAL ADVISOR Josephine Sack

MANAGING EDITOR M Shamsul Islam Khan

PUBLICATION AND PRINTING Hasan Shareef Ahmed
M Nurul Huda
Asem Ansari

DESKTOP PUBLISHING Hasan Shareef Ahmed
Mahbubul Hoque
Asem Ansari
M Ekramul Hassan

COVER DESIGN
Oil on canvas:
105 X 73.5 cm. Asem Ansari

CAPTIO:
Mother, do you think they'll drop the bomb?
Mother, do you think they'll like the song!

ISBN 984 - 551 - 003 - 5

May 1993

Copyright © 1993

International Centre for Diarrhoeal Disease Research, Bangladesh
GPO Box 128, Dhaka 1000, Bangladesh

Telephone : (880 - 2) - 600171 through (880 - 2) - 600178
Cable : CHOLERA DHAKA
Telex : 675612 ICDD BJ
Facsimiles : (880 - 2) - 883116
: (880 - 2) - 886050

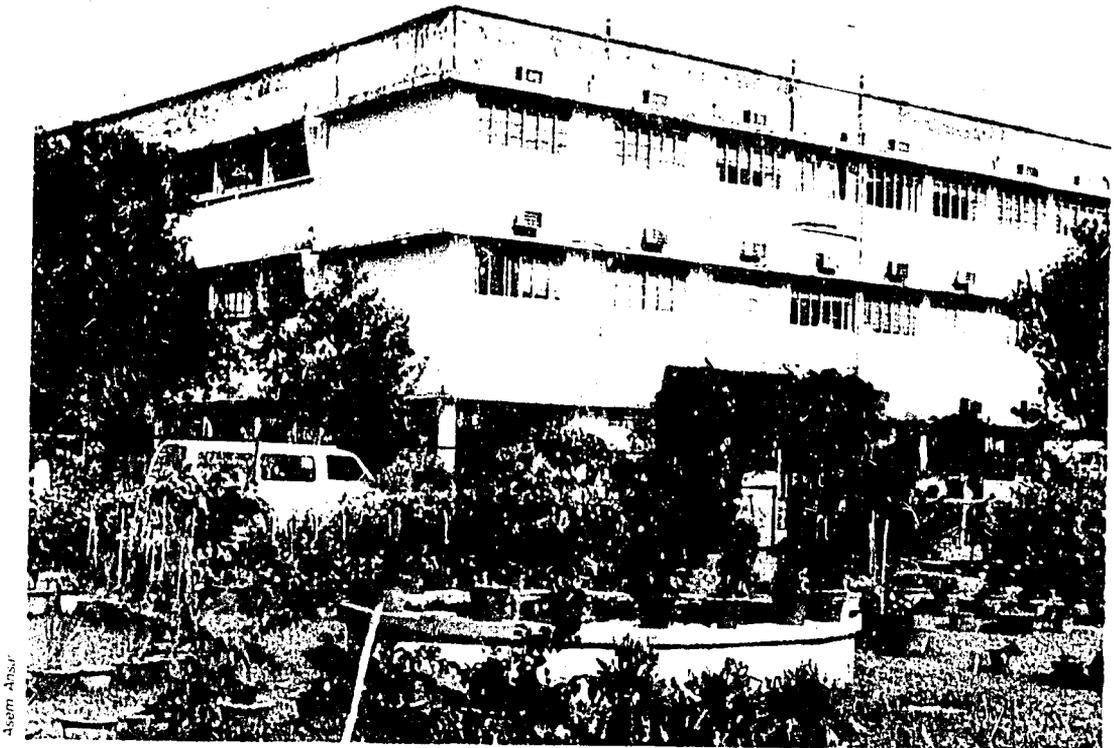
The ICDDR,B publishes a journal, a newsletter, scientific reports, monographs, annotated bibliographies, and many other items in the field of diarrhoeal diseases and on related subjects. Details of some of these publications may be found at the end of this report.

PREFACE

This is The Fourteenth Annual Report of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). Herein are described many aspects of the work of the ICDDR,B staff during 1991 including research, support for research, health services, training, dissemination, and administrative activities. Abbreviations and acronyms are used freely throughout. Please note that they are defined on the inside front cover. There is a map of the Centre opposite p. 81.

Scientific papers, letters, abstracts, and editorials published by the Centre's current or former staff and by visiting scientists are also listed here. Many of these describe research actually done in previous years and reported in earlier reports.

If you have any comments on this report or would like more information about the ICDDR,B or the works described here, please write to the Director at the address given opposite.



CONTENTS

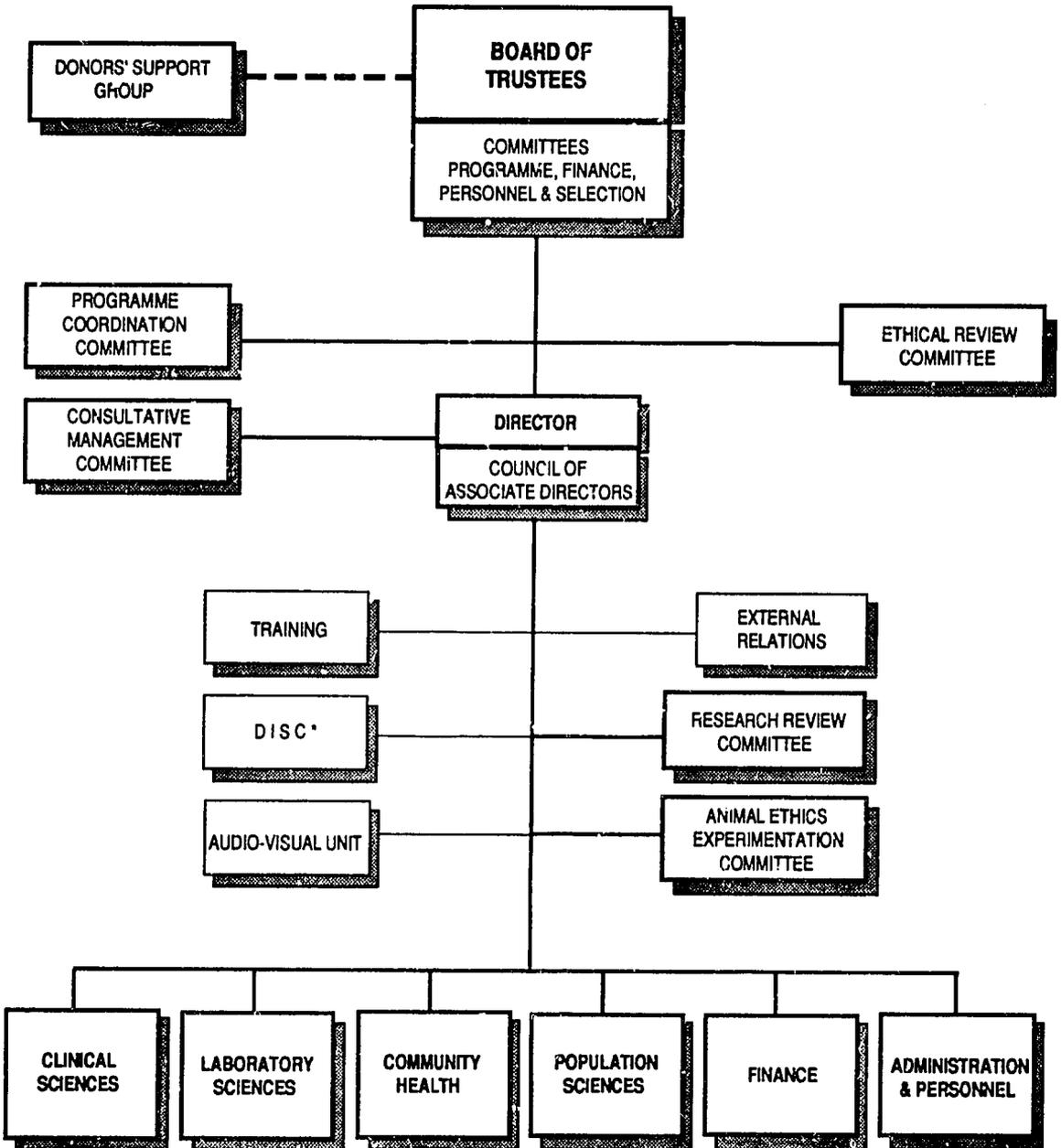
| | | | | |
|--|-----|-----|-----|----|
| Introduction | ... | ... | ... | 1 |
| Director's Report | ... | ... | ... | 1 |
| Nineteen Ninety - two | ... | ... | ... | 3 |
| Clinical Sciences Division | ... | ... | ... | 5 |
| Health Care | ... | ... | ... | 5 |
| Clinical Research | ... | ... | ... | 8 |
| Community Health Division | ... | ... | ... | 17 |
| Matlab Clinical Sciences | ... | ... | ... | 19 |
| Social Science | ... | ... | ... | 19 |
| MCH/Intervention - Rural | ... | ... | ... | 21 |
| Urban | ... | ... | ... | 26 |
| Environmental Health | ... | ... | ... | 34 |
| Epidemiology | ... | ... | ... | 38 |
| Laboratory Sciences Division | ... | ... | ... | 41 |
| Department of Laboratory Research | ... | ... | ... | 42 |
| Department of Laboratory Services | ... | ... | ... | 50 |
| Population Science and Extension Division | ... | ... | ... | 55 |
| Population Studies Centre | ... | ... | ... | 56 |
| Demographic Surveillance System | ... | ... | ... | 58 |
| MCH - FP Extension Project | ... | ... | ... | 59 |
| Services | ... | ... | ... | 61 |
| Administration and Personnel | ... | ... | ... | 63 |
| Personnel | ... | ... | ... | 63 |
| Supply | ... | ... | ... | 68 |
| General Administrative Branch | ... | ... | ... | 67 |
| Engineering Branch | ... | ... | ... | 68 |
| Diarrhoeal Diseases Information Services Centre | ... | ... | ... | 69 |
| Library and Information Services | ... | ... | ... | 69 |
| Audio - Visual Unit | ... | ... | ... | 73 |
| Publications - 1992 | ... | ... | ... | 71 |
| Staff Development and Training | ... | ... | ... | 81 |
| Staff Development | ... | ... | ... | 81 |
| Training | ... | ... | ... | 84 |
| Committees | ... | ... | ... | 86 |
| Finance Division | ... | ... | ... | 89 |
| Financial Report | ... | ... | ... | 89 |
| External Relations | ... | ... | ... | 90 |
| Auditors' Report | ... | ... | ... | 92 |
| Extra - curricular Events - a pictorial | ... | ... | ... | 95 |
| Appendix - Endowment Fund donors | ... | ... | ... | 98 |
| Index | ... | ... | ... | 99 |

INTRODUCTION



This photo shows the new construction over the hospital (building on the right), home of the Laboratory Sciences Division (windows) and the Sasakawa International Training Centre, through the canopied entrance.

ORGANOGRAM



DIRECTOR'S REPORT

The investment over the past years in creating an enabling environment for research and training is proving to have been a wise course of action. The recruitment of creative senior staff, the persistent effort of staff development opportunities offered particularly to junior and mid-level staff to test themselves in international scientific fora, the improved coordination/communication among the various divisions within the Centre, and the expanding linkages with institutions around the world have all contributed greatly to this increased productivity.

A clear trend has been an increase in community-based studies (epidemiological and operations research) and a determined move to build and strengthen social science research. The latter is best exemplified by the joint Bangladesh Rural Advancement Committee (BRAC) and ICDDR,B research project. This undertaking exploits the introduction of BRAC's rural development programme into Matlab thana where ICDDR,B has maintained for decades a longitudinal information database (the Demographic Surveillance System-DSS) and for several years the MCH-FP record-keeping system (for 50% of the target population).

The impact of social and economic development, brought about by the BRAC rural development programme, on health will be determined. More importantly efforts will be made to understand the mechanisms of social change through which outcomes on impacts of the BRAC programme can be explained.

Another important development is the coming of age of urban health research at the Centre. The establishment of the urban surveillance system in the slums of Dhaka has laid the foundation for sound population-based research including identification of the health problems, designing and testing health care interventions. It is hoped that the urban surveillance system will be as successful in facilitating reliable and useful research as has its more experienced counterpart, the DSS.

Recognising that persistent and invasive diarrhoeas account for over 50% of all deaths due to diarrhoeal diseases in children less than 5 years of age, studies have continued on aetiology, pathogenesis, treatment, and control of these disorders. Whereas factors determining duration of acute diarrhoeas may soon be unravelled (with implications on prevention), dietary management appears to be the mainstay for management of persistent diarrhoeas. An important related study is on laboratory methods for rapid and simple diagnosis of invasive diarrhoea due to *Entamoeba histolytica* - a monoclonal antibody-based ELISA that will distinguish pathogenic from non-pathogenic species.

Studies related to water supply and sanitation are being conducted in a number of areas including environmental determinants of child mortality and simple sanitation interventions, particularly handwashing. A demographic study investigating the impact of the Matlab embankment on mortality, fertility, health and nutrition is underway.

In nutrition, efforts have focussed on studies of vitamin A and other micronutrients and on the development of energy-dense infant/child food. Results of studies examining the safety of vitamin A in infants younger than 6 months at EPI contacts are likely to have international policy implications.

Operations research to further improve the management of family planning programmes in Bangladesh looked into the quality of care of existing programmes. Closely linked to this is the increasing emphasis being given to the health of women including reproductive tract infections, nutritional status and programmes to combat the unacceptable high maternal mortality ratio.

Re-orienting the goals of the training programme towards health research training has continued but the potential of ICDDR,B in contributing towards building capability

In essential national health research has yet to be fully realised (old habits die hard!).

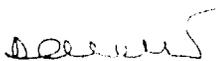
More successful have been efforts to disseminate widely the research findings of the Centre both within Bangladesh and outside, and to provide a forum for exchange of ideas. The launching of a health newsletter in Bangla, the planning for of an international workshop here on *Helicobacter pylori* (1993), and the Annual Scientific Conferences are a few examples. The ASCON II which was held in January 1993 and will be reported in next year's annual report had as its theme "Health Research and Policy Perspective".

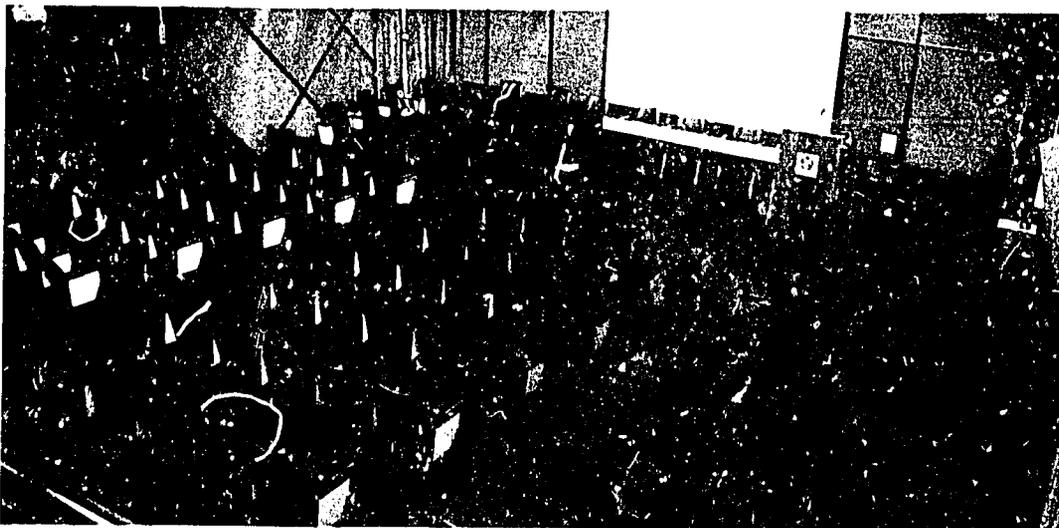
The hospitals in Dhaka and Matlab, the outreach facilities in Dhaka and Matlab and the ECPP provided care to many, again stretching the Centre's resources.

Thanks to donations from the Sasakawa Foundation, the Centre was able to engage and partially complete construction of physical facilities to accommodate the training activities of the Centre including training laboratories. The November 1992 meetings of the Board of Trustees and the Donors' Support Group were held at the just completed premises of the Sasakawa International Training Centre. By May 1993, construction of the entire first floor of the hospital will have been finished and the pressing requirement for space brought about by expanding activities will be largely met.

The year 1992 also marks the historical achievement of the peaceful resolution of the outstanding UNROB loan. The Government of Bangladesh generously agreed to convert this loan to a grant for activities in health care and training rendered since receipt of the loan.

A draft strategy of resource development was tabled at the 1992 Board Meeting. It is expected to be finalised in late 1993. One thing that experience teaches us is that the challenge of raising funds never falters.


Demissie Habte, M.D.
Director



A view of the auditorium of the new Sasakawa International Training Centre.

NINETEEN NINETY – TWO

The rest of the world sends us news of unbelievable horror: wars, hurricanes, and AIDS epidemics. Some good news occasionally filters through: democratic elections, signed agreements, and medical breakthroughs. All these events have an impact on health, and they all in some way affect Bangladesh and ICDDR,B.

But with respect to this report, there is no 1992 cyclone, no election, and no scientific conference to describe. There were, however, a number of other events which made the headlines. Some of these are detailed in the reports of the various divisions of the Centre which follow. Others that were Centre-wide or otherwise noteworthy are described here.

NEW BUILDINGS

1. The Sasakawa International Training Centre was completed in November and the Board of Trustees members were the first to use the new premises. Everyone there and all those at subsequent meetings have been very pleased with all aspects of the facility. With professional high-tech sound and projection systems and comfortable chairs (with optional desks), the 192-seat auditorium (with balcony), provides an excellent arena for scientific lectures and presentations. The two conference rooms, equipped with rectangular tables and chairs, are different in size and can be made into one larger room by removing the partition.

The lobby provides adequate space for poster exhibitions and opportunity for visiting and consulting over a cup of tea.

Such fine accommodations are attractive to large audiences and good attendance and enhance the Centre's ability to realise scientific achievement and communicate research outcome.

2. The Community Health Division is housed in new quarters over the library building where the staff members invited the Centre staff for a simple ceremony and tea in May to officially open the space for business. The Division's premises which also include adjoining rooms once occupied by other units of the Centre, provide offices for most of the scientific staff, the Associate Director' suite, and a conference room.

3. Atop the hospital beside the new training centre, new space for the Laboratory Sciences Division has been constructed. The Department of Laboratory Services, which includes the Clinical Laboratory once housed in the hospital, occupied

this space in October; the rest of the laboratories will be moving from the Director's wing in May of 1993.

SHASTHYA SANG LAP

In May the ICDDR,B launched a newsletter in Bengali called the *SHASTHYA SANG LAP* which translated means "Dialogue on Health". The honourable Health and Family Welfare Minister was the chief guest. Its objective is to reach field-level health workers with messages about the clinical management of common diseases, particularly ones researched by scientists here at the Centre. The newsletter is published three times a year and is designed to be preserved for future reference by health care personnel working at the union and upazila levels in Bangladesh.

ENDOWMENT FUND

As this Annual Report goes to press (May 1993), the amount raised for the hospital endowment fund stands at about US\$ 70,000. This is still a long way from the five million dollars the Centre expects to secure for this account, but after only one and one half years, it is a considerable sum and represents a commendable amount of fund-raising effort by many caring people. The income generated by this fund is used for patient care (ONLY patient care; none goes toward administrative costs) at both hospitals, making it possible for other funds to be used for research, which is the primary concern of ICDDR,B.

One fund-raising function which produced nearly US\$ 11,000 was a dinner dance (and raffle) at the Sonargaon Hotel in December. About 6,000 people from the Dhaka community of staff members and their families, friends, and

colleagues attended and were feted with good food and entertainment. Pictures of this event are in the Extracurricular Section of this report. A list of contributors is in Appendix. ICDDR,B is grateful to all these generous donors. Thank you.

JUST \$150 IN THE FUND WILL COVER THE COST OF TREATMENT FOR ONE CHILD EVERY YEAR FOREVER.

INTERDIVISIONAL SCIENTIFIC FORUMS

The weekly Interdivisional Scientific Forums are growing in popularity and draw an audience from various other institutions as well as the Centre. The four scientific divisions share responsibility for the presentations on a rotation basis. The following is a list of the subjects and speakers:

CLINICAL SCIENCES DIVISION

Hyperimmune bovine colostrum for rotavirus diarrhoea...A.K. Mitra
 New developments in diagnosis and treatment of diarrhoea...E. Leberthal
 Assessment of gastric acid with a new non-invasive test...S.A. Sarker
 Zinc and copper nutrition in newborns and for weaning...M.A. Islam
 Serotonin receptor blocking agents in experimental cholera...P.K. Bardhan
 Is rice-based ORT effective in young infants?...A. Islam
 Decreased food intake in children with *S. dysenteriae*...M. Rahman
 Changes in body composition of malnourished children after dietary supplementation...I. Kabir
 Breastfeeding and ORS at home prevent dehydration...A.S.G. Faruque
 Rotavirus subgroups and their clinical correlates...G.H. Rabbani
 Impact of zinc on intestinal permeability...S.K. Roy
 Increased calorie intake with amylase treated weaning diet...M. Rahman

COMMUNITY HEALTH DIVISION

Measles in immunised children.....A. de Francisco
 Women's role in family migration.....K. Alvi
 Handwashing practices...Bilqis A.H.
 Cholera epidemics in Bangladesh...A.K. Siddique
 A profile of urban slum areas of Dhaka...A. Baqui
 Treatment of diarrhoeal diseases in urban slums...C. Lerman
 Health effects of water supply and sanitation in urban and rural Guatemala...M. Bateman
 Urban volunteers: their views on community service...S. Laston

Perceptions on family planning...K.M.A. Aziz
 Determinants of cholera deaths...A.K. Siddique
 Knowledge and use of contraceptives...K. Alvi
 Water and sanitation priorities...Bilqis A.H.
 Oral iodised poppy seed oil to prevent iodine deficiency disorders, followed by BBC documentary...U.S. Anwar

LABORATORY SCIENCES DIVISION

Epidemiology of rotavirus strains...L. Unicomb
 Studies on plasmid-associated properties of *S. dysenteriae* type 1...K. Haider
 Invasive and non-invasive forms of *E. histolytica*...R. Haque
 Fatal falciparum malaria cases in a diarrhoeal disease hospital...A.K. Azad
 Immune response of children with shigellosis: a preview...T. Azim
 Local and systemic immune response in adults with shigellosis...R. Raqib
 New trends in laboratory diagnosis of shigellae infection...D. Islam
 A bacteriophage isolated from sewage effluent with gene transfer potentials...Z.U. Ahmed
 Is there an immune predisposition for repeated attacks of ascariasis in children?...T. Azim
 Vitamin A status assessment...M.A. Wahed
 Cholera in the Americas...B. Kay
 Use of PCR and the fluorescent antibody method for detecting *S. dysenteriae* type 1...S. Islam

POPULATION SCIENCE AND EXTENSION DIVISION

Effects of age at first marriage on fertility and mortality...M.K. Chowdhury
 Influence of field workers' care upon contraceptive adoption...M.B. Hossain
 Demography of household structure in rural Bangladesh...A. Foster
 Synergy and interaction among childhood infectious diseases...S. Becker
 Role of qualitative research in MCH-FP Extension Project...R. Mita
 Effects of adult mortality on infant and child mortality...M. Strong
 The BRAC/ICDDR,B Matlab project...A. Bhuiya
 Management of diarrhoea by mothers...T. Mirza
 Gender preference and fertility in Matlab...M. Rahman
 Sex and measles: implications for immunisation policies...P. Aaby
 Demographic and health impact of the Matlab embankment...M. Strong
 Individual and community aspects of women status and fertility...C. Balk

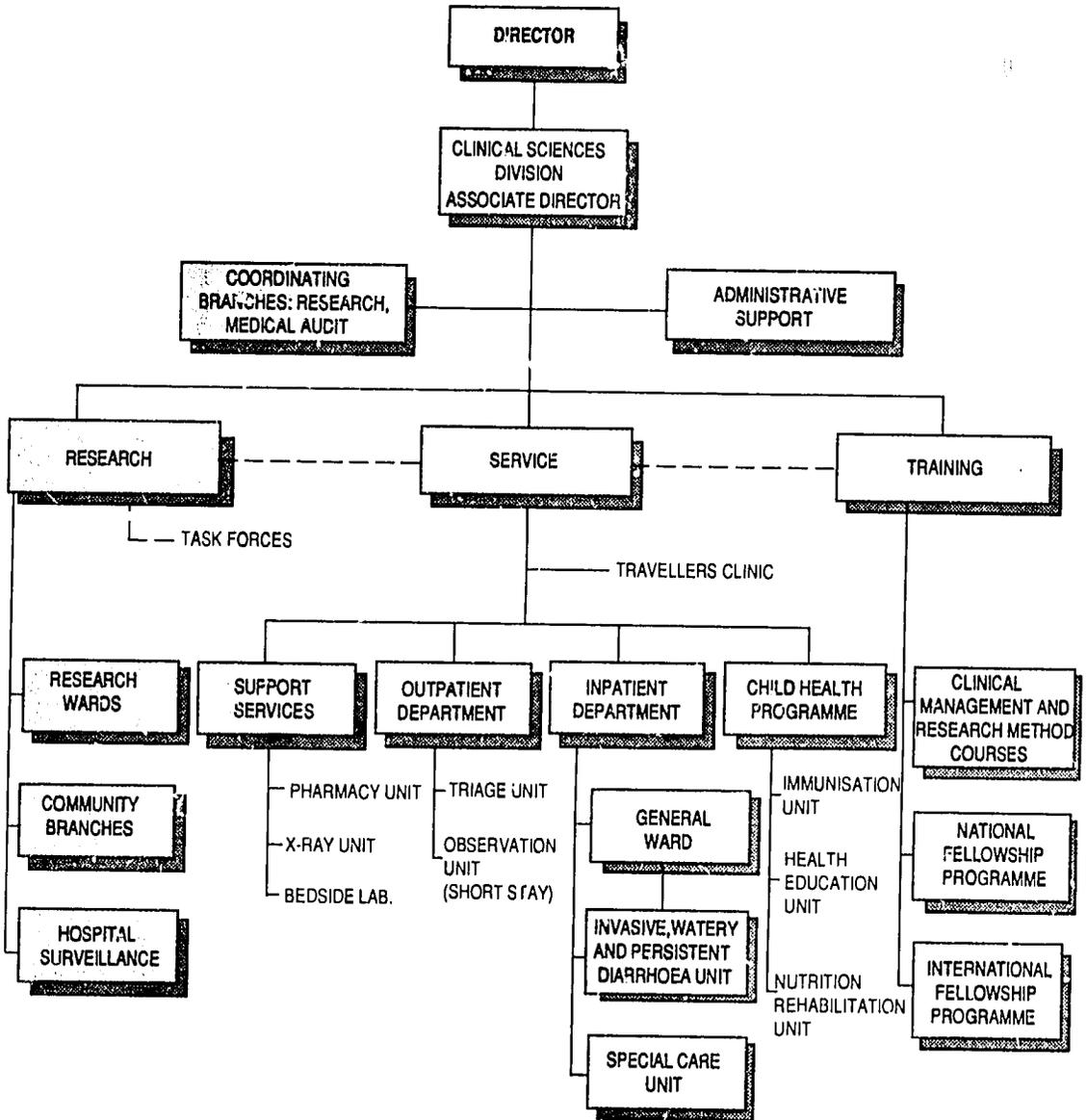
CLINICAL SCIENCES DIVISION



A nurse and doctor care for a young patient in the Dhaka Clinical Research and Service Centre while the mother looks on.

4-A

ORGANOGRAM : CLINICAL SCIENCES DIVISION



4-B

CLINICAL SCIENCES DIVISION

Associate Director: Dilip Mahalanabis

New In '92

The Clinical Sciences Division (CSD) runs a diarrhoea hospital in Dhaka (Clinical Research and Service Centre) for patient care and for conducting clinical research and training. The large number of patients with diarrhoea attending the Centre's hospital provides unparalleled opportunities for clinical studies. Many of these studies are performed within the hospital itself in the 14-bed study ward and the 12-bed metabolic ward. Others are undertaken in the general ward and in the field areas.

In addition to providing treatment for diarrhoea, complications, and nutrition rehabilitation, the Clinical Research and Service Centre (CRSC) offers health education to nearly all the patients and their attendants. The topics stressed are: preventing and treating diarrhoea, immunisation, nutrition, stimulating children, and birth spacing by family planning.

The Division operates a Surveillance Programme which investigates every 25th patient attending the CRSC. This system makes it possible to study the epidemiology of diarrhoeal diseases and to monitor changes in resistance to antibiotics.

In 1992, the divisional responsibilities were carried out by 183 fixed-term staff members, 104 volunteers, 25 contractual staff, and 49 Fellows/trainees. Two of these were international positions, 31 national officers, and 150 general service employees.

Important research currently being undertaken in the Division includes: the epidemiology of shigellosis; the determinants and management of persistent and acute diarrhoea; improvements in nutrition rehabilitation including the preparation of culturally appropriate foods; and the evaluation of the role of micronutrients (e.g. zinc, vitamin A, iron, selenium, etc.) in reducing morbidity from diarrhoea and ARI and promoting growth.

Research is coordinated through the following task forces: watery diarrhoea, invasive diarrhoea, nutrition management, clinical epidemiology, and maternal and child health. A medical audit system is in place to ensure the quality of patient care.

The Division is also responsible for providing facilities for training in clinical disciplines and in

- * A system of "medical auditing" was introduced in the Clinical Research and Service Centre.
- * Staff visited South America to advise on cholera epidemic.
- * New Officer took over charge of CRSC.
- * Dramatic increase of *V. cholerae* resistance to tetracycline noticed.
- * High calorie weaning food developed by CSD found to increase energy intake significantly.
- * Vitamin A and micronutrients took on important roles in protocols.

research to various health professionals (see Training). Several of the staff attended scientific meetings abroad or travelled to various places for consultations, collaborations, or training (see Staff Development). Dr. A.N. Alam went to Peru and Dr. M.A. Salam to Ecuador to help with the South American cholera epidemic. Dr. Alam also assisted with treatment of diarrhoea in Yemen, Iran, and Cambodia. Dr. S.K. Nath and Dr. R.L. Akbar (Training Branch) accompanied him to Cambodia.

Investigators of the Division collaborate with scientists in other divisions of the Centre, the national institutions and many institutions abroad.

HEALTH CARE

Although the major functions of the ICDDR,B are research and training, the heart of this institution is its service to the people of the community in the treatment of diarrhoeal diseases and related problems, and in the areas of preventive medicine and family planning. Besides the urban treatment centre, the activities of which are reported here, the CSD also operates two other clinics: Nandi-para Clinic, providing weekly service by physicians to a peri-urban village; and Narayananj Clinic, located in the centre of a rural project area with

physicians serving the needs of those who have ailments not manageable at the doorstep.

Treatment at all these centres is free to all (medical and nursing care, laboratory tests, medicines, and food); however, in conjunction, the Division's physicians by rotations examine, treat, and do laboratory examinations for private paying patients in the Travellers' Clinic, which occupies the same building. This report also follows.

The Child Health Programme, the third report under this heading, is an integrated health care facility with both preventive and curative components, providing services beyond the basic treatment of the hospital to both patients and their attendants.

Clinical Research and Service Centre, Dhaka

Officer in Charge: M.A. Salam (A.N. Alam until July)

Funded by: Core funds

During 1992, 87,973 persons attended the CRSC (55 of these had expired before arrival); this is 4,120 (4.5%) fewer than the previous year's figure of 92,148, and is the fifth highest number of patients treated at this Centre.

A total of 5,422 patients were admitted to the inpatient units, which represents 6.2% of the total attendance and is 476 (8.1%) fewer than the previous year's total. The proportion of admissions to the inpatient units dropped from 6.4% in 1991 to 6.2% in 1992. Of the total admissions, 4,923 (90.8%) were admitted to the General Ward or

the Intensive Care Unit (ICU). The average duration of hospitalisation of the patients admitted to either of these two areas was 5.9 days.

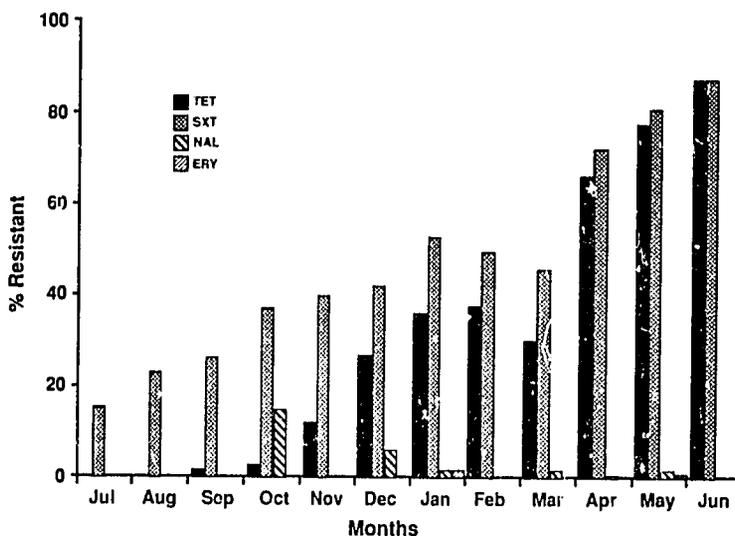
During the year, 499 patients were admitted to the Study Wards of the CRSC under 14 different research protocols. Additionally, more than 600 patients were studied in the short-stay units, thus making best possible utilisation of the patients for clinical research.

Of the 4,923 patients admitted to the General Ward or ICU for associated complications, 424 (8.6%) died in spite of all possible effort. An additional 15 patients died in the short-stay units, bringing the total hospital deaths to 439. Total in-house deaths represent 5% of patients brought alive to the CRSC; the figure is 12% lower than that of 1991.

Of the 5,422 admitted cases, *Shigella* spp. were isolated from stool/rectal swab cultures of 925 (17.1%) patients, and 104 (11.2%) of them died. Corresponding figures for 1991 were 951 (16.1%) and 120 (12.6%) respectively. Typhoidal or non-typhoidal *Salmonella* was isolated from 388 patients (7.2%), of whom 26 (6.7%) died. Accordingly, the figures for *Vibrio cholerae* O1 were 595 (11%) and 17 (2.9%), and for non-cholera vibrios, 68 (1.3% of those admitted) and 3 (4.4%). The highest number of deaths (274) occurred among the 3,563 patients who were either not sampled, or had no culturable bacterial enteric pathogens (ETEC is not routinely looked for) isolated (62.4% of total deaths).

An unexpected discovery was the dramatic

V. cholerae O1 resistance pattern
Clinical Research and Service Centre, ICDDR,B, July 1991 - June 1992





Dr. M.A. Salam amuses a child patient in the Clinical Research and Service Centre.

increase in the resistance of *V. cholerae* O1 to tetracycline (Figure). This resulted in the use of more intravenous fluids and expensive alternative antimicrobials, both contributing to increased expenditures.

A total of 72,728 litres of intravenous fluids (IV) were used, about a thousand more than the previous year. Use of IV fluids was 0.83 litre per patient (0.77 litre/patient in 1991). The number of litres of ORS used was 362,231, over 81,000 litres fewer than the 1991 figure. The ratio of IV fluids to ORS was 1:5; in 1991 it was 1:4.8.

During 1992, 6,803 radiological examinations were performed, which included 5,795 chest X-rays, 525 abdominal X-rays, and 483 X-rays of other body parts. This total included 41 chest, 5 abdominal, and 11 other X-rays performed on a cash payment basis. A total of 387 electrocardiographic examinations were performed, including 9 examinations on private patients.

Following recommendations of the Division's "external review", performed during 1992, a system of "medical auditing" has been introduced. This involves a committee of physicians who examine patient's charts systematically to determine if the proper procedures have been performed. Additionally, for improvement of clinical care and to

make more research time available to the medical staff, three "medical units" have been created, each consisting of a team of doctors; each unit is responsible for 24 hours of clinical service at a time in rotation. This has been shown to have its expected impact.

TRAVELLERS' CLINIC

Thirty-four patients visited the clinic for consultation during the year. The clinic handled 2,345 samples, of which 1,196 were for clinical pathology, 605 for microbiological investigations, 527 for biochemical tests, and 17 for miscellaneous tests. A total of 26 endoscopic examinations were performed.

CHILD HEALTH PROGRAMME

Principal Investigator: M. Aminul Islam

Funded by: DANIDA

The Child Health Programme (CHP) has now completed five years of offering a package of preventive services to the patients and attendants who come to the CRSC for clinical services. This package includes health education, immunisation, nutrition rehabilitation, and family planning

services. The Programme also offers treatment for tuberculosis, gives out safe delivery kits, and trains health personnel from home and abroad. Furthermore, monitoring and evaluating these services is an important perpetual activity.

Health education is given in groups and individually. Films are shown on various topics, such as prevention of diarrhoea, immunisation, and motivation for family planning. The male patients/attendants are given special sessions by a male health assistant. During the year, 95% of all patients and attendants received health counselling, 86% in groups and 94% individually. About 88,000 patients reported to the CRSC; 28,024 group health education sessions were organised for them and their attendants, each with 5 or 6 participants.

Immunisations (protection against diphtheria, whooping cough, tetanus, measles, polio, and tuberculosis) are offered daily from 7:00 am to 7:00 pm to children less than 2 years old and women of child-bearing age who report to the CRSC as patients or attendants. The Programme follows the international Expanded Programme on Immunization (EPI) guidelines and policies. In 1992, of the 33,787 children of the appropriate age who were treated at the CRSC, 35% were already immunised and 39% were not at that time due for any vaccine. Thus, 26% (8,759) were targeted for immunisation, and 85% (7,454) of these were immunised by the CHP (3% refused or were screened out); 12% missed the opportunity. An additional 1,183 children, who were siblings of patients, were immunised, bringing the total number to 8,637. Of these, 5,579 (65%) received their first dose of vaccine and 1,419 completed their immunisation schedule. Of the estimated 16,000 unimmunised women in the target age group, 9,789 (61%) received tetanus toxoid vaccine, 53% for the first time. This immunisation given to young women prevents tetanus infection of their newborn babies, whose umbilical cords may be cut with unclean blades.

Nutrition rehabilitation is offered to severely undernourished children admitted to the CRSC with diarrhoea. In 1992, 287 children were rehabilitated in the nutrition rehabilitation unit (NRU) along with their mothers. Mothers were trained on low-cost, home-based diets, kitchen gardening, child stimulation, and development of stitching/knitting skills. Because the NRU cannot accommodate all severely undernourished children reporting at the CRSC, 858 cases were motivated to come to the nutritional follow-up centre of the

CHP, an outpatient-based nutrition rehabilitation centre. Of these, 431 (50%) reported for growth monitoring and nutrition education.

Birth spacing and family planning services were continued for the mothers staying at the CRSC who were motivated for child spacing. During the year, 701 mothers received various methods of family planning, about the same number as in 1991. Also, 62 safe delivery kits were distributed to mothers who were in their last trimester of pregnancy. This kit contains sterile materials and, when used properly, will help prevent infection of the mother and baby during childbirth at home, where most deliveries take place.

Tuberculosis treatment (full course) is offered free of cost to all diagnosed cases and their contact cases, and visits are made to their homes (if they default) to ensure better coverage. Yet, this endeavour continued to be a problem in terms of patient compliance. During the year, 107 patients (109 in 1991) were treated, of whom 98 (92%) were children.

Training remains an important activity for dissemination and sharing of experiences with others working in similar fields. During 1992, 20 internal and 74 external health personnel were trained on the various aspects of the Programme. The Programme received requests from two students doing master of science programmes in universities abroad to work here as partial fulfillment of their dissertations. They will arrive in 1993.

Evaluation and monitoring systems have been restructured during the year to make these more scientific. The experiences have been shared by having the staff participate in two national and two international seminars and by publishing articles in international journals.

CLINICAL RESEARCH

The number of patients being treated at the CRSC is very large. About 200-300 patients seek treatment every day, the average yearly attendance being around 80,000. Therefore, the study of the patient population and spectrum of diseases seen at the facility is critical. However, it is not feasible to study each patient in depth nor to collect clinical and epidemiological data on each of these patients. The Surveillance Programme, therefore, maintains an ongoing evaluation system in which data are collected from a 4% systematic sample of patients. All patients who take part in a study are informed

and asked to sign a consent form, or consent is obtained, in the case of minors, from a parent or legal guardian.

ICDDR,B Surveillance Programme, Dhaka

Principal Investigator: Dilip Mahalanabis

Funded by: UNDP/WHO

The purpose of this ongoing diarrhoeal disease monitoring and research support activity is to identify common causative organisms of diarrhoeal illness seen at the ICDDR,B in relation to clinical and epidemiological characteristics, thus to (a) provide a weekly report for the Government of Bangladesh on diarrhoea pathogens isolated from the stool/rectal swab samples collected from selected patients, (b) improve care and introduce better preventive measures, (c) monitor changes in disease patterns, including drug sensitivity (particularly for cholera and shigellosis), and (d) provide a database on diarrhoeal illness for researchers to generate and test hypotheses.

During 1992, 3,514 were enrolled in this programme. Besides receiving routine medical care, they were interviewed by members of the surveillance team, who recorded information on socioeconomic and demographic characteristics, housing and environment, feeding practices, and use of drug and fluid therapy at home. Moreover,

each patient was examined physically by a physician and related medical histories were obtained. Anthropometric measurements, such as height, weight, and arm circumference, were also taken and a stool/rectal swab specimen was obtained for culture and microscopic examination. The Table shows the aetiological agents isolated from these patients in 1992.

■ Besides the studies on which they collaborate with other divisions, the CSD scientists are involved in 22 research projects. The first ones reported here are four on the treatment of shigellosis; two of them are new. Shigellosis is a major cause of diarrhoea and death in developing countries. The disease may lead to severe malnutrition, growth faltering, and susceptibility to complications and recurrent infection.

High nutrient feeding of undernourished children with shigellosis

Principal Investigator: R.N. Majumder

Funded by: USAID

The objective of this controlled clinical trial was to determine if intensive high-energy feeding of undernourished children 1-4 years old with acute shigellosis could improve their clinical and nutritional outcome.

Aetiological agents isolated from the patients in the surveillance programme in 1992

| Months | No. of patient: | <i>Salmonellae</i> | <i>Shigellae</i> | <i>Vibrio cholerae</i> 01 | Other vibrios | <i>Campylobacter</i> | Rotavirus |
|-------------------|-----------------|--------------------|------------------|---------------------------|---------------|----------------------|-----------|
| January | 230 | 3 | 33 | 14 | 23 | Not done | 34 |
| February | 180 | 4 | 22 | 5 | 22 | do | 31 |
| March | 249 | 4 | 21 | 13 | 60 | do | 22 |
| April | 498 | 6 | 48 | 67 | 78 | do | 14 |
| May | 364 | 4 | 48 | 61 | 43 | do | 16 |
| June | 243 | 14 | 37 | 42 | 40 | 22 | 29 |
| July | 240 | 10 | 18 | 26 | 45 | 44 | 46 |
| August | 289 | 13 | 33 | 50 | 32 | 57 | 23 |
| September | 263 | 13 | 22 | 51 | 58 | 44 | 34 |
| October | 307 | 20 | 32 | 71 | 63 | 35 | 41 |
| November | 334 | 14 | 24 | 74 | 50 | 33 | 62 |
| December | 317 | 7 | 40 | 44 | 51 | 39 | 106 |
| Total | 3514 | 112 | 378 | 518 | 565 | 274 | 458 |
| % | | 3.19 | 10.76 | 14.74 | 16.08 | 13.75 | 13.03 |
| Estimated total * | 87,850 | 2,800 | 9,450 | 12,950 | 14,125 | 9,704 | 11,450 |

* Extrapolated to the total number of patients attending the treatment facility

High-energy feeding attained by frequent meals of energy-dense foods (150 Kcal/kg.d) was compared with the usual food intake (75 Kcal/kg.d) in a group of children 1-4 years of age with severe shigellosis. Preliminary analysis of the results indicates that sick children could take as much as 150-160 kcal/kg/day from day 1 of treatment. Even over a period of 10 days, significant nutritional weight gain was demonstrated. We conclude that in acute shigellosis, frequent high energy feeding can improve food intake and has a positive impact on weight gain of malnourished children. The findings of this completed study may be of importance in reducing the adverse nutritional consequences of shigellosis, particularly in malnourished children.

Cytokines in the pathogenesis of shigellosis

Principal Investigator: M.A. Salam

Funded by: USAID

The objective of this study is to explore the relationship of cytokine production and action to severe, life-threatening complications of shigellosis. The study specifically attempts: a) to measure the production of the various cytokines, b) to determine whether a correlation exists between these biologically active hosts (and the microbial product mediators of the non-specific host response) and the severity of the colitis, fever, leukocytosis, and weight loss, or the development of specific complications, such as leukaemic reaction, hyponatraemia, or hypoglycaemia, and c) to determine if patients recovering from *Shigella* infection have a normal cytokine response to a defined stimulus, a DPT immunisation.

The enrolment of patients has been completed. Assays for Shiga toxin and cytokines are in progress and endotoxin assays have been done. The results show that there is a correlation between circulating endotoxin and development of haemolytic-uraemic syndrome, confirming earlier reports from the ICDDR,B.

Fatality rates in *Shigella* infection are high because of several lethal complications even with current standard therapy. A clear understanding of pathogenesis of complications of this disease will improve the management of patients infected with *Shigella* species and reduce disease and death.

Oral 5-aminosalicylic acid in acute shigellosis.

Principal Investigator: M.R. Islam and

P.K. Bardhan

Funded by: USAID

This double-blind, clinical trial is being conducted to evaluate the therapeutic efficacy of

5-ASA (aminosalicylic acid) in the treatment of acute shigellosis in adults. Patients received either 5-ASA (Asacol, 400 mg) or a placebo, 3 times daily, in addition to standard therapy with nalidixic acid 100 mg every 6 hours for 5 consecutive days. Clinical activity assessment and laboratory evaluations along with sigmoidoscopy with biopsy for histopathological changes are being recorded for every patient on different study days. Twenty patients have so far been enrolled, and the study is being continued.

Volatile fatty acids in experimental cholera and shigellosis

Principal Investigators: G.H. Rabbani, I. Kabir,

J. Albert, and M. Islam

Funded by: USAID/T

The significance of volatile fatty acids (VFA) in infectious diarrhoeas is not known. In this study, we are examining the role of VFAs on ion and water transport in the rabbit intestine, induced by cholera toxin. Animals' intestines are perfused with solutions containing cholera toxin and different VFAs in various molar concentrations and pHs. Polyethylene glycol (PEG) is used as a non-absorbable marker to determine net water and ion transport across the intestine. Transport rates in the control and VFA-treated animals are statistically compared. Separately, an experimental model of shigellosis will be developed in adult rabbits by infecting them orally with virulent *Shigella*. The animals will be treated with different VFAs orally and by rectal infusions for 3 to 5 days. The colonic inflammatory response to VFA treatment will be compared histologically between VFA-treated and control animals. If good results are found in animals with VFAs, their effects will be evaluated in human diseases.

Fifteen sets of intestinal perfusion experiments have been completed. The effluent samples have been kept frozen at -40°C for analysing the electrolyte contents and PEG. Further analysis is in progress.

The environment and *Shigella*-associated dysentery is the title of another related collaborative study being done. (see CHD).

■ Scientists still have many questions to answer about diarrhoeas that persist, that is, last 14 days or longer. Why do some episodes continue and others do not? What is happening in the bowel pathophysiologically? Which diets given to prevent and manage malnutrition are most effective and efficient? The following five reports are of studies that try to answer these questions and others.

Coconut oil-based, comminuted chicken-meat diet in persistent diarrhoea

Principal Investigator: P.K. Bardhan
Funded by: WHO

Most of the nutritional deficiencies seen in persistent diarrhoea due to malabsorption of nutrients are related to functional derangements of the gastrointestinal tract. Dietary manipulation remains the most important aspect of clinical management in persistent diarrhoea.

In this metabolic balance study, a diet based on coconut oil, which is a rich source of medium-chain triglycerides, is being compared with a diet of equal caloric content based on soyabean oil. Children 3-12 months of age, suffering from diarrhoea for more than two weeks, are randomly assigned to the two dietary groups. Clinical response and coefficients of nutrients absorption are recorded and related to the functional derangements identified by various laboratory investigations, and then compared between the two dietary groups. Subjects are followed for two months to monitor the results and to ensure appropriate dietary management at home. Patient enrolment and laboratory analysis have been completed. Preliminary data analysis shows that the diet based on soyabean oil is equally as effective as that based on coconut oil.

An antimicrobial in the treatment of persistent diarrhoea

Principal Investigator: P.K. Bardhan
Funded by: USAID

The overgrowth of bacteria in the small intestine may be one of the mechanisms responsible for the prolongation of diarrhoea. The objective of this double-blind study is to evaluate the efficacy of an antimicrobial agent, trimethoprim-sulphamethoxazole (TMP-SMX), in the management of children with persistent diarrhoea. Patients 3 to 24 months of age with persistent diarrhoea are being studied in two groups for the presence, quantification and type of microbial organisms in the upper small intestine, and for antibiotic sensitivity. The group receiving the TMP-SMX will then be compared again with the group not receiving it. Both groups receive a modified diet and a vitamin mineral mixture. Patient enrolment has been completed, and no adverse effects have been noted. Data are being analysed.

Small bowel microbial ecology of severe persistent diarrhoea

Principal Investigator: Dilip Mahalanabis
Funded by: USAID

Persistent diarrhoea is a poorly understood clinical syndrome, and descriptive studies on the pathogenesis and pathophysiology are needed to generate an hypothesis leading to more definitive studies. The microbial ecology in the small intestine is likely to be involved in patients with persistent diarrhoea.

The objective of this descriptive study on the pathogenesis and pathophysiology of severe persistent diarrhoea is to evaluate, in infants and small children with the disease, the role of a) diarrhoeagenic *Escherichia coli* in the small bowel, particularly enteroadherent *E. coli* of the localized and autoaggregative types and b) bacterial overgrowth of small bowel and colonic type of flora. Patients with severe persistent disease are compared with those with acute watery diarrhoea. About 100 children have been included in the study so far and samples are being processed in the laboratories. The study is in progress.

Algorithm for the management of persistent diarrhoea

Principal Investigator: Hasan Ashraf
Funded by: WHO

This study in Bangladesh is a part of a multicentre study for the evaluation of an algorithm for the management of persistent diarrhoea. The other countries involved in the study are India, Pakistan, Viet Nam, Mexico and Peru.

The treatment procedure called algorithm identifies the initial risk factors (clinical and laboratory) and inter-current factors (clinical and laboratory) associated with treatment failures and evaluates these alone or in combination as predictors of treatment failure. This also helps to identify factors (clinical and laboratory) associated with early discharge from the hospital and to evaluate these alone or in combination as predictors of early discharge.

After enrolment, the patient receives the study diet (Diet A), containing Khai (popped rice) powder, milk powder, vegetable oil, sugar, and water at a rate of 150 kcal/kg/day in divided feedings. If there is no improvement with Diet A within 7 days, the patient receives another study diet (Diet B), consisting of Khai powder, eggs, vegetable oil and glucose (i.e. diet free of animal milk). The patient is discharged from the hospital when the diarrhoea has ceased and there is weight gain. Patients are followed up two weeks later for a weight record and change in the diet, if necessary. So far, 70 patients have been enrolled. The study continues.



This child is severely dehydrated - sunken eyes, loss of skin elasticity and listlessness - and seriously needing the IV fluids being administered. Treatment with ORS will follow.

Prognostic and risk factors for prolongation of acute diarrhoea

Principal Investigators: Dilip Mahalanabis and A.S.G. Faruque
Funded by: SDC

The risk factors that influence the duration of diarrhoeal episodes or determine the nutritional impact of persistent diarrhoea are of particular interest. This ongoing clinic-based, cohort study aims to identify the factors that determine the progression of an acute diarrhoeal episode to persistent. It also seeks to use these factors as indicators of the need for early and appropriate treatment. Children with acute watery diarrhoea are randomly given either rice-ORS or glucose-ORS and are evaluated before, during, and after treatment at regular intervals.

So far, 937 children 3 to 35 months of age have been enrolled. Data management is in progress and the results will soon be available. The results may help in designing future intervention strategies against persistent diarrhoea.

- Oral rehydration therapy (ORT) continues to be

an important aspect of research, either as an adjunct, as above, or as the focus, described in the following two studies. ORT is widely used throughout the world for the prevention of death from dehydration, because it is simple and can be administered by nonmedical people in their homes. Though it saves thousands of lives every year, many are still dying who could be saved if their care-givers used oral rehydration solution (ORS) and/or used it properly. Scientists are now working on the formula, believing that ORS might be more attractive if it could not only prevent and cure dehydration, but also shorten the duration of the episode and reduce the number of stools.

Ready-to-use packaged rice-ORS on morbidity and nutrition

Principal Investigators: A.S.G. Faruque and D. Mahalanabis
Funded by: SDC

This study, undertaken in Narayanganj, aims to evaluate the role of ready-to-use, packaged rice-ORS in reducing the number and duration

of diarrhoeal episodes, and in improving nutrition in infants and young children with mild diarrhoea in rural communities in Narayanganj. The children of comparable communities receive either ready-to-use rice-ORS or glucose-ORS. About 1,200 infants and young children are under study to document their diarrhoeal illnesses and nutritional changes. The response of the mothers is also being monitored.

The results of the study will help to formulate future health policy in diarrhoeal disease management and will have far reaching implications for child survival efforts. The study is in progress.

Glutamine and glucose in stimulating water and electrolyte absorption

Principal Investigators: S. Islam, D. Mahalanabis, M.A. Wahed, and A.S.M.H. Rahman
Funded by: WHO

Organic substrate is an integral part of ORS because it enhances the absorption of sodium and water from the intestine. In this study, done in collaboration with the University of Dhaka (A.K. Chowdhury), the effect of glutamine, the primary metabolic fuel of the intestinal mucosal cells, on water and electrolyte absorption was measured *in vivo* in ileal loops of healthy rabbits and compared with glucose. The purpose was to generate physiological information which may be useful in designing better ORS formulations. Polyethylene glycol was used as a non-absorbable marker. Two loops of similar length, separated by an interloop, were constructed in intravenously anaesthetised animals. The loops were injected with 5 ml of a solution that contained Na^+ , K^+ , Cl^- , PEG, and either glucose or glutamine. After 45 minutes of intra-abdominal incubation at 37°C , both glucose and glutamine stimulated water, sodium, potassium, and chloride absorption. But the absorption of water, sodium, potassium, and chloride from the glutamine electrolyte solution was significantly higher than that of from the glucose solution. It is concluded that from equimolar solution, the water and electrolyte absorption efficacy of glutamine is superior to glucose. These results suggest that either alone or in combination with glucose, glutamine is a potentially important organic substrate to be tested in ORS for treating diarrhoeal dehydration.

Management of acute diarrhoea in diabetics

Principal Investigator: R. Haider
Funded by: USAID

The objective of this completed study, which was done in collaboration with the Bangladesh Institute

for Research and Rehabilitation in Diabetes, Endocrine, and Metabolic Disorders (BIRDEM), was to assess whether there is significant risk of hyperglycaemia with the presently used carbohydrate-containing glucose-ORS and rice-ORS compared with a solution without carbohydrate (glycine-ORS) in diabetics with acute diarrhoea. Forty-five diabetics 15-60 years of age, with less than three days of diarrhoea were studied.

Results showed that there was no significant difference in blood glucose levels and duration of diarrhoea in any of the three ORS groups. Therefore, physicians and health workers can safely advise and use ORS containing either glucose or rice powder in diabetics with acute diarrhoea, presenting with mild or moderate dehydration.

■ In Bangladesh, and in other developing countries, many children have repeated attacks of diarrhoea, and this takes its toll on their growth and development. Malnourished children are believed to be more susceptible to infection, and so they are caught in a cycle they cannot escape. Infants are particularly at risk at the time they are weaned from the breast. And so, mothers are encouraged to continue feedings when their babies have diarrhoea. An energy-high weaning food, one that is thin in consistency so that it can be swallowed easily and packed with calories and nutrients so the baby need not eat much to be fully nourished, seems to be a wise way to approach this problem. And this weaning food has been developed by CSD scientists. The following four reports are of studies to determine the acceptability and performance of this recipe, which is based on amylase-rich, germinated cereal (ARGC) flour.

Feeding behavior and acceptability of ARGC fortified weaning food

Principal Investigators: Sushila Zeitlyn, D. Mahalanabis, and A.S.G. Faruque
Funded by: USAID/T

This completed qualitative, ethnographic study investigated the acceptability of promoting ARGC flour as an additive to the usual home-based family foods. The objective was to see whether ARGC could increase the acceptability of giving infants and children a greater share of the family food. The 60 study mothers of infants between 6 and 24 months of age responded very positively to the ARGC. It was found to be particularly popular with mothers of children under 10 months of age. Descriptive data on feeding practices and beliefs about digestion and the dietary management of diarrhoea and the caes

of diarrhoea were also gathered. The study was completed in December and the data are being prepared for publication.

ARGC flour in the treatment of dysentery

Principal Investigator: Dilip Mahalanabis
Funded by: SDC

The objective of this controlled study is to evaluate the role of a porridge liquefied by adding ARGC flour in increasing the caloric and nutrient intake in children 6 to 35 months of age with acute dysentery. Children are randomly allocated to receive either an amylase-treated porridge (study diet), an unaltered thick porridge with energy density similar to that of the study porridge (1st control), or a porridge diluted with water to make its consistency similar to that of the study porridge (2nd control). Besides given standard case management, the children receive the porridges 4 times daily for 5 days. A total of 99 patients of both sexes, 33 in each group, will be studied over a period of two years. The major response variables will be quantity of food and breastmilk intake, duration of illness and character of stool output.

We have so far recruited 90 patients. Data entry of these is completed and interim analysis is in progress. The results so far show that the energy intake from the study porridge increased significantly compared with the controls (i.e. more than 90% increase over 5 days); the ARGC-treated porridge did not cause any adverse effects on breastmilk intake and had no adverse effect on the course of diarrhoea.

Energy-dense porridge for children with acute watery diarrhoea

Principal Investigators: Mujibur Rahman and A.K. Mitra
Funded by: SDC

The aim of this controlled study is to evaluate the role of a porridge liquefied by the addition of ARGC flour in increasing the caloric and nutrient intake in infants and young children with acute diarrhoea. Patients attending the CRSC are randomly allocated to receive either of three diets: (a) the experimental diet of rice or rice plus lentil plus ARGC, (b) a control diet of rice or rice plus lentil of the same energy density, or (c) a control diet of rice or rice plus lentil, liquefied by adding water to the same consistency as the experimental diet. A total of 99 patients of both sexes, 33 in each group, are being studied over a period of two years. The children are given the standard case management, and 4 meals of the

assigned porridge are offered every day until discharge. The major response variables are quantity of food intake, quantity of breastmilk intake, diarrhoeal duration, and stool output. Also, the net absorption of total energy, protein, and lipids of 100 male patients is being measured, using an intake and output balance over a period of 3 days.

We have completed the first phase of the study. Patient recruitment for the metabolic balance study is in progress. The results of the interim analysis of the study show that the energy intake from the study porridge was significantly more (i.e. more than 60% increase over 3 days) than that from either of the controls. Furthermore, the ARGC porridge did not have any negative effects on breastmilk intake, nor on the course of diarrhoea, i.e. it did not cause an increase in the amount or duration of stool output.

ARGC rice powder and yogurt in persistent diarrhoea

Principal Investigators: D. Mahalanabis and A. Khanam
Funded by: SDC

In an effort to improve the diet of patients with persistent diarrhoea and guard against malnutrition, we evaluated the role of yogurt and starch that has been partially hydrolysed by adding ARGC. Sixty-five children 5 to 23 months of age were randomly assigned to four diet groups using a factorial design. One group (16) received cooked rice powder plus milk; the second group (15), ARGC-based rice powder prepared with milk; the third group (17), a diet based on cooked rice powder and yogurt; and the fourth (17) ARGC-based rice powder plus yogurt.

Data have been entered into a computer and an interim analysis is underway to evaluate the different diets on intake, weight gain, stool output, and recovery from persistent diarrhoea.

ARGC flour-based weaning food in the rehabilitation of undernourished children

Principal Investigators: M. Mujibur Rahman and M. Aminul Islam
Funded by: SDC

The aim of this study is to evaluate whether an energy-dense porridge liquefied with ARGC flour increases the energy intake in severely malnourished children 5 to 18 months of age recovering from diarrhoea; whether it causes recurrence of diarrhoea; whether it adversely affects breastmilk intake; and how the mothers

respond to such an approach. The children randomly receive either the amylase-treated porridge, an unaltered thick porridge which is energy dense (1st control), or a porridge diluted with water to the same consistency as the experimental diet (2nd control). The porridges are offered 4 times daily for 5 days. The major outcome variables are: intake of porridge and breastmilk, recurrence of diarrhoea, and mothers' acceptance of the study porridge.

Of the 99 patients (33 in each group) to be studied, we have so far recruited 81. The interim analysis shows that energy intake (kcal/kg.d) increased significantly in the study group compared with controls (i.e. by more than 40% over 5 days). Intake of ARGC porridge did not cause recurrence of diarrhoea or adversely affect breastmilk intake, and the porridge was well accepted by the mothers.

■ Vitamin A supplementation has been shown to reduce the death rate of children less than 5 years of age. Zinc, the experts say, enhances skeletal growth when supplemented in deficient patients. And other micronutrients have also been demonstrated to improve health in various ways. As many as eight studies, most of them new in 1992, are exploring more specifically how these vitamins and minerals affect disease, growth, and development. These results should have important public health implications.

Safety and effect of vitamin A supplementation

Principal Investigators: Dilip Mahalanabis and M.M. Rahman

Funded by: USAID

To evaluate the safety of vitamin A supplementation and its effect on the health of infants less than 6 months of age, using the immunisation programme as an entry point, a placebo-controlled, double-blind study is being undertaken. The infants are randomly assigned to receive either vitamin A or an identical liquid preparation which does not contain the vitamin. The study group's infants receive 3 consecutive doses of 50,000 units of vitamin A (infants in the control group receive 3 placebo doses) per month each time they receive a DPT immunisation. A total of 480 babies, 240 in each group, will eventually be studied over a period of one year. Being monitored are: side-effects, if any (e.g. bulged fontanelle, nausea/vomiting, irritability and diarrhoea) following each dose; serum retinyl ester level 7 days after the 3rd dose; and the state of vitamin A stores after the 3rd dose, as measured by the modified relative

dose response test (for details of this test, see the collaborative study **Establishment of techniques to assess vitamin A status** in LSD, Biochemistry and Nutrition). This is an ongoing study. So far we have enrolled 128 infants.

Vitamin A supplementation in the treatment of shigellosis

Principal Investigator: Shahadat Hossain

Funded by: USAID

The objective of this double-blind, clinical study, in which the children are randomly allocated to receive either vitamin A or a placebo, is to determine whether a large single dose of the vitamin (200,000 IU) reduces the duration and severity of symptoms of patients suffering from acute shigellosis who also have subclinical vitamin A deficiency. This is a common syndrome in the population from which these patients come, and positive results could lead to interventions which reduce the suffering and death from shigellosis.

So far we have recruited 44 patients and of these, the bacteriological reports are as follows: 24 *Shigella dysenteriae* type O1, 2 *S. dysenteriae* type O2, 14 *S. flexneri*, 2 *S. sonnei*, and in 2 specimens no organisms were isolated. The study is ongoing and the data have not yet been analysed.

Vitamin A and zinc in persistent diarrhoea

Principal Investigators: D. Mahalanabis, D. Habte, and A.S.G. Faruque

Funded by: USAID

Sufficient biomedical and experimental evidence has been accumulated over recent years to justify a clinical trial with community follow-up of an appropriate mixture of vitamin A and zinc to determine its public health impact on diarrhoeal diseases.

This ongoing, double-blind, clinic-based study with community follow-up aims to determine the effect of vitamin A and zinc, either singly or combined, on both the duration of acute diarrhoea (both watery and dysentery) and the progression of nutritional recovery during convalescence.

Children are randomly allocated to receive daily for 15 days either vitamin A (15,000 IU), elemental zinc (40 mg), both, or a multivitamin preparation. This multivitamin is also present in the preparations of the other three groups. Study children stay in the hospital for 24 hours, after which they are evaluated in the clinic and households at regular intervals. So far, about 200 infants and children have been studied.

Effect of vitamin A status and its supplementation on pneumonia

Principal Investigator: A.N. Alam

Funded by: USAID

The objective of this study, done in collaboration with Dhaka Shishu Hospital (M.S. Akbar) is to see if vitamin A supplementation in hospitalised children with subclinical deficiency reduces the duration and severity of pneumonia. The study is double-blind with random appropriation of cases and a cross-over design.

Children of both sexes between 6 and 60 months admitted to Dhaka Shishu Hospital with histories of cough, fever, and respiratory rate of more than 40/minute are being recruited. All children receive standard antibiotic treatment for pneumonia according to WHO recommendations. In addition, children receive an identical syrup, either with 200,000 IU of vitamin A or without any vitamin. Besides routine laboratory investigations and x-rays of the chest, biochemical and anthropometric indices are collected on admission, and the clinical course with respect to body temperature, respiratory rate, and clinical signs in the chest are closely monitored every 8 hours. After discharge, the children are followed up every fortnight for a period of three months to collect information about illnesses and monitor any relapse of pneumonia.

So far, 65 of the 110 patients required are being studied. Completed data after the 6 follow-ups are being entered into the computer. The results will be available only after completion of the study when the code is broken.

Zinc and iron supplementation on growth and morbidity

Principal Investigators: S.M. Akramuzzaman and A.K. Mitra

Funded by: UNICEF

The aim of this community-based study was to evaluate the role of zinc and iron supplementation in reducing morbidity and improving the growth of children in a poor community. It was conducted in Nandipara, where there are more than 2,000 households with about 450 eligible children under this study. The children were randomly assigned either to an intervention group to receive vitamins plus minerals, or a control group to receive vitamins, daily for one complete year on a double-blind schedule. Daily symptoms of illness, if any, and compliance were recorded by the locally recruited volunteers and rechecked by the health assistants. Anthropometric measurements were taken on a fortnightly basis. The investiga-

tors monitored the records and gave treatment for any illnesses on their weekly visits.

After the initial census and household mapping, the procedure of supplementation was carried out. The rate of drop-out was less than 10%. The common illnesses among these children are acute respiratory infections, otitis media, and skin infections. The supplementation is completed and the morbidity and anthropometric data have been entered into the computer. Analysis of the data and a report on the results are expected to be completed soon.

Micronutrient mixtures in acute diarrhoea, acute respiratory infections, and malnutrition

Principal Investigators: D. Mahalanabis and A.S.G. Faruque

Funded by: SDC

This community intervention trial at Narayanganj aims to evaluate the role of certain micronutrients in reducing the number and average duration of episodes of and the total number of days a patient suffers from acute respiratory infections (ARI) and diarrhoea during the study period. Also, the study will appraise their use in improving nutrition in infants and young children in rural communities.

The study is in progress. Twenty-four comparable communities are randomly allocated to four different interventions groups. Targeted children in six communities are given a micronutrient mixture comprised of zinc, selenium, iron, copper, and folate; those in another six receive a mixture of iron, copper, and folate. Another group from another six communities get only zinc and selenium, and the remaining group is provided a multivitamin preparation only. The multivitamins are also present in the mixtures of the other three groups. About 1,200 infants and young children are monitored for diarrhoea and ARI diseases and nutritional changes.

Effect of folic acid in acute diarrhoea

Principal Investigator: Hasan Ashraf

Funded by: USAID

Some limited studies have suggested that the administration of oral folate during the acute phase of infantile and early childhood (1-44 months of age) diarrhoea shortens its duration.

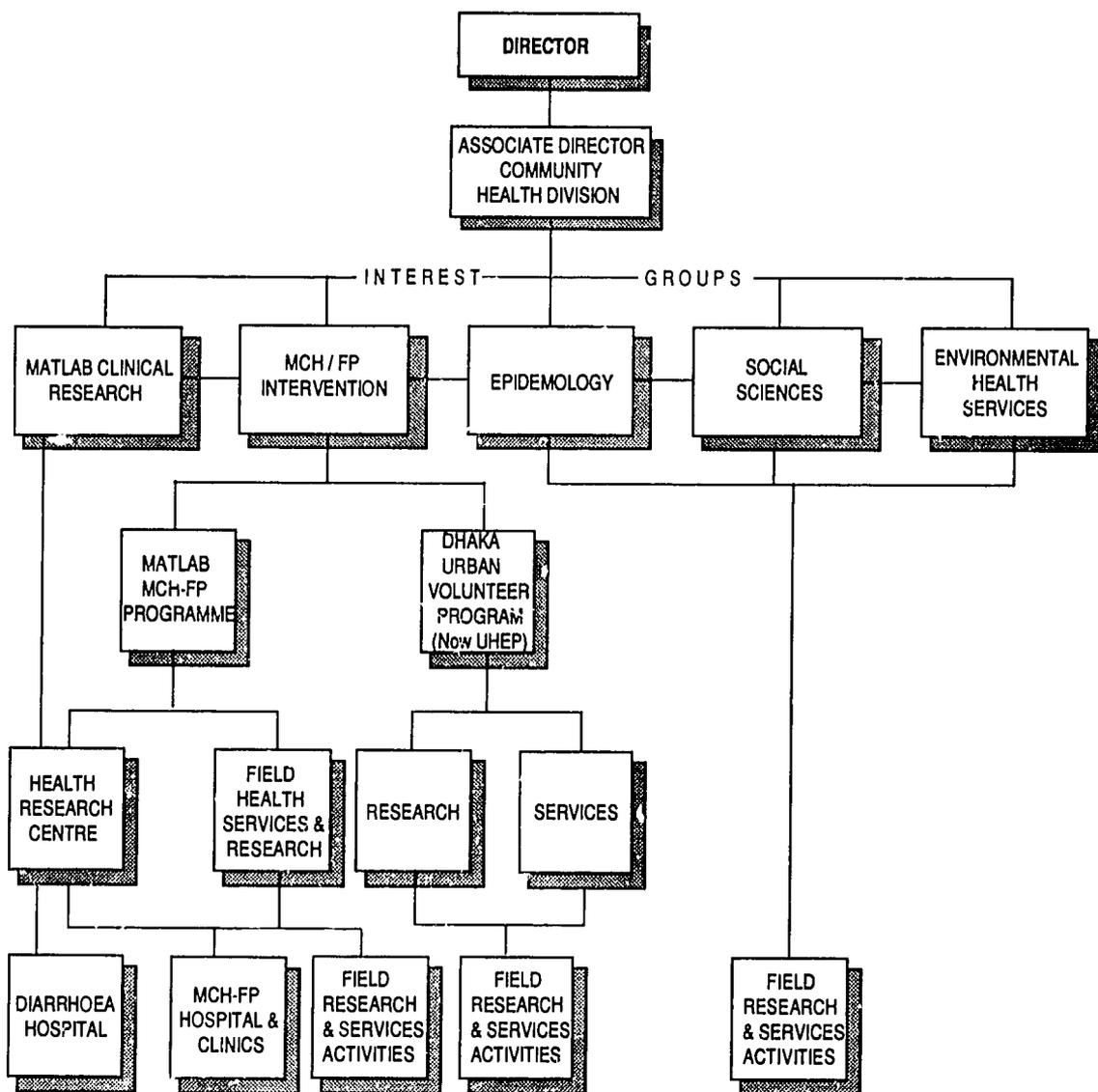
In this double-blind study, male patients 6 to 36 months of age with a history of watery diarrhoea of less than 72-hours' duration are randomly assigned to receive either oral folate (5 mg) or a placebo every 8 hours for 5 days. So far, 12 patients have been enrolled.

COMMUNITY HEALTH DIVISION



Prof. Sack enjoying his new office in the Community Health Division's recently constructed premises.

ORGANOGRAM : COMMUNITY HEALTH DIVISION



COMMUNITY HEALTH DIVISION

Associate Director: R. Bradley Sack

The Community Health Division (CHD) is comprised of investigators whose primary interest is in the study of infectious diseases at the community level, especially diarrhoeal and related illnesses in children and their mothers; further attention is also given to family planning, nutritional rehabilitation, and maternity care. More specifically, these interests include: epidemiologic patterns of illness, transmission of infectious agents, delivery of health care, and prevention of illness through education, behaviour modification, and vaccines. The research and service work of the Division takes place in both rural and urban areas, mostly with persons of low socioeconomic status. The rural area is in Matlab, and the major programme there is called the **Maternal and Child Health and Family Planning Project**. The urban area is in Dhaka and its major programme is called the **Urban Health Extension Project**.

There are currently 16 international, 26 national officers, and 215 general service staff members employed by the CHD. An additional one national officer and 17 General Service staff are on short term service, and 139 employees are either community health workers, health workers, or urban volunteers.

The major achievements of 1992 are reported below in brief. More details are given by the various units.

- ** In response to requests by the Government of Bangladesh (GoB), teams of physicians and epidemiologists visited the areas of the country where major diarrhoea epidemics were occurring. Most of the patients were confirmed as having cholera.
- ** ICCDR,B consultants, including Dr. AKM Siddique from CHD, returned to South America (Peru and Ecuador) to assist the governments there in the management and control of their cholera epidemics.
- ** The Environmental Health interest group, in conjunction with UNICEF, organised and held a three-day workshop in Rajendripur in April

New in '92

- * Division moved to new space over library in May.
 - * First Divisional retreat held in November.
 - * Workshop on water and sanitation held in April.
 - * Matlab had record-breaking epidemic of diarrhoea.
 - * UVP ended; UHEP began.
 - * MCH-FP area has a contraceptive user's prevalence of 61%.
 - * Oral polio immunisations given to children with diarrhoea found to have less than optimal effect.
- on water and sanitation issues (WS/S) involving the non-governmental organisations (NGO) working in those areas in Bangladesh. Representatives from 21 selected NGO and donor agencies and CHD scientists identified problems and their solutions in conducting WS/S projects. The proceedings are being published in both English and Bengali.
- ** The CHD offices were moved in May to their newly-constructed space above the library (see photo in this section).
 - ** A large number of presentations by CHD members were given at the Asian Diarrhoeal Disease Conference held in Pakistan in November. Others attended and/or gave papers at the African Diarrhoeal Disease Conference in Nigeria (March); the annual National Conference on International Health in Washington (May); the American Anthropological Association Annual Conference in San Francisco (June); the US-Japan Cholera meeting in Tokyo (July); the Australian Tropical

Health and Nutrition Conference in Brisbane (October); the Annual Convention of Indian Society for Medical Statistics in Bombay (November); and the International Congress on Malaria and Tropical Medicine in Thailand (December).

- ** Many visits were also made to other parts of the world for seminars, workshops, training courses (see Staff Development), meetings, consultations, and fund-raising.
- ** The first Divisional retreat was held at the Midtown Hotel, Dhaka in November (2 days). The group identified goals and priorities for CHD for the next five years.
- ** Much effort was devoted during the year to the development of several major protocols, which will begin in 1993. These include: a) **vaccine studies** (AIK-C measles vaccine given at 6 months of age; pneumococcal vaccine given to pregnant women during their 3rd trimester), b) **epidemiologic studies** (sentinel, country-wide surveillance system for cholera; newborn cohort study to be done in Mirzapur;

decay of maternal measles antibody in small children), c) **behavioural studies** (health-seeking behaviour in the urban slums; rural studies of barriers to seeking medical care for children with acute respiratory infection (ARI); rural studies of hand-washing behaviour; disposal of children's faeces in an urban slum), and **clinical and intervention studies** (assessing wheezing and hypoxia in children hospitalised with lower ARIs; prevention of persistent diarrhoea by the use of bismuth subsalicylate during acute diarrhoeal episodes; study of anaemia in pregnant women; reproductive tract infections in rural women).

The Division has 5 "scientific interest groups", each with a coordinator; each meets monthly to discuss areas of common work and study. They are: MATLAB CLINICAL SCIENCES, SOCIAL SCIENCES, MCH/INTERVENTION, EPIDEMIOLOGY, and ENVIRONMENTAL HEALTH. The Division also has a coordination committee made up of several persons, including the coordinators of each interest group; this meets weekly. All members of the Division meet together monthly. The activities of the interest groups follow.



Centre's staff members and guests examine the new CHD quarters on the day of its inauguration

The MATLAB CLINICAL SCIENCES INTEREST GROUP (Md Yunus, Coordinator) includes those scientists whose primary involvement is in the Matlab Diarrhoea Treatment Centre. This rural field hospital and research centre offers free diarrhoeal treatment to residents of Matlab and surrounding areas, thus providing support to many of the ongoing community-based studies. A laboratory provides microbiological support. Often referred to as "the hospital", this two-story building with 70 beds is located in Matlab Thana, Chandpur District, 50 km SE of Dhaka.

Matlab Diarrhoea Treatment Centre

Head: Md. Yunus

Funded by: Core funds

The Diarrhoea Treatment Centre (DTC) in the Matlab Health and Research Centre and the 3 community-operated treatment centres (COTCs) located at Nayergaon, Kalirbazar, and Shataki provide free treatment services to diarrhoeal patients of the community. A record breaking epidemic of diarrhoeal diseases at Matlab and neighboring thanas during 1992 brought 16,866 patients to the DTC; 20% came from within the Demographic Surveillance System (DSS) area and 80% from outside. This was an increase of more than 6,000 over 1991. The case fatality rate was 0.67%. Another 6,251 patients with diarrhoea were treated at the three COTCs (3,303 in 1991), and 13 died, a case fatality rate of only 0.21%.

Stool specimens from 3,327 patients who lived within the DSS area were cultured and yielded two main pathogens: *Vibrio cholerae* O1 (23%) and *Shigella* spp. (6%). The isolation of *V. cholerae* O1 rose sharply during the year from that of previous years. Non-cholera vibrios and *Salmonella* were each isolated from about 1% of the patients. Figure 1 presents the isolation rate of these organisms for the last 8 years. Isolation of *Shigella* spp. declined during the year; the most common species was *S. flexneri* (74%), followed by *S. dysenteriae* type 1 (18%).

Figure 2 depicts the resistance pattern of *Shigella* isolates to common antibiotics over the last 6 years. The greatest change was the increase over previous years in the resistance to mecillinam of all *Shigella* species; the previous years are not shown in the figure. Encouraging is the continued sensitivity to nalidixic acid of all but *S. dysenteriae* type 1.

Stool microscopic examination was done on 1,805 samples and the main ova and parasites detected were: *Ascaris lumbricoides* (31%), *Trichuris trichura* (12%), hookworms (5%), and *Giardia lamblia* (5%). *Entamoeba histolytica* was

detected in only 1% of the samples.

The Matlab Centre hosted 226 visitors during 1992 from home and abroad, including representatives of donor agencies, visiting scientists, and foreign diplomats (see Visitors).

Matlab staff clinic:

Head: Md. Yunus

Funded by: Core funds

The Matlab staff clinic provides health care services to staff members and their entitled dependents. It is primarily managed by a female health assistant; the physicians of the DTC are on duty on rotation. During 1992, 5,374 patients were seen as outpatients by the clinic and another 79 were provided with hospitalised care. In addition, vaccinations against diphtheria, whooping cough, tetanus, poliomyelitis, measles, and tuberculosis were provided.

The SOCIAL SCIENCE INTEREST GROUP (KMA AZIZ, coordinator) is involved primarily with social and behavioural issues that are important in the implementation of public health interventions. Behaviour is influenced by cultural dimensions and geographic elements which must be considered when change in a community is necessary for the sake of health. Besides the following reports, scientists of this group also collaborated on the study **Feeding behaviour and the acceptability of ARGO fortified weaning food** (see CSD)

Factors related to patients with diarrhoea

Principal Investigators: K.M.A. Aziz, A. Bhuiya, M. Yunus, and M. Strong

Funded by: Core funds

The objective of this epidemiologic and ethnomedical study was to determine the socioeconomic, demographic, and cultural factors related to patients with diarrhoea by investigating the perceptions and knowledge regarding diarrhoeal diseases and their management in the home, as well as utilisation of community resources and treatment centre facilities in the Matlab area.

The index cases were 312 children less than 5 years of age selected from the patients admitted to the DTC during June to December 1990. They included 230 watery diarrhoea and 82 dysentery cases. In addition, the study included 452 watery diarrhoea and 145 dysentery cases from the neighbourhood of the index cases, recruited through active surveillance. Information about diarrhoea and its management during and after illness of the selected cases was collected

Figure 1 - Isolation of vibrios and *Shigella* species
Matlab Diarrhoea Treatment Centre for last eight years

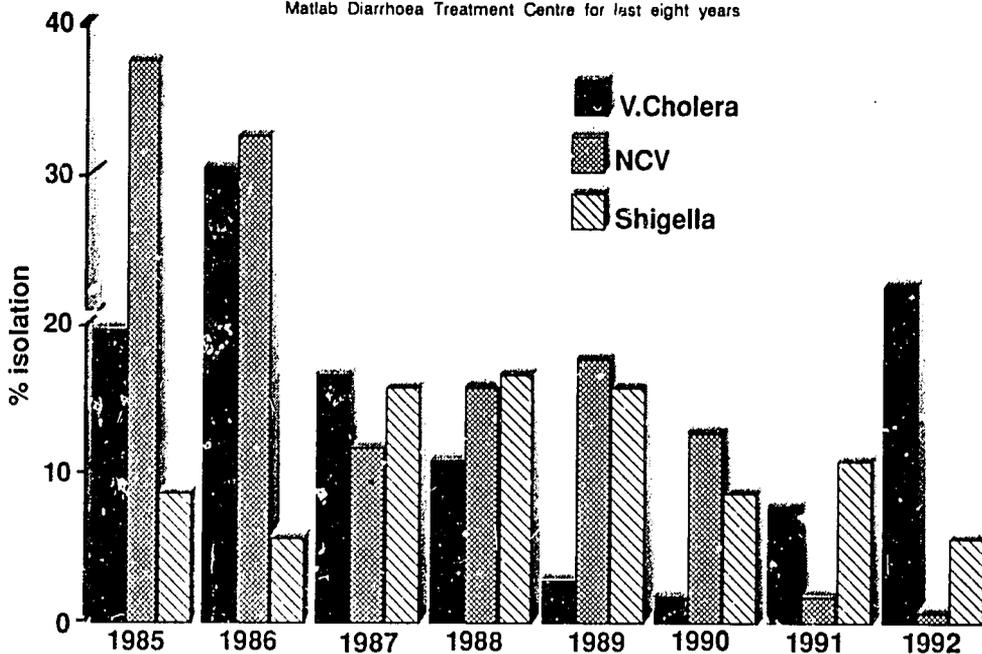
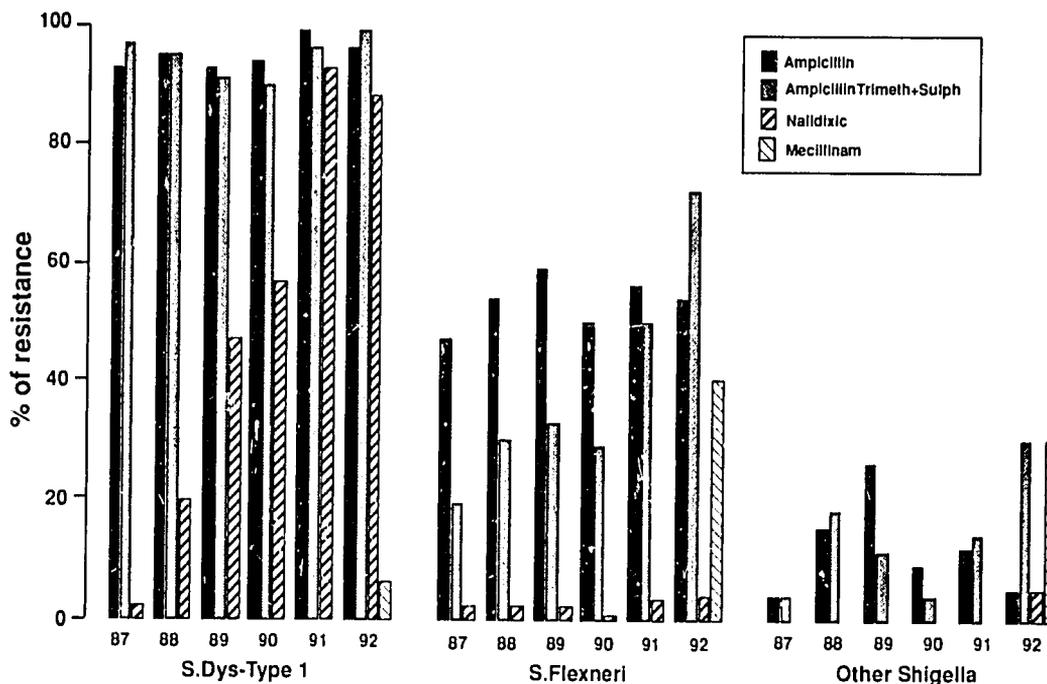


Figure 2 - Resistance pattern of *Shigella* species
Matlab Diarrhoea Treatment Centre for last six years



by interviewing the caregivers. The caregivers were also asked about their perceptions about diarrhoea and hygienic practices. Selective socioeconomic information, including type and dimension of houses, land owning, education of the parents, and occupation of the father, was also obtained.

The caregivers management approach was determined by the type and cause of diarrhoea. Oral rehydration therapy (ORT) was not considered for diarrhoeas which were believed to be caused by supernatural and certain other cultural factors. In the index cases, overall ORT use prior to hospitalisation was about 70%. In the community cases, this rate was only 28%. Almost all the users of ORT believed that it would stop diarrhoea. Non-users sometimes resorted to incantation for the child and mother, imposed restriction on movement and food intake of the mothers, and favoured the use of herbs and drugs. Almost all mothers of fully and partially breastfed children continued to breastfeed them during the acute and convalescent stages of diarrhoea. There was a noticeable shift in the supplemental foods which the mothers recommended and gave to partially breastfed children during diarrhoea. However, they seemed to reduce the use of all other foods.

Regarding hygiene practices, it was observed that all the caregivers used bare hands and most used only water in cleaning the child after defecation, and then most used only water to clean the soiled hand. The majority of caregivers disposed of the faeces in an unhygienic way.

The findings have implications for both management and prevention of diarrhoea. Educational interventions could be directed toward helping the caregivers make the right choice of management approach for diarrhoeal illness and follow hygienic practices in cleaning and disposing of the stools, which are likely to have a positive impact on diarrhoeal diseases control programmes.

β -carotene rich foods as a source of vitamin A

Principal Investigator: K.M.A. Aziz

Funded by: USAID

The objective of this study is to develop a nutrition education strategy that will lead to improved preparation and increased consumption of β -carotene rich vegetables and fruits by young children and mothers. The protocol has two major phases. The first is comprised of a series of baseline and follow-up surveys, namely a) KAP and indepth interviews every 6 months, b) quarterly participant observations, and c) monthly

24-hour dietary recall. In addition, mothers are provided monthly nutrition education about β -carotene rich vegetables and fruits, including cooking demonstrations in groups of 6 to 10. In the second phase, 2 sets of villages will be selected and designated study area' and control area' in both the MCH-FP and the comparison areas. This phase will be similar to the first in respect to information collection; in addition, collection of food, breastmilk, and finger prick blood samples from children will be done for analyses of β -carotene or serum vitamin A levels.

In the first phase which started in April, 160 mothers, each with an index child 6 to 59 months of age, were identified from a cluster of randomly selected villages in the comparison area of Matlab MCH-FP. The basis for selection of households was: (1) mothers illiterate, (2) members not in possession of working watches and/or radios, (3) cultivable land not exceeding 50 decimals, and (4) kitchen garden space not exceeding more than half of a dwelling space. This phase will be completed in February 1993. Data processing and analysis are in progress.

The MCH/INTERVENTION INTEREST GROUP (A. de Francisco, coordinator) is involved with activities that serve the medical needs in the community, both in rural Matlab, and urban Dhaka.

RURAL ACTIVITIES

Matlab MCH-FP Project

Principal Investigators: Andrés de Francisco and J. Chakraborty

Funded by: Core funds

The overall goals of the Matlab Maternal and Child Health and Family Planning (MCH/FP) Project and Record-keeping System are fertility decline and decreased mortality and morbidity of women of childbearing age and children less than 5 years of age in rural Bangladesh. Project activities directed towards these goals include provision of services and training, research focused on identification of successful methods of service delivery and related descriptive research, and maintenance of a computerised record-keeping system.

The Project started as the Family Planning and Health Services Project in 1977 with the objective of reducing fertility and subsequently improving child survival. It expanded in 1986 to include broader services and data collection in a population of 100,000 (see 1990 AR for details of the history).

CHD staff involved in MCH-FP activities meet in the Conference Room of the Treatment Centre at Matlab. Dr. de Francisco, left, leads the discussion.



FAMILY PLANNING ACTIVITIES: The programme has now achieved a contraceptive users prevalence (CUP) of 61%, the highest ever reported in rural Bangladesh and approximately 1/3 higher than the national average. The total fertility rate has been reduced to 3.6 in the area. This has been achieved by the community health workers (CHWs), who with their excellent training and good relationship with the community, offer contraceptives to eligible couples on a cafeteria approach, i.e. their clients are offered a wide range, from condoms to Copper T (IUDs), in their homes. By the end of 1992, 10,867 women were contraceptive users; of these 5,393 (50%) were using injectables (DMPA) and 2,858 (26%) oral contraceptives.

Current service-oriented research activities include the screening for and treatment of side-effects of women using contraception. An analysis of menstrual cycle disturbances and the discontinuation of DMPA in Matlab showed that the major factors affecting discontinuation were changes in the menstrual status. Side-effects, management of the side-effects, motivation for use and husband's opinion had effected the duration of use of DMPA.

The Project undertakes between 150 and 200 tubectomies and a few vasectomies each year.

These are done by two female physicians at the MCH-FP inpatient facility, and normally the recipients require only 2 days in the hospital. Long-term observation for possible complications through household visits is being conducted.

MOTHER AND CHILD SURVIVAL ACTIVITIES: Service statistics indicate that during the year, 2,068 pregnant women received antenatal care and 603 received postnatal care. The programme's nurse midwives were called for deliveries 593 times and the midwives 366 times. This is an increase from 444 and 245 respectively in the previous year.

One hundred and ninety-five mothers were admitted to the Matlab Hospital and delivered by their staff, and 78 females were admitted for other reasons. The outpatient department saw 6,839 women of reproductive age during the year, and 21,854 contacts were made for follow-up of contraceptive counseling, the largest share being with women using injectables.

During 1992, 922 children less than 5 years of age were admitted to the hospital; of these 461 (50%) were suffering from acute lower respiratory infections (ALRI). Similarly, the outpatient department of the hospital and the 4 sub-centres attended 6,334 infants and 14,787 children 1 to 4

years of age. There were 83 children admitted to the nutrition rehabilitation unit.

Immunisation data for the year show that 93.9% of infants were immunised with BCG (tuberculosis vaccine), 81.2% with DPTP III (3 doses of diphtheria, whooping cough, tetanus and polio vaccines), 94.4% of children 9 to 23 months of age against measles, and 96.9% of women of reproductive age with 2 doses of tetanus toxoid. Over 14,033 capsules of vitamin A were distributed in the appropriate dosage every 6 months, reaching a coverage of 95% in that age group (over 6 months old).

During the year, 1,866 cases of ALRI were reported; of these 1,430 were treated at home by CHWs, and 363 were referred to the ALRI unit at the hospital.

Furthermore, 234,457 locally made ORS packets were distributed and 3,325 safe delivery kits were produced and given to pregnant women.

RECORD-KEEPING SYSTEM: The Project has a computerised record-keeping system which provides feedback to the field workers within one month of data collection for improved service delivery, supervision, and quality of care. As a result, mothers and children at risk are targeted more efficiently by CHWs, and the workers' time and activities are better organised. Considerable reductions in maternal and child mortality are documented.

RESEARCH STUDIES: The main research objectives of the Project are to test and quantify the effectiveness of health and family planning programme interventions in decreasing fertility and morbidity and mortality prior to extension in a broader nationalised context; and to conduct descriptive, epidemiologic, and operations research.

Safety and efficacy of vitamin A supplementation in infancy through EPI (rural component)

Principal Investigators: Andrés de Francisco, J. Chakraborty, H.R. Chowdhury, Md. Yunus, A.H. Baqui, A.K. Siddique, and R.B. Sack
Funded by: USAID

Child survival programmes have recently included supplementation of vitamin A through the EPI to increase coverage and to improve vitamin A liver stores in infants. However, no benefits of mega-dose supplementation in infants nor toxicity have been properly addressed to date.

A double-blind, placebo, controlled trial was conducted in Matlab to evaluate the safety and

toxicity of vitamin A supplementation through the EPI. A total of 191 infants were randomly given either 50,000 IU of vitamin A or a placebo at a mean age of 6.5, 11.1, and 15.8 weeks. Infants were examined on days 1, 2, 3, and 8 after supplementation by a medical doctor.

Eleven infants (11.5%) supplemented with vitamin A had bulging of the fontanelle as opposed to only 1 (1%) in the placebo group (see Tables 1 & 2). There were 17 doses accompanied by bulging of which 16 were in the vitamin A group. The toxicity had a cumulative effect with increasing doses. No other side-effects were seen and the observed toxicity was transient, although in 2 infants it lasted up to 72 hours.

Control of ALRI through case finding and management

Principal Investigators: Andrés de Francisco, J. Chakraborty, R. Shaheen, and S. Erny
Funded by: Core funds

Acute lower respiratory infection is an important cause of death of children less than 5 years of age in Matlab. The ALRI intervention was initiated in 1988 in Matlab with the goal of decreasing the suffering and death of children from pneumonia. The programme reported a significant reduction in

Table 1

Infants by fontanelle status after supplementation;
Matlab MCH-FP Programme.

| | | Vitamin A | Placebo | Total |
|------------|-----|-----------|---------|-------|
| Fontanelle | Yes | 11 | 1 | 12 |
| Bulged | No | 85 | 94 | 179 |
| | | 96 | 95 | 191 |

$$\chi^2 = 7.1 \quad p < 0.01$$

Table 2

Supplemented doses and fontanelle outcome.

| | | Vitamin A | Placebo | Total |
|------------|-----|-----------|---------|-------|
| Fontanelle | Yes | 16 | 1 | 17 |
| Bulged | No | 276 | 292 | 568 |
| | | 292 | 293 | 585 |

$$\chi^2 = 11.92 \quad p < 0.001$$

ALRI-specific mortality (32%) after the intervention through the systematic detection and treatment of pneumonia cases by CHWs. Subsequently, it was reported that passive case detection was higher in the home treatment area, and that children in the referral area had a higher incidence of repeated episodes. Infants, males, and children in the home treatment area all had higher rates of treatment for moderate disease.

In an effort to study the effectiveness of the GoB National ALRI Programme recommendations, the CHWs in all 4 treatment blocks are detecting cases of ALRI and treating them at home with oral co-trimoxazole. Severely sick children and infants are referred either to a sub-centre or to the ALRI ward at the Matlab Hospital. A study on follow-up of compliance with oral antibiotic treatment is currently in place.

Education to improve maternal recognition of ALRI

Principal Investigators: Andrés de Francisco, J. Chakraborty, and S. Zeitlyn
Funded by: Core funds

An intervention was undertaken at the household level to evaluate the feasibility and impact of the transmission by CHWs of specific health messages derived from earlier qualitative studies. The objective was to facilitate treatment delivery and to assure early referral of severe cases through a series of messages.

Two comparable groups of villages were selected in blocks B and C of the MCH/FP area (1/2 the Demographic Surveillance System Area), each having a population of 10,000. In one group, for 9 months, CHWs conducted health education through messages directed toward early recognition of ALRI.

A series of focus discussion groups were undertaken to ascertain baseline knowledge and practices related to pneumonia at the household level. The discussions were held with 20 groups of people, of which 8 were conducted with men and 12 with women. The participants had all experienced ALRI in the past year and were selected to represent the socioeconomic and educational profile of the population. Preliminary findings indicate that people in the intervention area and those who had recently had a child with an episode of ALRI could recognise an episode of pneumonia, and that there was a reluctance to seek or accept allopathic medicine for very young infants for whom homeopathic treatment is considered more suitable.

There were no differences between the intervention area and the control area on incidence of ALRI. Information on active and

passive case detection systems is being computerised. Mortality due to ALRI was low in the study areas and there was no difference between areas. A thorough review of the information is currently taking place.

Safe motherhood

Principal Investigators: Andrés de Francisco, A.M. Vanneste, and J. Chakraborty
Funded by: Ford Foundation

Maternal mortality rates are indicators of the health of women of reproductive age and measures of the quality of the health services provided to a community. Ninety-five per cent of pregnant women do not have access to maternity services and most deliveries occur at home. The most important causes of maternal death are postpartum haemorrhage, eclampsia, abortion, obstructed labour and postpartum sepsis. The periods at highest risk of maternal deaths are during labour and two days after delivery.

Challenged by this, the Project posted nurse midwives in peripheral sub-centres to attend deliveries, perform antenatal and postnatal care, and train the traditional birth attendants and CHWs. Recent analysis of data provided seems to indicate a reduction in the maternal mortality ratio which was achieved by giving proper training, means, and supervision, and providing back-up for the programme midwives through a referral system. However, deliveries attended by the nurse midwives were few. A study on midwife utilisation for delivery identified distance from the midwife and having received antenatal care as important factors. The Project is currently involved in reviewing the available information on the contribution of the referral system on this reduction.

During the year, a series of materials was produced or revised to improve the quality of care of the Maternity Care Project (operations research and provision of maternal health services; see 1991 AR, p.30). The guidelines and the high risk screening forms given to the midwives and paramedics for the management and referral of obstetric problems have been revised. Guidelines for referral to the regional hospital have also been reviewed. Similarly, training was given on communication methods for paramedics (see below).

Risk approach of antenatal care in Matlab

Principal Investigator: Anne Marie Vanneste and A. de Francisco
Funded by: Ford Foundation

The efficiency of antenatal screening has been

questioned in several settings. A retrospective evaluation of the antenatal care given to women who subsequently delivered in the Matlab MCH-FP area was conducted. This analysis, intended to find out how efficient antenatal screening, could have been in predicting maternal and perinatal mortality by evaluating various screening scores. By accepting a level in which one third of women would be classified as high risk, the score still fails to detect 30% to 40% of pregnant women who are actually at risk for the stated outcomes. Antenatal care cannot predict on its own all adverse pregnancy outcomes. Furthermore, those women would need emergency obstetric services once the risk becomes apparent. The importance of strengthening referral transport and end-point hospital facilities is stressed.

Nutrition surveillance system

Principal Investigator: Andrés de Francisco and J. Chakraborty
Funded by: HKI

The Project is currently collaborating with Helen Keller International (HKI) in a country-wide nutrition surveillance system in disaster prone areas. Information on measurement of mid-upper arm circumference (MUAC) in groups of 500 infants in both the treatment and comparison areas of the MCH-FP area is currently being provided to HKI and analysed.

A separate nutrition rehabilitation unit (NRU) in the MCH-FP Clinic (part of the Matlab Hospital which also has a maternity ward, surgical unit for voluntary sterilisation, and beds for special studies) was started in 1986 for the treatment of severely malnourished children. The importance of the unit lies in the involvement of the mothers in preparing nutritious, low cost, and acceptable food for the admitted children. Similarly, nutritional rehabilitation centres (called day care centres) were opened at each sub-centre to allow mothers to attend during the day with their children for rehabilitation. Nutrition education messages have been reshaped and summarised in 5 points, translated, and widely disseminated by the CHWs.

Dysentery surveillance system

Principal investigators: J. Myaux, J. Chakraborty, E.H. Khan, and A. de Francisco
Funded by: Core funds and BADC

Dysentery caused by *Shigella* sp. remains a major cause of childhood death and disease in Bangladesh with a mortality rate of 7.4% in the

age group 1-4 years. It has been shown that effective antimicrobial therapy reduces the duration and intensity of the disease and prevents complications from occurring, malnutrition being the most perverse. In Matlab, the profile of the endemic varies all the time. In 1989, the attack rate was estimated to be 30%; it came down to 7% in 1990. Seasonal peaks are observed in April through May, and outbreaks can occur with attack rates from 1% to 33%.

From 1989, a systematic treatment was introduced in the field, using nalidixic acid for all cases of dysentery. According to the changes observed, particularly the development of resistance to this antibiotic, a surveillance procedure started in June 1992 to monitor the endemic, based on common morbidity and mortality indicators, resistance patterns, principal aetiological agents, *Shigella* isolation rates, and referrals to the sub-centres and DTC. This routine surveillance will provide an appropriate tool to evaluate the importance of the endemic at any time and to adapt the treatment strategy. Alarm indicators were selected based on attack rate, isolation rate of *Shigella dysenteriae* type 1, and resistance to nalidixic acid.

The monitoring is performed from various levels in the health care referral tree. Passive surveillance reports are obtained from a) the community (about 15,000 aged under 5 years) through the 80 CHWs' fortnightly visits, b) the sub-centres, and c) the DTC. In addition, an active surveillance is taking place from 4 selected clusters of villages (1,311 children) through 4 additional trained CHWs. All eligible households are visited fortnightly, and rectal swabs are collected for all dysentery cases for isolation of organisms and sensitivity to antibiotics. Follow-up visits are made on the 7th day.

To complete the epidemiological study, a mapping procedure of the study area was developed. A new household-level map of the MCH-FP was drawn in collaboration with SPARRSO (Bangladesh Space Research & Remote Sensing Organization). After field validation, the accuracy in the location of households was estimated to be 93%. We will soon be able to use spatial analytic techniques as aids in understanding both diseases and health care delivery systems.

Health services utilisation on the recovery from dysentery

Principal investigators: J. Myaux, J. Chakraborty, M. Yunus, E.H. Khan, and A. de Francisco
Funded by: NORAD, WUSC/CIDA, BADC

A community-based programme for the treatment of dysentery was implemented in one MCH intervention area. Cases of clinically diagnosed dysentery in children less than 5 years old were identified during home visits by CHWs and referred to a nearby sub-centre for treatment with nalidixic acid. This study examines the relationship between case management and recovery on the 7th day of 177 dysentery cases identified in a sample of 17 villages. During the one-year survey, the incidence of dysentery was found to be 6.6% with a peak in 3-year-old children. *Shigella* spp. were isolated from 47 of 177 rectal swabs (26.6%), most of them *S. flexneri*. Only the few *S. dysenteriae* type 1 isolates were found resistant to nalidixic acid. Although all cases were referred to the sub-centre for treatment, only 45% actually attended. Another 23% went to traditional healers and 25% received allopathic treatment from other sources. Only 5 children did not receive any treatment.

The overall recovery rate, based on the type and number of stools on the 7th day, was 62%. The type of treatment had no significant impact on the outcome. Gender, age, and frequency of stools, but not duration nor distance to the treatment source, were related to the choice of treatment service. Neither the number of stools, stool culture results, nor the age of the child were related to recovery. The children with *S. dysenteriae* type 1 did not recover by the 7th day.

The low rate of isolation of *Shigella* spp. from dysentery cases and the lack of benefit of this community-based treatment programme suggest that a more targeted approach to dysentery treatment is advisable.

Measles surveillance system

Principal Investigators: Andrés de Francisco, A.M. Sarder, Md Yunus, and H. Chowdhury
Funded by: UNICEF

Activities in measles surveillance expanded in 1989 to include, together with the DSS area, the epidemiology of measles in the government-attended comparison area as well. Results show that measles cases in children less than 9 months of age accounted for about 17% of all the cases reported in children less than 5 years of age, suggesting that measles during this age period is a serious problem in rural Bangladesh. Similarly, the survey intends to monitor measles epidemiology under the increasing coverage levels of immunisation achieved by the GoB.

TRAINING ACTIVITIES: A session to train

paramedics on communications methods was held with NIPSOM-GTZ. Midwives, paramedics, supervisors, TBAs, and CHWs benefited from this training, learning how to better lead group discussions, organise and present role play, and produce and use teaching materials with local resources. CHWs were also trained to conduct antenatal care.

URBAN ACTIVITIES

Urban Health Extension Project

Project Director: Ngudup Paljor

Funded by: USAID

The Urban Health Extension Project (UHEP) is a follow-on activity of the successful Urban Volunteers Project (UVP), which ended in March 1992 (see 1991 AR, p.35). UHEP's principal activities include providing services to the urban slum population and conducting operations, epidemiologic, and demographic research to gain a better understanding of the health and family planning needs and constraints of the slum population.

The operational agenda of the 3-year UHEP agreement includes the following mandates:

- ** To document the lessons learned from the UVP phase of the project
- ** To determine family planning and health needs and constraints of the Dhaka slum population through analysis of existing data
- ** To disseminate the Project's findings, mainly in Bangladesh, through scientific reports, briefing papers, seminars, forums, etc.
- ** To maintain and further refine the Volunteer Service Delivery System and the Urban Surveillance System

The year 1992 witnessed some significant events in the Project. These include the conclusion of the five-and-one-half-year pilot effort of the UVP, implementation of the UHEP, and ongoing planning for the next phase. A total of 117 UHEP staff members are divided into five working teams for operational purposes: service delivery, field research, systems and data management, research, and support.

The first part of this report summarises the activities of the health and demographic surveillance system known as the Urban Surveillance System, the second part summarises activities of the volunteer-based service delivery system, and the third and fourth cover

collaborative studies, dissemination, and technical assistance activities.

I. The Urban Surveillance System

Principal Investigators: Abdullah H. Baqui, K. Jamil, S. Salway, Q. Nahar, S. El Arifeen, S. Nurani, S. Nasreen, H. Nazrul, N.M. Jahangir, N. Begum, *et al.*
Funded by: USAID

Since mid-1990, the UHEP has maintained a health and demographic surveillance system in a representative sample of the urban slum population of Dhaka city. This data gathering system is known as the Urban Surveillance System (USS). The USS was designed to address the lack of accurate and appropriate urban poor-specific information and to evaluate the effectiveness and impact of UVP's service delivery system. The USS also provides a rapid vehicle for conducting epidemiologic, demographic, and operations research, including assessment of health and family planning needs of the population.

The estimated total target population of the USS is about 376,000 residing in the slums of five thanas of Dhaka city: Mohammadpur, Lalbag, Kotwali, Sutrapur and Demra. The USS sample was drawn based on a multi-stage probability areal sampling method; the sampling units are clusters of an average size of 33 households. Currently, there are 233 clusters and 8,300 households under surveillance.

Data on demographic events, contraceptive, and health-related behaviour, and family planning and health service delivery are collected on a 90-day cycle. Socioeconomic information is collected annually. To ascertain cause of death, verbal autopsies are conducted on all reported deaths. The data collection is supplemented periodically by survey modules exploring topics in depth.

Various research projects and analyses, both quantitative and qualitative, have been conducted and presented using USS data and infrastructure in 1992. A summary of completed and ongoing studies follows.

RESEARCH ACTIVITIES * Family planning: Given the paucity of accurate and reliable data on family planning in the urban slums, one priority research area for 1992 was designed to provide basic information on contraception behavior among this population. The **Analysis of the USS baseline data** provided findings on the knowledge, practice of contraception, sources of method supply, and intentions of future use of family

planning in the population residing in the slums (K. Jamil, A.H. Baqui, N. Paljor). At least four modern contraceptive methods were known by 95% of the mothers. The contraceptive prevalence rate (CPR) was found to be 36%, with 31% using one of the modern methods. The **Analysis of the health facilities survey** conducted in the surveillance area provided important community-level information on family planning services and health facilities available to and used by the slum population (N. Fronczak).

Another **Analysis using health facility and contraceptive behaviour information** examined whether the availability of family planning services and the mode of service delivery affect the CPR and method choice in the urban slums (K. Jamil and S. Salway). Results showed that areas with field workers had a significantly higher CPR than areas without field workers. When comparing areas with no clinics and no field workers with areas with clinics offering only injectables, there was very little increase in CPR. In areas with both clinics and field workers, there was a substantially higher adoption of injectables, although there was no difference in the overall CPR. These findings have important implications for selecting the most effective modes of service delivery for this population.

Several other analyses of the USS data focusing on the unmet need for family planning and the barriers to contraceptive use were done. The USS data was combined with **In-depth interviews of selected groups of women not using contraceptives** to explore their perceptions regarding their need for and use of them (S. Salway, K. Jamil, *et al.*).

Some of the ongoing analyses in the area of family planning include examining the continuation rates, the drop-out rates, and the switching patterns of different contraceptive methods. The unmet need for family planning among the urban poor is explored with the purpose of stratifying the population according to the type of family planning service needs. Another analysis looks at the clustering of contraceptive use in the urban slums and its determinants.

* **Postpartum amenorrhoea:** Postpartum amenorrhoea is an important component of birth interval in Bangladeshi women. Studies conducted in rural areas have investigated various components of birth interval and its relationship with child mortality. However, very little work has been done in urban areas. A study is ongoing in the USS population to investigate the patterns of postpartum amenorrhoea and contraceptive adoption following a birth in the urban slums of Dhaka.

* **Health:** Several reports using USS baseline data described health knowledge, related behaviour, and health status of the population. Prevalence of diarrhoea and vitamin A deficiency-related eye problems were high and existence of large gaps between mothers' knowledge and use of health care were identified (e.g. knowledge and use of ORT, and immunisation). One qualitative study investigated the reasons for low use of ORT: **Socioeconomic determinants of diarrhoea and ORT use in Dhaka slums** (Laston *et al.*).

* **Breastfeeding:** One report using USS baseline data described the **Infant feeding practices, including breastfeeding, in the urban slums** (A.H. Baqui *et al.*). Although the prevalence of breastfeeding was high, exclusive breastfeeding was extremely low. Supplementation commonly occurred at an early age. These findings led to an in-depth study of the determinants of infant feeding patterns, particularly the early introduction of supplementary foods. This study seeks to explain the pathways that influence mothers' behaviour. The study hopes to make recommendations to the National Campaign for the Promotion and Protection of Breastfeeding regarding appropriate educational strategies and on collection of data in future surveys.

* **Nutrition:** One study estimated the **Levels and correlates of maternal nutritional status in the Dhaka slum populations** using weight, height, and mid-upper arm circumference (MUAC) data from a representative sample of 2,417 non-pregnant USS mothers (A.H. Baqui *et al.*). Mothers' mean weight, height, MUAC and body mass index (BMI) were low. Mothers' height was significantly negatively correlated with number of children lost. The risk was not graduated but appeared to display a threshold phenomenon below which the risk of child death increased sharply. This study concluded that improvement of maternal nutritional status would be important for both maternal and child health. However, this will require complex and long-term planning. As an interim measure, maternal and child health programmes should target shorter mothers who have a height of less than 145 cm for appropriate antenatal and obstetric services as they have a higher risk of child loss.

* **Mortality:** Using 1991 longitudinal data, the **Epidemiology and causes of death among children less than 5 years of age** were analysed (A.H. Baqui, *et al.*). Of the infant mortality rate of 141 of 1,000 live births, tetanus (18.9%),

respiratory infections (18.9%), diarrhoea (16.2%; 8.1% due to acute diarrhoea and another 8.1% to persistent diarrhoea), low birth weight (12.6%), birth asphyxia (6.3%), and measles (5.4%) were the most significant identifiable causes. The 1-4-year old mortality rate was 7.3 of 1,000. In this age group, diarrhoea was the most important cause of death (28.0%); persistent diarrhoea accounted for 20.0% of the deaths. Other important causes of death in the 1-4-year age group were respiratory infections (20.0%) and measles (16.0%). This finding was similar to earlier findings from rural Bangladesh and reconfirmed that a few basic health services, such as diarrhoea and ARI case management, immunisation, and appropriate antenatal and obstetric care, could substantially reduce mortality in children.

II. Volunteer-based Health and Family Planning Service Delivery System

Principal Investigators: Nancy Fronczak, M. Khatoon, S.A. Jahan, J. Khatun, H. Nazrul, S. Amin, A.H. Baqui, S. Laston, *et al.*
Funded by: USAID

The volunteer service delivery system is based on the premise that community health and family planning education, referral to appropriate service points, and oral rehydration salts (ORS) distribution can measurably improve the health status of slum residents even under conditions of chronic social, economic, and environmental distress. It was conceived as an operations research and service delivery pilot project to test the feasibility and impact of using largely illiterate women from the slum communities to furnish preventive health care and referral information to slum residents. Women and children less than 5 years of age were the primary targets.

Volunteers were recruited and trained to educate and motivate mothers to use ORS, immunise their children, improve their own and their children's nutrition, and adopt contraception. These women also distributed ORS.

The programme is now much smaller and more consolidated and is being maintained within the UHEP as a demonstration programme. At the demonstration site, volunteers continue to serve as community liaisons to provide health education and referral services and distribute ORS. A cadre of paid paraprofessionals continues to interface with the volunteers in providing domiciliary preventive health outreach services. The primary purpose of this demonstration site is for continued operations research to improve the volunteer system and serve as a model for future

Table 3

Urban Health Extension Project, ICDDR,B
Summary of service statistics, January - December 1992

| Month | Health Commodities Distributed | | Health Education | | | | | Referral to Static Health Facilities | | | | |
|--------------|--------------------------------|---------------|------------------|-----------------|---------------|--------------|--------------|--------------------------------------|----------------|-------------|-------------|------------|
| | No. of patients treated | ORS | ORS prep. | Nutrition educ. | Hygiene educ. | Immun | Family plan | ICDDR | Nutriton centr | Immun centr | Family plan | Others |
| JAN | 7381 | 20614 | 7514 | 5404 | 7341 | 2469 | 1730 | 69 | 21 | 496 | 172 | 140 |
| FEB | 7742 | 20528 | 6992 | 5233 | 6844 | 2601 | 1355 | 44 | 26 | 369 | 170 | 107 |
| MAR | 8660 | 22993 | 7258 | 4999 | 7112 | 2097 | 1263 | 32 | 12 | 140 | 105 | 77 |
| APR | 9973 | 26728 | 7938 | 5437 | 7897 | 2110 | 1477 | 68 | 20 | 218 | 82 | 84 |
| MAY | 9380 | 24700 | 7423 | 5049 | 7489 | 1938 | 1348 | 47 | 14 | 268 | 62 | 88 |
| JUN | 9780 | 25692 | 8043 | 5668 | 7927 | 2641 | 2067 | 35 | 29 | 346 | 148 | 86 |
| JUL | 8445 | 23437 | 7118 | 5113 | 7105 | 2081 | 1536 | 59 | 26 | 334 | 78 | 75 |
| AUG | 8281 | 24155 | 6724 | 4825 | 6752 | 2116 | 1352 | 45 | 24 | 419 | 106 | 130 |
| SEP | 8198 | 23805 | 6522 | 4752 | 6504 | 1995 | 1374 | 25 | 8 | 226 | 48 | 78 |
| OCT | 7866 | 23124 | 6321 | 4519 | 6216 | 1805 | 1086 | 49 | 12 | 227 | 38 | 57 |
| NOV | 7708 | 22634 | 5792 | 3955 | 5661 | 1528 | 1038 | 45 | 18 | 187 | 51 | 62 |
| DEC | 7428 | 20837 | 551 | | | | | 31 | 12 | 227 | 69 | |
| TOTAL | 100842 | 279247 | 78200 | 54954 | 76848 | 23381 | 15626 | 549 | 222 | 3457 | 1129 | 984 |

replication by the GoB and/or the NGOs.

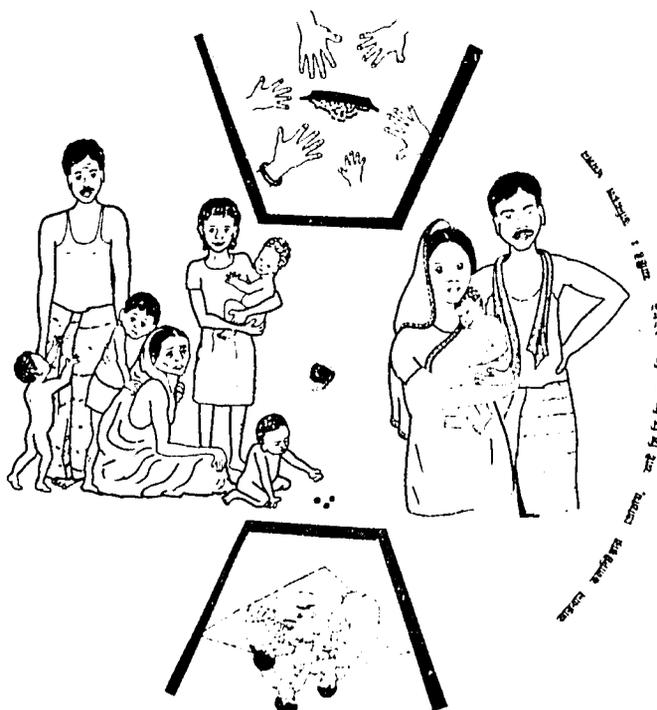
SERVICES PROVIDED: Through a network of 359 volunteers who reside in the slums, the Project has provided extensive services in diarrhoea prevention and treatment, nutrition promotion, and immunisation and family planning motivation and referral. The service statistics are collected by volunteers using a symbol calendar (see 1991 AR, p.36). Table 3 is a summary of services provided by the volunteers in 1992.

RESEARCH ACTIVITIES * Lessons Learned: Over the past several years, much interest and many questions have been raised concerning provision of basic MCH-FP services by largely illiterate slum women. Questions about the effectiveness of the volunteers, the programme's expectations about their activities, what opportunities exist in bringing about a balance between demand for services and supply of needed services, what is the most appropriate role for the volunteers in the larger service delivery structure, and others.

Evaluation of the volunteer system indicated that largely illiterate women could indeed be recruited and trained as volunteers. Volunteers were found to be effective at transmitting simple

health and family planning messages to their slum neighbors, referring and accompanying them to clinics, and motivating them to improve their personal hygiene, use ORS, receive immunisations, and adopt contraception. They are also effective direct distributors of health commodities such as ORS. They have an important and valid role to play in linking slum residents with services, but it is inappropriate to expect them to work as solo health providers in these areas. These findings provide important lessons to be shared with NGOs, the GoB, and private sector health providers in the slum communities.

*** Views of volunteers on community service:** The volunteer retention rate is high, many of them having been with the Project for more than 8 to 10 years. One important question was why do they stay? Understanding volunteers' motivations and expectations is an important programmatic issue with direct implication on programme sustainability and replicability. To ascertain their motivations, a series of 26 focus group discussions were held. They showed that services provided by them increased their respect in their community. A predominant theme in all the groups was indeed that they perceived their activities as being very useful and felt that,



One of the UHEP educational materials used by illiterate slum women to promote family planning in Dhaka urban communities.

through their efforts, patients recovered and deaths were averted.

Another important point mentioned in some of the focus groups was that their activity enabled them to venture outside and become acquainted with many people in their communities, gaining increasing mobility.

By training community volunteers to serve as liaisons between the health workers and the community, it appears possible to create a demand for services and increase access to service points. Linking them directly to NGO clinics may increase their credibility and service within the community, if services provided and referral systems are monitored and improved.

* **Health and family planning facilities:** There is much debate on the question of whether or not adequate health facilities exist for the slum population. The most common thesis is that the services are available, but somehow there is a missing link between the availability and access to the service points. Others feel that there is

indeed a lack of adequate facilities, and that whatever facilities there are in the city are of secondary and tertiary nature which seldom meet the needs for the primary care of the population. A descriptive survey was conducted in 238 USS clusters to describe health providers and facilities utilised by the urban slum population.

The survey found that 79% of those canvassed reported receiving home visitors who provided contraceptive pills and condoms at least once in a three-month period, and 92% reported having health visitors on a regular basis either for family planning or for distribution of vitamin A. Traditional birth attendants (dais) and spiritual healers (fakirs) were reported to be easily available and frequently consulted. Pharmacies were most often used for curative services of a less serious nature. Immunisation and family planning clinics were reported to be within close proximity to most of the clusters, whereas curative care for serious illnesses was generally a substantial distance away, with government hospitals being the most frequently cited source.

The survey information indicated that quality of care issues and more subtle barriers to access, rather than physical proximity, may be factors affecting utilisation of family planning and immunisation services. Pharmacies, too, should be included in planning strategies to improve the quality of care.

* **Nutrition Rehabilitation Centres (NRCs):** The Project has maintained two small NRCs in the slums of Dhaka since 1987 for management and rehabilitation of moderately malnourished children as part of the volunteer service provision. To evaluate their effectiveness, one-year data on admissions and follow-up were analysed (funded by BADC). NRCs were found to be effective in treating the malnourished children who attended the centres, with a sustained improvement seen one year after discharge. However, it was noted that they received only an estimated 26% of the children who would be eligible for rehabilitation within the catchment areas. Of these, only 60% were fully treated at the NRCs, 20% required referral to inpatient facilities, and 20% dropped out, with a higher rate of drop-out for female children than for males. Descriptive information indicated that one of the biggest hindrances to improving coverage was the need for the child's caretaker to remain in an onsite feeding centre for the full day for several weeks. It was proposed that, although they were shown to be effective for the children who attended, NRCs were not the best strategy for nutritional rehabilitation in the urban slum communities. Home-based rehabilitation as an alternative programme approach is being discussed as an agenda for future research.

* **Water and sanitation:** Key informant interviews were conducted in the slum areas to gather information on water and sanitation facilities and communities' willingness to pay for their improvement.

Data from the USS showed that 65% of the slum households used tap water and 35% tubewell water for drinking, although many of the water sources were a distance away from the household and shared by multiple households, thereby limiting access. Only 32% of the slum households had latrines which connected with sewer lines; 17% had septic tanks or pit latrines and 44% had "hanging" open latrines.

Households living on government land cited land tenureship as the major deterrent in communities' willingness to invest in these facilities. Households renting thought that sanitation was the total responsibility of the landlords. Latrines

were not an item which they expected to pay for once the need for privacy was met. They, however, expressed willingness to share costs for access to convenient water, electricity, and gas lines for cooking, explaining that these were needs which they paid for anyway. The approaches used by tenants for solving water and sanitation problems on government land and private land varied to a great extent.

III. Other Ongoing and Collaborative Studies:

Empowering women for health:

Principal Investigators: Kirk Dearden, J. Khatun, and N.I. Faisal

Funded by: USAID, Ford Foundation

Twenty-two focus groups were held with four groups of women and their husbands to assess the impact of training and service delivery in Dhaka slums: a) current volunteers from the UHEP, b) "released" volunteers, c) Women's Empowerment Pilot Project (WEPP) participants, and d) controls. The WEPP was a 1990-1991 project of the UVP designed to provide training and raise consciousness.

Results from the focus groups suggest that women's and men's roles are highly circumscribed: women are seen as homemakers and nurturers and men are seen as protectors and providers. Women's movement in public space is also limited. Women do, however, appear to play an important part in decision-making by influencing and/or collectively making choices regarding household affairs. Work and access to income are considered to be particularly empowering in Bangladesh. Work outside the home appears to fundamentally alter women's perceptions of the world around them. Income earned also positively influences women's relationships with husbands and mothers-in-law. Released volunteers were the most likely to have made major decisions alone, invested resources in daughters, and assumed responsibility for activities normally performed by men. These findings suggest that programmes which stress work, access to income, and mobility outside the household may be considerably more successful in improving women's position in society than those which do not.

The effectiveness of TOPV in children with gastroenteritis.

Principal Investigators: J. Myaux, A. Uzma, L. Unicomb, M.A. Islam, and M. Santosham
Funded by: USAID, BADC, UNICEF

The purpose of this study is to determine to what extent the protective effect of giving a dose of trivalent oral polio vaccine (TOPV) during a simple diarrhoeal episode will be hampered. Although WHO is committed to the global eradication of poliomyelitis by the year 2000, the disease has not been controlled yet in this region and remains a major problem. In most industrialised countries, the disease virtually disappeared following intensive vaccine strategy that confers almost 100% protection. But infants in the tropics do not respond sufficiently to the same vaccine.

From November 1990 until April 1992, 391 infants 6 to 16 weeks old were enrolled in a 4-month follow-up study. The children were selected from the households in the UHEP research clusters of Dhaka slums by doorstep screening visits and assigned to one of two cohorts, based on the presence or absence of simple watery diarrhoea on the day of enrolment.

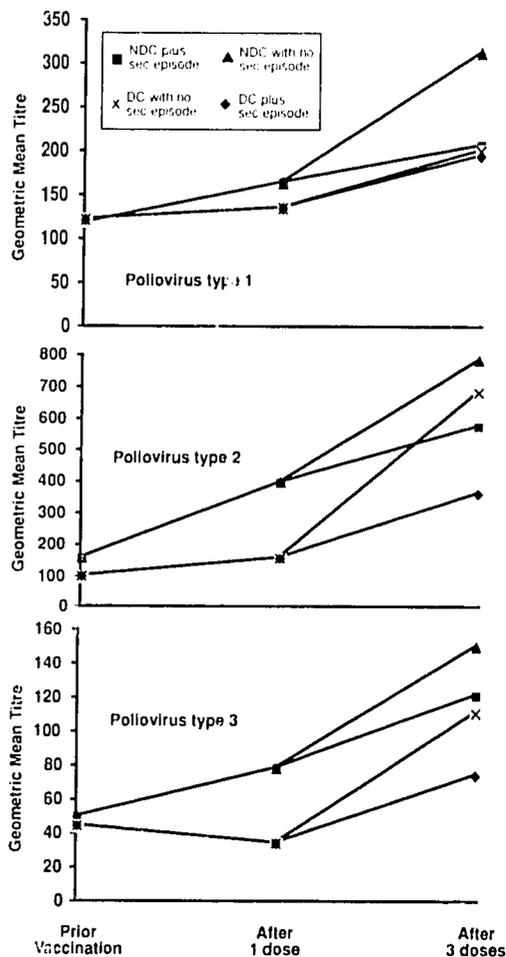
The children were taken with their mothers to the short stay unit of the Clinical Research and Service Centre (CRSC) for validation and given the first dose of TOPV. Blood samples for neutralising antibody detection were collected prior to immunisation with the second dose of TOPV and 4 weeks after the 3rd dose. Rectal swab specimens were taken on day one for rotavirus type A isolation and on day 7 for polio antibody detection. Diarrhoea was monitored at home for 3 days in both cohorts. The same procedure was used for the two following doses at 4-week intervals, according to the national EPI timetable. During the study, in-stock and in-use open vials were tested and found to be fully potent.

Rotavirus was isolated from 9% of the specimens of children with diarrhoea. After a full course of vaccine, 17%, 9%, and 25% of the infants with diarrhoea were found seronegative respectively for polio type 1, 2, and 3; 4% were negative to all 3 serotype. The proportions were slightly lower in the diarrhoea-free cohort, with 14%, 6%, and 20% for 1, 2, and 3, and only 1% for all 3 serotypes. Although the overall sero-conversion rates are much lower than in more developed countries, they are slightly higher than expected, given the results of other studies.

The analysis on the geometric mean titre also shows an overall lower sero-response in the diarrhoeal cohort, with a subsequent decrease of the response when the child had another diarrhoeal episode at the time of the second or the third dose (see Figure 3).

In conclusion, the study shows a clear negative effect of diarrhoea on the effectiveness of TOPV. Still, this observation does not explain completely the poor immunologic response after

Figure 3 - The cumulative effect of simple diarrhoeal episodes on the increase of neutralising antibodies after 1 and 3 doses of TOPV in the diarrhoeal and the non-diarrhoeal cohorts





A UHEP urban volunteer distributing ORS packets in the urban slums, following a heavy rainfall.

vaccination in developing countries. Nevertheless, in the perspective of the eradication of the disease, the vaccine strategy should be reviewed and adapted to these countries.

Acceptability and correct use of packet rice-ORS vs sucrose-ORS

Principal Investigators: Abdullah H. Baqui, S. Laston, and A. Uzma
Funded by: USAID

In a comparative study the acceptability, and correct and long-term use of prepackaged rice-ORS was compared with that of standard prepackaged sucrose-ORS by urban community mothers.

Important issues concerning the large gap between sucrose- and rice-ORS use were explored through focus group discussions. Preliminary analysis indicates that it would not be appropriate to promote packet rice-ORS because few mothers used it to manage diarrhoea in their children. The high cost of fuel required to prepare rice-ORS and the time involved (20 minutes) were the main reasons for its low use.

Safety and efficacy of vitamin A supplementation in infancy through EPI (urban component)

Principal Investigators: Abdullah H. Baqui, A. Uzma, A.K. Siddique, and S. El Arifeen
Funded by: USAID

This is a double-blind, controlled trial comparing the and a placebo supplementation in infancy using EPI sessions as an entry point. The objectives are to assess the safety and efficacy of the supplementation in young infants. It was begun in September with a plan to enroll 200 infants over a 6-month period and to supplement half of them with 50,000 IU vitamin A and the other half with a placebo during each EPI session.

During the first 4 months, 81 infants were enrolled. However, the rural component (see MCH-FP) which started earlier has already been completed, and in response to the findings, the Research Review Committee approved the recommendation to reduce the vitamin A dosage to 25,000 IU. The findings of this study will have important programmatic implications. If vitamin A supplementation during EPI session is found to be safe and effective, these two vertical programmes could be integrated.

IV. Dissemination and Technical Assistance

Activities:

UHEP's dissemination efforts are geared toward the project staff, the Centre at large, USAID, other donor and multilateral agencies, NGOs, and GoB entities. Aside from routine information sharing and management decision-making mechanisms in the Project during the year, a more formal mechanism of a monthly in-house seminar was introduced to increase the Project staff's understanding of their work, to improve greater participation, and develop a sense of ownership of the Project's activities. In 1992, 15 in-house seminar presentations and 5 interdivisional presentations were made by project staff. They also regularly participated in various NGO and GoB sponsored forums. Other forms of dissemination included a wide array of visitors to the Project's field sites. For example in 1992, over 65 individuals and groups visited these sites. A wide range of both formal and informal technical assistance was provided to various organisations by the project staff. Most notable were Shamim Ara's (Community Health Coordinator) input in the national CDD's standardisation of educational messages and A.H. Baqui's (Research Head) assistance on infant feeding practices to the national advocacy group on "Promotion and Protection of Breastfeeding."

The ENVIRONMENTAL HEALTH INTEREST GROUP (Bilqis A. Hoque, Coordinator) is an interdisciplinary and interdivisional body of scientists working to solve environmental health problems by conducting descriptive and intervention studies, risk factor analyses, and other applied research studies, by promoting and disseminating research findings, and by providing appropriate training.

The Group's scientists have been designated the regional contacts and technical coordinators of the Global Applied Research Network (GARNET) for water supply and sanitation (WS/S). Acting as the coordinating agency, a professional forum has been established to exchange WS/S information among NGOs and other institutions. Interested members have been identified (60 from various parts of the country) and regular meetings are being conducted every 2 months with about 50% attendance.

The environment and child survival

Principal Investigators: Bilqis A. Hoque, Md. Yunus, M. Strong, J. Charkaborty, and R.B. Sack

Funded by: IDRC (Canada)

This study aims to define important environmental risk factors for mortality from infectious causes in children 1 to 59 months of age and to draw guidelines for affordable, widely replicable interventions for child survival. It is ongoing in the DSS area of Matlab. A case-control design has been adopted to compare approximately 600 cases with the same number of living controls. Environmental factors which are being examined include: indicators of hygiene and sanitation at the individual and family level, kitchen/household hygiene, sanitation, water use, faecal coliforms and specific chemical concentrations in water (In a 20% sample of families of cases and controls), feeding practices, maternal behavior, and indoor environmental pollution. Socioeconomic variables are recorded to eliminate possible confounding factors during the analysis.

By the end of the year, about 500 cases had been studied and the main causes of death were diarrhoeal diseases (39%), ARI (24%), other infectious diseases (26%), and accidents (12%). Preliminary analyses indicate that some of the important factors associated with all deaths were: a) absence of sanitary latrines, b) improper handwashing, c) crowding in sleeping rooms, and d) maternal illiteracy. Based on these findings a dissemination phase is being planned to communicate the risk factors to the housewives in the basis of the cases. The final analysis is expected to be completed by the end of 1993.

Environment and *Shigella*-related dysentery

Principal Investigators: Bilqis A. Hoque and D. Mahalanabis

Funded by: SDC

The objectives are to study the importance of practical environmental risk factors for *Shigella*-related dysentery among children 1 to 10 years of age and to develop appropriate guidelines for its prevention based on these findings. The hypothesis of the study is that dysentery is more likely to occur than watery diarrhoea in association with a contaminated environment.

A case-control method has been adopted, using for each patient with *Shigella*-proven disease (case): 2 sets of matched controls (a non-*Shigella* diarrhoea control and a non-diarrhoea community control) of the same sex and age categories (<4 years and >4 years). The main prognostic risk factors of interest are: water (amount, quality, accessibility and other existing environmental conditions), sanitation (disposal of excreta by age, solid waste disposal practices, and personal hygiene practices), feeding practices and home management of children,

nutritional status, and socioeconomic and demographic characteristics.

We have collected data from 474 cases and 474 controls of each category and water and hand-wash samples of 27% of the cases and controls. Data entry and management are underway.

Long-term follow-up on water supply and sanitation

Principal Investigators: Bilqis A.Hoque, T. Juncker, R.B. Sack, A. Hall, and K.M.A. Aziz
Funded by: BADC

A WS/S and hygiene education intervention project was launched by the ICDDR,B during a period from 1983 to 1987 in rural areas of Mirzapur thana (about 60 km NE of Dhaka). The project provided handpumps (an average of 1 pump for each 33 people), double pit sanitary latrines (to almost all families) and extensive hygiene education to about 800 families. Village women were trained to maintain the pumps, and backup support was provided by project staff. The control population (800 families) did not receive any of these project interventions but had access to the usual government and private facilities. This study is a follow-up of both populations to compare the present conditions of water and sanitation facilities, their use, and the disease transmission knowledge in both areas.

Table 4
Water supply and sanitation conditions in
Mirzapur handpump project areas

| Parameters | Intervention area | | Control area | |
|---|-------------------|------|--------------|------|
| | 1987 | 1992 | 1987 | 1992 |
| Tubewell/Tara pump water use for various domestic purposes: | | | | |
| Drinking | 100% | 99% | 98% | 97% |
| Bathing | 90% | 69% | 5% | 6% |
| Type of latrine used by household: | | | | |
| Sanitary/pit | 90% | 83% | 3% | 7% |
| Non-sanitary | 10% | 17% | 97% | 93% |
| Functioning condition of Tara handpumps: | | | | |
| Good/acceptable | 94% | 80% | | * |

* Tara pumps were not given, and are not present.

The data collection, which was a one-time, cross-sectional survey, was completed in mid-1992. About 500 families from each area were randomly selected and studied. Preliminary analyses indicate that, in general, promoted water and sanitation facilities and practices have been sustained in the intervention area (Table 4). The people who did not use tubewells collected water from mainly ponds, ditches, and other surface water bodies. The functioning status of the latrines in the intervention area (64%) had deteriorated from that at the end of the project period when more than 80% were repaired and left to the users in good condition. We have data on present hygiene practices, health knowledge related to the WS/S practices, diarrhoeal prevalence, and ascaris infection rates. By mid-1993, we will complete the data analyses which will document the sustainability (or lack of) of the different components of the project.

Water quality impact of the Meghna-Dhonagoda embankment

Principal Investigator: Bilqis A.Hoque, M.A. Wahed, A. Felsenstein, and R.B. Sack
Funded by: BADC

The Meghna-Dhonagoda flood-control and drainage embankment was constructed in the late 1980s, but all drainage and irrigation structures are not yet completed. Considering the health and environmental implications of such a major intervention, we are conducting a pilot study to determine mainly its impact on water quality.

Data collection began in March and will be completed by February 1993. Monthly water samples are being collected from 70 water sources, half inside and half outside the embankment. These samples are being tested for iron, calcium, magnesium, copper, zinc, manganese, faecal coliform bacteria, and chemical oxygen demand concentration. Since the latter is widely used to determine the general pollution levels of water samples, we present these data (median values) from March through December 1992 (Figure 4).

This preliminary analysis shows that the surface waters inside the embankment are more polluted than water outside the embankment during specific months of the year. It is possible that during the rainy months (July-October), cropping activities and dilution effects are different inside the embankment and may affect the quality of surface water.

Promotion of safe WS/S practices through schools and women's clubs

Principal Investigators: Bilqis A. Hoque, J. Myaux, J. Chakraborty, and R.B. Sack
 Funded by: BADC

The objectives of this pilot test were to study the feasibility and the constraints of involving primary schools and women in delivering sanitation messages in rural Bangladesh, so that a comprehensive sanitation programme could be recommended.

Promotion through schools: The school promotion was undertaken in 4 rural primary schools (up to 5th grade), of which three were usual schools and one was a madrasa (religious topics are emphasised along with the usual curriculum). Two

teachers from each of these schools were trained on specific sanitation and hygiene issues and their relevant messages. It was agreed that the teachers would promote those messages suitably during their normal courses. The content of the training session was earlier determined and tested based on experiences, focus group discussions, and pretesting.

Two unannounced surveys were conducted to generally assess the acceptance of the messages among the students of these schools (a baseline and a final survey after 4 months following the teachers training session). Following completion of the field activities, a final one-day long discussion was held with the teachers of the schools to understand their activities, feelings, and problems.

One of the messages was to promote hand-washing, and preliminary results indicate that handwashing practices have improved among the students, as shown by the reduction in the faecal coliform counts of their hand-wash samples (Figure 5). The control group is made up of students from three other schools whose hand-wash samples were also collected at the same time as the post-intervention survey. Final analyses are in progress.

Figure 4 - Chemical oxygen demand (mg/litre) inside & outside embankment

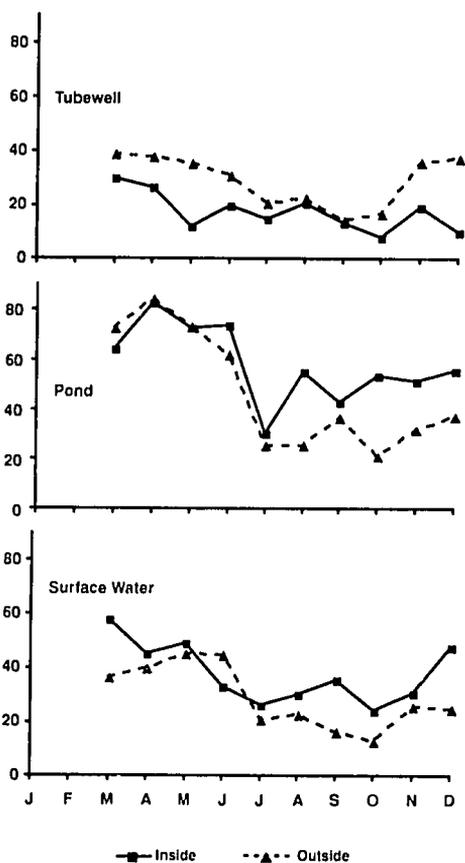
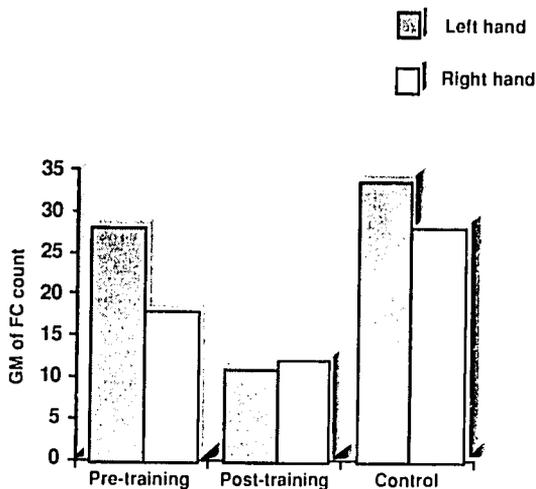


Figure 5 - Pre- and post-training faecal coliform count on hands of school children, Matlab, 1992



Promotion through women club: The study on women's involvement in the promotion of the messages was conducted in another area more or less during the same time period. The rural women were trained in handpump maintenance and given education on disease transmission and the benefits of using safe water. They were asked to promote the messages in their bari (about 5-12 households/bari) and maintain the tubewells as required in their community. Preliminary analysis indicates that these women performed handpump maintenance efficiently, and their involvement/motivational efforts resulted in increased use of tubewell water by the families in the local area.

Environmental Health Science Laboratory:

Principal Investigators: Bilqis A. Hoque, J. Alam, and R.B. Sack

Funded by: Core funds

A new Environmental Health Science Laboratory was established in Matlab in 1992. General water pollution tests, microbiological tests, and chemical tests on water samples collected from the environmental projects and received from external agencies were done. Tests were also performed on the quality of stored water purifying tablets in selected stores of the country.

This laboratory also monitored the performance of the sewage treatment plant in the Matlab complex, which supports the DTC. Biochemical, chemical, and bacteriological indicators of general pollution have been determined. The sewage treatment plant consists of two septic tanks and two filtration units in parallel and two ponds in series. The organic and biological (pollution) load to the system varied with the season and number of patients being treated in the DTC (annual total: 16,866). Approximately 30% to 45% of the pollution in the sewage is reduced while it goes through septic tanks and filtration units. In ponds it is usually reduced to acceptable concentration levels. Furthermore, the ponds are closed and, thus, any remaining pathogens are confined.

Water treatment during floods and cyclones

Principal Investigators: Bilqis A. Hoque, J. Alam, and R.B. Sack

Funded by: Core funds

Floods and cyclones are almost annual events in Bangladesh. Post-disaster epidemics of water-borne diseases have been frequently reported. To provide technical advice on feasible options for treating drinking water, a study was undertaken to determine whether or not the contaminated

surface water could be treated with bleaching powder and alum available in local markets.

Three different solutions of bleaching powder and alum were prepared. Contaminated surface water was treated with these solutions over four different contact periods; 1, 15, 30, and 60 minutes. The faecal coliform bacteria concentration of the water was compared before and after treatment.

The results indicated that bleaching powder solution equal to or greater than 24 mg/l and alum solution equal to or greater than 400 mg/l can disinfect water to 0 faecal coliform counts from several thousand in 30 minutes contact time. This finding has potentials for promoting appropriate treatment of water at household levels during both normal and disaster periods. The effectiveness of promoting bleaching powder solution is being field-tested.



Village men repair a tubewell.

Asger Anwar

Rapid assessment of sanitation in Banaripara.

Principal Investigators: Bilqis A. Hoque and S. Zeitlyn

Funded by: UNICEF

A rapid assessment of the integrated sanitation programme of DPHE - UNICEF in Banaripara, Bangladesh was made in February 1992 at the request of UNICEF. There they had conducted a community-base sanitation intervention at the field level among community health workers, local schools, and religious leaders.

Two hundred and ten households of 30 villages were randomly visited, and members were interviewed on specific sanitation practices and socioeconomic characteristics. The latrines were also checked.

The sanitation practices were found to be significantly better than nation-wide practices (73% vs. 26%). About 70% knew what was meant by sanitary disposal of faeces. The local schools played the major role in promoting the programme with substantial support from local government offices. The participation of other community groups (leaders, women, and health workers) was lacking since they had not been encouraged to participate in a planned way. These findings have programmatic and policy implications and an in-depth evaluation and follow-up monitoring was recommended.

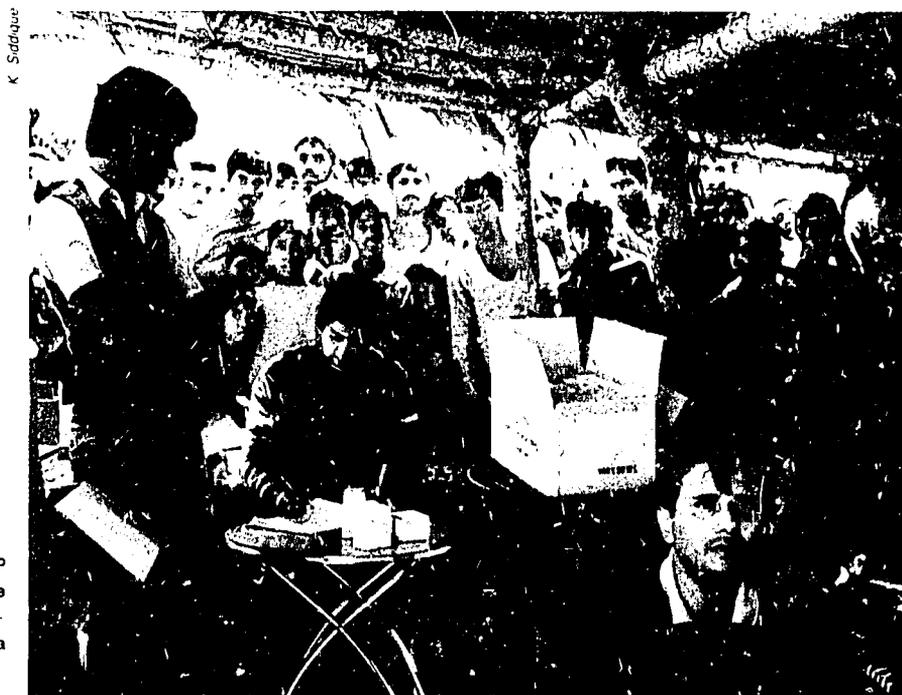
The EPIDEMIOLOGY INTEREST GROUP (A.K. Siddique, coordinator) is involved with the study of the epidemiological aspects of diarrhoeal disease, including diarrhoeal outbreaks throughout the country.

Epidemic Control Preparedness Programme

Principal Investigator: A.K. Siddique

Funded by: Canada Fund, ICHF/American Express Int'l, BADC, and Core funds

In 1992, the Epidemic Control Preparedness Programme (ECP) physicians were called for assistance in 10 affected districts where diarrhoeal epidemics were reported. In four southern districts (Barisal, Patuakhali, Jhalokati, and Pirojpur), epidemics were more pronounced than in the others. The physicians spent 156 man-days between April 10 and May 19 in southern districts investigating the epidemic. During this period, the GoB surveillance reported 19,807 cases and 655 deaths from these areas. The ECP physicians treated a total of 1,146 patients with acute watery diarrhoea and collected 226 stool specimens (rectal swabs) for culture. *Vibrio cholerae* O1 were isolated from 58% of the samples. Over 70% of the isolates were resistant to tetracycline.



Doctors of the ECPP provide medical care to patients in a temporary field diarrhoea treatment Centre.

Between July and October, the physicians also investigated epidemics in middle belt and northern districts of Sirajganj, Comilla, Brahmanbaria, Kishoreganj, and Narshingdi. The GoB surveillance reported 20,940 cases and 237 deaths from these areas. The physicians spent 59 man-days during the epidemic and treated a total of 879 patients with acute watery diarrhoea. Stool specimens were collected from 172 patients. *V. cholerae* O1 were isolated from 73% of the samples and 80% of the isolates were resistant to tetracycline.

A diarrhoea treatment centre was established by the ECPP physicians at Bakerganj thana in Barisal district during the southern epidemic. The centre was operated for a month (between 14 April and 13 May) in collaboration with the GoB health services. Over 500 diarrhoea patients were treated at this centre. The physicians also assisted in setting up another 34 makeshift treatment centres at different locations during the 1992 epidemics. They also provided guidance to the GoB and NGO health workers for appropriate management of cases.

The impact of rotavirus infection at birth on subsequent infections

Principal Investigators: Nigar S. Shahid, J. Albert, N. N. Banu, S.M. Faruque, and L. Unicomb
Funded by: SDC

The objective of this study, done in collaboration with Dhaka Shishu Hospital (K. Banu) and Holy Family Hospital (B. Elahi), is to determine whether exposure immediately after birth with rotavirus (RV) strains influences the outcome of a subsequent infection with community strains. Studies conducted elsewhere have shown that infection of neonates with unique "nursery" strains confer protection against severe diarrhoea upon subsequent infections.

Neonates were enrolled from the two hospitals and followed daily for the first 7 days and then

weekly for the first year of life, with stool samples collected at each visit and each diarrhoeal episode. Antigen detection for RV is performed daily. Each diarrhoeal stool is matched with a non-diarrhoeal control stool and subjected to analysis for RV, parasites, diarrhoeagenic *Escherichia coli*, vibrios, *Campylobacter*, and *Shigellae*. Colostrum and monthly breast-milk samples are collected for estimation of serotype-specific RV antibodies.

Blood samples (cord blood and quarterly samples) are collected for IgA and IgG estimation to detect mild or symptomatic infections. Both serum IgG and neutralising antibody levels are very high in the cord blood and persist for the first few months of life. Serum IgG results show that a large number of seroconversions take place with asymptomatic RV excretion.

The study has two groups of infants: those (49) who have excreted RV during the neonatal period (RV +) and those (41) who have not (RV -). These 90 babies have been followed for at least 52 weeks. Preliminary analysis shows that an RV event (RV excretion/diarrhoea/seroconversion) is less likely in babies belonging to the RV + group. Although there were no significant differences between RV excretion rates and RV diarrhoeal episodes between the groups, the severity of the RV diarrhoeal episodes (number of stools per day and fever) was greater in the RV - group than in the RV + group.

About 80% of all observed diarrhoeal episodes occur after 6 month of age. Of the 117 samples of diarrhoeal stools analysed, only 6 were positive for RV (3 in each group); 23 had a bacterial isolate identified. Five *E.coli* colonies are being stocked for later isolation of diarrhoeagenic *E. coli*. *Shigella* spp. have been isolated from 6 diarrhoeal and from no control samples. *C. jejuni* has been isolated from 11 diarrhoeal and 13 non-diarrhoeal samples. Other pathogens identified were *Aeromonas* spp, *Plesiomonas shigelloide*, and one *Salmonella* group E.



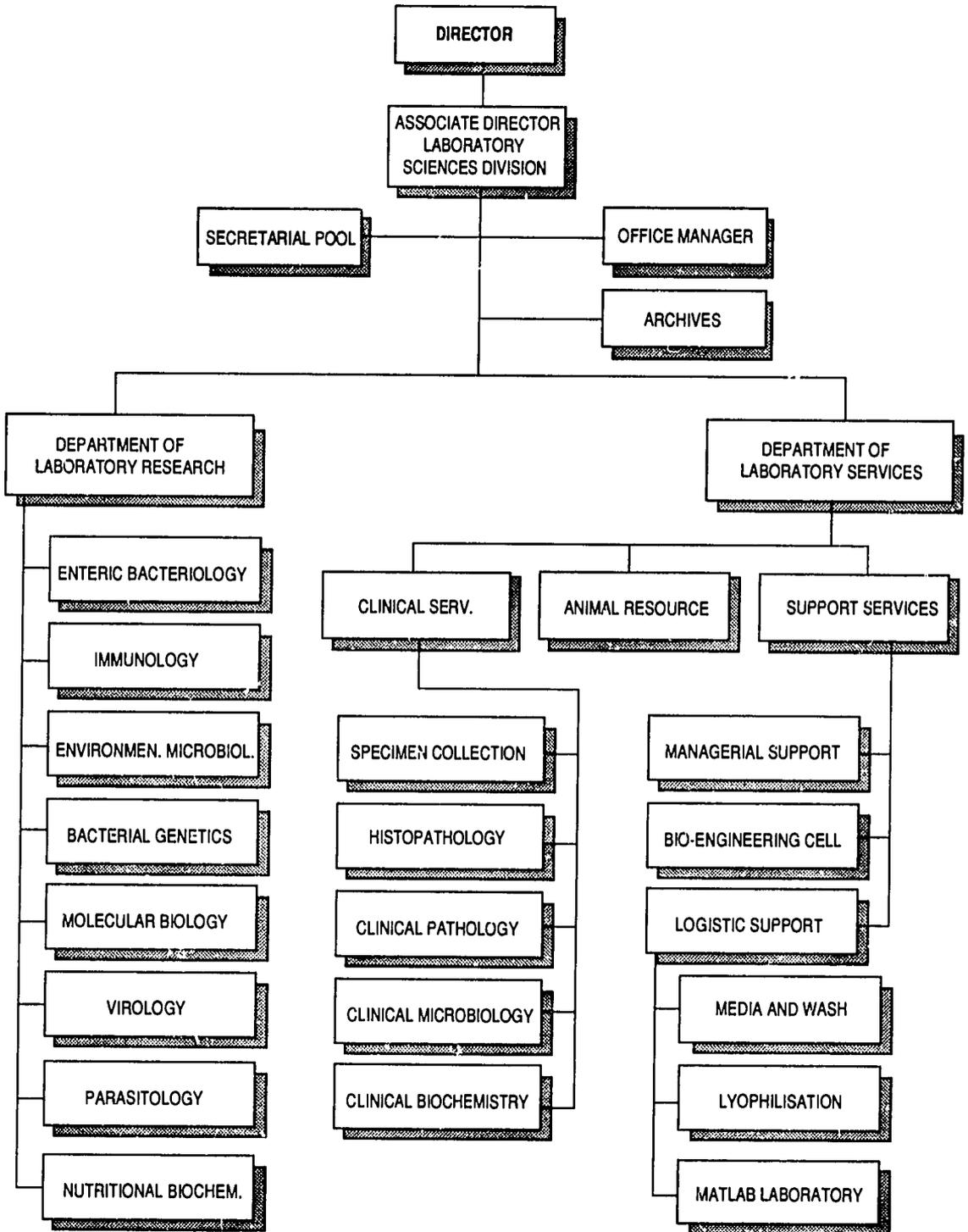
Reaching epidemic sites is not always by road, as is illustrated in this photo.

LABORATORY SCIENCES DIVISION



Students of a laboratory course receiving instruction
from Mr. Md. Ansaruzzaman, Scientific Officer,
Enteric Bacteriology Laboratory

ORGANOGRAM : LABORATORY SCIENCES DIVISION



LABORATORY SCIENCES DIVISION

Associate Director: R. Bradley Sack

New in '92

The Laboratory Sciences Division (LSD) is organised into two departments: Department of Laboratory Research, headed by Dr. John Albert, and the Department of Laboratory Services, headed by Dr. Moyenu Islam. These two Departments work together to accomplish the following objectives:

- ** To conduct research in microbiology, immunology, and pathogenesis of diarrhoeal illness and related disorders
- ** To provide laboratory support to clinical, community, field, and environmental studies carried out by scientists at the Centre
- ** To provide diagnostic laboratory services to patients of the Dhaka Clinical Research and Services Centre (CRSC) and the Matlab Treatment Centre (MTC)
- ** To promote training of graduate and post-graduate students in research methodology and laboratory diagnostic procedures (see Training)

The Division is currently comprised of 4 international and 27 national level scientists and 89 support staff members. Four fellows and 13 students were trained during the year. In 1992, there was a notable increase in international participation by members of the Division. Collaboration with institutions outside the country also increased; 15 such research institutions are presently involved in projects with the Division.

Some of the major accomplishments of the Division during 1992 are listed here:

- ** A new Associate Director took over the administration of the Division in January. Professor R. Bradley Sack replaced Dr. Moyenu Islam who was acting Associate Director for over two years.
- ** The Department of Laboratory Services moved to the newly constructed first floor (north wing) above the hospital in October. The other

- * New Associate Director took over in January.
- * Part of the Division moved into new space in October.
- * Scientific review committee gave good report.
- * Biosafety consultant visited and gave advice.
- * Oral cholera vaccine found to be stable without cold-chain.
- * *B. fragilis* implicated as cause of diarrhoea in small children.
- * PCR used to study *Shigellae* transmission.

department is scheduled to take occupancy of its new space in April of 1993.

- ** The intravenous plant was officially closed in July, since it was no longer needed; alternate sources of intravenous fluids are now available.
- ** A Scientific Review Committee appointed by the Board of Trustees spent three days in November reviewing the operations of the Division, gave a favourable report, and made recommendations for improvement.
- ** Several staff members made presentations or attended international meetings: a conference on vaccines for enteric diseases in Cambridge, UK (April); the US-Japan Cholera Meeting in Tokyo (July); the Congress on Mucosal Immunology in Prague (August); Asian Conference on Diarrhoeal Diseases in Karachi, Pakistan (November); and International Congress for Tropical Medicine and Malaria, Thailand, December.
- ** The need for an improvement in biosafety of the Division was recognised, and a consultant, Dr. Bradford Kay (USA), spent two weeks

advising on improvements in this area. One outcome was that the need for a Center-wide biosafety committee was identified, and plans were made to constitute such a committee soon.

During the year, 30 manuscripts were written for publication and 10 new protocols were developed and reviewed. There are currently 19 research studies in progress in the Division. They are reported here by the following 8 laboratories in the DEPARTMENT OF LABORATORY RESEARCH: Bacterial Genetics, Biochemistry and Nutrition, Enteric Bacteriology, Environmental Microbiology, Immunology, Molecular Biology, Parasitology, and Virology.

BACTERIAL GENETICS

Head: Zia U. Ahmed

The research focus of the Bacterial Genetics Laboratory is on the study of enteric vaccines. One of these that was continued during 1992 was the investigation of a live vaccine against shigellosis, and a new undertaking was the testing of the thermal stability of the whole-cell B subunit oral cholera vaccine. Can it be transported without the cold chain? In addition, a study was started early in the year on cloning of the toxin gene of enterotoxigenic *Bacteroides fragilis*, and another studying the colonisation potential of live attenuated candidate vaccine strains of *V. cholerae* was recently begun.

Thymine-requiring attenuated mutant of *Shigella flexneri*

Principal Investigator: Zia U. Ahmed
Funded by: USAID

The thymine-requiring and temperature-sensitive mutant of *Shigella flexneri* Y strain TSF21, which was earlier shown to be safe, immunogenic, and able to provide protection against both homologous and heterologous challenge (see 1991 AR, p.53), was further studied with respect to the molecular lesion within the *thyA* gene. In collaboration with the Tumor Biology Branch of the Ludwig Institute for Cancer Research in Melbourne, Australia, the *thyA* gene of strain TSF21 and the wild-type parent strain SH4 was amplified by using the PCR technique with primers synthesised from the published sequence of the *thyA* gene of *E. coli* K-12. The nucleotide sequence determination of the amplified products was carried out. The products had identical nucleotide sequence except for 1 nucleotide substitution in the mutant. The demonstrated

non-reactogenicity and protective efficacy of the strain suggest that isolation of a deletion type of *thyA* mutant in this strain (to ensure non-revertability) may be a worthwhile undertaking in an effort to contribute to the development of a live oral vaccine against shigellosis.

Thermal stability of a killed cholera vaccine

Principal Investigator: Zia U. Ahmed
Funded by: SAREC

Thermal stability of the WC/B oral cholera vaccine, which was field-tested by ICDDR,B in 1985 by maintaining a cold-chain from production to field use, was considered to be an interesting area of study because of its practical implications. This collaborative study with the University of Göteborg (Sweden) involved maintaining the vaccine (which was identical to the one field tested, except that it contained recombinant B-subunit of cholera toxin instead of the natural excreted product used in the previous vaccine) at 4°C, 30°C, and 42°C for a period of up to 6 months, determining the antigen content in the samples, and testing its immunogenicity in rabbits. Results obtained so far with samples stored up to 12 weeks indicate undiminished antigen content and immunogenicity. Furthermore, lyophilisation of the vaccine was also found to have no adverse effects. The data strongly indicate that the vaccine may be used without a cold-chain and suggest that it has the potential for use as a public health tool.

Experiments are now in progress to assess immunogenicity of the vaccine by using no adjuvant (stimulants of antibody production) or reduced amounts of adjuvant in subcutaneous immunisation, together with experiments that are designed to assess the protective efficacy in rabbits.

Cloning of enterotoxigenic *B. fragilis* toxin gene

Principal Investigator: Zia U. Ahmed
Funded by: USAID

The obligate anaerobic bacterium *Bacteroides fragilis* is usually considered to be a normal flora of the gut. However, strains have been found that produce an enterotoxin. These enterotoxigenic *B. fragilis* (ETBF) strains have been implicated as potential diarrhoeagenic agents from a number of case-control studies undertaken at various geographic locations. We are trying to clone the toxin gene from an ETBF strain. So far, 6 clones have been found that expressed toxicity in a tissue culture assay; however, this property has been difficult to reproduce and appears to be

rather unstable in our hands. Work is in progress to overcome these difficulties, and further screening is being done.

Mucosal colonisation potential of attenuated *V. cholerae* strains

Principal Investigators: R.B. Sack and Z.U. Ahmed
Funded by: WHO

Colonisation of the mucosal gel by *Vibrio cholerae* is an early step in pathogenesis, and is, thus, a potent virulence factor. Several attenuated mutants of *V. cholerae* with the potential for use in a live oral vaccine have been described. Also, new cell surface antigens have been described recently. A live oral vaccine should have uniminished colonisation efficacy for enhanced vaccine effectiveness and these antigens are suspected to be potent colonisation factors. A protocol to study the colonisation potential and protective efficacy of these antigens, using a number of attenuated mutants in the RITARD model, has been finalised, and initial experiments have started.

BIOCHEMISTRY AND NUTRITION

Head: M.A. Wahed

The Biochemistry and Nutrition Laboratory conducts sophisticated assays requiring expensive equipment which needs regular and skilled maintenance and has a high turnover and depreciation value. The major goals are to provide research support in the area of biochemistry and nutrition; conduct basic research; simplify, develop, and adopt new techniques; and train others to do these activities.

In 1992, two new tests were developed, one to detect vitamin A₂ in serum and the other, copper in environmental samples. The Laboratory supported 28 projects and performed 6,414 tests.

Techniques to assess vitamin A status

Principal Investigators: M.A. Wahed and M.M. Rahman
Funded by: USAID/A

To assess vitamin A status, a reliable, simple and accurate method is lacking. Accordingly, we in collaboration with the University of Alabama, Birmingham, are proposing to establish the relative dose response (RDR) and modified relative dose response (MRDR) methods. Both methods are based on the binding of newly incorporated vitamin A to retinol binding protein in the liver and subsequent release into the circulation and, hence, can estimate vitamin A stores in the body.

The RDR method requires two blood samples as opposed to the MRDR which needs only one, but the binding to retinol-binding protein of dihydroretinol (vitamin A₂ used for MRDR) is 30% to 50% lower than the usual binding of retinol to this protein. So comparison of MRDR with RDR is necessary, apart from the validation itself, in malnourished children, since many of them in Bangladesh and other developing countries suffer from some degree of malnutrition.

We are studying 75 children of varying nutritional levels coming to the CRSC. When they recover from acute diarrhoea (about a week after discharge), they are tested for sensitivity of the MRDR test. This is followed by the RDR within 4 to 6 days. Both RDR and MRDR values will be compared with retinol-binding protein and pre-albumin to evaluate potential confounding factors of the tests in malnourished children. This is an ongoing study and we have so far recruited 39 children on whom both tests have been done.

We expect that the MRDR test will be of potential use not only to identify populations at risk for vitamin A deficiency, but also to measure the impact of vitamin A intervention programmes currently under consideration by the Centre.

Validation of the deuterated retinol dilution technique to assess vitamin A status

Principal Investigators: Marjorie Haskel and M.A. Wahed

The current techniques used to assess vitamin A status include plasma vitamin A, RDR or MRDR tests (above), cellular impression cytology (CIC), dietary vitamin A intake, and clinical evaluation. But there are contradictory reports or lack of adequate validation of these techniques. Therefore, this proposed study, in collaboration with the University of California in Davis (Ken Brown) and Dhaka Medical College, plans to use liver tissue collected from adult surgical patients during surgical interventions to measure vitamin A stores and evaluate the deuterated retinol dilution technique (a non-radioactive stable isotope dilution procedure).

The hypotheses are that (a) the ratio of deuterated retinol in plasma will correctly predict hepatic retinol concentration in these repleted and depleted adult surgical patients, (b) the results of RDR, MRDR, and CIC tests will identify subjects with low liver reserves of vitamin A, and (c) plasma retinol concentration will not predict the liver status.

Mr. Wahed visited the University of California in August to complete plans for the study; the tests have been completed on 3 patients.

Collaboration with other divisions: The ingredients for the study **Energy-dense instant weaning food** (see CSD) are prepared in this Laboratory. Also, the micronutrients for the **Micronutrient mixture in acute diarrhoea and ARI, and in improving nutrition**, and the vitamin A and zinc syrups for the **Vitamin A and zinc in reducing diarrhoea duration and rate of persistent diarrhoea and improving nutritional recovery** are mixed here (see CSD). With the Community Health Division, the Laboratory collaborated on the study **Water quality impact of Meghna-Dhona-ganga embankment** (see CHD).

Collaboration with national institutions: The study **Absorption-promoting ORS in animal models** was carried out in part in this Laboratory in collaboration with the University of Dhaka (see CSD), and syrups for the study **The effect of vitamin A status and its supplementation on pneumonia** (a joint project with the CSD and Dhaka Shishu Hospital) were prepared and randomised here (see CSD).

ENTERIC BACTERIOLOGY

Head: M. John Albert

The Enteric Bacteriology Laboratory does case-control studies to determine whether a particular organism is the causative agent of diarrhoea, conducts studies on the pathogenesis of diarrhoea, defines new aetiological agents of diarrhoea, and develops simpler assays for diagnosis of bacterial pathogens.

Three of the 1992 studies involved 2 types of bacteria which cause diarrhoea: *Escherichia coli* and *Shigella dysenteriae* type 1. The fourth study reported here includes *Vibrio cholerae* with these, and the fifth is on *Bacteroides fragilis*.

Role and characteristics of diarrhoeagenic *E. coli*

Principal Investigator: M. John Albert

Funded by: USAID

The 5 categories of *Escherichia coli* that are known to cause diarrhoea are: enterotoxigenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), enteroinvasive *E. coli* (EIEC), enterohaemorrhagic *E. coli* (EHEC) and enteroaggregative *E. coli* (EAaggEC). The role of these *E. coli* is being investigated in the aetiology and pathogenesis of acute and persistent diarrhoeas in children in Bangladesh. For the acute phase of the study, 400 children less than 5 years of age with acute diarrhoea seeking treatment at the CRSC were selected, with an equal number of matched controls with non-gastrointestinal diseases at the

Dhaka Shishu Hospital. For the persistent phase, 80 children with persistent diarrhoea and an equal number of controls were studied; *E. coli* isolates from throat, upper small bowel secretion, and stools are being tested for pathogenic properties by both DNA probe assays and bioassays. For the acute diarrhoea study, only isolates from stools are being tested. Preliminary results indicate that ETEC, EPEC, and EAaggEC are prevalent in this age group in Bangladesh.

Virulence-associated properties of EIEC

Principal Investigator: Khaleda Haider

Funded by: Core funds

A total of 33 EIEC strains isolated from various geographic locations were screened for a series of virulence-associated properties and compared with those of 5 strains of *S. dysenteriae* type 1 isolated in Bangladesh. EIEC strains, particularly those belonging to the serogroup O28, exhibited considerable similarity to *S. dysenteriae* type 1 strains in several virulence-associated properties, including cell surface hydrophobicity, haemagglutination, plasmid profile, Sereny test, and capacity to adhere to HeLa cell monolayers. The ability to bind Congo red dye appeared to be a more stable phenomenon in EIEC than in the *Shigella* strains.

The results obtained from this completed study represent a survey of characteristics of EIEC strains which might have relevance to virulence. In addition to the capacity for invasion, these strains appear to possess several other properties which have been putatively equated to virulence in *Shigella* spp.

Genetic analysis and phenotypic correlation of plasmids in strains of *S. dysenteriae* type 1

Principal Investigators: Khaleda Haider and

S.M. Faruque

Funded by: USAID

During 1992, a number of important experiments were completed at the Department of Microbiology, University of Kyoto, Japan, as part of a collaborative research programme.

The studies involved restriction map analysis of the 6 and 2 Mdal plasmids of *S. dysenteriae* 1 and identification of specific fragments of those plasmids. Each of the two specific fragments of one of the plasmids and the specific fragment of the other were subcloned separately into a vector. The probes will be used to select transformants after introducing these plasmids individually into a plasmidless strain of *S. dysenteriae* 1 and *E. coli* K-12. Finally, the transformants will be studied

for specific functions. Besides these, probes are being used to identify specifically *S. dysenteriae* 1, which will have implications in epidemiological studies.

Occurrence of drug resistance in *Shigella* species

Principal Investigator: Khaleida Haider

Funded by: Core funds

Shigella strains isolated from patients with diarrhoea, who attended the CRSC during 1984 and 1988-1991 were studied. The isolation of *Shigella* ranged from 8% to 13% of patients and there were variations in the prevalence of the different species of *Shigella* in different years. In 1984, *S. dysenteriae* 1 and *S. flexneri* were isolated with similar frequencies (43%), but in 1991 the latter predominated (22% and 59% respectively). Resistance of isolates to ampicillin (A), trimethoprim-sulfamethoxazole (TMP-SMX) and nalidixic acid (Nal) was investigated. Resistance to A was low in *S. dysenteriae* and in *S. flexneri* during 1984, but increased in 1988 and onwards. Resistance to TMP-SMX in *S. dysenteriae* 1 remained very high throughout the period of study, but approximately 50% of *S. flexneri* strains were susceptible. Resistance to Nal was very high in *S. dysenteriae* 1 during 1988-1989, but started to decline thereafter. Nal continues to be useful in the treatment of infections due to other *Shigella* species. Resistance of species and serotypes other than *S. dysenteriae* 1 and *S. flexneri* to A remained low, although resistance of *S. sonnei* to TMP-SMX remained high. The minimum inhibitory concentration of A varied and that of TMP-SMX was found to be very high. Implementation of measures for rational use of antibiotics is urgently needed. This study was completed.

Biochemical fingerprinting in studies of diarrhoeal pathogens

Principal Investigator: M. John Albert

Funded by: SAREC

Biochemical fingerprinting is a computerised technique developed at the Karolinska Institute, Sweden, for strain discrimination of bacteria and is useful in epidemiological studies. This technique relies on absolute differences in substrate utilisation and relative differences in the velocity of utilisation of different substrates by bacteria for strain discrimination. We plan to use the technique in collaboration with the scientists at the Institute to study the epidemiology of diarrhoeas due to *E. coli*, *V. cholerae* O1 and *S. dysenteriae* type 1 in Bangladesh. *E. coli* iso-

lates will be obtained from an ongoing project. *V. cholerae* O1 and *S. dysenteriae* type 1 isolates will be obtained from the past and present endemic and epidemic diarrhoeas.

Isolation of enterotoxigenic *B. fragilis*

Principal Investigators: R. Bradley Sack,

M.J. Albert, and K. Alam

Funded by: Core funds

Enterotoxigenic *Bacteroides fragilis* (ETBF) have recently been shown to be associated with acute diarrhoeal diseases in domestic animals and small children in the United States. Although the organism has been isolated previously in Bangladesh, no epidemiological studies have been done to demonstrate its association with diarrhoeal disease. We, therefore, did a case-control study in which children less than 5 years of age admitted to the CRSC with acute diarrhoea were matched with children of the same age admitted to Dhaka Shishu Hospital (courtesy of M.S. Akbar) at approximately the same time with non-diarrhoeal illnesses. Stools were assayed for all known enteric pathogens by standard methods; *B. fragilis* were isolated by using selective agar media and enterotoxin production determined using morphologic changes in human colonic tissue culture. A total of 368 children with diarrhoea and 440 children without diarrhoea were studied.

The isolation rate of all *B. fragilis* was approximately 20% in children both with and without diarrhoea. In children less than 12 months of age, there was no difference in the isolation rate of ETBF between the two groups. In the 13- to 48-month age group, however, there was a significantly higher isolation rate of ETBF in children with diarrhoea than in those without. The clinical syndrome seen in patients harboring ETBF consisted of watery diarrhoea and vomiting, but no fever or abdominal pain, which generally resulted in only mild dehydration. These results support the role of ETBF as a diarrhoeal pathogen in Bangladeshi children; the results are similar to previous studies in the U.S., in that ETBF are associated with diarrhoea only in children over 1 year of age. The rates of isolation of ETBF are less, however, suggesting that the selective media used may not be adequate for this part of the world, or that Bangladeshis do not carry *B. fragilis* as a usual part of their normal faecal flora.

Collaborative studies include **Volatile fatty acids in experimental cholera and shigellosis** (see CSD) and

The carrier state and objects as reservoirs or secondary hosts of shigellae (see Environmental Microbiology Lab).

ENVIRONMENTAL MICROBIOLOGY

Head: Md. Sirajul Islam

The Environmental Microbiology Laboratory conducts independent studies and provides inter-departmental services for testing environmental samples supplied by other scientific divisions. Various environmental samples from national and international institutions of Bangladesh are also examined here. During 1992, 1,197 samples, including rectal swab, stool, water, and others were tested. The staff participated in the training course organised by the Training Bureau and gave special instruction to a microbiologist from Zambia for one month in November.

One investigation was continued and is reported here.

The carrier state and objects as reservoirs or secondary hosts of *Shigella* spp.

Principal investigators: Md. Sirajul Islam and M.J. Albert

Funded by: SDC

This investigation of the duration of the convalescent excretion of *Shigella* spp. by humans and the potential of various animate and inanimate objects in the home environment as reservoirs of infection (using both the conventional technique and the PCR process) is in progress. The first year of the study was laboratory-based; this phase is completed. The results show that *S. dysenteriae* type 1 can survive in water up to 3 weeks in a culturable state and in a non-culturable but viable state for up to 6 weeks. Furthermore, *S. dysenteriae* can also persist in various inanimate objects longer (about a week) in a non-culturable state. In this state, *Shigellae* may possibly cause disease, because it has been observed that non-culturable but viable *V. cholerae* can become culturable when ingested by humans.

The second year of the study is field-based. All the procedures and techniques for processing field samples are now established and standardised in the laboratory and the field sampling has begun.

IMMUNOLOGY

Co-heads: Tasnim Azim and Firdausi Qadri

Facilities have been developed in the Immunology Laboratory to undertake pathogenicity and

immune response studies on diarrhoeal diseases. Techniques are optimally formulated for the purification of antigens, such as toxin, outer-membrane proteins, lipopolysaccharides (LPS), capsular polysaccharides, and fimbriae. For these purposes, several methods and chromatographic techniques are used. The purified antigens are used for immunoassays and functional studies. Techniques used include haemagglutination assays, ELISAs, and immunoblots.

The Laboratory's cellular immunology scientists perform lymphocyte proliferation assays, ELISPOT, immunofluorescence, and granulocyte function assays. In addition, tests for identification of bacteria by latex agglutination and immunomagnetic beads and ELISA for tumour necrosis factor have been set up. A monoclonal antibody (Mab) producing laboratory is in function and hybridomas are being generated to meet the requirements of the scientists.

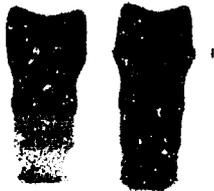
During the year, 5 studies were in progress in the laboratory and are reported here. Collaborative studies were also done with other laboratories and other divisions.

Haemagglutination ability and adhesiveness of *Shigella* species (Part 2).

Principal Investigators: Firdausi Qadri and T. Azim
Funded by: USAID

Shigellae belonging to various species and serotypes have the ability to adhere to mammalian erythrocytes and, thus, cause their agglutination. This property has been studied extensively in strains of *S. dysenteriae* type 1. Results show that the LPS and the slime polysaccharide are the adhesins instead of fimbriae and protein components, and that, in the presence of the slime polysaccharide, bacteria become resistant to killing by human serum and by polymorphonuclear phagocytes. The slime polysaccharide is also produced when *S. dysenteriae* type 1 strains are cultured *in vivo* in the rabbit gut, giving them the capacity to resist host defense immune mechanisms.

A MAb produced against the LPS of *S. dysenteriae* type 1 inhibits the haemagglutinating ability of these strains. Five MAbs have been produced against *S. dysenteriae* type 13 which recognise the LPS of this serotype and are very specific (see Figure). Three of these can be used for identification of bacteria by direct slide agglutination. MAbs have also been produced against Shiga toxin and bundle-forming pilus of enteropathogenic *E. coli*. Studies are being undertaken to utilise these MAbs for immunodiagnostic purposes.



Immunoblotting of a sodium dodecyl sulfate-polyacrylamide gel with ICL3, a monoclonal antibody - recognising LPS of *S. dysenteriae* 13. The figure shows that the antibody recognises both the O - antigenic polysaccharide and the core antigen of the LPS.

Immune response to *S. dysenteriae* type 1

Principal Investigator: Tasnim Azim
Funded by: USAID

Infection from *S. dysenteriae* type 1 in children less than 5 years of age can lead to serious complications which may be accompanied by leukaemoid reaction. Leukaemoid reaction is associated with a high white blood cell count, granulocytosis, and an increase in immature neutrophils. The factors precipitating it are not understood, but it has been hypothesised that an inappropriate immune response could be one such factor. This study, in collaboration with the University of Dhaka (L.N. Islam), therefore, aims to investigate the immune status of children with dysentery from *S. dysenteriae* type 1, with and without leukaemoid reaction. So far, 137 children have been enrolled, of whom 20 were matched healthy controls, 56 had dysentery from *S. dysenteriae* type 1 (of these 25 developed leukaemoid reaction), 22 from *S. flexneri*, 5 from *Entamoeba histolytica* and the rest had disease in which either another or no organism was isolated.

Immune status of children who develop persistent diarrhoea

Principal Investigator: Tasnim Azim
Funded by: USAID

Little is known about the role of the immune status of the child in the development of persistent diarrhoea. Other studies have shown that children with a diminished, delayed type hypersensitivity response have a greater chance of developing persistent diarrhoea. This study done in collaboration with the University of Dhaka (L.N. Islam) aims to extensively examine the cellular and humoral immune status of children between 7 and 24 months of age who come to the CRSC with a history of diarrhoea for about 7 days. The children who then go on to develop persistent diarrhoea are examined again for the same immunological parameters. Healthy children and those with malnutrition but without diarrhoea of the same age group are included as controls; 30 in each group will be required for the study. By the end of 1992, 30 children had been enrolled, of whom 6 developed persistent diarrhoea.

Local and systemic immune response to shigellosis

Principal Investigator: Rubhana Raqib
Funded by: SAREC

This report is the continuation of a study with the same name (see 1991 AR, p.55), which aims to analyse the local and systemic immune response to shigellosis in adult humans. Samples of peripheral blood, stools, and rectal biopsies (3 specimens) are being collected from 50 patients with clinical dysentery. Blood and stool samples were taken on the day of admission and on days 4, 7, 11, and 30 after the onset of diarrhoea. Rectal biopsies were taken on the day of admission and on day 30. Some samples were also collected from 42 healthy controls. All samples will be analysed at the Karolinska Institute (Sweden).

Detection of *Shigella* and identification of species/serotype specificity directly from stool

Principal Investigator: Dilara Islam
Funded by: SAREC

In this study, biological samples are being collected from 50 patients with clinical dysentery due to *Shigella* spp. to develop an immunodiagnostic assay for the detection of *Shigellae* and the identification of species/serotype specificity directly from stools. The samples are peripheral blood, stools, and rectal biopsy. Blood and stool

samples are taken on the day of admission and days 4, 7, 11, and 30 after the onset of diarrhoea. Rectal biopsies are taken on the day of admission and on day 30.

The same samples are being collected from 42 healthy controls (only once). All samples will be analysed using several different assays at the Karolinska Institute (Sweden) as follows: a) detection of Shiga toxin in stools by immunomagnetic particle-based separation assay, b) amplification of specific DNA fragments of Shiga toxin gene from stools, c) determination of antibody secreting cells in blood and antibody response in serum and stools against Shiga toxin, and (c) evaluation of the usefulness of the immunomagnetic separation/PCR procedure for detection of *Shigella* by analysing 300 to 400 stool samples.

MOLECULAR BIOLOGY

Head: Shah M. Faruque

The Molecular Biology Laboratory is a well-equipped, modern laboratory with technical facilities ranging from gel electrophoresis, nucleic acid preparation, and hybridisations, using both radio-labelled and non-radioactive probes, to the most sophisticated techniques of DNA sequencing and DNA amplification by PCR. Recent diagnostic techniques routinely used in the laboratory include DNA probe assays of diarrhoeal pathogens, ribosomal RNA fingerprinting (ribotyping) for differentiating among strains, and PCR assays for rapid identification of *Vibrio cholerae* O1 and *Shigella* strains.

The Laboratory continued in 1992 to be involved in the development and application of molecular techniques to identify and characterise diarrhoeagenic organisms. The general aim was to develop rapid and sensitive diagnostic methods, and determine the prevalence and clinical and epidemiological significance of pathogenic enteric microorganisms.

Identification of enteric pathogens using specific DNA probes

Principal Investigator: Shah M. Faruque
Funded by: USAID

Specific gene probes against *E. coli* pathogenic determinants have been used to assess the role of the various categories of diarrhoeagenic *E. coli* in Bangladesh. More than 9,000 isolates obtained from 3,000 patients between December 1986 and May 1988 have been screened for pathogenic *E. coli* to determine the prevalence and seasonality of these categories of diarrhoeagenic *E. coli* in patients of different age groups.

A new generation of probes has also been tested for specificity, sensitivity, and easy applicability. Besides probes for genetic determinants of pathogenic factors, other probes such as ribosomal RNA gene probes have been used to study clonal relationships and evolutionary links among isolates. Ribosomal RNA fingerprinting of *V. cholerae* isolates revealed important epidemiological information. Ribotyping of *Shigella* and enterotoxigenic *E. coli* isolates has been undertaken and found to be a useful approach for differentiating strains.

Identification of enteric pathogen by specific DNA amplification

Principal Investigator: Shah M. Faruque
Funded by: USAID

This study employs the PCR to amplify specific segments of pathogenic genes and, thus, identify the enteric pathogen from biological specimens. The aim is to develop and standardise rapid and sensitive diagnostic techniques for different enteric pathogens and test the applicability of these techniques in clinical and epidemiological studies.

PCR assays have been standardised for *Shigella* and toxigenic *V. cholerae* O1 strains, and the assays are specific and sensitive enough to detect as low as 10 bacterial cells. The PCR assay for *V. cholerae* O1 has been found to be applicable in environmental studies to detect the organism in water samples, where it cannot be detected by conventional culture techniques.

Genetic analysis and phenotypic correlation of plasmids in *S. dysenteriae* type 1 (see Enteric Bacteriology Lab).

PARASITOLOGY

Head: Rashidul Haque

The Parasitology Laboratory is well-equipped with good quality optical microscopes, an inverted microscope, a cellulose acetate electrophoresis apparatus, a liquid nitrogen tank, and centrifuges. The research of the Laboratory is focused primarily on the development of a rapid diagnostic test for pathogenic *Entamoeba histolytica*.

Techniques to identify pathogenic strains of *E. histolytica*

Principal Investigators: Rashidul Haque and Andrew Hall
Funded by: USAID

There is now a large body of evidence to suggest that *E. histolytica* exists in nonpathogenic

and pathogenic forms. Current detection of infection caused by this parasite depends on its morphologic identification in stools by microscopic examination. This is an insensitive procedure and does not differentiate the pathogenic species from the much more prevalent nonpathogenic species. There are no commercially available or practical and reliable methods for the detection of *E. histolytica* for routine use in clinical laboratories. Therefore, this study was undertaken to establish these techniques for use in clinical and epidemiologic studies.

This Laboratory has established the isoenzyme electrophoresis technique to determine the zymodemes of *E. histolytica* and it has been used to characterise the isolates, but this technique is expensive and time consuming. So, an immunofluorescence assay using MAbs has been defined and has been used to test 92 cultured isolates (from diarrhoeal patients) of the parasite, which had been characterised by zymodeme analysis (34 pathogenic and 58 nonpathogenic). Recently, an ELISA was developed using the anti-lectin MAbs to detect antigen from pathogenic *E. histolytica* and applied to 74 single diarrhoeal stool specimens. It was positive in 12 of the 12 specimens which were subsequently cultured to be pathogenic amoeba, in 0 of the 22 which were nonpathogenic, and in 2 of the 40 that had other or no intestinal parasites. The specificity and sensitivity of the assay for pathogenic *E. histolytica* were 97% and 100% respectively. The ELISA offers a promise as a rapid and sensitive means to detect this parasite directly from stool specimens. A larger study is being planned.

VIROLOGY

Head: Leanne Unicomb

The Virology Laboratory conducts research on diarrhoeal viruses, such as group A rotavirus, enteric adenovirus, and astrovirus, and is also involved in the study of poliovirus vaccination. Tests for virus antigen and antibodies of various types are performed for group A rotavirus, enteric adenovirus, and poliovirus. The Laboratory's scientists specialise in work with tissue culture, immunological techniques, and molecular biological techniques.

Two studies conducted during 1992 examined symptoms associated with viral infections (group A rotavirus and enteric adenovirus), and collaborative studies on neonatal rotavirus infection and poliovirus were performed.

Severity of rotavirus diarrhoea according to serotypes

Principal Investigator: Leanne Unicomb

Funded by: Core funds

To improve the understanding of the relative importance of serotypes of group A rotavirus, we, in collaboration with the Centers of Disease Control, USA (Caryn Bern), examined the correlation of clinical characteristics and disease severity with the serotypes in children less than 2 years of age who attended the Matlab DTC. Serotypes were determined using an oligonucleotide probe hybridisation technique. Episodes did not differ by serotype in prevalence of vomiting, copious diarrhoea, fever, abdominal pain, or length of stay in the treatment centre. Children infected with serotypes 2 or 3 were more likely to have more severe dehydration. Malnourished children with rotavirus diarrhoea were more likely to die within one month of detection than children with rotavirus diarrhoea who were not malnourished.

Clinical characteristics of diarrhoea associated with enteric adenovirus infection

Principal Investigators: Leanne Unicomb and K. Jarechi-Khan

Funded by: Core funds

It is generally thought that infection with enteric adenovirus gives rise to a mild form of diarrhoea. To investigate the nature of this disease, stool specimens from 80 infants less than 5 years of age who sought treatment for diarrhoea in Matlab were tested for enteric adenovirus using an ELISA test followed by cell culture. Only the children who were infected with enteric adenovirus and from whom no other diarrhoeal pathogen was found were studied. The most common clinical features of enteric adenovirus infection were watery diarrhoea of more than 8 loose motions per day with a duration of less than 4 days prior to presentation, vomiting, abdominal pain and low grade fever. When the clinical signs of enteric adenovirus infection were compared with those associated with rotavirus diarrhoea, vomiting and watery stools were more common among rotavirus-infected children. The degree of dehydration resulting from infection with enteric adenovirus or rotavirus was statistically similar. Three deaths were associated with enteric adenovirus infection.

Collaborative studies: **The impact of rotavirus infection at birth on subsequent rotavirus infection** (see CHD) and **The effectiveness of TOPV in children with gastroenteritis** (see CHD)

The DEPARTMENT OF LABORATORY SERVICES is comprised of the Animal Resources Branch, the Clinical Laboratory, the Histopathology Laboratory, the Matlab Laboratory, and the Support Services. These reports follow.

ANIMAL RESOURCES

Head: K.A. Al-Mahmud

The Animal Resources Branch provides support to scientists in their animal experiments, produces animals, conducts research and inter-institutional collaboration, trains in laboratory animal care and management, and extends veterinary services within the limits of its available facilities.

During 1992, the Branch supported about 15 research studies and a few exploratory animal experiments, and gave inter-departmental research support to 6. For these investigations, hyperimmune sera were produced against various antigens using 156 rabbits and 11 guinea pigs. Ascitic fluid was produced and immunological studies were done on 494 BALB/c mice. Ileal loop assays of bacterial toxins and bacteria were performed on 80 rabbits and 16 rats. RITARD model experiments were done on 107 rabbits to observe the diarrhoeagenic properties of various enteric pathogens. Sereny tests were done using 73 guinea pigs to observe and confirm the invasiveness of the enteric pathogens isolated in other laboratories. Absorption promotion studies were done on 12 rabbits. ST tests (80 samples) were done on infant mice. Finally, experiments were performed to study the effect of volatile fatty acids on cholera and *Shigella* models of rabbits (15).

The Branch produced and supplied a large number of mice, rabbits, rats, and guinea pigs, and over 25,000 ml of blood, not only for ICDDR,B scientists, but also for those at the Institute of Public Health and other national or international organisations and pharmaceutical companies. Training was provided to two personnel from the Bangladesh Livestock Research Institute on Laboratory Animal Science and Technology. Technical expertise was also shared with other national institutes.

The Veterinary Clinic for Small Animals (M. Hossain) treated 192 sick animals, including surgical cases. Clients who brought their pets were mostly expatriates.

Coccidia - and *Giardia* - free rabbits from an animal house

Principal Investigator: A.S.M. Hamidur Rahman
Funded by: Core funds

The ICDDR,B Animal House is a conventional laboratory where rabbits of the New Zealand white variety are bred. The animals in such an establishment generally remain infected with protozoa/helminths as asymptomatic carriers. In fact, nearly 70% of the rabbits here were found to be infected with *Coccidia* and/or *Giardia*. Performing experiments with the infected rabbits may give confusing or erratic results particularly in RITARD and ileal loop assays. A study was, therefore, undertaken to eliminate the protozoal infection (*Eimeria* and *Giardia*) from the post-weaned rabbits with sulphamonomethoxine sodium and metronidazole in their drinking water. Three courses of treatment over a period of 6 to 8 weeks were necessary to completely eliminate the infection. Reinfection was, however, almost certain if proper sanitary measures were not practised. The body-weight gain of the treated rabbits was significantly higher than that of the nontreated ones.

Local ingredients used to feed laboratory rabbits

Principal Investigator: K.M. Nasirul Islam
Funded by: Core funds

An experiment was undertaken with 54 weaned New Zealand white rabbits of both sexes to compare the performances of mash feed with factory pellets made with locally available ingredients. The average body-weight gain of the rabbits fed with pellets was significantly higher than that of those fed with mash. The maximum weight gain was found to be in the 16th week of age of both groups of rabbits. No significant difference was observed between the two groups in total feed consumed. The percentage of survival was also higher in rabbits of the pelleted group.

CLINICAL LABORATORY

Head: Md. Anowar Hossain

The Clinical Laboratory of the Dhaka Hospital (CRSC) provides: (a) diagnostic support to patient care activities (inpatients and outpatients, Staff Clinic, and Traveler's Clinic), (b) research support, (c) support to epidemic programmes, and (d) training to national and international Fellows. It also conducts research, either collaborative or by individual staff members, on diarrhoeal disease agents and methodological development, and undertakes quality control measures.

The Laboratory moved in 1992 from the ground floor to the first floor of the hospital building. This new space better accommodates the increased workload, particularly the private



Clinical laboratory staff at work in their new space.

patients. A specimen reception area and waiting, sitting and toilet facilities for outside users were provided. The three sections of the laboratory (microbiology, pathology, and biochemistry) have been relocated in three separate rooms.

During the year, one UNICAM 8630 Kinetic spectrophotometer was purchased to meet the increased demand of tests in the biochemistry section. A recalculation of all tests using commercial kits was done and a costing file was created. Quality control support was provided, as usual, to the Institute of Public Health by testing their IV fluids for electrolyte content and ORS packets for electrolytes and glucose.

The number of specimens received for testing in 1992 increased from about 88,000 in the previous year to 98,664; over 235,000 tests were performed on these specimens, an 18.7% increase over 1991. The most common diarrhoeal agents isolated from or detected in stools were species of *Shigella* (2,293), *V. cholerae* O1 (1,680), *Aeromonas* (1,579), *Salmonella* (731), and *Giardia* (608).

Several new bacterial agents were isolated. For example, the microbiology section was able to detect some cross-reacting bacterial isolates. They also identified or detected 15 drug-resistant *Salmonella* spp. (and multiple drug-resistant *S. glaucoster*) from stools, blood, and urine, and isolated *Hafnia alvei* from both stools and blood.

S. dysenteriae serotype 11, 12, 13, *S. boydii* serotype 16 and one gas-producing *S. boydii* 7 were also isolated during the year. The microscopic unit of the pathology section was able to detect the blue-green algae (*Cynobacterium*-like organism) from the stools of 5 patients.

A thousand serum specimens (100 microlitres each) from patients of all age groups were provided to the London School of Hygiene and Tropical Medicine (Dorothy Crawford and Tanzina Hoque) for a collaborative seroepidemiological survey of EBV (Ebstein-Barr virus), and 60 paediatric patient serum samples were provided to Dr. Tahmid Ahmed of the CSD, who is undergoing postgraduate study at the University of Tsukuba in Japan, to check for the antibody status against food allergens.

Attempts have been made to arrange for all sections of the Laboratory to be under a quality control scheme of the College of American Pathologist. Although the biochemistry section has already been participating in external quality control, through the arrangement of the World Health Organization, with Wolfson Research Lab, Queen Elizabeth Medical Centre, UK, internal quality control procedures have now been adopted to control the performance of technicians and their reproducibility and control of chemicals and reagents.

Twenty-two research protocols were supported during the year. One study undertaken here was in collaboration with the Institute of Post-graduate Medicine and Research (Nazrul Islam).

Laboratory staff gave lectures and provided practical support to participants of the Training Bureau's international training courses and provided special instruction to a doctor from the Institute of Epidemiology Disease Control and Research and a medical officer and technician from the Santal Mission of the Norwegian Board of Health Project.

Coagglutination technique and ELISA for diagnosis of rotavirus diarrhoea

Principal Investigator: Anwar Hossain

The results of this completed study are in the process of being analysed. Stool specimens collected from the CRSC and the Dhaka Shishu Hospital were subjected to two tests, the coagglutination test and enzyme-linked immunosorbent assay (ELISA), and were analysed to determine sensitivity, specificity, and positive and negative predictive values. Preliminary findings show that

210 of the 1,332 specimens were found to be positive for rotavirus antigens by ELISA and 276 by coagglutination. Of the 210, 50 were negative in the coagglutination test and of the 276, 116 were negative in ELISA. Sensitivity of the coagglutination test was 76%, specificity 90%, positive and negative predictive values 58% and 95% respectively.

HISTOPATHOLOGY LABORATORY

Head: Moyenu Islam

The Histopathology Laboratory provides services in support of patient care and research. The scientists of the Laboratory undertake biopsy and cytological examinations and interpretation of bone marrow aspirates for patients of the CRSC, Staff Clinic, Travellers Clinic, Mirzapur Kumudini Hospital (30 Km NE of Dhaka), and private practitioners. A total of 508 biopsy samples, 245 animal tissue samples, and 732 conjunctive impression cytology samples were processed during the year.

In 1992, services were provided for the studies, **Theraeutic efficacy of oral 5-aminosalicylic acid in acute shigellosis** (see CSD)



A view of the Histopathology laboratory in its new quarters.

and **Local and systemic immune response to shigellosis** (see Immunology Lab). Conjunctival impression cytology transfer smears and filter paper strips were stained and mounted for research studies undertaken by scientists in other scientific divisions. The report of one independent study follows.

Fatal cases of diarrhoeal illness and acute respiratory infection

Principal Investigator: M.M. Islam

Funded by: UNDP/WHO

Twenty-five autopsies were conducted in 1992. Twenty-one of these patients who died were malnourished, 12 had shigellosis, and 17 had pneumonia, to name but a few of the complications; some had more than one. Interesting cases were presented in 9 clinicopathological conferences and the proceedings of three were published in the Journal of Diarrhoeal Diseases Research, the Centre's medical journal. The study continues and data are being analysed.

MATLAB FIELD LABORATORY

Head: Qazi Shafi Ahmad

The Matlab Field Laboratory provides full diagnostic services to the Diarrhoea Treatment Centre (see CMD) and supports all field- and hospital-based research studies. In 1992, the Laboratory employed 8 staff members to perform such tests as microbiological culture and sensitivity, routine examination of stools, urine, serum electrolytes, glucose protein, urea, and type and cross-match of blood transfusions. They performed 18,749 clinical microbiology, parasitology and haematology tests (about 3,000 more than in 1991). The most frequently isolated pathogen was *V. cholerae* (995), surpassing *Shigella* spp. (366) for the first time in many years. *Salmonellae* were detected in only 34 specimens.

SUPPORT SERVICES

Logistic Support

Head: Qazi Shafi Ahmad

The IV fluid section was discontinued in June, so the Logistic Support Unit now includes just two sections: the media preparation and wash-up and the bacterial stock culture collection. The unit's staff of 15 provide technical support to the hospitals and clinical laboratories at Dhaka and Matlab by supplying various kinds of culture media required for the identification of bacterial pathogens. They also supply bacteriological

media for use in research projects.

During 1992, the media section prepared 4,235 litres of several different kinds of culture media, and the IV fluid section (January to June) prepared 25,000 bottles containing various quantities of injectable solutions and distilled water. To fulfil the needs after June, a large distilled water plant (30 litre/hour) was purchased and installed in the wash-up room. For quality control, the IV fluids were routinely tested for electrolyte content and sterility. Quality control tests were also performed on various culture media. The bacterial stock culture collection supported 15 research projects by lyophilising various volumes of samples ranging from 1 ml to 1,000 ml bottles. Recent isolates of *V. cholerae*, *Shigella*, and *Salmonella* were also lyophilised as routine activity. About 145 ml of diagnostic *V. cholerae* and *S. flexneri* antisera were prepared and supplied for diagnostic purposes.

The Branch also supplied various culture media and IV fluids to national and international institutions, including the Dhaka Medical College Hospital, the Institute of Public Health, and government and private hospitals.

ARCHIVE

Head: M.A. Malek

The Information and Archive Unit provides support by computerising data for the treatment centres and laboratories (performing data entry/verification, coding, editing, data cleaning, and data processing). They also produce blood culture reports, *Shigella* sensitivity reports, and monthly financial recovery reports for the Clinical Laboratory, treatment centres, Traveller's Clinic, Staff Clinic, and private patients. The Unit also generates monthly financial reports for media and IV fluid preparation (until the section closed in June). In 1992, the Unit processed 120,645 records (98,315 in 1991).

Archiving data for future use, the Unit produces query reports and data analysis. A database of 465,000 pathology, microbiology, and biochemistry records has so far been developed; about 9,000 records are added every month. Data collected for the vaccine trial are archived; the information is stored in the mainframe computer which is used by the scientists of the Division for data analysis.

About 80,000 blood, breastmilk, and stool specimens are divided into different groups and sub-groups and kept in the cold room and refrigerators on a planned schedule so that a particular specimen or a group can be retrieved whenever required. A database of specimens has

also been developed for convenient retrieval. The vaccine trial specimens were reorganised and relocated in 1992, making more space available in the cold room at -20°C .

BIO-ENGINEERING

Head: M. Sobhani

The Bio-engineering Cell provides all the technical support, i.e. installation, modification, maintenance of scientific and audiovisual instruments to all the laboratories. Several new items of equipment were installed in 1992, including an electrophoresis instrument, an Eppendroff, Beckman, and Sorval centrifuge, a table-top glass still, a Vortex mixer, 2 micro-ovens, a steriliser, an auto-ELISA, an ultra-low freezer, a digital programmable centrifuge, an electronic balance, a Unicam spectrophotometer, an autoclave, and 2 microscopes.

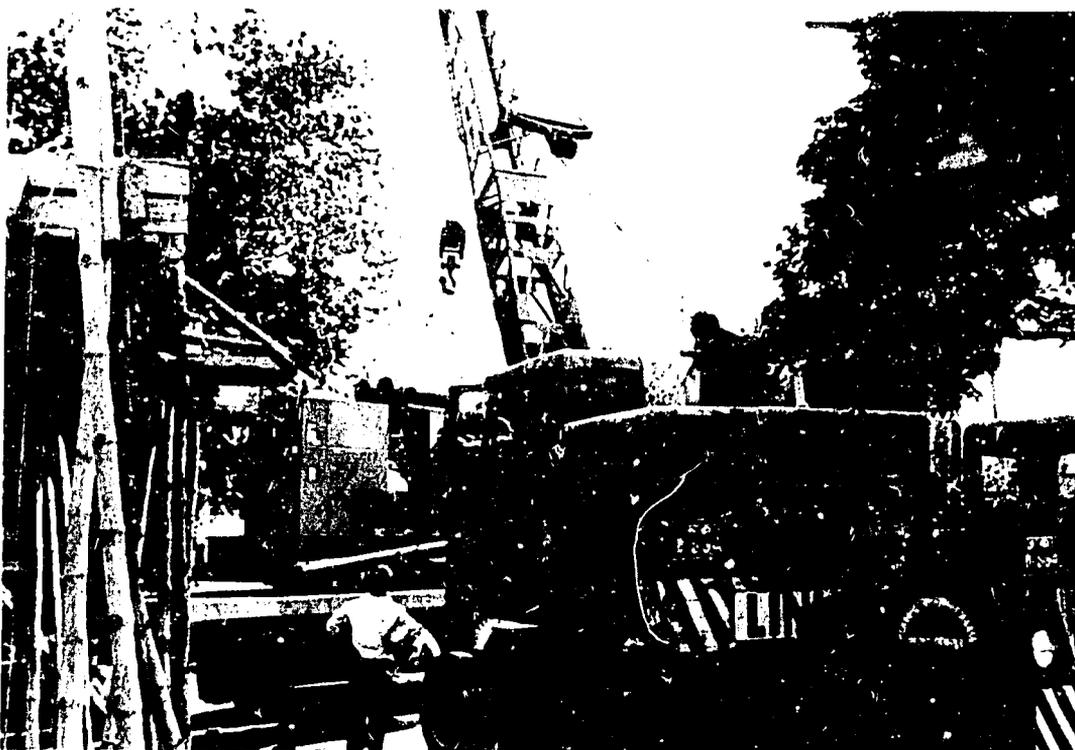
The Cell also provided services to the Institute of Public Health, Shishu Hospital, Kumudini Hospital, and BIRDEM and delivered 5 lectures on common faults and preventive maintenance of

analytical instruments at the National Electromedical Workshop.

MANAGER'S OFFICE

Head: Md. Akbar Ali

To assist in operational management the Laboratory Manager's Office provides specifications and information about various kinds of equipment, instruments, spares, and supplies to be ordered (most of them from overseas) for the laboratories of the Division, and looks into biosafety aspects. During 1992, the Office held 8 meetings of the Safety Committee, during which they discussed, among other things, safety management policies, hazard assessment, safe equipment selection, development of safe techniques, accident reports, and the writing of a safety manual. Two talks on safety and one on cost effectiveness of laboratory tests were delivered. Several meetings were also held with the Supply and Finance staffs to monitor the flow of overseas supplies.



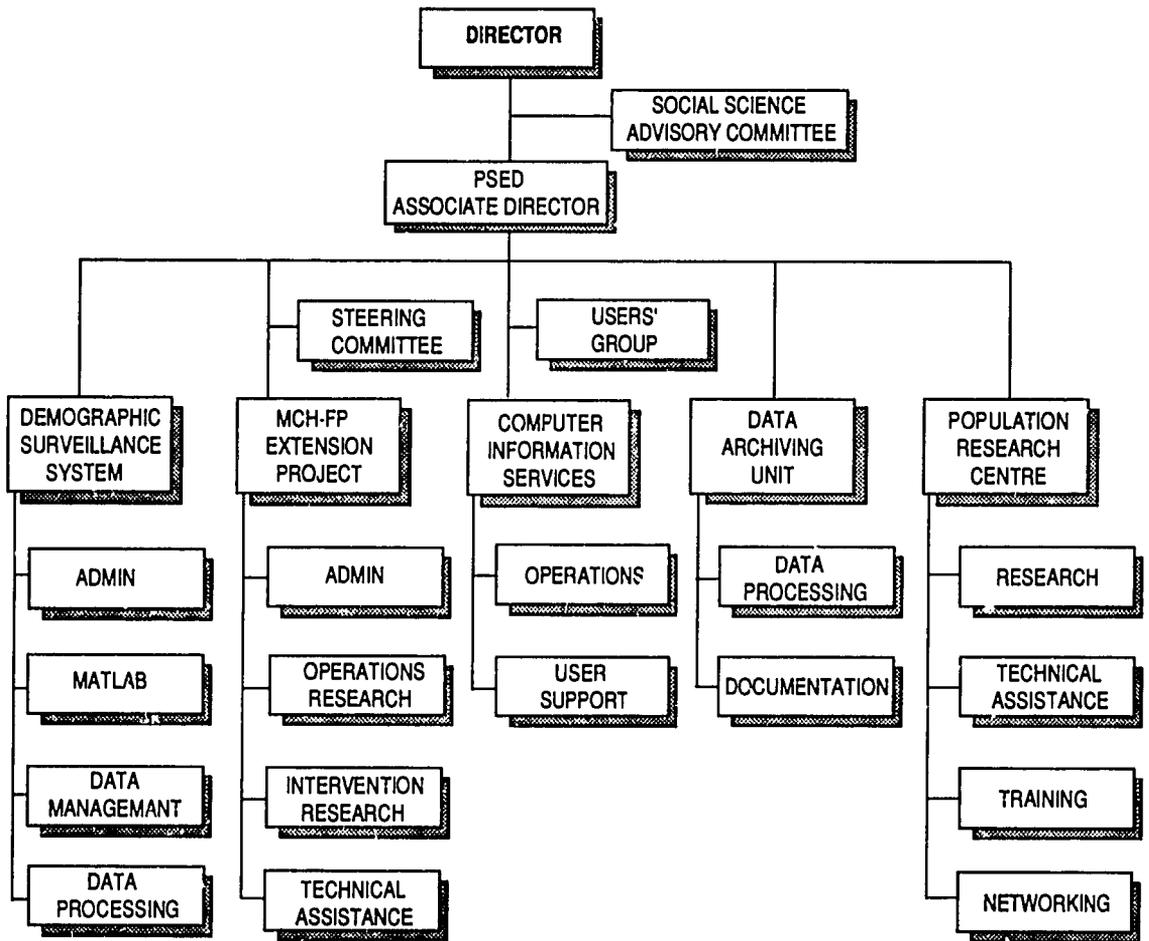
A crane delivers the new generator to its location beside the old generator substation. A new building was constructed around it (see Engineering Branch). Continuous power is essential for the laboratory of specimens and other perishable materials.

POPULATION SCIENCE AND EXTENSION DIVISION



Children greet a Health Assistant who comes to collect data in a village

**ORGANOGRAM :
POPULATION SCIENCE AND EXTENSION DIVISION**



POPULATION SCIENCE AND EXTENSION DIVISION

Associate Director: Michael Strong

The Population Science and Extension Division (PSED) conducts research on population growth and its components, and factors affecting fertility and mortality, with particular attention to family planning programmes and interactions of population growth and health and human development. The Division works with the Government of Bangladesh and international and donor agencies to translate findings from applied research into programme improvements.

To support this research (and health and population research by scientists from other divisions and institutions), PSED staff maintain a unique demographic surveillance system in Matlab thana, the Centre's rural field site, and sample surveillance and surveys in four other thanas where the MCH-FP Extension Project works with the government programme. They are also responsible for the system which provides information about health care and contraceptive use in the treatment area for the MCH-FP project in Matlab, for use both in research and programme management. PSED staff provide computer support and data archiving services to Division researchers, those from other divisions of the Centre, and those from other institutions in Bangladesh and abroad.

Scientists of the PSED are demographers, statisticians, social scientists, and health management experts. They are assisted by a wide variety of technical and field support staff. In 1992 there were 6 international (3 of them seconded) and 182 national staff members, as well as 30 Community Health Workers. The scientific staff presented papers at the annual meeting of the Population Association of America (PAA) and elsewhere, and participated in activities, such as the WHO/UNICEF Consultation on the Measurement of Mortality in Infants and Children in Geneva. An important part of the Division's work is training and education for staff members (see Staff Development).

HIGHLIGHTS 1992

Reorganisation: As recommended by the Programme Review Committee of the Board of

- * Reorganisation created new Population Studies Centre.
- * Linkage with local institutes established a serious focus on examining women's reproductive health issues.
- * Major collaboration with BRAC introduced.
- * External assessment team noted many accomplishments of the Extension Project.
- * A programme to expand the government's delivery of injectable contraceptives through home visits began.

Trustees and discussed at the May 1992 Board meeting, the PSED modified its organisational structure to reflect the actual functioning of the Division. The PSED is now made up of the following units, which are described in separate sections of this report:

- ** Population Studies Centre (PSC)
- ** Demographic Surveillance System (DSS)
- ** MCH-FP Extension Project
- ** Data Archiving Unit
- ** Computer Information Services.

Reproductive health and women's empowerment: In September, the Ford Foundation approved a grant for support of community-based research on reproductive health and women's empowerment. This will fund two PSED proposals. The first is an umbrella project linking the Centre, the Bangladesh Rural Advancement Committee (BRAC), the Bangladesh Institute of Development Studies (BIDS), the Bangladesh Institute of Research for Promotion of Essential and Reproductive Health and Training (BIRPERHT), the Population Council, and the Ford Foundation into a Consortium on Reproductive Health to examine women's health issues. A major focus of this

project will be to develop the research skills and capacities of the consortium members and other institutions in Bangladesh.

The second proposal which this grant funds is for the Centre's portion of the Consortium field work in the BRAC/ICDDR,B Matlab area (see below). This three-year grant will enable the ICDDR,B to make major progress in its social science research and research training initiatives.

BRAC/ICDDR,B Matlab project: A major new initiative during the year will involve PSED staff in research on how social development and improvement in women's status affect the health of the family. Due to the presence of the ICDDR,B field station, there is a unique opportunity in Matlab to investigate the impact of social and economic development that occurs in the presence or absence of special maternal and child health and family planning programmes. This research will be carried out in collaboration with BRAC and other members of the Consortium on Reproductive Health, with a fundamental goal to help improve the well-being of the rural poor, especially women.

POPULATION STUDIES CENTRE

Studies Director: Radheshyam Bairagi

The Population Studies Centre was established in

1992. It is the locus of population studies at the ICDDR,B, apart from the applied and operational research being carried out by the Extension Project. The PSC undertakes population studies at the national or international level, although it will continue its special interest in analysis of data from Matlab. Researchers from throughout the ICDDR,B undertaking population studies, as well as visiting scholars, will be affiliated with this group for research support. The PSC will also provide frequent discussion group meetings, host workshops, and serve as a source of technical assistance for the government and others.

PSC staff have been responsible for designing the BRAC/ICDDR,B project described above, in collaboration with BRAC colleagues, and for designing, implementing, and analysing data from the Baseline Survey for the project.

Other current and recently completed research by staff members and visiting scientists assigned to PSC include work on measurement, determinants, and consequences of child and adult mortality, and work on factors affecting fertility, including women's status and gender preference.

I. Mortality and Health Behaviour

Covariates of childhood mortality in Matlab: A study (A. Bhuiya and K. Streatfield) published this year examined relationships between social,



Women of a BRAC village organisation listen to their leader.

economic, demographic, and programme factors and childhood mortality, separately for boys and girls at different ages. They found that effects of mothers' education on the risk of mortality depended on the sex of the child, whereas age, birth order, programme effects, and sex differences all varied with the age of the child.

Effects of adult mortality on infant and child mortality: The death of a parent notably increases the subsequent risk of death for young children in a high-mortality setting. The availability of linked prospective data on family members from the DSS made it possible to quantify the risk. A paper presented to the PAA (M. Strong) shows that in rural Bangladesh the death of a mother raises the probability of death in the next 24 months by a factor of ten. At ages 1 to 11 months, the excess risk is much greater for girls than for boys. Deaths of fathers, by contrast, cause little excess risk to the children. It appears that it is specifically the loss of the mother's care and health knowledge, rather than common family susceptibility or loss of income, that accounts for the higher child mortality. Implications for design and targeting of child survival programmes are discussed.

Health of adults in the developing world; the view from Matlab: An article (M. Strong) examines trends and differences in adult mortality in Matlab. Progress in reducing age-specific mortality rates for 15-to-59-year-old men and women has been slow. Non-communicable diseases are the leading category of causes; deaths due to injuries are less common than in other studies in poor countries. As elsewhere, men in this age range have higher mortality rates than women, but maternal mortality is so high that this usual difference is reversed at peak childbearing ages, with higher mortality for women than for men. The paper concludes with recommendations for better collection of data on rates and causes of adult deaths in poor countries.

Violent death among women of reproductive age
Principal Investigator: Fazlur Rahman
Funded by: Population Council

Data collected by the Extension Project on causes of death for women of reproductive age in its field sites during 1984-1991 showed that 28% could be attributed to violence or injury (suicide or homicide). Violent deaths accounted for more deaths to women in the areas studied than all pregnancy-related causes combined. The rate of violent deaths differed markedly

among areas from which data were collected. This project is a secondary analysis of these data to produce a descriptive epidemiology of violent death of women; it is expected to produce results that can be used in directing in-depth investigations and calling attention to a significant problem.

Previous birth technique in monitoring child survival

Principal Investigator: Radeshyam Bairagi
Funded by: UNICEF

Direct estimation of levels and trends of mortality remains difficult in countries like Bangladesh that lack complete systems of registration of vital events. Various indirect techniques have been proposed, and the existence of complete registration in the DSS for Matlab allows the accuracy of these techniques to be evaluated. This project examines the accuracy of a promising new method for estimating child mortality that has received considerable attention from researchers and policy-makers, the previous birth technique. The specific goal is to determine if accurate estimates of death rates can be obtained by asking mothers about the survival status of their previous child within a few months of a subsequent birth, rather than immediately postpartum, as is done currently. Having a longer "window" of time would help considerably in future attempts to implement the technique in poor countries.

Sisterhood method of estimating maternal mortality
Principal Investigator: Md. Shahidullah

Another indirect technique allows maternal mortality rates to be estimated by asking adult women about the survival status of their sisters. Data have been collected for a comparison of estimates produced by this technique with direct estimates from the DSS; the analysis now going on will produce valuable information on the accuracy of the method for use in other high-mortality settings, where surveillance systems like the DSS do not exist. The report of this study will be submitted as a doctoral dissertation to the Australian National University.

Village health care providers' knowledge of diarrhoea management: A study (A. Bhuiya) published this year compared knowledge of childhood diarrhoea and its management among allopathic, homeopathic, and traditional healers working in the Matlab area. Allopathic practitioners were more likely than homeopaths and traditional

healers to know about microbial agents of diarrhoea and to report use of ORS in treatment (80% versus 20%). They were also more likely to prescribe antibiotics for treatment of dysentery.

Effects of foetal loss on human reproduction

Principal Investigator: Darryl Holman

This project examines the effects of foetal loss on birth spacing, using data from a one-year prospective endocrinological study of 375 women in Matlab. Conceptions will be detected by twice-weekly urine samples. Results will show the distributions of foetal loss by women's age and by gestational age, and the pattern of infecundability following the loss. The results of this study will be submitted as a doctoral dissertation to Pennsylvania State University.

II. Factors Affecting Fertility:

Gender preference, contraceptive use, and birth spacing:

A paper (M. Rahman and J. Akbar and colleagues from Johns Hopkins University and the Population Council) published this year examined the effects of gender preference on contraceptive use in Matlab. They found strong evidence of a bias towards sons, such that couples would not use contraception until they had at least one and preferably more surviving sons. There was evidence that couples with all sons were more likely than others with the same number of children (both sexes) to try for an additional child, indicating some preference for sex balance. In related work (M. Rahman and J. DaVanzo), the effects of gender preference on the spacing of births were examined, showing that son preference affects timing of births most in the early and late stages of family building. The authors argue that son preference will prove a significant barrier to further fertility decline in Bangladesh. But in a forthcoming paper (R. Bairagi) on a related issue, cross-national data are used to argue that son preference will not have much effect on further fertility decline. The subject remains an important one for Bangladesh and other South Asian countries and an active topic of research and discussion in PSED.

Contraceptive use dynamics: A project which proposes to use data from Matlab, the Extension project sites, and the Urban Surveillance sites in Dhaka to do comparative analyses of contraceptive adoption, continuation, and method switching is awaiting funding. The proposed project will also strengthen PSED resources for demographic analysis.

Age at marriage on fertility and infant and maternal mortality

Principal Investigator: Radeshyam Bairagi
Funded by: UNICEF

The average age of marriage for Bangladeshi women has been increasing, but remains exceptionally low, and most women begin childbearing soon after marriage. An early start to childbearing is typically followed by a larger than average number of births, and infants born to young mothers, and the mothers themselves, are at higher risk of death due to a combination of biological and social factors. This paper estimates that crude birth rates would be reduced by 13%, total fertility rates by 9%, infant mortality rates by 5%, and maternal mortality rates by 7% in rural Bangladesh if the minimum age at marriage for women could be raised to 18 years.

Women's participation in Grameen Bank credit programmes

Principal Investigators: Mizanur Rahman and J. DaVanzo
Funded by: Rockefeller Foundation

A grant to the RAND Corporation and ICDDR,B is funding an investigation begun this year to examine whether, and how, participation in rural credit groups affect women's status and decision-making power, and thus their health and fertility-related behaviour. The Grameen Bank is a large and innovative self-help organisation providing credit to women's groups. Group members subscribe to principles that include responsible parenthood and support for family planning. This project will include collection and analysis of data on group members and non-members in areas with both long-established and new programmes. Together with the ICDDR,B/BRAC project, this should produce results of substantive interest on a neglected area and test new methods of measurement of women's status and control over their reproductive lives.

DEMOGRAPHIC SURVEILLANCE SYSTEM

Project Director: Michael Strong
Funded by: UNDP, the Netherlands, UNFPA, and Core funds

The Demographic Surveillance System is in charge of vital event registration and related data collection in Matlab, processing and computerising these data, publishing an annual report, and making data available to researchers. This data collection has been in operation since 1966.

The funding situation and outlook for DSS continued to improve during this period, and project activities have included: streamlining and reorganising following the creation of the Population Studies Centre; conducting operations research on solving the problem of unrecorded household splits; improving the database, especially the pregnancy history table; and extracting data for various studies. During 1992 the DSS annual reports for 1985, 1986, and 1987 were finalised and published.

DSS data, often linked to data from the record-keeping system managed by the Extension Project, continued to be used by researchers in other institutions for valuable secondary and comparative analyses. Papers published this year using Centre data covered such topics as famine-related mortality (J. Menken and C. Campbell); child mortality differentials by sex (P. Muhuri and S. Preston); and birth spacing and child mortality (J. Miller, J. Trussell, A. Pebley, and B. Vaughan). Several of these researchers have been involved for some years in collaborative projects with colleagues at the Centre. Centre researchers and other Bangladeshi scientists have often used these data for research as part of training programmes. The production of data for useful secondary analyses and relevant professional training is an important part of the PSED contribution to the understanding and amelioration of population problems.

MCH - FP EXTENSION PROJECT

Project Director: John Haaga

Associate Project Director: Rushikesh Maru

Funded by: USAID

The MCH - FP Extension Project is a collaborative effort of the ICDDR,B and the Ministry of Health and Family Welfare of the Government of Bangladesh (GoB), supported by the Population Council. Its purpose is to improve the efficiency and effectiveness of the national family planning and maternal and child health programmes by undertaking applied research, dissemination, and technical assistance. The project's activities focus on improving management and increasing the quality of care.

During 1992, the Extension Project was assessed by an outside team commissioned by USAID. The report noted many accomplishments under the first two agreements (1982 - 1992): The Extension Project "has collaborated very successfully with the GoB in the testing and introduction of several major innovations impacting the national family planning programme", and it "has drawn considerable attention to the success of

the Bangladesh programme through extensive publication of scientific articles in international peer-reviewed journals." The report made recommendations for new emphasis on management issues and cost-effectiveness analysis in research, and on dissemination and collaboration within Bangladesh. These recommendations are being used in preparation of a proposal for a new agreement to fund the follow-on project during 1993 - 1997.

During 1992, applied research by Project staff focused on improving quality of care and access to family planning, improving management and the use of management information, and studying problems in the delivery of MCH care in the government system.

Quality of care: Analyses of data collected in Extension Project sites showed that women's perceptions of the quality of services delivered by field workers and clinics affected their subsequent likelihood of adopting contraception (M. Koenig, M.B. Hossain, and M. Whittaker). Continuing work is looking at practicable ways to measure and to monitor the quality of care, including both technical and inter-personal aspects of services.

An overview paper (M. Koenig and R. Simmons) summarised project findings about constraints on delivery of family planning services in rural Bangladesh. The authors argued that the same factors traditionally considered to lower demand for contraception also make service organisation and delivery difficult, i.e. supply- and demand-side factors are not clearly distinguishable in accounting for problems.

A special study was begun to analyse the situation of the family planning and MCH programme in Chittagong Division, the region where performance has lagged in the last decade. The report, due in early 1993, will examine reasons for poor programme performance, variation within the division, and propose ways in which the project's operations research and technical assistance can help.

Increasing method choice: An important element of the quality of care is the range of methods safely available. During 1992, a programme (F. Rahman, M. Islam, and R. Maru) was begun in eight thanas to try to expand within the government system the delivery of injectable contraceptives through home visits by field workers. Injectable contraceptives have proved popular and safe in Matlab and Extension Project sites, but questions remain about how to implement the programme safely with uninterrupted supply in a wider setting. The

phased expansion will continue during 1993, with Project staff providing training and monitoring. The increase in use of reversible contraceptives in the last decade in Bangladesh has been dramatic. But at the same time there has been a decline in sterilisations and other clinical methods, which would be appropriate for many women. A working paper of the Project examined programme factors accounting for the weakness of the sterilisation programme.

A long-standing policy issue for the Bangladesh family planning programme is whether and how to introduce low-dose oral contraceptives. A Project research intern (S. Salway) prepared a paper showing that use-effectiveness of the low-dose pill in Matlab has been comparable to that of the high-dose pill.

Increasing accessibility of family planning and MCH: Project staff have for several years worked on various implementation problems facing the satellite clinic programme, designed to bring clinical methods of contraception and preventive and curative health care by paramedics to more people at outreach sites. A summary paper was prepared this year, and project staff advised on the design of a new USAID-funded programme to strengthen the satellite clinic programme.

Management uses of information: Project staff continued field testing of an intervention to improve local-level management by action planning at the union and thana-levels, in Abhoynagar thana (where the project has a field office) and Monohardi thana (a non-project site). Preliminary results show the value of locally generated and implemented solutions to problems identified by teams composed of workers and their supervisors.

Project staff continued to provide assistance to the Management Information System unit of the Ministry of Health and Family Welfare, helping in the simplification of the registers used in the field by government family planning workers, and designing a training course for workers and supervisors in record-keeping and reporting. A related project evaluated a client-oriented register for use by Health Assistants.

MCH interventions: An evaluation (T. Juncker *et al.*) was completed for an intervention begun in earlier years, whereby family planning field workers screened pregnant women for severe anaemia and provided iron and folate supplements on their rounds of home visits. The evaluation revealed that the service added to the credibility and sense of achievement of the workers, without

notably interfering with other duties. However, cost-effectiveness analysis showed that the screening for severe anaemia was not worthwhile even when performed according to standards. Workers needed to provide more information than they had about side-effects and their management to boost compliance.

An analysis of causes of maternal mortality in the Extension Project sites was nearly completed (M. Whittaker *et al.*). It showed very high, but variable across sites, rates of deaths due to violence, as well as the expected high rates of deaths due to pregnancy-related causes.

Project staff began an evaluation of the performance of field workers responsible for screening and referral of high-risk pregnancies.

Family planning workers and women's status: A paper (R. Simmons, R. Mita, and M. Koenig) was published this year using focus-group data to show that employment in the family planning programme in Matlab had raised the prestige, social influence, and professional status of women workers, despite initial hostility in conservative communities. Current Project work is examining work conditions for field workers in the government programmes.

Sample Surveillance System: Project staff continued to operate a cost-effective, sample-based system for collecting data on demographic events, contraceptive use, and contacts with the health and family planning programmes, in a panel of households located in four rural thanas, two of which (Abhaynagar and Sirajganj sadar) are Project sites for field interventions. The basic data were supplemented by special modules to collect data relevant to project research on use of satellite clinics and women's perceptions of quality of care.

Matlab record-keeping system (RKS): In collaboration with staff of the CHD, Extension Project staff handled data processing and reporting for the MCH-FP project in Matlab. RKS data cover health and nutritional status, contraceptive use, immunisation status, etc. The data are used for management reports (produced with a turn-around time of only a few weeks) and to create working files for Centre researchers.

COMPUTER INFORMATION SERVICES
Manager: Abdullah Hel Mostafa

The Computer Information Services (CIS) is a technical support branch for providing mainframe computer services to PSED and the other

research and support divisions of the Centre, providing the computer facility, system development support, and training. It also provides engineering support for maintenance and installation of personal computers.

The CIS underwent two external reviews in 1991. As a result, most of the effort in 1992 went toward implementing recommendations from those reviews. A major effort was to redesign pricing and access policies to eliminate inefficient under-utilisation of the mainframe. Computer usage this year is 22% higher than it was in 1991. For the first time, some idle capacity of the computer was made available to outside users.

CIS staff devoted much of their work to systems to improve Centre management and research dissemination. The mailing system for Glimpse and the Annual Report was redesigned and reinstalled under database management software for the library. The database creation system for the Staff Development office was test-

ed for implementation. The Grants Administrator's information system was modified. The Personnel System needed modifications and inclusions to produce additional insurance premium reports and to improve leave management. Data cleaning and report generation programmes were written for Community Health Division. Data entry, management and analysis work for the Staff Clinic were also completed during this period. A new database creation and management system for maintaining contact with the Centre's alumni is being developed.

Several training courses and workshops were conducted (see Staff Development). Engineering support staff continued to provide PC maintenance and installation throughout the Centre. They fabricated two working PCs from the parts of outdated and discarded ones. In addition to their usual work, CIS staff supported and modified biomedical equipment with microprocessors and printers.

Table 1

Fertility and Mortality Rates from the MCH-FP Extension Project Sample Registration System

| | Sirajgonj ¹ | | | | | Abhoynagar ² | | | | | Jessore Comparison Area ³ | | | | |
|---|------------------------|-------|-------|-------|-------|-------------------------|-------|-------|------|-------|--------------------------------------|------|------|------|------|
| | 1987 | 1988 | 1989 | 1990 | 1991 | 1987 | 1988 | 1989 | 1990 | 1991 | 1987 | 1988 | 1989 | 1990 | 1991 |
| Fertility | | | | | | | | | | | | | | | |
| Crude birth rate (births per 1000 pop. per year) | 40.6 | 41.4 | 32.6 | 30.5 | 27.5 | 29.5 | 28.6 | 23.0 | 23.1 | 23.8 | 30.9 | 31.9 | 27.6 | 28.1 | 26.7 |
| Total fertility rate (average births per women) | 5.3 | 5.4 | 4.6 | 4.0 | 3.6 | 3.4 | 3.2 | 2.6 | 2.7 | 2.7 | 3.9 | 4.2 | 3.5 | 3.5 | 3.2 |
| Mortality | | | | | | | | | | | | | | | |
| Crude death rate (deaths per 1000 pop.) | 13.4 | 14.6 | 12.9 | 9.8 | 9.4 | 7.8 | 7.8 | 8.1 | 7.5 | 8.6 | 6.2 | 7.5 | 7.7 | 7.9 | 7.6 |
| Infant mortality rate (per 1000 live births) | 149.5 | 165.5 | 150.3 | 135.6 | 110.9 | 104.0 | 102.4 | 112.8 | 85.4 | 120.1 | 91.7 | 79.2 | 72.0 | 98.8 | 81.1 |
| Neonatal death rate (per 1000 live births) | 92.0 | 100.2 | 80.5 | 88.5 | 58.6 | 58.4 | 59.6 | 64.0 | 64.1 | 75.1 | 56.8 | 45.8 | 48.0 | 68.2 | 61.4 |
| Post neonatal death rate | 57.5 | 65.3 | 69.8 | 47.1 | 52.3 | 45.6 | 42.8 | 48.8 | 21.3 | 45.0 | 34.9 | 33.3 | 24.0 | 30.6 | 19.7 |
| Child mortality rate (per 1000 children aged 1-4 years) | 18.1 | 21.4 | 16.0 | 13.6 | 9.9 | 4.6 | 8.0 | 4.4 | 3.8 | 4.7 | 6.7 | 3.0 | 5.3 | 1.2* | 7.4 |

(1) 1986-88 rates include Gopalpur comparison area, which was dropped from SRS in 1989.

(2) 1986-88 rates include Fultala comparison area, which was dropped from SRS in 1989.

(3) Keshobpur and Bagherpara tahnas.

* This rate seems to be very low and is under investigation.

DATA ARCHIVING UNIT

Head: M.A. Kashem Shaikh

The Data Archiving Unit (DAU) provides services to PSED and the other research divisions of the Centre, as well as to researchers in other institutions using data collected by the Centre. The staff document and archive data files, making possible secondary analyses of data which are often unique and would otherwise be unuseable.

A major achievement this year was the archiving of complex data files from the field trial of the oral cholera vaccines. The DAU also archived and documented data from the DSS

(1983-1986 events), a study of factors leading to cessation of breastfeeding in Dhaka slums, and a study of the interval between age at menarche and age at first delivery. Besides these newly archived data sets, previously archived data were reorganised and transferred to safe storage media and checked periodically.

Archived data were also made available for use by collaborating institutions abroad, including the University of Pennsylvania, Pennsylvania State University, and the University of Wisconsin. DAU staff also provided data management support for a research project on patients at the Matlab treatment centre.

Table 2

Population dynamics in the Matlab Treatment Area (served by the Centre's MCH-FP Programme) and the Matlab Comparison Area (served by the government health services).

| Vital rates (per 1000 people) | Area | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 ^a |
|--|-----------------|-------|-------|------|------|------|------|------|-------------------|
| Fertility | | | | | | | | | |
| Crude birth rate | Treatment Area | 30.7 | 34.4 | 33.3 | 33.5 | 30.9 | 28.5 | 28.1 | 25.3 |
| | Comparison Area | 37.3 | 42.6 | 40.0 | 39.1 | 40.5 | 36.5 | 36.1 | 32.7 |
| Total fertility rate ^b | Treatment Area | 4.0 | 4.5 | 4.3 | 4.1 | 3.7 | 3.7 | 3.6 | 3.0 |
| | Comparison Area | 5.1 | 6.0 | 5.5 | 5.2 | 5.4 | 5.2 | 5.2 | 4.3 |
| Mortality | | | | | | | | | |
| Crude death rate | Treatment Area | 13.4 | 10.1 | 9.9 | 9.4 | 8.7 | 8.1 | 7.6 | 8.1 |
| | Comparison Area | 17.3 | 14.2 | 12.1 | 11.1 | 11.1 | 9.4 | 9.4 | 10.2 |
| Neonatal mortality death rate ^c | Treatment Area | 57.9 | 51.8 | 49.6 | 43.5 | 43.0 | 47.0 | 48.0 | 47.7 |
| | Comparison Area | 71.4 | 69.5 | 51.8 | 55.2 | 57.2 | 51.5 | 55.7 | 63.5 |
| Post-neonatal mortality rate ^c | Treatment Area | 56.9 | 34.2 | 37.5 | 34.9 | 38.9 | 28.7 | 27.2 | 32.3 |
| | Comparison Area | 55.7 | 49.0 | 37.7 | 39.2 | 39.8 | 38.2 | 35.5 | 51.7 |
| Infant mortality rate ^c | Treatment Area | 114.8 | 86.0 | 87.1 | 78.4 | 81.9 | 75.7 | 75.2 | 80.0 |
| | Comparison Area | 127.1 | 118.5 | 89.5 | 94.4 | 97.0 | 89.7 | 91.2 | 115.2 |
| Child (1-4) death rate | Treatment Area | 23.1 | 16.0 | 13.1 | 9.8 | 7.4 | 6.4 | 5.3 | 6.8 |
| | Comparison Area | 39.2 | 24.6 | 20.1 | 14.9 | 14.3 | 11.3 | 9.2 | 9.2 |
| Natural increase | | | | | | | | | |
| Rate of natural increase (%) | Treatment Area | 1.7 | 2.4 | 2.3 | 2.4 | 2.2 | 2.0 | 2.1 | 1.7 |
| | Comparison Area | 2.0 | 2.8 | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 2.3 |

^a Provisional data

^b Per woman

^c Per 1000 live births

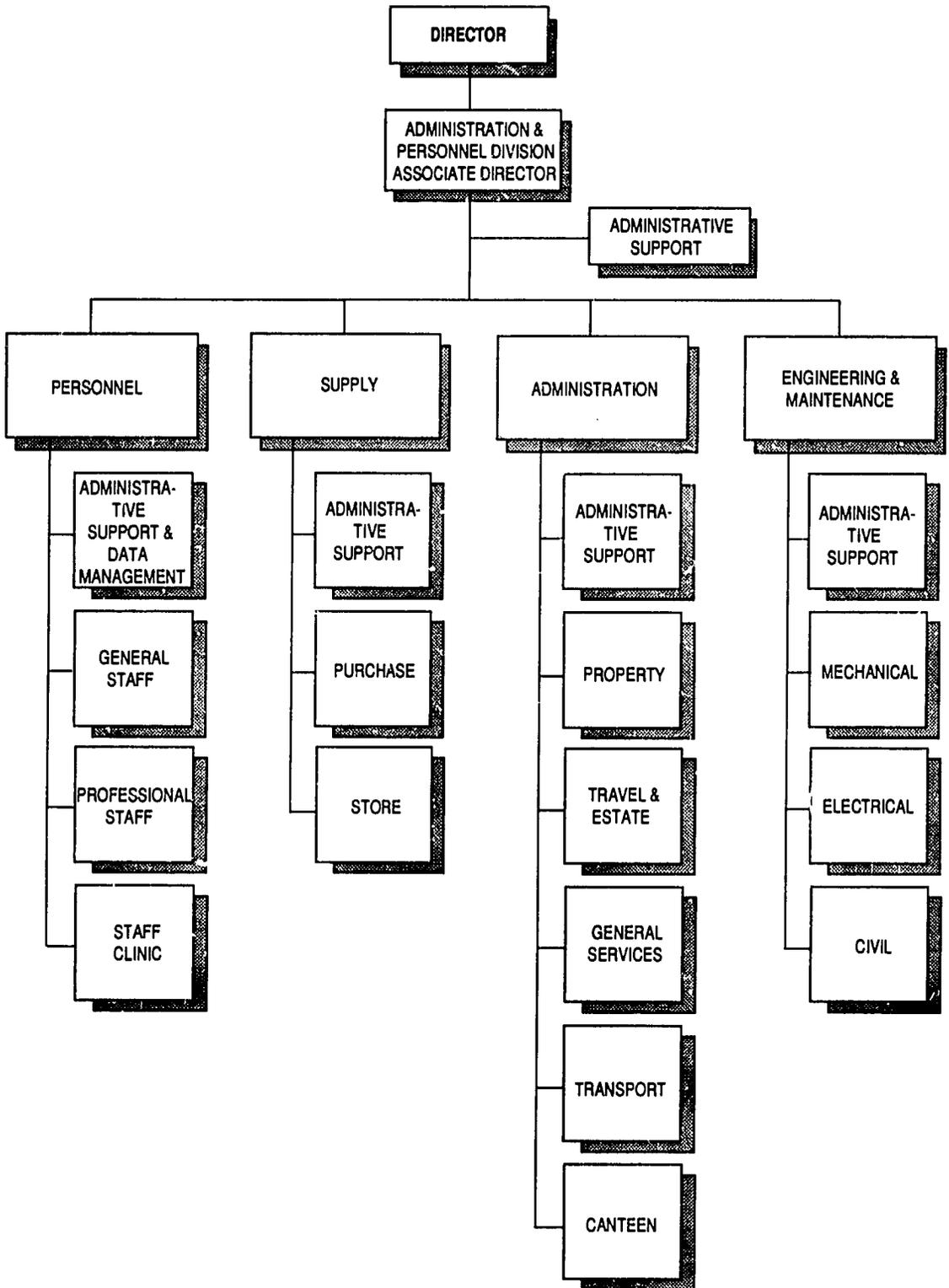
ADMINISTRATION AND PERSONNEL DIVISION



Asem Alsan

A group of American visitors from RESULTS, a congressional lobbying group, being given a tour of the Dhaka hospital by Dr. Salam

ORGANOGRAM : ADMINISTRATION & PERSONNEL DIVISION



62-B

ADMINISTRATION AND PERSONNEL

Associate Director: M.A. Mahbub

The Administration and Personnel Division (A&PD) is responsible for supporting the research and scientific activities of the Centre by providing the necessary logistics for the employees and ensuring the development and maintenance of the physical facilities and communication systems of the Centre. The Division has four main branches: Personnel, Supply, Engineering, and General Administration.

PERSONNEL BRANCH

Personnel Office

Chief Personnel Officer: Wahabuzzaman Ahmed

At the end of 1992, the Centre had 1,027 staff members plus 151 Community Health Workers and 107 Health Workers. There were 31 International staff members, 13 of whom were on secondment, 149 were National Officers and 847 were in the General Service category. The staff strength was almost similar to that of the previous year and a total of 75 separations took place.

DEPARTURES

DR. A.N. ALAM (Bangladesh), Head, Clinical Research and Service Centre separated from the Centre in June on completion of his 6-year International Fixed-Term Professional assignment. He soon thereafter was appointed as Consultant in the Director's office for 11 months.

NEW STAFF

DR. OSGOOD MASSEE BATEMAN (USA), formerly working as Associate Director for Environmental Health, The WASH Project in Washington, D.C., joined the Centre in March as Epidemiologist in the Community Health Division (CHD), initially for 3 years. This is an International Fixed-Term Professional position.

Two Johns Hopkins University (JHU)-seconded staff members were offered International Professional Fixed-Term positions after completing their

New in '92

- * 200-line digital PABX telephone exchange installed.
- * Sasakawa International Training Centre, northern wing on hospital, and partial floor over library constructed.
- * Generator installed to provide back-up emergency power.
- * Supply office established "Quality Circle" meetings.

assignments: MR. NGUDUP PALJOR (USA), Project Director and DR. ABDULLAH HEL BAQUI (Bangladesh), Head, Research and Evaluation Branch under the Urban Health & Extension Project (UHEP). They joined in January initially for 3 years.

MS. SARAH SALWAY (UK), Research Investigator and former Intern to the MCH-FP Extension Project, was seconded by the London School of Hygiene and Tropical Medicine in the UHEP of the CHD for one year in May.

MR. GRAHAM A.N. WRIGHT (U.K.) joined as a Consultant to the Director in February for one year.

Two International Short-Term staff members joined the Centre under the UHEP: DR. SANDRA LASTON (USA) joined as Anthropologist. Prior to her coming, she was affiliated with the Department of Anthropology, Case Western University, Ohio, USA. MS. NANCY FRONCZAK (USA), a doctoral student of JHU joined as Health Services Programme Specialist. Her last service was in Cambodia with Lutheran World Federation, Geneva, Switzerland.

MS. PAULINE DOLAN (USA) joined as MCH-FP Program Adviser in the UHEP. She is a graduate student at the School for International Training (SIT) in Vermont and is studying for her Master's in International Administration.

FELLOWS AND INTERNS

Four International Health Research Fellows joined the Centre during the year from various institutions and universities:

DR. SUNDAY ABRAHAM ALABI (Nigeria) joined the Laboratory Sciences Division (LSD) in December for a period of one to two years. Dr. Alabi is from the National Institute for Medical Research, Lagos, Nigeria

DR. ANNE RONAN, an Irish citizen resident of Australia, joined the Centre in August under a Contractual Service Agreement in the Clinical Sciences Division (CSD) for a period of two years under an exchange programme between the Royal Children's Hospital, Melbourne and ICDDR,B.

DR. YU WEILI (China) from the Ministry of Public Health, People's Republic of China, joined the Centre in July for one to two years in the CHD.

DR. ADAM Y. SLOTE (USA), sponsored by the University of California, San Francisco, joined the Centre as Visiting Fellow in August for a period of one year in the CHD.

MS. AMY SULLIVAN (USA) joined in June as a Population Council Intern in the MCH-FP Extension Project, initially for six months.

MS. MARJORIE J. HASKELL (USA) joined the Centre in September, in the CSD as a Student Investigator, to assist with the coordination activity of a protocol jointly undertaken by the University of California, Davis, ICDDR,B, Dhaka Medical College Hospital, and the Children's Nutrition Unit of the Save the Children's Fund, UK.

VISITORS AND CONSULTANTS

During the year, the following individuals were invited to provide consultancies in various projects/programmes:

DR. CARYN BERN (USA), from the Viral Gastroenteritis Unit, Centers for Disease Control, USA came to provide a consultancy in the LSD for about two months to analyse clinical data on rotavirus.

DR. CLARA MENENDEZ (Spain), a Senior Registrar of the Tropical Medicine Unit in Spain provided a consultancy to the Matlab MCH-FP

for nine days to review the involvement of the traditional birth attendants in the maternity care system and the supplementation of iron during pregnancy and give recommendations on strategies for the measurement of low birth weight.

MS. CHURAMONIE JAGDEO (Canada), former Nurse/Health Trainer of the MCH-FP Extension Project, seconded by WUSC, returned for a brief consultancy visit in February.

PROF. V.I. MATHAN (India), a member of the ICDDR,B Board of Trustees, Head of Wellcome Research Unit and Department of Gastroenterology, and Medical Superintendent, Christian Medical College Hospital, India was invited in January to rewrite the Centre's Strategic Plan.

MR. WYIKIN ROBIN AND MR. RICHARD GUSTAFSON (USA), from the International Executive Service Corps (IESC) were invited to provide consultancies during January in the Supply and Maintenance Branches respectively.

DR. SHAMS EL ARIFEEEN (Bangladesh), formerly working for Expanded Programme on Immunisation (EPI), provided a consultancy to the CHD for a month to assist in writing two protocols for the proposed measles vaccine trial.

MS. LAILA BAQUEE (Bangladesh) visited the Matlab MCH-FP Project in September and the MCH-FP Extension Project in December for training of Paramedics on communications, counselling, motivation skills, and teaching methods.

DR. ROBERT BLACK (USA), Johns Hopkins University (JHU), visited in January and again in September and October to consult on several projects of the UHEP.

DR. DAVID SACK (USA), JHU, arrived in February for 3 weeks to work on the feasibility study of oral cholera vaccines.

DR MALABI VENKATESEN (USA), Walter Reed Army Institute, consulted with colleagues in the CHD in February on the molecular biology of *Shigella* studies.

DR STAN BECKER (USA), JHU, visited in April to consult on the Women's Empowerment Project.

PROF. NEAL HALSEY (USA), JHU and DR. ODILE LEROY (France), Pasteur-Merieux Institute, Paris, came to consult on the measles vaccine trial.

DR. VERONIQUE FILIPPI (UK), Research Fellow, London School of Hygiene and Tropical Medicine, came in June to work with the MCH-FP on a proposed study of patterns and determinants of secondary infertility in Matlab.

PROF. JEAN ELLICKSON (USA), Chairperson, Sociology and Anthropology Department, Illinois University, consulted on behavioural research in the CHD.

VINCENT FAUVEAU (France; now in Laos), former ICDDR,B scientist, returned to the Centre to begin work on a book about the MCH-FP work in Matlab.

PROF. CHRIS KJOLHEDE (USA), JHU, consulted on a vitamin A project in the CHD in June.

DR. ANDREW HALL (UK), visited in June for two weeks to consult with colleagues on a parasitology project.

DR. KEN BROWN (USA), arrived in February and October to consult with CSD on vitamin A status and health outcomes.

The following experts were invited on contractual service agreements during the year from both home and abroad:

DR. CHRIS TUNON (UK), a management specialist, visited the MCH-FP Extension Project for four months to prepare a situation analysis of the GoB family planning/MCH programme in Chittagong Division and also to provide a report outlining the programme's performance, strengths and weaknesses, and a strategy for improving performance.

DR. BARBARA WHITNEY (USA) provided a consultancy in the early part of the year for about three months working on an evaluation of training programmes for the UHEP. She returned in September by invitation of the Population Council to assist the Project Director of the MCH-FP Extension Project to revise the proposal for a new cooperative agreement with USAID and help prepare a new organogram, post descriptions, and a management plan for the Project.

MS. SARAH SMITH (USA), a Registered Nurse, came on a Contractual Service Agreement to the Urban Health & Extension Project for two months to assess, develop, and recommend actions in regard to the Nutrition Rehabilitation Centre.

DR. MANZOOR HOSSAIN, Paediatrician and DR. ABU ISHAQUE KHAN, Radiologist (Bangladesh), from Shishu Hospital joined in December on a Contractual Service Agreement to participate in teaching ward rounds at the Clinical Research and Service Centre.

DR. MORAL NAZRUL ISLAM (Bangladesh), Staff Correspondent of The Daily Ittefaq, came as editorial consultant in May for eight months under DISC to provide assistance in preparation of the Bengali newsletter, *Shasthya Sanglap*.

Many individuals and groups came to the Centre to visit and to observe the activities. Among these were: Prof. Cornelis Werner, College for Developing Countries, Universiteit Antwerpen, Belgium; Prof. Emanuel Leberthal, Hahnemann University, USA; H.E. Mr. Xavier Van Migem, Ambassador of Belgium; Mr. Santiago, Mr. Araya, and Mr. Acuna from Television Nacional de Chile; Mr. Charles E. Coff Jr., Staff Writer, National Geographic Magazine, USA; Dr. Anwarul Huq, Research Assistant Professor, University of Maryland, USA; Dr. Michael Bennish, New England Medical Centre, Tufts University, USA; H.E. Mr. William B. Milam, Ambassador of the USA; Mr. Barry Gabberman, Deputy Vice-President, The Ford Foundation, USA; Dr. Gunnar Meeuwisse, Karlskrona Central Hospital, Sweden; Mr. Makoto Kusakawa and Mr. Kouji Kakeo, Japan Committee for UNICEF, Japan; Mr. Alan Gold, representative for RESULTS (a US congressional lobby group); Dr. R.H. Henderson, a Centre BOT member and Asst. Director General of WHO, and his wife, Switzerland, Dr. Dale Spriggs and Dr. George Curlin, NIH, USA, with Dr. David Madden, Science Attache, New Delhi, India; Dr. Charles Larson, Paediatrician, McGill University, USA; Dr. David Sachar, Director, Division of Gastroenterology, Mount Sinai Medical Center, NY, USA; Mr. Syed Z. Rahman, Editor for Bangla Service of Voice of America, USA; Mr. Ali A.A. Wahab, Charge d'Affaires a.i., Royal Saudi Embassy; Dr. Jim Phillips, Sr. Associate at Population Council and once MCH-FP Extension Project director; a team from the U.S. Medical Corps/Disaster Preparedness; and representatives from several Dhaka-based NGOs and agencies, including The Swallows, USAID, HDP, CIRDAP, UNICEF, AIDAB, and World Bank.

Visitors to Matlab included: Dr. Toshiharu Makishima, Japanese Red Cross Medical Center, Tokyo; Mr. Guelat and Mr. Proinai, Embassy of Switzerland; Dr. Kalyan Raj Pandey, Chief of Family Planning and MCH, Government of Nepal;

Mr. Geer Van der Linden and **Ms. Celia Gregory**, Asian Development Bank, Dhaka and the Philip-
pines; groups from the Sasakawa Foundation,
Japan, the MIE National Hospital, Japan, and
UNICEF.

OBITUARIES

With sorrow we record the deaths of the following
staff members who have had many years of
service with the Centre: **Mr. Md. Ashequr Rahman**
(47), Health Assistant, Matlab H&R Centre, CHD,
served the Centre for 28 years; **Mr. S.M. Ramzain**
Hossain (44), Housekeeper, CRC 14 years; **Mr.**
Md. Mujibur Rahman (31), Driver, MCH - FP Ex-
tension Project, PSED - 2 years and 9 months;
and **Mr. M.A. Salek Mian** (57), Senior Research
Officer, LSD - 31 years and 11 months.

RETIREMENT

Four staff members retired from the Centre during
the year: **Mr. A.N.M. Shahid**, Assistant Staff
Nurse, CRC; **Mr. Montazuddin Sarker**, Cook,
Kitchen Services, A&P; **Mr. Abdul Majid**, Pharmacy
In-charge, CRC; and **Mr. Md. Showkat Ali**,
Speedboat Driver, Matlab H&R Centre, CHD.

LONG SERVICE AWARD: 25 YEARS

During 1992, three National Officers and 14
General Service staff members completed 25
years of service in the Centre and were awarded
meritorious increases in pay: **Mr. Md. Colam**
Mustafa, Laboratory Technician, LSD; **Mr. Md.**
Abul Hashem, Senior Accounts Officer, Finance;
Mr. A.H.G. Kader Chowdhury, Administrative
Assistant, Finance; **Mr. Abdul Mannan Bakaul**,
Senior Health Assistant, Matlab DSS, PSED; **Mr.**
Mukshed Ali Khan, Senior Health Assistant,
Community Studies, CHD; **Mr. Md. Abu Taher**,
Mechanic, M&E Branch, A&P; **Mr. Md. Abdur**
Razzak, Speedboat Driver, Matlab H&R Centre,
CHD; **Mr. Noor Mohammad**, Security Guard,
Matlab H&R Centre, CHD; **Mr. Haradhan**
Chakraborty, Administrative Assistant, Travel, A&P;
Mr. K.J.M. Mannan Pathan, Senior Health
Assistant, Matlab DSS, PSED; **Mr. Brojendra**
Kumar Das, Laboratory Technician, LSD; **Mr. Md.**
Fazlul Haque, Senior Laboratory Technician, LSD;
Mr. Abdur Razzak, Despatcher, Matlab H&R
Centre, CHD; **Mr. Abdur Khaleque**, Master
Mechanic, M&E Branch, A&P; **Mr. A.R.M. Abdul**
Alim, Section Chief, LSD; **Dr. Kh. A. Al-Mahmud**,
Head, Animal Resources Branch, LSD; and **Mr.**
M.A. Kashem Sheikh, Head, DAU, PSED.

LONG SERVICE AWARD: 30 YEARS

During 1992, one National Officer and 12 General
Service staff members completed 30 years of
service and were awarded meritorious increases in
pay: **Mr. Osman G. Siddiqui**, Senior Technician,
Research, LSD; **Mr. Mayeen Uddin**, Animal
Technician, ARB, LSD; **Mr. M. Shafiqul Islam**,
Assistant Scientist, CHD; **Mr. Sultan Ahmed**
Sarder, Senior Research Officer, LSD; **Mrs.**
Sushama Pashi, Research Officer, LSD; **Mr. Abdul**
Gaffar Bhuiyan, Senior Laboratory Technician,
LSD; **Mr. A.K.M. Nurul Islam**, Supervisor, Technical
Support, LSD; **Mr. Zahidul Huq**, Laboratory
Technician, LSD; **Mr. Abdul Aziz**, Maintenance
Mechanic, M&E Branch, A&P; **Mr. P.K. Bose**
Neogi, Senior Research Officer, LSD; **Mr. Delwar**
Hossain, Laboratory Technician, LSD; **Mr.**
Waseque Uddin Ahmed, Senior Research Officer,
LSD; and **Mr. M.A. Salek Mian**, Senior Research
Officer, LSD.

STEP INCREASE AWARD

The following staff members were granted special
salary increases of two steps within their own
grades in recognition of sustained performance of
exceptional merit, effective January 1, 1992: **Mr.**
M. Shamsul Islam Khan, Head, DISC, Director's
Bureau; **Mr. Qazi Shafi Ahmad**, Laboratory
Manager, LSD; **Mr. A. Mazid Sarder**, Manager,
DSS, Matlab H&R Centre, CHD; **Ms. Makhduma**
Khatun, Senior Research Officer, CRC, CSD; **Mrs.**
Zubaida Nasreen, Secretary Gr-I, Matlab MCH-
FP, CHD. **Mr. Lutfur Rahman**, Data Processing
Coordinator, Finance; **Mr. M. Aminul Huque**,
Personnel Manager (Professional), Personnel
Office, A&P; **Mr. Rabindra Das**, Engineering
Supervisor, M&E Branch, A&P; **Mr. Md. Hamidul-**
lah, Transport Officer, L&F Support, A&P.

SCIENTIFIC RANKING

The following staff members were granted
promotions and ranked as noted in recognition of
sustained performance of exceptional merit and
scientific achievement, effective May 1, 1992:

PSED: **Mr. Nikhil Ch. Roy**, Research Fellow,
MCH - FP Extension Project; **Mr. Md. Nurul Alam**
Research Fellow, DSS; **Mr. Md. Abdur Razzak**,
Research Fellow, DSS; **Fazilatun Nessa**, Research
Fellow, MCH - FP Extension Project; **Dr. Mridul K.**
Chowdhury, Associate Scientist, DSS; **Dr. Md.**
Fazlur Rahman, Associate Scientist, MCH - FP
Extension Project; and **Mr. Mehrab Ali Khan**;
Assistant Scientist, MCH - FP Extension Project.

LSD: **Mr. Khorshed Alam**, Assistant Scientist; **Mr. M.A. Wahed**, Associate Scientist; **Mr. Zeaur Rahim**, Associate Scientist; **Dr. Sirajul Islam**, Associate Scientist; **Dr. Khaleda Haider**, Associate Scientist; and **Dr. Md. Anwar Hossain**, Assistant Scientist.

CSD: **Dr. R.N. Mozumder**, Assistant Scientist, CRSC; **Dr. Ali Miraj Khan**, Assistant Scientist, CRSC; **Dr. Hasan Ashraf**, Assistant Scientist, CRSC; **Dr. Rukhsana Haider**, Assistant Scientist, CRSC; **Dr. Mujibur Rahman**, Assistant Scientist, CRSC; **Dr. A.K. Mitra**, Associate Scientist, CRSC; **Dr. Shafiqul A. Sarker**, Associate Scientist, CRSC; **Dr. S.K. Roy**, Scientist, CRSC; **Dr. G.H. Rabbani**, Scientist, CRSC; **Dr. Asma Khanam**, Scientist, CRSC; and **Dr. M. Aminul Islam**, Assistant Scientist, CHP.

CHD: **Mr. M. Shafiqul Islam**, Associate Scientist; **Bilqis A. Hoque**, Scientist; **Dr. K.M.A. Aziz**, Senior Scientist; **Mr. A.I. Chowdhury**, Research Fellow, Matlab MCH FP; and **Kh. Zahid Hasan**, Associate Scientist.

Staff Clinic

Physicians: Meena Choudhury/Matiur Rahman

The Staff Clinic continued to provide improved health care to the staff members and their dependents during 1992. 22,959 patients were seen (Table 1) and 284 vaccinated. Of the patients, 412 were referral cases, 393 were emergency cases, 482 required surgery, and 129 were hospitalised. Thirty six births were also reported during the period and 62 families were provided with family planning services.

GENERAL ADMINISTRATION BRANCH

Logistics and Field Support

Transport Officer: Md. Hamidullah

The Logistics and Field Support Unit provided and coordinated valuable and efficient support to the Centre's programmes with land and water transportation. It also operated the radio communications system effectively between the Centre and the Matlab Health and Research Centre. The Unit had 15 vehicles in its pool and at the end of the year, 25 were rented to staff members.

General Services

Supervisor: Mujibur Rahman

The General Services Unit has carried out security and cleaning activities of the Centre efficiently. In addition to the above, the staff members of the unit responded efficiently to the needs of the scientific divisions and arranged venues for various seminars, workshops, meetings, conferences, dinners, and the Board of Trustees meetings.

Travel Office

Manager: Kh. Shafiqul Hossain

During the year, the Travel Office obtained clearance and permission from concerned government offices and arranged visas for staff members, trainees, consultants, trustees, auditors, and other visitors. In addition, they also obtained custom passbooks for the new staff members, obtaining permission from the National Board of Revenue. Yearly renewal of passbooks and annual verification for staff members were also undertaken.

Monthly attendance of patients at Dhaka Staff Clinic, 1992

| Patients | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| Self | 818 | 792 | 805 | 731 | 834 | 676 | 786 | 913 | 942 | 972 | 815 | 812 | 9936 |
| Dependent | 1041 | 772 | 1099 | 968 | 1106 | 874 | 1186 | 1000 | 1180 | 1023 | 1396 | 1010 | 12655 |
| Vaccine | 22 | 27 | 15 | 24 | 21 | 17 | 19 | 22 | 23 | 33 | 29 | 32 | 284 |
| Family Planning | - | - | - | - | - | - | - | - | - | - | - | - | 62 |
| Cx Snear | 1 | 1 | 1 | 2 | 4 | - | - | 2 | 4 | 4 | 2 | 1 | 22 |
| Total : | 1882 | 1592 | 1920 | 1725 | 2015 | 1567 | 1991 | 1927 | 2149 | 2032 | 2242 | 1855 | 22959 |

The Office, which now occupies new space in the Director's wing, provided travel assistance to staff members, trainees conference and workshop participants, and members of the Board of Trustees, and handled the import/export of personal effects and household goods of the expatriate staff.

Estate Office

Senior Estate Officer: Mujibur Rahman

The Estate Office maintained the telecommunications systems (80 direct and 4 ISD telephone connections, including the newly installed, modern 10 + 200 line digital PABX) of the Centre in perfect working order. The Office also arranged one new ISD telephone connection.

The reproduction unit mimeographed 60,000 pages and photocopied 20,000 pages each month for the scientific divisions.

The Office located and contracted suitable housing accommodations for incoming new expatriate staff and ensured smooth installation by providing household appliances, furniture, telephones, and other equipment. Twenty six houses rented by the Centre for various purposes, i.e. residences, the project office, the guest house, and field offices were managed by Office personnel. They also arranged timely payments of the Centre's utility bills (official and residential) and carried out monthly billing for rented household appliances and furniture.

The guest house accommodated many of the Centre's official guests, including training participants, and provided food and laundry facilities. Many official lunches, dinners, and reception parties were also arranged there.

SUPPLY BRANCH

Supply Office

Chief Supply Officer: M.G. Morshed

During the year, the Supply Office procured materials worth approximately US\$ 1.88 million (US\$ 1.75 million in 1991). These include some capital items such as an automatic fire alarm system for the store and warehouse, a steam autoclave distilling plant for the LSD, 825 VA generator and transformer and a 200-line digital PABX telephone exchange (replaced old switch-board system). They sold unusable goods worth around Tk 360,000, including 5 unservicable vehicles.

The Supply Office established a 'Rate Running Contract' to procure stock items from the selected vendors. This system ensures receiving of materials within 4-5 days (over 30 days lead time) with a stable price. This has minimised our stock value.

For better understanding and to improve the level of communications between the requisitioners and procurers, the Office held regular 'Quality Circle' meetings to solve requisitioner/supply problems.

ENGINEERING BRANCH

Engineering and Maintenance Office

Engineering Manager: Taqsem Akhshan

The Engineering Branch is responsible for all construction, installation, and maintenance of buildings, civil structures, roads, electrical and mechanical equipment, and other fixtures of the Centre. The Branch also provides all types of technical and engineering support and advice to various departments and projects.

In 1992, the following improvements of the physical facilities were made:

1. The construction of the Sasakawa International Training Centre and the northern wing on top of the hospital building was done at a cost of US\$ 450,000, creating about 21,300 sq. ft. of covered area. In this construction, one small modern auditorium with seating capacity of 192 and two seminar rooms were built. The Training Coordination Bureau and part of LSD have also been housed there.

2. Part of the second floor of the existing library building was constructed to house the CHD, covering 3,200 sq. ft. of area at a cost of US\$ 65,000.

3. To ensure a better and more stable power supply to laboratories and the hospital, an 800 KVA transformer and electrical substation equipment were installed at a cost of \$70,000. Also installed for emergency back-up power supply was an 825 KVA auto-switch standby generator (\$144,000). To house this equipment, a building was constructed covering 1,600 sq. ft. (\$31,000), (see photo; p.54).

DIARRHOEAL DISEASES INFORMATION SERVICES CENTRE



Mr. Khan explaining the various services of DISC
to visitors from USAID, Dhaka

PARTNERSHIP IN PROGRESS

ICDDR,B
Annual Report
1991-1992



DEMOGRAPHIC SURVEILLANCE SYSTEM— MATLAB

VOLUME EIGHTEEN

REGISTRATION OF
DEMOGRAPHIC EVENTS-
1987

SCIENTIFIC REPORT NO. 70
November 1992



INTERNATIONAL
CENTRE FOR
DIARRHOEAL DISEASE
RESEARCH,
BANGLADESH

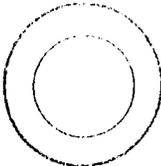
PROCEEDINGS OF THE WORKSHOP ON

November 23-26, 1991



Volume 11
Number 1
March 1993
ISSN 0253-6766

JOURNAL OF Diarrhoeal Diseases Research



INTERNATIONAL CENTRE FOR
DIARRHOEAL DISEASE RESEARCH, BANGLADESH

THE DIARRHOEAL DISEASES INFORMATION SERVICE

Head: M. Shamsul Islam Khan

The role of the Diarrhoeal Diseases Information Services Centre (DISC) is to support the research, training, and dissemination of knowledge and activities of the Centre's staff members. This support includes a variety of activities, such as information, library, and publication services. The library and information services include a fairly representative journal collection, a lending book collection, major reference textbooks and other reference sources, an interlibrary loan service, departmental book collection, and reference and bibliographic services, including literature searches, and a current awareness assistance. The upgraded information retrieval system, with databases (Medline, 1966 to present, and Popline from the beginning) on CD ROMs and Current Contents on diskettes, facilitates faster access to published information and literature.

The publication service includes a quarterly journal of international repute, an annotated bibliography (within the journal), two newsletters, a news bulletin, an annual report, and occasional scientific and special publications.

In 1992, the DISC continued to serve and extend its various facilities to the Centre's staff, including those in the field stations located at different places in the country. The facilities and some services were also enjoyed by persons other than ICDDR,B staff.

DISC also continued to generate funds through journal subscriptions and memberships and through the sale of priced documents. Its various programmes were managed by 12 staff members (11.5 full time equivalent) and the services of daily labourers for 108 man days to pack and prepare materials for mailing. Major DISC activities performed during 1992 are highlighted below.

Library use: More than 400 of the Centre's researchers, physicians, research support personnel, nurses, students, and many international trainees and visitors took advantage of the library's major facilities and services. There were another 14,435 reader visits from outside, such as researchers, teachers, physicians, and students from universities, NGOs, the Institute of Public Health, National

New in '92

- * A new newsletter in Bengali was launched.
- * Subscription to JDDR increased.
- * New look given to JDDR and Glinpse.
- * Some of the year's publications are pictured opposite.

Institute of Preventive and Social Medicine and others who used the library frequently.

Collection development: During the year, 398 new books and 598 volumes of bound journals were added to the library. Of the new books, 238 were purchased and the rest were received either on a complimentary or an exchange basis. The library received 389 current journals; of these, 240 were on subscription, and 149 on exchange (27 titles) or complimentary basis (122 titles). After the current journal subscriptions and requirements of the Centre's scientific staff members were reviewed, 7 journals were deleted but 29 new journals are being added. When journal articles needed by the Centre's staff members are not available from the existing collection, the library monitors the needs and takes special care to procure the publications in the fastest way possible. The Nuffield Library (British Medical Association) of the UK provided excellent support by sending requested articles, even sometimes by fax without charge. In addition, special effort was made to procure reprints of papers and publications on diarrhoeal disease-related journal articles from sources world-wide, thereby increasing the library's collection on these subjects (172 papers and reprints).

Photocopying service: A total of 62,486 pages of photocopies were made and supplied. Library users other than the ICDDR,B staff also enjoyed the benefit of the photocopying service; the greatest beneficiary was the UNICEF's Dhaka office library.

Borrowing facilities: The library's borrowing facilities are available to staff members and those of the Institute of Public Health (on limited basis). Library materials can be borrowed by other libraries, provided interlibrary loan agreements have been signed. DISC extended its library facilities and information services by signing interlibrary agreements with the Aga Khan Community Health Programme and the USAID both in Dhaka. It also maintains formal interlibrary loan arrangements with the National Health Library and Documentation Centre (NHLDC), Bangladesh Institute of Development Studies and BIRDEM. During the year, 17,977 books and journals were loaned to staff members. Under the interlibrary loan arrangement, 1,282 books and bound journals (including loose journal issues) were borrowed by national institutions; the greatest beneficiary was NHLDC.

Database and bibliographic service: DISC's own databases created for journal holdings, the book collection, and periodical articles were further expanded to include information on new materials. Databases have facilitated faster access to incoming books, monographs, and new periodicals. It was also decided to develop a database of all completed and ongoing research projects of the ICDDR,B, the work of which will begin soon. Continued efforts were made to upgrade DISC's service delivery and dissemination channels to support its reputation as a specialised information centre of excellence for diarrhoeal disease-related topics. During the year, 355 Medline and Popline searches were made; of these, 169 were for the ICDDR,B scientists and 186 (51.99%) for outsiders. Service was also offered from the Current Contents (Life Sciences) on diskettes.

Information dissemination: DISC disseminates information on incoming learning resources through a Fast Bulletin, a book acquisitions list, and the Current Awareness Service Bulletin (CASB). The Fast Bulletin, generally published twice a week, includes information on incoming issues of journals and periodicals, whereas the CASB disseminates information on articles of relevance to the Centre's scientists. CASB, generally published on a fortnightly basis, also includes abstracts of most of ICDDR,B publications and some other important papers. During the year, 25 issues of the CASB, along with 6 issues of the book acquisition list, and 100 issues of the Fast Bulletin were produced to inform the Centre's scientists and other library users about the incoming books, availability of relevant journal articles, and incoming journal

issues. Information on 1,775 relevant articles and documents and on 327 books and monographs were disseminated through the CASB.

Informal reference service: In 1992, library staff responded to 2,300 informal queries and checked various reference citations.

Journal of Diarrhoeal Diseases Research: The publication schedule of the quarterly Journal (JDDR) has been maintained on time. In 1992, 4 issues (and Bibliography on Diarrhoeal Diseases), 500 copies of each issue, were published. The JDDR received 58 manuscripts and published 37 papers (editorial - 1, review articles - 3, original articles - 21, short reports - 4, clinico-pathological reports - 3, and letters - 5). The annotated Bibliography section disseminated information on 399 important articles (256 of these papers included abstracts). The JDDR was given a new look by changing the cover design and using better quality paper, and it continued to be indexed by all the renowned international indexing systems, including Index Medicus, Current Contents, and Excerpta Medica. The Editorial Board and the Editorial Advisory Board whose members guide the development of the JDDR were reorganised in June. The current Editorial Board is composed of: Editor-in-Chief: Dilip Mahalanabis; Deputy Editor-in-Chief: Golam H. Rabbani; Editorial Advisor: Josephine Sack; Managing Editor: M. Shamsul Islam Khan; Editors: M. Bateman, A. Bhuiya, M.R. Chowdhury, D. Habte, and R.B. Sack.

Glimpse: The newsletter is published bimonthly (4,000 copies per issue) to highlight the Centre's research, training, and other activities and to disseminate information on conferences, seminars, and scientific papers published by the staff. The overall design and the quality of the newsletter production was changed and improved from the January-February 1992 issue. The new appearance is well accepted and widely appreciated both within and outside the country. The Editorial Board was reorganised and reconstituted to make it an Executive Committee with the following members: Editor-in-Chief: Dilip Mahalanabis, Managing Editor: M. Shamsul Islam Khan; Editorial Advisor: Josephine Sack; Associate Editor: Hasan Shareef Ahmed; and Design: Asem Ansari. As in the previous few years, the publication schedule of Glimpse was maintained with 6 issues published, featuring 18 important published studies of the Centre in language for non scientists and laymen. They also disseminated 34 abstracts of the Centre's published papers, 18 ongoing

research projects, and the training activities of the Training Coordination Bureau. This year's newsletters focused on the activities of the Urban Surveillance System, the Clinical Research Centre, and the memoirs of past directors on the occasion of the 31st anniversary of the ICDDR,B (and the Cholera Research Laboratory).

ICDDR,B News: During the year, 5 issues of the in-house bilingual bimonthly newsletter, launched in 1990, were published, disseminating information on staff changes, promotions and special awards, staff development, training, obituaries, foreign visitors, and workshops and seminars organised at the Centre, expansion of facilities, and fund-raising activities. They highlighted health information and non-scientific activities of the Centre. The Editorial Board is comprised of the following members: Editor: M. Aminul Huque; Members: Demissie Habte, Arifuzzaman Khan, Asem Ansari, Mukhlesur Rahman, and Hasan Shareef Ahmed.

Shasthya Sanglap: In May, a newsletter in Bengali, Shasthya Sanglap (Dialogue on Health),

was launched starting with the Bengali New Year (1399), and 2 issues of the newsletter were published in 1992. The newsletter is published (15,000 copies per issue; 3 issues in the first year) with the aims to educate the lay people of the country and create awareness among them about their basic health problems, with an emphasis on primary health care, to highlight the Centre's research findings, and to answer questions on health issues. An Editorial Board, consisting of the following members, manage the publication and advise on the development of the newsletter: Chief Advisor: Demissie Habte; Editor: Fakir Anjuman Ara (A.K. Mitra was the first editor); Managing Editor: M. Shamsul Islam Khan; Consultant Editor: Moral Nazrul Islam; Members: Yusuf Hasan, A.S.M. Mizanur Rahman, Mujibur Rahman, Selina Amin; Circulation Manager: Hasan Shareef Ahmed; and Design: Asem Ansari. The newsletter has been able to generate serious interest among health workers at grass-roots level. Copies are distributed to health workers at the union level through thana health complexes, civil surgeons, deputy directors of family planning, senior health education officers, district health



Students of a training programme study in the library. Some of the many journals available are displayed in the background

superintendents, thana health and family planning officers, thana family planning officers, non-government organisations, libraries, and others.

Internal scientific publications: Under the Scientific Report Series, 3 separate volumes (v.16-18) of the Demographic Surveillance System: Registration of Demographic Events, covering the period from 1985 to 1987, were published (v.16:500 copies, v.17:300 copies, v.18:300 copies). Under the Special Publication Series, the Publication Services Section also published a 39 page Proceedings of the Workshop on Water and Sanitation Priorities for the 1990's, November 23-26, 1991 (1,000 copies), and a 40 page monograph on Partnership in progress: ICDDR,B collaboration with and contribution to Bangladesh (2,000 copies). The Section also arranged the production of: a) a family planning training manual for female village workers (200 copies), b) Management of Diarrhoea by Oral Rehydration Therapy: a training manual for community health workers (200 copies), and c) Proceedings of the Support Group Meeting (250 copies). They printed one brochure on clinical management of diarrhoea (500 copies) and one brochure for ICDDR,B's second annual scientific conference, 1993 (1,000 copies), and reprinted one scientific publication (200 copies).

Distribution and mailing of publications: During the year, the Publications Services Section either mailed or distributed 54,339 copies of the Centre's publications and brochures to relevant points worldwide. This included 19,915 copies of Glimpse, 24,467 copies of Shasthya Sanglap, 2,512 copies of the 1991 Annual Report, 1,604 copies of the JDDR, 4,587 copies of other scientific reports, 420 copies of specialised bibliographies, 539 copies of the CASB, 273 promotional brochures, and 22 reprints of the Centre's external publications (articles). Of these copies, 14,489 (26.67%) were mailed to individuals, libraries, and organisations outside Bangladesh, 29,140 (53.63%) copies were mailed in Bangladesh, and the rest were distributed to the participants of international and regional seminars, visitors, and trainees, and to the Centre's various working areas and field stations. The Glimpse was distributed to 129 countries.

Editorial and laser printing services: DISC's editorial and laser printing services were expanded to those who were willing to pay for the services to generate some funds to offset the cost of these facilities. During the year, several staff members used the services.

National collaboration: A total of 676 duplicate journal issues were offered to the NHLDC, Institute of Nutrition and Food Science, and the National Institute of Preventive and Social Medicine. Several researchers and physicians of other organisations were also greatly benefited by the borrowing facilities. The Head of DISC continued to give lectures on "Computer Applications in Information System" at the Department of Library and Information Science, University of Dhaka. In December, the services of the Librarian of DISC (Mr. Farhad Hossain) were offered to the Agricultural Information Centre of the Bangladesh Agricultural Research Council to help organise a training programme on micro-CDS/ISIS. The Head of DISC (who is also the General Secretary of the Library Association of Bangladesh) served on the National Book Policy Framing Committee, constituted by the Ministry of Cultural Affairs, GoB.

Purchase of equipment: The library procured one vacuum cleaner for cleaning books, journals, and other reading material.

Library Advisory Committee: The Library Advisory Committee, comprising representatives from scientific divisions of the Centre, was expanded to have a larger participation from within and outside the library. It now consists of the following members: Chairman: Zia Uddin Ahmed; Member-Secretary: M. Shamsul Islam Khan; Members: K.M.A. Aziz, Md. Yunus, S.K. Roy, P.K. Bardhan, A.H. Baqui, Abbas Uddin Bhuiya, Saleha Begum, Farhad Hossain, and M.M. Ali. The Committee meets several times a year for reviewing current journals and the book collection for additions and deletions as appropriate, library services for improvement, and library policies.

Earning of revenues: Intensive effort was given to raising the subscription level of the JDDR, and a policy was adopted in 1991 to make copies of the journal available to the Centre's scientists through an internal subscription process. DISC received encouraging support, earning 215 subscriptions (including DISC memberships and Glimpse). In view of the low response in becoming DISC members, it was decided to discontinue this system beginning January 1993. Instead, a new library membership system was planned. Under this system, a library user by paying a nominal annual membership fee (Tk. 100.00 for students and Tk. 200.00 for individuals) will receive photocopying service at a substantially reduced rate (Tk.1.00 per page) and a 25%

discount off the Centre's priced publications and fee based services (CASB, literature search facilities, etc.). A policy was also adopted to charge for the services offered by the information retrieval facilities, such as Medline and Popline.

Foreign visit and participation in seminar: Under the International Visitors Programme of the USIA, the Head of DISC visited several libraries of various types and educational and research organisations located in six different states of the USA in mid 1992. During this visit, he also attended the Annual Conference of the American Library Association held in San Francisco during the last week of June. He also attended a two day Pre IFLA seminar and a two day COMLA workshop on Rural Resource Centres in New Delhi, both in August.

Availability of services and publications: Any one interested in making use of the facilities mentioned above may contact the Head of DISC at the address given in the front of the report. See **Publications** for reference information on DISC publications.

Audio Visual Unit
Head: Asem Ansari

The Audio Visual Unit prepares graphs, charts, photographs, slides, drawings, and posters; produces video films of important events and activities of the Centre; and provides film developing and audio visual services. In 1992, besides photographing all the major events of the Centre and their usual duties, the staff of the Unit provided photos for all the publications of DISC, including this Annual Report.



Prof. Habte gives his address at the inaugural ceremony for the new Bengali newsletter, *Shasthya Sanglap*.

ICDDR,B PUBLICATIONS - 1992

INTERNAL PUBLICATION SERIES:

ICDDR,B Annual Report, 1991. May 1992. 122 p.

Special Publication

Bilqis AH, Sack RB, Bateman M, Zeitlyn S, eds. Proceedings of the Workshop on Water and Sanitation Priorities for the 1990's, 23-26 November 1991. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1992. 39 p. (Special publication, 28)

Demographic Surveillance System Matlab. v. 16. Registration of demographic events 1985. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1992. vi, 74 p. (Scientific report, 68)

Demographic Surveillance System Matlab. v. 17. Registration of demographic events 1986. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1992. vi, 69 p. (Scientific report, 69)

Demographic Surveillance System Matlab. v. 18. Registration of demographic events 1987. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1992. vi, 68 p. (Scientific report, 70)

Partnership in progress: ICDDR,B's collaboration with and contribution to Bangladesh. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1992. 48 p.

Journal and Newsletter

- 1 Journal of Diarrhoeal Diseases Research (also includes: Bibliography on Diarrhoeal Diseases). v. 10, nos. 1-4, 1992.
- 2 Glimpse. v. 13, no. 6, 1991 and v. 14, nos. 1-5, 1992.
- 3 ICDDR,B News. v. 2, no. 6, 1991 and v. 3, nos. 1-4, 1992.
- 4 Shasthya Sanglap. v. 1, nos. 1-2, 1992.
- 5 Current Awareness Service Bulletin. v. 16, nos. 1-25, 1992 and supplement (book acquisition list) nos. 1-6, v. 16, 1992.

ORIGINAL SCIENTIFIC PAPERS (Including Short Reports):

Ahmed F, Clemens JD, Rao MR, Sack DA, Khan MR, Haque E. Community-based evaluation of the effect of breast-feeding on the risk of microbiologically confirmed or clinically presumptive shigellosis in Bangladeshi children. *Pediatrics* 1992 Sep;90(3):406-11

Alam NH, Ahmed T, Khatun M, Molla AM. Effects of food with two oral rehydration therapies: a randomised controlled clinical trial. *Gut* 1992 Apr;33(4):560-2

Albert MJ, Qadri F, Ansaruzzaman M, Kibriya AKMG, Haider K, Neogi PKB, Alam K, Alam AN. Characterization of *Aeromonas caviae* antigens which cross-react with *Shigella boydii* 5 [note]. *J Clin Microbiol* 1992 May;30(5):1341-3

Albert MJ, Ansaruzzaman M, Alim ARMA, Mitra AK. Fluorescent antibody staining test for rapid diagnosis of *Shigella dysenteriae* 1 infection [note]. *Diagn Microbiol Infect Dis* 1992 May-Jun;15(4):359-61

Albert MJ, Alam K, Ansaruzzaman M, Islam MM, Rahman ASMH, Haider K, Bhuiyan NA, Nahar S, Ryan N, Montanaro J, Mathan MM. Pathogenesis of *Providencia alcalifaciens* induced diarrhea. *Infect Immun* 1992 Dec;60(12):5017-24

Albert MJ, Faruque SM, Ansaruzzaman M, Islam MM, Haider K, Alam K, Kabir I, Robins-Browne R. Sharing of virulence-associated properties at the phenotypic and genetic levels between enteropathogenic *Escherichia coli* and *hahnia alvei*. *J Med Microbiol* 1992 Nov;37(5):310-4

Amin II, Hossain MA, Hossain M, Miah MRA, Rahman Z, Rahman KM. Studies on virulence determinants of *Plesiomonas shigelloides*. *Bangladesh Med Res Counc Bull* 1992 Apr;18(1):12-21

Azad MAK, Lebenthal E. Role of rat intestinal glucoamylase in glucose polymer hydrolysis and absorption. *Pediatr Res* 1990 Aug;28(2):166-70*

Bairagi R, Bhattacharya AK. Parental sex preference and its effects on fertility intention and contraceptive use in Calcutta. *Rur Demogr* 1989;16(1-2):43-56*

Baqui AH, Sack RB, Black RE, Haider K, Hossain

- A, Alim ARMA, Yunus M, Chowdhury HR, Siddique AK. Enteropathogens associated with acute and persistent diarrhea in Bangladeshi children <5 years of age. *J Infect Dis* 1992 Oct;166(4):792-6
- Baqi AH, Black RE, Sack RB, Yunus M, Siddique AK, Chowdhury HR. Epidemiological and clinical characteristics of acute and persistent diarrhoea in rural Bangladeshi children. *Acta Paediatr* 1992 Sep;81(suppl 381):15-21
- Bardhan PK, Gyr K, Beglinger C, Vogtlin J, Frey R, Vischer W. Diagnosis of bacterial overgrowth after culturing proximal small bowel aspirate obtained during routine upper gastrointestinal endoscopy. *Scand J Gastroenterol* 1992 Mar;27(3):253-6
- Bardhan PK, Salam MA, Molla AM. Gastric emptying of liquid in children suffering from acute rotaviral gastroenteritis. *Gut* 1992 Jan;33(1):26-9
- Bennish ML, Salam MA, Hossain MA, Myaux J, Khan EH, Chakraborty J, Henry F, Ronsmans C. Antimicrobial resistance to *Shigella* isolates in Bangladesh, 1983-1990: increasing frequency of strains multiply resistant to ampicillin, trimethoprim-sulfamethoxazole, and nalidixic acid. *Clin Infect Dis* 1992 May;14(5):1055-60
- Bennish ML, Salam MA. Rethinking options for the treatment of shigellosis. *J Antimicrob Chemother* 1992 Sep;30(3):243-7
- Bennish ML, Salam MA, Khan WA, Khan AM. Treatment of shigellosis: III. Comparison of one- or two-dose ciprofloxacin with standard 5-day therapy: a randomized, blinded trial. *Ann Intern Med* 1992 Nov 1;117(9):727-34
- Bern C, Unicomb L, Gentsch JR, Banul N, Yunus M, Sack RB, Glass RI. Rotavirus diarrhea in Bangladeshi children: correlation of disease severity with serotypes. *J Clin Microbiol* 1992 Dec;30(12):3234-8
- Bhuiya A, Streatfield K. A hazard logit model analysis of covariates of childhood mortality in Matlab, Bangladesh. *J Biosoc Sci* 1992 Oct;24(4):447-62
- Bhuiya A. Village health care providers in Matlab, Bangladesh: a study of their knowledge in the management of childhood diarrhoea. *J Diarrhoeal Dis Res* 1992 Mar;10(1):10-5
- Butler T, Dunn D, Colmer J. Concomitant intestinal adenovirus infection and pulmonary cytomegalovirus infection in children causing fatal enteritis and pneumonia. *Trans R Soc Trop Med Hyg* 1992 May-Jun;86(3):298-300
- Chowdhury AI, Fauveau V, Aziz KMA. Effect of child survival on contraceptive use in Bangladesh. *J Biosoc Sci* 1992 Oct;24(4):427-32
- Ciznar I, Ahsan CR, Rahman A, Shahabuddin M, Bartkova G, Clemens JD, Sack DA. Crossed immunoelectrophoretic analysis of antigenic composition of B-subunit/whole-cell and whole-cell only killed oral cholera vaccines. *Vaccine* 1992;10(9):591-6
- Clemens JD, Sack DA, Rao MR, Chakraborty J, Khan MR, Kay B, Ahmed F, Banik AK, van Loon FFPL, Yunus M, Harris JR. Evidence that inactivated oral cholera vaccines both prevent and mitigate *Vibrio cholerae* O1 infections in a cholera-endemic area. *J Infect Dis* 1992 Nov;166(5):1029-34
- Clemens JD, van Loon FFPL, Rao M, Sack DA, Ahmed F, Chakraborty J, Khan MR, Yunus M, Harris JR, Svennerholm AM, Holmgren J. Nonparticipation as a determinant of adverse health outcomes in a field trial of oral cholera vaccines. *Am J Epidemiol* 1992 Apr 15;135(8):865-74
- Clemens JD, Ward RL, Rao MR, Sack DA, Knowlton DR, van Loon FFPL, Huda S, McNeal M, Ahmed F, Schiff G. Seroepidemiologic evaluation of antibodies to rotavirus as correlates of the risk of clinically significant rotavirus diarrhea in rural Bangladesh. *J Infect Dis* 1992 Jan;165(1):161-5
- Colwell RR, Hasan JA, Huq A, Loomis L, Siebeling RJ, Torres M, Galvez S, Islam S, Bernstein D. Development and evaluation of a rapid, simple, sensitive, monoclonal antibody-based co-agglutination test for direct detection of *Vibrio cholerae* O1. *FEMS Microbiol Lett* 1992 Oct 15;76(3):215-9
- Faruque ASG, Mahalanabis D, Islam A, Hoque SS, Hasnat A. Breast feeding and oral rehydration at home during diarrhoea to prevent dehydration. *Arch Dis Child* 1992 Aug;67(8):1027-9
- Faruque SM, Haider K, Albert MJ, Ahmad QS, Alam AN, Nahar S, Tzipori S. A comparative study of specific gene probes and standard bioassays to identify diarrhoeagenic *Escherichia*

- coli* in paediatric patients with diarrhoea in Bangladesh. *J Med Microbiol* 1992 Jan;36(1):37 - 40
- Faruque SM, Haider K, Rahman MM, Alim ARMA, Ahmad QS, Albert MJ, Sack RB. Differentiation of *Shigella flexneri* strains by rRNA gene restriction patterns. *J Clin Microbiol* 1992 Nov;30(11):2996 - 9
- Faruque SM, Haider K, Rahman MM, Alim ARMA, Baqui AH, Ahmad QS, Hossain KMB, Albert MJ. Evaluation of a DNA probe to identify enteroaggregative *Escherichia coli* from children with diarrhoea in Bangladesh. *J Diarrhoeal Dis Res* 1992 Mar;10(1):31 - 4
- Fauveau C, Siddiqui M, Briend A, Silimperi DR, Begum N, Fauveau V. Limited impact of a targeted food supplementation programme in Bangladeshi urban slum children. *Ann Trop Paediatr* 1992;12(1):41 - 8
- Fauveau V, Yunus M, Islam MS, Briend A, Bennish ML. Does ORT reduce diarrhoeal mortality? *Health Pol Plann* 1992 Sep;7(3):243 - 50
- Fauveau V, Stewart MK, Chakraborty J, Khan SA. Impact on mortality of a community based programme to control acute lower respiratory tract infections. *Bull WHO* 1992;70(1):109 - 16
- Fauveau V, Henry FJ, Briend A, Yunus M, Chakraborty J. Persistent diarrhea as a cause of childhood mortality in rural Bangladesh. *Acta Paediatr* 1992 Sep;81(suppl 381):12 - 4
- Ferdous AJ, Islam SN, Ahsan M, Hasan CM, Ahmed ZU. *In vitro* antibacterial activity of the volatile oil of *Nigella sativa* seeds against multiple drug resistant isolates of *Shigella* spp. and isolates of *Vibrio cholerae* and *Escherichia coli*. *Phytother Res* 1992 May Jun;6(3):137 - 40
- Gonzalez Ruiz A, Haque R, Rehman T, Aguirre A, Jaramillo C, Castanon G, Hall A, Guhl F, Ruiz Palacios G, Warhurst DC, Miles MA. A monoclonal antibody for distinction of invasive and noninvasive clinical isolates of *Entamoeba histolytica*. *J Clin Microbiol* 1992 Nov;30(11):2807 - 13
- Haider K, Faruque SM, Albert MJ, Nahar S, Neogi PKB, Hossain A. Comparison of a modified adherence assay with existing assay methods for identification of enteroaggregative *Escherichia coli* (note). *J Clin Microbiol* 1992 Jun;30(6):1614 - 6
- Hall A, Anwar KS, Tomkins AM. Intensity of reinfection with *Ascaris lumbricoides* and its implications for parasite control. *Lancet* 1992 May 23;339(8804):1253 - 7
- Henning B, Stewart K, Zaman K, Alam AN, Brown KH, Black RE. Lack of therapeutic efficacy of vitamin A for non-cholera, watery diarrhoea in Bangladeshi children. *Eur J Clin Nutr* 1992 Jun;46(6):437 - 43
- Henry FJ, Udoy AS, Wanke CA, Aziz KMA. Epidemiology of persistent diarrhea and etiologic agents in Mirzapur, Bangladesh. *Acta Paediatr* 1992 Sep;81(suppl 381):27 - 31
- Henry FJ, Briend A, Fauveau V, Huttly SRA, Yunus M, Chakraborty J. The risk approach to intervention in severe malnutrition in rural Bangladesh. *Am J Epidemiol* 1992 Aug 15;136(4):460 - 3
- Hossain MA, Kabir I, Albert MJ, Kibriya AKMG, Alam K, Alam AN. *Campylobacter jejuni* bacteraemia in children with diarrhoea in Bangladesh: report of six cases. *J Diarrhoeal Dis Res* 1992 Jun;10(2):101 - 4
- Hossain MA, Rahman KM, Asna SMZH, Rahim Z, Hussain T, Miah MRA. Incidence of *Aeromonas* isolated from diarrhoeal children and study of some virulence factors in the isolates. *Bangladesh Med Res Counc Bull* 1992 Dec;18(2):61 - 7
- Hughart N, Silimperi DR, Khatun J, Stanton B. A new EPI strategy to reach high risk urban children in Bangladesh - urban volunteers. *Trop Geogr Med* 1992 Jan-Apr;44(1-2):142 - 8
- Huq A, Alam M, Parveen S, Colwell RR. Occurrence of resistance to vibriostatic compound O/129 in *Vibrio cholerae* O1 isolated from clinical and environmental samples in Bangladesh. *J Clin Microbiol* 1992 Jan;30(1):219 - 21
- Islam D, Lindberg A - A. Detection of *Shigella dysenteriae* type 1 and *Shigella flexneri* in feces by immunomagnetic isolation and polymerase chain reaction. *J Clin Microbiol* 1992 Nov;30(11):2801 - 6
- Islam MA, Kofoed P - E, Begum S. Can mothers safely prepare *labon-gur* salt-sugar solution after demonstration in a diarrhoeal hospital? *Trop Geogr Med* 1992 Jan-Apr;44(1-2):81 - 5
- Islam MA, Thilsted SH, Mahalanabis D.

- Evaluation of preventive health services for hospitalised children under a child health programme. *J Diarrhoeal Dis Res* 1992 Dec;10(4):205 - 12
- Islam MS, Alam MJ, Tzipori S. Abundance of *Aeromonas* spp. in various components of pond ecosystems in Dhaka, Bangladesh. *Int J Environ Stud* 1992;39:297 - 304
- Islam MS, Shahid NS, Haque ME, Mostafa G. Food preference and avoidance beliefs during pregnancy and after childbirth in Matlab, Bangladesh. *Bangladesh J Nutr* 1991 Jun;4(2):1 - 14*
- Islam MS, Alam MJ, Neogi PKB. Seasonality and toxigenicity of *Vibrio cholerae* non 01 isolated from different components of pond ecosystems of Dhaka City, Bangladesh. *World J Microbiol Biotechnol* 1992;8:160 - 3
- Jarecki - Khan K, Unicomb LE. Seroprevalence of enteric and nonenteric adenoviruses in Bangladesh [note]. *J Clin Microbiol* 1992 Oct;30(10):2733 - 4
- Kabir I, Butler T, Underwood LE, Rahman MM. Effects of a protein rich diet during convalescence from shigellosis on catch-up growth, serum proteins, and insulin like growth factor I. *Pediatr Res* 1992 Dec;32(6):689 - 92
- Koenig MA, Rob U, Khan MA, Chakraborty J, Fauveau V. Contraceptive use in Matlab, Bangladesh in 1990: levels, trends, and explanations. *Stud Fam Plann* 1992 Nov/Dec; 23(6):352 - 64
- Kofoed P E, Zeitlyn S, Rahman AKSM, Gomes M, Nielsen B. Reasons for low tetanus immunization coverage in a hospital: a focus group investigation [short communication]. *Acta Paediatr* 1992 Aug;81(8):632
- Levine MM, McEwen J, Losonsky G, Reymann M, Harari I, Brown JE, Taylor DN, Donohue Rolfe A, Cohen D, Bennish M, Arnon R. Antibodies to Shiga holotoxin and to two synthetic peptides of the B subunit in sera of patients with *Shigella dysenteriae* 1 dysentery. *J Clin Microbiol* 1992 Jul;30(7):1636 - 41
- Miller JE, Trussell J, Pebley AR, Vaughan B. Birth spacing and child mortality in Bangladesh and the Philippines. *Demography* 1992 May;29(2):305 - 18
- Nerad JL, Griffiths JK, Van der Meer JW, Endres S, Poutsika DD, Keusch GT, Bennish M, Salam MA, Dinarello CA, Cannon JG. Interleukin - 1 beta (IL - 1 beta), IL - 1 receptor antagonist, and TNF alpha production in whole blood. *J Leukoc Biol* 1992 Dec;52(6):687 - 92
- Nielsen CC, Islam MA, Thilsted SH, Ishrat F. Why do some families become defaulters in a hospital based nutrition rehabilitation follow-up programme? *Trop Geogr Med* 1992 Oct;44(4):346 - 51
- Parveen S, Huq A, Hasan JAK, Aziz KMS. Occurrence of hemolysin producing *Aeromonas* in the aquatic environment. *Microbios* 1992;70:67 - 70
- Rahim Z, Aziz KMS. Isolation of enterotoxigenic *Vibrio cholerae* non 01 from the Buriganga river and two ponds of Dhaka, Bangladesh. *J Diarrhoeal Dis Res* 1992 Dec;10(4):227 - 30
- Rahim Z, Akbar A, Bradford AK. Prevalence of *Plesiomonas shigelloides* among diarrhoeal patients in Bangladesh. *Eur J Epidemiol* 1992 Sep;8(5):753 - 6
- Rahman M, Akbar J, Phillips JF, Becker S. Contraceptive use in Matlab, Bangladesh: the role of gender preference. *Stud Fam Plann* 1992 Jul/Aug;23(4):229 - 42
- Rahman MM, Kabir I, Mahalanabis D, Malek MA. Decreased food intake in children with severe dysentery due to *Shigella dysenteriae* 1 infection. *Eur J Clin Nutr* 1992 Nov;46(11):833 - 8
- Rahman MM, Qadri F, Albert MJ, Hossain A, Mosihuzzaman M. Lipopolysaccharide composition and virulence properties of clinical and environmental strains of *Vibrio fluvialis* and *Vibrio mimicus*. *Microbiol Immunol* 1992;36(4):327 - 38
- Rasheed FN, Bulmer JN, Morrison L, Jawla MFB, Hassan - king M, Riley EM, Greenwood BM. Isolation of maternal mononuclear cells from placentas for use in *in vitro* functional assays. *J Immunol Methods* 1992 Feb 5;146(2):185 - 93
- Roy SK, Behrens RH, Haider R, Akramuzzaman SM, Mahalanabis D, Wahed MA, Tomkins AM. Impact of zinc supplementation on intestinal permeability in Bangladeshi children with acute diarrhoea and persistent syndrome. *J Pediatr Gastroenterol Nutr* 1992 Oct;15(3):289 - 96
- Roy SK, Akramuzzaman SM, Haider R, Majid N,

- Khatun M, Akbar MS, Alam AN. Persistent diarrhoea: factors affecting absorption and clinical prognosis during management with a rice-based diet. *Acta Paediatr* 1991 Sep;81(suppl 381):139-43
- Saha SK, Khan WA, Saha S. Blood cultures from Bangladeshi children with septicaemia: an evaluation of conventional, lysis-direct plating and lysis-centrifugation methods. *Tran R Soc Trop Med Hyg* 1992 Sep Oct;86(5):554-6
- Salahuddin AKM, Rahman S, Nessa F, Begum RA, Bhuyan MNH. Disease profile in respect of health services of Upazila Health Complex. *Bangladesh Med Res Counc Bull* 1992 Apr;18(1):36-46
- Sarker SA, Gyr K. Non-immunological defence mechanisms of the gut. *Gut* 1992 Jul;33(7):987-93
- Sayed S, Sack DA, Qadri F. Occurrence of a large plasmid in a strain of *Plesiomonas shigelloides* with cross-reactivity against *Shigella sonnei*. *Indian J Med Res [A]* 1992 Jan;95:21-2
- Sayed S, Sack DA, Qadri F. Protection from *Shigella sonnei* infection by immunisation of rabbits with *Plesiomonas shigelloides* (SVC 01). *J Med Microbiol* 1992 Dec;37(6):382-4
- Schultsz C, Qadri F, Ciznar I, Bartkova G, Hossain SA, Wadstrom T. Binding of *Shigella* species to hydrophobic gels. *Biologia (Bratislava)* 1992;47(3):249-56
- Schultsz C, Qadri F, Hossain SA, Ahmed F, Ciznar I. *Shigella*-specific IgA in saliva of children with bacillary dysentery. *FEMS Microbiol Immunol* 1992 Jan;4(2):65-72
- Siddique AK, Zaman K, Baqui AH, Akram K, Mutsuddy P, Eusof A, Haider K, Islam S, Sack RB. Cholera epidemics in Bangladesh: 1985-1991. *J Diarrhoeal Dis Res* 1992 Jun;10(2):79-86
- Simmons R, Mita R, Koenig MA. Employment in family planning and women's status in Bangladesh. *Stud Fam Plann* 1992 Mar/Apr;23(2):97-109
- Strockbine NA, Faruque SM, Kay BA, Haider K, Alam K, Alam AN, Tzipori S, Wachsmuth IK. DNA probe analysis of diarrhoeagenic *Escherichia coli*: detection of EAF-positive isolates of traditional enteropathogenic *E. coli* serotypes among Bangladeshi paediatric diarrhoea patients. *Mol Cell Probes* 1992 Apr;6(2):93-9
- van Loon FPL, Gyr K, Banik AK. Perfusion studies in cholera: methods and procedures. *J Diarrhoeal Dis Res* 1992 Sep;10(3):133-8
- Zeitlyn S, Rahman AKSM, Nielsen BH, Gomes M, Kofoed P-EL, Mahalanabis D. Compliance with diphtheria, tetanus, and pertussis immunisation in Bangladesh: factors identifying high risk groups. *Br Med J* 1992 Mar 7;304(6827):606-9

REVIEW ARTICLES, PROCEEDINGS, MONOGRAPHS, BOOK CHAPTERS, ETC.

Bairagi R, Chowdhury MK. Validity and reliability of some anthropometric indices to identify determinants of mortality. *In: Proceedings of the One Day Seminar on Applied and Theoretical Statistics, Savar, Dhaka, 10 May 1991.* Dhaka: Bangladesh Statistical Association, 1992:1-8

Bennish M. Quinolone therapy in childhood shigellosis: past experience and current dilemmas. *Adv Antimicrob Antineoplastic Chemother* 1992;11:191-201

Bennish ML, Ronsmans C. Health and nutritional consequences of the 1991 Bangladesh cyclone. *Nutr Rev* 1992 Apr;50(4 pt.1):102-5

Bhuiya A, compiler. Abstracts of UNICEF-supported studies 87-91 Bangladesh. Dhaka: UNICEF, 1992. 88 p.

Chen L, Black RE, Sarder AM, Merson MH, Bhatia S, Yunus MD, Chakraborty J. Oral rehydration therapy in Bangladesh. *In: Mahadevan K, ed. Policies and strategies for child survival: experiences from Asia.* Delhi: B.R. Publishing, 1990:313-21*

Chowdhury M, Choudhury Y, Bhuiya A, Islam K, Hussain Z, Rahman O, Glass R, Bennish M. Cyclone aftermath: research and directions for the future. *In: Hossain H, Dodge CP, Abed FH, eds. From crisis to development: coping with disasters in Bangladesh.* Dhaka: University Press Limited, 1992:101-33

Fauveau V, Briend A, Chakraborty J, Khan SA. Chest circumference at birth and risk of early mortality: a valid alternative to birth weight. *In: Boerma T, ed. Measurement of maternal and child mortality, morbidity and health care:*

interdisciplinary approaches; proceedings of the Seminar of International Union for the Scientific Study of Population, Cairo, 4-7 November 1991. Cairo: 1992:299-308

Habte D. Building and strengthening research capacity in health: the challenge to Africa. *J Diarrhoeal Dis Res* 1992 Jun;10(2):73-8

Hoque SS, Islam M, Khan AM. A nine month old malnourished baby girl presenting with shigellosis, pneumonia and shock (case 1, 1992) (clinicopathological conference of the ICDDR,B). *J Diarrhoeal Dis Res* 1992 Mar;10(1):42-4

Hoque SS, Aiani AN, Islam MR, Khan MR. Recent advances in the treatment of typhoid: with special emphasis on multidrug resistant *Salmonella typhi* in Bangladesh. *Bangladesh J Child Health* 1992 Mar/Jun;16(1/2):15-9

Islam MS, Fauveau V, Yunus M. Mothers' knowledge and use of oral rehydration therapy in three health delivery areas in Matlab, rural Bangladesh. *Torch (Dhaka)* 1992 May;(4):3-4

Khan MR, Hoque SS. Emergence of multi drug resistant *Salmonella typhi*: a need for therapeutic reappraisal. *Bangladesh J Child Health* 1992 Mar/Jun;16(1/2):1-3

Koenig MA, Simmons R. Constraints on supply and demand for family planning: evidence from rural Bangladesh. *In: Phillips JF, Ross JA, eds. Family planning programmes & fertility. Oxford: Oxford University Press, 1992:259-75*

Koenig MA. Mortality reductions from measles and tetanus immunization: a review of the evidence. *In: Hill K, ed. Child health priorities for the 1990s; report of a seminar held in Baltimore, Maryland, June 20-22, 1991. Baltimore, MD.: The Johns Hopkins University, 1991:43-71**

Mahalanabis D, Molla AM, Sack DA. Clinical management of cholera. *In: Barua D, Greenough WB, III, eds. Cholera. New York: Plenum, 1992:253-83*

Mitra AK. An approach to protect worker's health. *Bangladesh Priv Med Pract J* 1992;2(1):204-6

Nag M. Family planning success stories in Bangladesh and India. Washington, D.C.:

Population and Human Resources Department, The World Bank, 1992. 37 p. (Policy research working paper series, 1041)

Neaz A, Banu H. Effect of programmatic and non-programmatic factors on contraception and fertility in Bangladesh. Dhaka: National Institute of Population Research and Training, 1992. xiv, 179 p.

Phillips JF, Hossain MB, Simmons R, Koenig M. Worker-client exchanges and contraceptive use in rural Bangladesh. New York: The Population Council, 1991. 37 p. (Working paper, 32)*

Rabbani GH, Greenough WB, III. Pathophysiology and clinical aspects of cholera. *In: Barua D, Greenough WB, III, eds. Cholera. New York: Plenum, 1992:209-28*

Rabbani GH, Ashraf H, Islam M, Azad AK. A 1-year old girl with severe malnutrition, bloody-mucoid diarrhoea and fever (postmortem study case - 2 of 1992) (clinicopathological conference of the ICDDR,B). *J Diarrhoeal Dis Res* 1992 Sep;10(3):164-70

Rahim Z, Aziz KMS. Isolation of enterotoxigenic and drug resistant *Aeromonas* spp. from the root system of common water plants of Bangladesh. *In: Islam AKMN, Fattah QA, Muttaqi IA, Aziz A, eds. Plant science and man: problems and prospects; proceedings of the International Botanical Conference, Dhaka, 10-12 January 1991. Dhaka: Bangladesh Botanical Society, 1992:59-63*

Rahman MM, Hossain SMI, Islam M, Azad AK. Clinical and autopsy findings of a nine-month-old girl with malnutrition and pneumonia (postmortem study case - 15/91). *J Diarrhoeal Dis Res* 1992 Dec;10(4):235-8

Strong MA. The health of adults in the developing world: the view from Bangladesh. *Health Trans Rev* 1992 Oct;2(2):215-24

Yunus M, Siddique AK, Sack RB. Epidemiology of cholera in Bangladesh. *In: Proceedings of the 28th Joint Conference of the US-Japan Cooperative Medical Science Program Cholera and Related Diarrheal Diseases Panel, Tokyo, 20-21 July 1992. Tokyo: US-Japan Cooperative Medical Science Program, 1992:70-5*

ABSTRACTS, LETTERS, AND EDITORIALS.

Albert MJ, Kabir I, Neogi PKB, Kibriya AKMG. *Vibrio mimicus* bacteraemia in a child [letter]. J Diarrhoeal Dis Res 1992 Mar;10(1):39 - 40

Bhaskaram P, Hemalatha P, Islam A. Zinc status in breastfed infants [letter]. Lancet 1992 Dec 5;340(8822):1416 - 7

Faruque SM, Albert J. Genetic relation between *Vibrio cholerae* O1 strains in Ecuador and Bangladesh [letter]. Lancet 1992 Mar 21;339(8795):740 - 1

Gonzalez - Ruiz A, Haque R, Rehman T, Aguirre A, Castanon G, Hall A, Guhl F, Ruiz - Palacios G, Warhurst DC, Miles MA. Identification of invasive *Entamoeba histolytica* and detection of coproantigen by an invasive - specific monoclonal

antibody [abstract]. J Med Microbiol 1993; 38(suppl 1). [abstract no. 301]

Kabir I, Butler T, Underwood LF. Shigellosis in children: effect of a protein - rich diet on catch - up growth, serum proteins and somatomedin - C [abstract]. Clin Res 1991 Dec;39(4):841A*

Patra FC. Enhanced sodium absorption by citrate [reply]. J Pediatr Gastroenterol Nutr 1992 Jan;14(1):119

Rahman M. Sex composition of children and contraceptive use in Matlab, Bangladesh [abstract]. Pop Index 1990 Fall;56(3):443 - 4*

Sack RB. Prospects for control of cholera with oral vaccines [editorial]. J Diarrhoeal Dis Res 1992 Mar;10(1):1 - 3

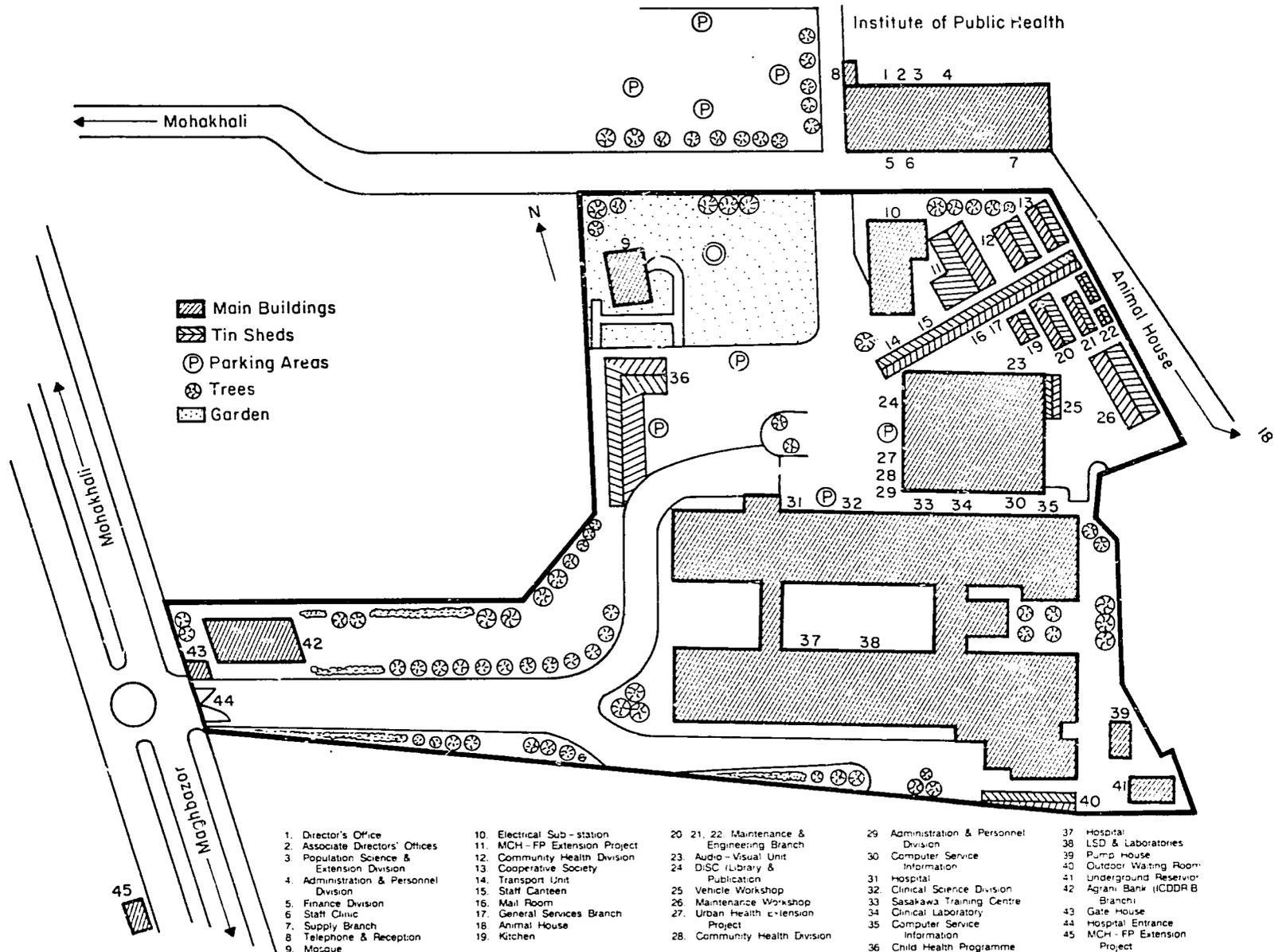
*Not listed in earlier annual reports.

STAFF DEVELOPMENT AND TRAINING COMMITTEES



Doctors from Laos getting "hands on" experience in the hospital

80-A



STAFF DEVELOPMENT AND TRAINING

STAFF DEVELOPMENT

Manager: Bejoy R. Saha

New in '92

The Centre, committed to maintaining a "systematic staff development programme", and as in previous years, endeavoured to develop the skills of its personnel to sustain its ongoing research and training and to create well-trained scientists and support staff to meet future requirements. This was done by organising workshops and courses in the Centre and sending staff members to national and overseas institutions. A total of 112 staff members benefited from this programme in 1992. Some also attended scientific conferences to present papers. Besides fellowships for study or training for individuals from a number of agencies, the ICDDR,B received direct financial support from the Swiss Development Cooperation for the programme.

OVERSEAS:

At the beginning of 1992, 29 staff members were studying abroad. During the year, an additional 19 went abroad to begin their studies or training and 21 completed theirs. Thus by the end of the year, 27 were on overseas study or training in Australia, Belgium, France, Japan, Switzerland, Sweden, the UK, and the USA. Two of them completed their doctoral degrees, but are continuing clinical studies to acquire their MRCP qualifications. The subjects of these studies included Community Health, Demography, Gastroenterology, Nutrition, Population Dynamics, Public Health, Primary Health Care, Microbiology, Molecular Biology, and Molecular Genetics.

In addition, 49 staff members attended a number of scientific conferences and workshops, including the 4th African Conference (Lagos) and the 6th Asian Conference on Diarrhoeal Diseases (Karachi). Their attendance in the conferences and workshops gave them the opportunity to exchange ideas with the researchers of other institutions and countries who attended.

A brief description of some of those who are either currently on training or have returned after completion is given below:

Ms. Lutfun Nahar, Senior Data Management

- * 21 staff members completed their studies abroad.
- * 49 attended international scientific conferences or short courses/workshops.
- * In evaluation by participants of previous training courses Programme scored high.
- * 457 men and women from 24 countries received training in health research and other aspects of diarrhoeal disease at the Centre.

Officer, DSS, PSED, gained a Master's degree in Sociology from the University of Western Ontario, Canada and now heads the research unit in the DSS.

Dr. M. Aminul Islam, Assistant Scientist and Coordinator of the Child Health Programme of the CSD, gained a Master's degree in Applied Nutrition from the National Institute of Nutrition, Hyderabad, India.

Dr. Syed Mohd. Axramuzzaman, Medical Officer, Clinical Research and Service Centre (CRSC), CSD, gained a Master's degree in Community Health in Developing Countries from the London School of Hygiene and Tropical Medicine (LSHTM), UK.

Dr. Mst. Khalequzzaman, Assistant Scientist, Matlab Health and Research (MH&R) Centre, CHD, and **Dr. Fakir Anjuman Ara**, Training Physician, Training Coordination Bureau (TCB), gained MPH degrees from the Johns Hopkins University (JHU), USA, and the University of Leeds, UK, respectively.

Ms. Fazilatun Nessa, Operations Researcher, MCH-FP Extension Project, PSED, gained an M.Sc. degree in Medical Demography from the LSHTM, UK.

Dr. Mizanur Rahman, Population Studies Centre, PSED, returned, having completed a doctorate at JHU and a post-graduate degree from RAND Corporation.

Mr. S.K. Jalal went to the St. Pierre Hospital, Free University of Brussels, Belgium for a nine-month training course in Diagnostic Microbiology, but remained to complete a two-year Master's programme.

Dr. Shafiqul A. Sarker, Assistant Scientist, CRSC, CSD, obtained an MD with specialisation in gastroenterology from the University of Basel, Switzerland.

Dr. Mohammad Ali, Medical Officer, CRSC, CSD, left to begin his studies in Primary Health, leading to a Master's degree at the University of Western Australia.

Dr. Shamim Akhter Khan, Medical Officer, MCH Project, MH&R Centre, CHD, left to begin studies at the LSHTM, UK for a Master's degree in Community Health in Developing Countries.

Dr. Amal K. Mitra, Associate Scientist, CRSC, CSD, left to begin studies in Public Health leading to an MPH degree at the University of Alabama at Birmingham, USA.

Mr. A.K.S. Mahmudur Rahman, Preventive Health Officer, Child Health Programme, CSD, left to begin studies in Primary Health Care leading to a Masters degree at the University of Manchester, UK.

Mr. Jalaluddin Akbar, PSED, is working on a PhD in Population Planning at the University of Michigan, USA.

Mr. Mehrab Ali Khan, PSED, is pursuing a Master's in Demography at the Australian National University. Two other PSED staff members, **Mr. Md. Shahidullah** and **Mr. Abdur Razzaque** are working on PhDs at the same university.

Dr. Rezia Laila Akbar, Training Coordinator, TCB, attended a short course on Management of Training Centres at the Asian Institute of Technology (AIT), Thailand; **Mr. Wahabuzzaman Ahmed**, Chief Personnel Officer, a 'Leadership and Management Development Programme' at the International Management Development Institute, University of Pittsburgh, USA; **Mr. Jatindra Nath Sarker**, Project Office Manager, UHEP, CHD, a 7-week course on Management at the Asian

Institute of Management (AIM), Philippines; **Mr. Rafique-ul-Islam**, Programmer, UHEP, CHD, and **Mrs. Saleha Begum**, Programme Analyst, Computer Information Services, PSED, short courses on Computer Systems Application at the AIT, Thailand; **Dr. Hafiz Chowdhury**, Medical Officer, Matlab and **Dr. A. Uzma**, Medical Officer, UHEP, a training course on Conjunctival Impression Cytology at the Post-graduate Institute of Medical Education and Research, Chandigarh, India; **Dr. Rukhsana Haider**, Assistant Scientist, CSD, **Dr. Md. Khalequzzaman**, Assistant Scientist, MHRC, and **Mr. J. Chakraborty**, Programme Manager, MCH-FP, a WHO sponsored workshop in Gebza, Turkey; **Dr. A. de Francisco**, P.I., MCH-FP Project, a pre-workshop on ARI in Pattaya, Thailand; **Mr. Mikhil Roy** and **Mr. M.A. Kashem Shaikh**, both PSED staff members, the Summer Population Institute at the East-West Population Centre in Hawaii; **Dr. Bilqis A. Hoque**, Scientist, CHD, a workshop on Women in Water Supply and Sanitation, Bangkok; and **Dr. Khaleda Haider**, Associate Scientist, LSD, received training on 'Role of the *Shigella dysenteriae* type 1 in virulence' at the Department of Microbiology, Faculty of Medicine, Kyoto University, Japan, under the supervision of Prof. Y. Takeda.

IN-COUNTRY:

During 1992, 15 staff members were sent to several institutions within the country for training in Computer, English language, Accounting and Personnel Management/Administration and Human Relations. Six attended a one-year (part-time) diploma course in Computer Science, and one person attended a full-time course on Diploma in Child Health at the Dhaka Shishu Hospital.

Three staff members, who had begun their part-time studies last year, completed their degrees during the year:

Dr. Iqbal Kabir, Associate Scientist, CSD, obtained a PhD in Nutrition from the University of Dhaka.

Dr. Anowar Hossain, Assistant Scientist, LSD, obtained an MCPS degree in Clinical Pathology from the Bangladesh College of Physicians and Surgeon, Dhaka.

Mr. Golam Rasul, Data Entry Technician, Computer Information Services, PSED, obtained a diploma in Applied Electronics from the Dhaka Polytechnic Institute, Dhaka.

In addition, a number of scientists attended scientific conferences held in the country to

present papers on the findings of their research. Others attended specialised short courses on various subjects, such as Obstetric Ward and Delivery Room Activities (Holy Family Red Crescent Hospital) and Training of Trainers (NIPORT-GTZ).

IN-HOUSE:

Several courses were held at the Centre in which 78 persons participated. Five courses on English language were attended by 56 staff members, 17 attended the 'Research Methodology Workshop', and two attended the course on 'Epidemiological Methods in Public Health' organised by the TCB. Two employees attended the workshop on 'Analysis of Data on the Health of Women and Children using SPSS/PC' organised by the Population Council, Dhaka in collaboration with the ICDDR,B. Another workshop on SAS and SQL/DS database management systems was held by the Computer Information Services, who also gave an introductory Lotus 1-2-3 course to staff members from the personnel and supply offices and provided hands on training in various PC software packages on a continuous basis to Centre staff.

TRAINING COORDINATION BUREAU

Coordinator: R.L. Akbar

Training in areas of the Centre's competence is a stated objective of the Centre. In view of the objective, as in previous years, the Centre's Training Coordination Bureau (TCB) has organised national and international training courses, offered fellowships, and organised workshops and seminars with an emphasis on health research. During 1992, 457 scientists, physicians, health administrators, health personnel, trainers, and students from 24 countries received training in the Centre.

The training courses were highly rated by participants, funding agencies, and recipient countries. An evaluation was also undertaken during the year through questionnaires to alumni to assess the effectiveness of courses on Clinical Management of Diarrhoeal Diseases and Laboratory Diagnosis of Common Diarrhoeal Disease Agents organised from 1989 through 1991. The results of the evaluation indicated that 70% of the respondents found the courses useful for them and that they were utilising the knowledge and skills acquired at the ICDDR,B at their work places. Others reported that there were constraints in the work place which prevented

them from taking full advantage of their education.

HEALTH RESEARCH TRAINING:

The training programme continued to focus on health research which would contribute to the development of the greatly needed health research manpower and to research-capacity building in developing countries. In 1992, 102 persons from 6 countries participated in specialised training courses, workshops, and fellowships.

The **Research Methodology Workshop** was attended by 16 participants, including 9 staff and Fellows of the Centre and 7 others (3 from India, 2 from Bangladeshi institutions, and 1 each from Nepal and Pakistan). The workshop enabled the participants to acquire the fundamentals of formulating and implementing research proposals and management and analyses of data sets.

Health Research Training Fellowships were offered to two persons (one from China and the other from Nigeria; see Personnel). The programme aims to develop knowledge and skills of Fellows in essential national health research and strengthen linkages between the ICDDR,B and health and research institutions here and in other developing countries. The programme is based primarily on practical 'hands-on' experience and consists of the involvement of the trainees from the time of identification of the research topic to the publication of results.

A course on **Biostatistics** was organised at the request of the UNICEF, Dhaka for 10 of its programme staff. It aimed to help them improve their statistical skills to enable them to a) improve their efficiency in executing, monitoring, and evaluating projects, b) make better and more accurate use of data for analysis reports, and c) recognise when and what type of expertise is required to help design research studies and evaluations or for data collection and analysis.

Two courses on **Epidemiological Methods in Public Health** were organised in collaboration with national institutions and attended by 37 participants from various institutions of Bangladesh. They aimed to impart training to participants to plan, design, and undertake epidemiological studies, to apply appropriate methods in data collection, to analyse and interpret data, and to formulate, implement, and evaluate health interventions. The courses, like all

other courses, were evaluated and found useful to those who are planning to build a career in public health and in the field of epidemiology.

Research traineeships are designed to offer an opportunity to young Bangladeshi graduates to develop their research capabilities by providing training through its ongoing research protocols. The programme is based primarily on practical experience that can be achieved in this manner. Fellows in this programme are graduates in medicine, social sciences, and nutrition and some are also paramedics. The duration of training is a minimum of one year; 46 persons received training during the year.

CLINICAL FELLOWSHIP PROGRAMME:

In addition to the courses, the ICDDR,B offered fellowships (individual training) to 64 persons for training in research and other aspects of diarrhoeal diseases. The main objective of this programme is to provide Fellows with specialised skills in diagnosing and treating patients with diarrhoea and malnutrition and some insights into research methods.

Government Fellowship: The Government fellowship programme began in 1989. As usual, on request from the ICDDR,B, the Director - General of Health Services, GoB, nominated 8 fellows, one from each medical college on the basis of merit. For one year, these Fellows were provided intensive training on the clinical management of diarrhoeal diseases with an orientation in clinical pathology.

Fellowship for nurses: Aiming to create trained nurses for management of diarrhoeal patients in the country, the Centre offered 10 fellowships on a competitive basis. The objective of the programme is to provide the nursing trainees with adequate 'hands on' training to enable them to acquire adequate knowledge and skills to competently manage patients with diarrhoea and the diarrhoea treatment units.

Fellowship for SAARC countries: The Centre continued to offer fellowships to the countries of the South Asian Association for Regional Cooperation (SAARC). Fellows from Bangladesh (2), Bhutan (1), India (2), Maldives (1), Nepal (1), Pakistan (2) and Sri Lanka (2) were provided theoretical and practical training in current practices in diagnosing and treating diarrhoeal diseases, epidemiology, and prevention of diarrhoea.

Other fellowships: Thirty Fellows from 7 countries received training on various aspects of diarrhoeal diseases with an insight into research methods. They included trainees from a number of Western universities who chose this for their elective (see Personnel). They worked in the hospital at the bedside of patients for 'hands-on' training in clinical management of diarrhoeal diseases and assisted the PIs with the current research protocols.

Postgraduate students: In the Centre's laboratories, 6 MSc and 5 MPhil students of Dhaka University carried out their research studies.

COURSES:

International: Twenty-five physicians, nurses, and diarrhoeal disease control programme managers from Bangladesh (2), Bhutan (1), Cambodia (2), Ethiopia (2), India (4), Maldives (1), Nigeria (2), Sri Lanka (4), Sudan (3), and Zambia (4) attended two courses on the "Clinical Management of Diarrhoeal Diseases with Special Emphasis on Persistent Diarrhoea". These courses were designed to provide participants with the skills necessary to diagnose and treat diarrhoea of various aetiologies and the complications in both the hospital and the community. In addition, the participants were taught to organise courses for health personnel in their own countries. Their tuition fees, travel, and living expenses were provided by grants from Japan and USAID.

A 3-week course on "Laboratory Diagnosis of Common Diarrhoeal Disease Agents" was attended by 9 participants from Ethiopia (2), Kenya (2), Nigeria (2), and Uganda (3). The course provided the participants with an opportunity to learn the principles of laboratory procedures through practical work. Specifically, they learned the procedures to isolate and identify pathogens responsible for causing diarrhoea and to prepare culture media in their home laboratories. Laboratory safety was emphasised.

National courses: Thirty-seven postgraduate students and nurses from institutions of Bangladesh attended three national training courses on the Clinical Management of Diarrhoeal Diseases. The courses aimed to provide adequate knowledge and skills in managing patients in both the hospital and community, with an emphasis on the use of ORS and the role of nutrition for the management of diarrhoea.

Two 'Integrated Courses on the Management of Diarrhoeal Diseases and ARI', sponsored by the Bangladesh Population and Health Consortium,

were attended by 28 physicians and health personnel of its grantee project (NGOs). The courses aimed to provide the participants with the skills to: a) diagnose and manage patients suffering from acute watery, invasive, and persistent diarrhoea; b) identify complications and refer them to appropriate health facilities; c) identify risk factors for diarrhoea and acute respiratory infections (ARI) and take appropriate actions for addressing them; d) diagnose and manage ARI cases; e) identify indications for referral and refer patients to appropriate facilities; f) communicate with mothers and community members and provide health education; and g) train, encourage, and motivate the community to take the responsibility of managing simple cases at home and provide support when necessary.

OTHERS:

A four-day study visit was organised for a group of five Japanese experts who intend to work for the International Medical Programme in the future. The visit, sponsored by the Japan International Corporation of Welfare Services, aimed to enable the participants to understand the health and social issues of Asian countries in order to develop the ability of planning and management of the medical cooperation projects as experts.

Dr. R.L. Akbar, Training Coordinator, along with Drs. A.N. Alam and S.K. Nath, visited Cambodia to organise a training course on Clinical Management and Prevention of Diarrhoea for the Cambodian physicians.

The Centre's Training Programme also collaborated with the Population Council, Dhaka, in organising a workshop on 'Analysis of Data on the Health of Women and Children' using SPSS/PC+.

Two staff members of the International Centre for Integrated Mountain Development, Kathmandu, Nepal, were given on-the-job training in the field of support services (supply, personnel, etc.).

Short-term Courses: During the year, a series of one- and two-day courses were held for 181 students and health professionals from Bangladesh medical colleges and other government and non-government institutions on the management of diarrhoea with ORS.

SEMINARS:

To provide opportunities for an exchange of in-

formation and views, 28 seminars were organised during the year, in addition to interdivisional scientific forums (see Introduction) and clinical seminars at the Clinical Research and Service Centre. Both resident and visiting scientists presented seminars on diarrhoea and other related topics. A few of these were:

New methods of measuring body composition and energy expenditure...Dr. M. Abu Khaled, Associate Professor, University of Alabama at Birmingham, USA

Plans for cholera vaccine trials in Latin America...Dr. David A. Sack, Associate Professor, The Johns Hopkins University (JHU), USA

Assessment of vitamin A status...Prof. Kenneth H. Brown, Department of Nutrition, University of California, Davis, USA

Shigella and cholera in Tanzania, Prof. Fred Mhalu, University of Dar-es-Salam, Tanzania and member of ICDDR,B Board of Trustees.

Environmental risk factors for acute respiratory illness among children in Indonesia...Dr. Chris Kjolhede, Assistant Professor, JHU, USA

Family formation patterns, first birth intervals, and maternal status in Matlab, Bangladesh...Dr. Ann P. Riley, Assistant Professor, Georgetown University, USA

Rapid tests for the detection of *Vibrio cholerae* O1 from clinical samples...Mr. Jafrul Hasan, Doctoral Candidate, University of Maryland, USA

Biosafety in the research laboratory...Dr. Bradford A. Kay, Associate Professor, JHU, USA

Urban environmental health and hygiene in sub-Saharan Africa...Mr. Uno Winblad, Winblad Konsult AB, Pataholm, Sweden

Impact of nutrition education intervention program on vitamin A status...Dr. Akhtar Hussain, University of Bergen, Norway

Results of recent investigations into transmission and control of cholera and shigellosis...Dr. Robert V. Tauxe, CDC, USA.

COMMITTEES – 1992

The Board of Trustees provides general direction to the affairs of the Centre. The Board has 17 members: the Director of the Centre, three persons nominated by the Government of Bangladesh, one by the World Health Organization, one by the United Nations, and eleven members at large, of whom at least half must come from developing countries. Each June one-third of the members complete their three-year term unless re-elected for another term, after which they must retire.

The Board meets twice a year (in 1992, in May and November, both times in Dhaka) and considers matters of science, finance, and management. The Director of the Centre is Secretary to the Board. The 1992 members were:

Dr. Peter Sumbung (Indonesia), Chairman, to June
 Prof. Demissie Habte (Ethiopia), Secretary
 Dr. Y.Y. Al-Mazrou (Saudi Arabia)
 Dr. Deanna Ashley (Jamaica), Chairperson in November
 Prof. John C. Caldwell (Australia)
 Mr. E.A. Chaudhury (Bangladesh)
 Prof. Dr. K.M. Fariduddin (Bangladesh)
 Prof. J.R. Hamilton (Canada)
 Mr. M. Mokammel Haque (Bangladesh)
 Dr. Ralph H. Hendersor. (WHO representative)
 Dr. Maureen Law (Canada)
 Prof. A. Lindberg (Sweden)
 Prof. V.I. Mathan (India)
 Prof. Fred S. Mhalu (Tanzania)
 Prof. A.S. Muller (The Netherlands)
 Dr. Jon E. Rhode (UNICEF representative)
 Dr. Takashi Wagatsuma (Japan)
 Prof. Chen Chunming (China) from June replacing Dr. Sumbung

The Programme Coordination Committee (PCC) is a mandatory Committee of the Centre which coordinates research with the work of national institutes in Bangladesh. Its objectives are: a) to ensure that the Centre offers fellowships and facilities for training and research to Bangladeshi scientists and health personnel; b) to ensure that the Centre establishes and maintains contact with Bangladeshi institutes by means of collaborative research, seminars and exchange of visits; c) to ensure that the Centre avoids actions

prejudicial to the interest of research in similar fields carried out by other organisations in Bangladesh; and d) to assist in solving any controversy in relation to the involvement of the ICDDR,B in research and training.

The PCC has 50 members: five from ICDDR,B, three nominated by the Board of Trustees from its members and the remaining members from government health departments/ institutions, universities, and non-governmental organisations related to science, health, nutrition, development, education, and population studies. The present Committee will be in office until December 1993: The Chairman is Prof. M.A. Matin, Vice Chairman is Prof. Kamaluddin Ahmad and the Member-Secretary is Prof. Demissie Habte. The members were:

Prof. M.A. Matin
 Prof. Kamaluddin Ahmad
 Prof. Nurul Islam
 Maj. Gen. M.R. Chowdhury
 Prof. K.A. Monsur
 Prof. T.A. Chowdhury
 Dr. Humayun KMA Hye
 Brig. (Retd.) M. Hedayetullah
 Dr. Zafrullah Choudhury
 Dr. A.K. Khan
 Dr. Mobarak Hossain
 Dr. Sultana Khanum
 Vice-Chancellors of Bangladesh Agricultural University, Dhaka University, Bangladesh University of Engg. & Technology, Chittagong University, Rajshahi University, Jahangirnagar University, Islamic University, Shahjalal University of Science & Technology, and Khulna University
 Chairmen of Bangladesh Agricultural Research Council and BCSIR Laboratories,
 Research Director, Bangladesh Institute of Development Studies
 Medical Director, Bangladesh Institute of Research & Rehabilitation in Diabetes, Endocrine & Metabolic Disorders
 Directors-General of Health Services, Family Planning Implementation, and the National Institute of Population Research and Training
 Directors of Institute of Postgraduate Medicine &

Research, Institute of Nutrition & Food Science, Dhaka Univ., Institute of Public Health, National Institute of Preventive & Social Medicine, Institute of Public Health Nutrition, and Bangladesh Fertility Research Programme Executive Director, Bangladesh Rural Advancement Committee

Director, MIS Unit, Family Planning Directorate
Joint Director, Dhaka Shishu Hospital
Directors of Institute of Bangladesh Studies, Rajshahi University; and Bangladesh Medical Research Council

Project Director, CDD Programme, GoB
Directors of Cancer Institute & Research Hospital and Institute of Herbal Medicine

Prof. J.R. Hamilton, Member, Board of Trustees
Dr. Deanna Ashley, Member, Board of Trustees
Director, ICDDR,B,

Associate Directors, CSD, CHD, LSD, and PSED

The PCC met and discussed issues related to furtherance of collaborative efforts between the Centre and national institutions. The Scientific Review Committee of PCC also met on two occasions and considered four protocols originating from national institutions. The interest among the scientists of national institutions in developing research proposals and in undertaking research in their own institutions has been sustained. The scientists of the Centre provided technical assistance to them in developing proposals and gave necessary guidance during the research. Seven PCC-collaborative research proposals were provided with funds amounting to approximately US \$32,000 by the Centre.

In six ICDDR,B ongoing research protocols, investigators from four national institutions participated along with the scientists from the Centre. This collaboration is viewed as most rewarding for ICDDR,B researchers, as well as researchers from national institutions. The Centre welcomes the initiatives of national scientists.

The Centre also assisted Dhaka University and other medical research institutions with installation and maintenance of their scientific instruments and equipment by providing animals and animal blood to facilitate their research.

The Research Review Committee (RCC) evaluates all research proposals of the Centre in terms of their scientific value, competence of the PIs, significance and feasibility in the light of the Centre's objectives, priorities, and financial resources. The RCC is composed of scientists and physicians from the ICDDR,B, external bodies, and representatives from the PCC Standing Committee. During 1992, the RCC met nine times

and considered 28 protocols; 26 were approved, one disapproved, and one project proposal was noted. The members of RRC in 1992 were:

Prof. Demissie Habte, Chairman
Prof. Kamaluddin Ahmad
Maj. Gen. M.R. Choudhury
Dr. Dilip Mahalanabis
Prof. R. Bradley Sack
Dr. Michael A. Strong
Dr. M. Moyenu Islam
Dr. M. John Albert
Dr. P.K. Bardhan
Dr. Sajeda Amin
Prof. T.A. Chowdhury

The Ethical Review Committee (ERC) is also a Mandatory Committee of the Centre which meets regularly to examine the ethical issues of research protocols involving human subjects after they are approved by the RRC. It has 15 members: four from the Centre, one each from the PCC Standing Committee, the Bangladesh Medical Research Council and from the WHO, Bangladesh, and eight persons representing other disciplines.

The ERC has a five-member subcommittee to undertake periodic inspection and audit of research projects on behalf of the Committee and to ensure that studies are being conducted ethically and according to the approved proposal. The Committee ensures that the study patients will receive the same treatment if they wish to withdraw themselves from the study, and that their privacy will not be infringed upon. In 1992, the ERC met eight times and considered 19 protocols including one PCC-collaborative study. Eighteen protocols were approved and consideration of one protocol was deferred. The members were:

Prof. Kamaluddin Ahmad, Representative of PCC Standing Committee; Biochemist & Nutritionist
Dr. Humayun KMA Hye, Pharmacologist (Chairman until July)
Prof. T.A. Chowdhury, Representative of Bangladesh Medical Research Council; Gynaecologist (Chairman from July)
Prof. K.A. Monsur, Scientist
Dr. Shafiqur Rahman, Community Scientist
Dr. Rafiqur Rahman, Lawyer
Mrs. Taherunnessa Abdullah, Behavioural Scientist
Mrs. Husnara Kamal, Behavioural Scientist (Retired in August)
Mr. Md. Mofazzal Hossain Khan, Religious Representative
Dr. Jamal Ara Rahman, Non-scientific Member
Dr. Samira Aboubaker, Representative of WHO

Dr. D. Mahalanabis, ICDDR,B, Clinician
 Dr. A.N. Alam, ICDDR,B, Clinician (Retired in July)
 Dr. K.M.A. Aziz, Anthropologist, ICDDR,B
 Ms. Husna Ara Begum, ICDDR,B, Nurse
 Dr. M.A. Salam, ICDDR,B, Gastroenterologist
 Mrs. Sayeda Rowshan Kadir, Women's Affairs

The Council of Associate Directors (CAD) is a consultative management body comprising the Director and the Associate Directors of the Divisions. They meet each week to advise and assist the Director, discuss matters of mutual interest, and make policy decisions. The members of the Council in 1992 were:

Prof. Demissie Habte, Director
 Dr. Dilip Mahalanabis, CSD
 Prof. R. Bradley Sack, CHD and LSD
 Dr. Michael Strong, PSED
 Mr. Kenneth J.J. Tipping, Finance
 Mr. M.A. Mahub, Administration and Personnel
 Mrs. Judith Chowdhury, Minutes Secretary

The Consultative Management Committee includes members of the CAD, other senior members of the Centre's administration, a representative of each Division, and the President of the Staff Welfare Association (SWA). It meets as an informal platform for a wider discussion of the management of the ICDDR,B. In 1992, the Committee met twice, once after each Board of Trustees meeting to get an up date of the meeting and discuss action to be taken. The members, in addition to members of CAD, were:

Mr. M.S.I. Khan (DISC), Dr. R.L. Akbar (TCB), and Mr. M. Mujibur Rahman (President, SWA); Administration and Personnel: Mr. W. Ahmed, Mr. M.G. Morshed, and T.A. Khan; CHD: Dr. K.M.A. Aziz, Dr. A.K.M. Siddique, Dr. Md Yunus, and Mr. N. Paljor; CSD: Dr. A.N. Alam, Dr. I. Kabir, Dr. Aminul Islam, and Mrs. A. Stephen; Finance Division: Mr. M.R. Khalili; LSD: Mr. M.A. Wahed, Dr. M.M. Islam, and Dr. J. Albert; and PSED: Mr. K.A. Majumder, Ms. L. Naher, Mr. S. Rahman.

The Animal Ethics Experimentation Committee: The Board of Trustees of the ICDDR,B established an 'Animal Ethics Experimentation Committee (AEEC)' to ensure compliance of accepted standards that protect the welfare of animals, since many of the research activities of the Centre utilise research animals. This Committee is required to give clearance to protocols involving research animals prior to RRC consideration.

The Committee met twice in 1992 and cleared four research proposals and approved a 'Manual for care and management of laboratory animals at ICDDR,B'. The members of the Committee were:

Dr. M.A. Jalil (Veterinary & Animal Husbandry) -
 Chairman
 Prof. A.N.M. Abdul Qadir (Parasitologist),
 Dr. Abu Tweb Abu Ahmed (Zoologist),
 Dr. Shamsul Haque (Veterinary Medicine),
 Mr. S.E. Kabir (lay person),
 Dr. M. Moyenu Islam (Pathologist, ICDDR,B),
 Dr. K.A. Al-Mahmud (Veterinary Medicine,
 ICDDR,B),



Dr. Peter Sumbung receives a gift from the director on his retirement from the Board of Trustees and the Chairmanship in June.

FINANCE DIVISION

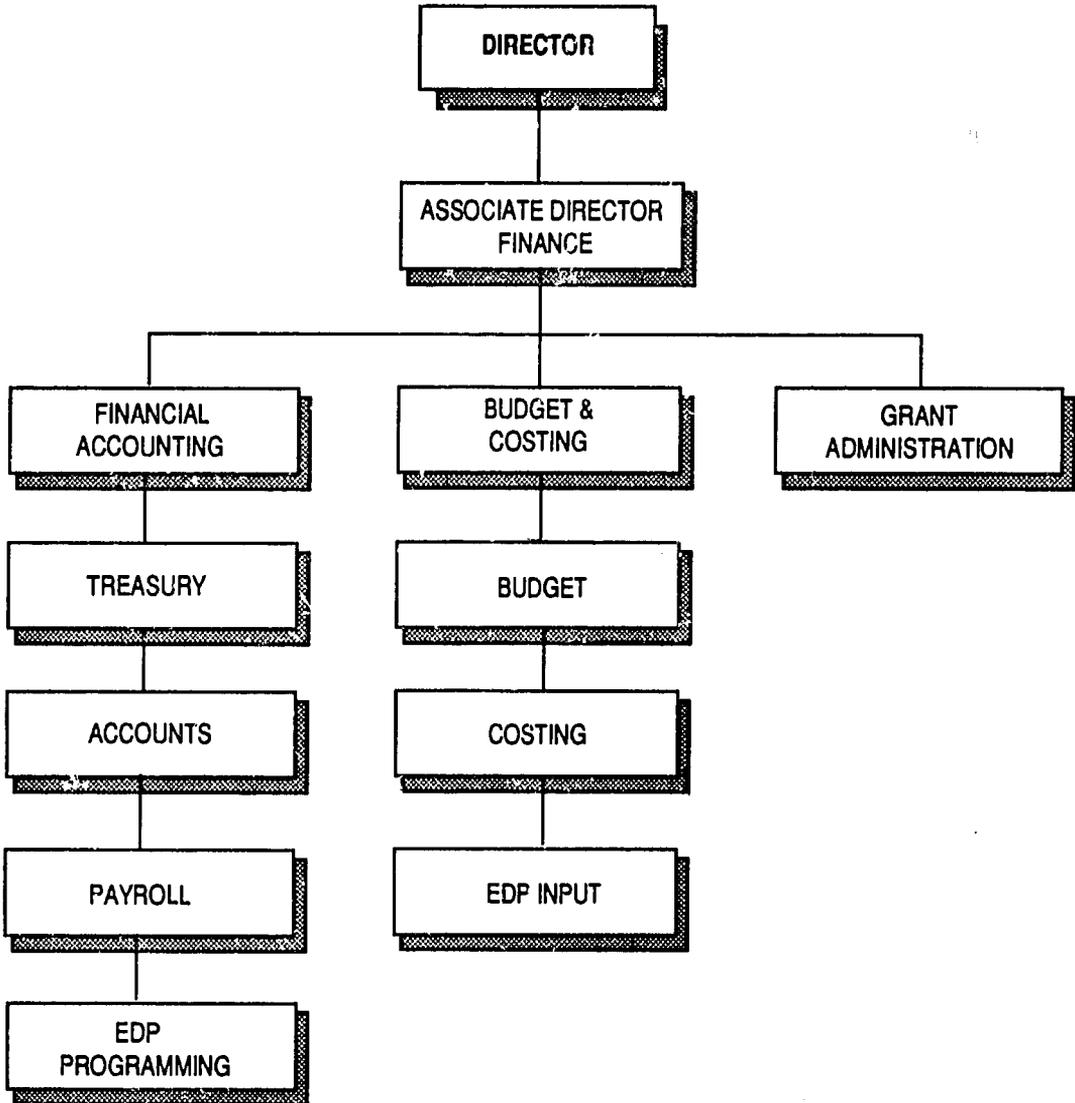


Asem Ahsan

The Director receiving the Government of Japan's contribution
from H.E. Toshio Saiki, Japanese Ambassador

88-A

ORGANOGRAM : FINANCE



FINANCE DIVISION

Associate Director: Kenneth J.J. Tipping

New in '92

The Finance Division, comprising Financial Accounting, Budget and Cost Accounting, and Grants Administration, has overall responsibility for the financial operations of the Centre, in particular to:

- ** assume custody of all funds and property, and to safeguard, manage and invest the funds and property in accordance with approved policies,
- ** assume responsibility for improvement, revision and development of financial systems and procedures,
- ** coordinate and supervise the preparation of the Centre's budget and to then ensure that financial transactions and commitments are within approved budgets and authorisation limits,
- ** perform accounting and control functions, financial planning, and reporting, and preparation and payment of payrolls, and to then ensure that adequate internal control and division of duties exist so that the accuracy and integrity of the transactions and records can be confidently relied on,
- ** ensure that procedures and controls comply with statutory and donor regulations
- ** record financial transactions and commitments in such a manner that accurate and timely financial reports (monthly, Board of Trustees, annual and donor) can be prepared, and
- ** have full responsibility for all functions related to financial management of the Centre.

ICDDR,B had a significant change in both revenues and expenditure in 1992.

- ** Contributions from donors after deducting contributions for fixed asset expenditure of US\$235,031 (1991 US\$ 629,768) decreased by 4.4% from US\$9,719,152 to US\$9,291,979.

- * Core contributions rose, but project funds decreased.

- * Rockefeller Foundation recommenced funding; Ford Foundation funding increased.

- * GoB converted over one million dollars of loan to a grant.

- ** Net expenditure after deducting miscellaneous receipts of US\$607,783 (1991 US\$662,180), but excluding depreciation, increased by 6.6% from US\$8,703,158 to US\$9,273,912.

- ** The operating cash surplus decreased by 98.2% from US\$1,015,994 to US\$18,067 which after charging depreciation of US\$703,979 (1991 US\$568,772) resulted in a net deficit for the year of US\$685,912 compared to a net surplus of US\$447,222 for 1991.

- ** Net current assets increased by US\$627,883 due to the conversion of the Government of Bangladesh (GoB) loan to a grant (US\$1,186,080), reduction in net Donor advance contributions (US\$379,881), and interest income on non-operating fund bank deposits (US\$360,374), offset by an increase in net other current liabilities (US\$92,028) and a decrease in operating bank balances (US\$1,206,424).

The decrease in operating donor revenue of US\$821,910 resulted mainly from a one time contribution received in 1991 for prior years overhead rate adjustment and contributions to disaster relief activities. Even with the continuing hiring austerity and strict control over expenditure, the Centre was unable to fund this year's depreciation of US\$703,979 by US\$685,912 with unfounded depreciation now standing at US\$5,423,961 (1991 US\$4,859,560). Strong financial management, despite reducing operating cash balances, obviated the need to access the Centre's bank overdraft facilities.

EXTERNAL RELATIONS

Consultant to the Director: Graham Wright

The Centre's donors have continued their support broadly along the same lines as in 1991, which is at the same level as the donation in 1988 despite inflation in the intervening period. That the Centre was able to increase productivity despite these funding limitations is indicative of the strict austerity and economy measures undertaken by management. As was made clear in the 1992 (and 1991) Donors' Support Group meetings, ICDDR,B needs additional support if it is to continue to realise its huge potential.

Core/Central contributions rose by US\$828,048 (25.7%), reflecting special contributions received during the year. **The Netherlands, UNDP, and UNFPA**, recognising its irreplaceable and unique nature, funded the Demographic Surveillance System (DSS). **The Arab Gulf Fund** contributed US\$350,000 for preventative health services to infants and children, and to develop the research capability of national institutions.

Project contributions decreased by US\$1,649,958 (23.1%), particularly as a result of the end of the **World University Service, Canada** agreement to fund key components of the Matlab MCH-FP and hospital programmes, and the extensive disaster response activities undertaken by the Centre after the 1991 cyclone. With the commencement of the **BRAC/ICDDR,B** Intervention and Maternity Care studies and the Bangladesh Consortium on Reproductive Health, the **Ford Foundation's** contributions to the Centre have risen dramatically. **Switzerland (SDC)** increased project funding and assisted with the installation of a generator and transformer to protect the Centre's power supply and, thus, its biological and computer records. After several years, the **Tockefeller Foundation** has recommenced funding studies conducted at the Centre.

A **Capital** contribution of US\$300,000 was made by the **Sasakawa Foundation** to finance the second phase of the Sasakawa International Training Centre to house additional training and research laboratories above the hospital. The **Government of Bangladesh** converted US\$1,135,080 of its US\$1,186,080 loan to a grant with the balance being given as its advance contribution for the years 1993 and 1994.

In a busy year for this Office, a tour was undertaken to look into further broadening the Centre's resource development base in the private sector and into endowment funding. This tour included visits to the UK, the USA, Canada, Australia, and Japan. The information gathered and contacts made have led to:

- ** a clear understanding of the complexity of running large-scale fund-raising campaigns and generating funds from the private sector,
- ** an increased impetus in resource development activity,
- ** the development of a revised draft of the ICDDR,B Resource Development Strategy, and
- ** the signing of a new collaborative agreement with the International Child Health Foundation.

In addition, preliminary research was conducted on United States and United Kingdom foundations to identify those with a history of funding international health research, population activities and training. The office now maintains "Donor History Files" on all past and present as well as prospective donors, and has started a small resource development library containing listings, manuals, and other related materials.

Two important new publicity documents were produced: "Partnership in Progress - ICDDR,B's Collaboration with and Contribution to Bangladesh", illustrating the special relationship between the Centre and the host country, and a small introductory brochure describing the Centre and its activities.

ICDDR,B thanks all its current Donors for their continued support and the optimism offered at the Donors' Support Group meeting where, in his opening address, the Honourable Minister for Health and Family Welfare, Mr Chowdhury Kamal Ibne Yusuf, remarked:

"ICDDR,B has made great progress over the last four years, and the Centre continues to play an invaluable role in international health research. This progress, the importance of the research underway in the Centre, and the increased level of activity at the Centre require generous support."

Mr. Enam Ahmed Chaudhury, Secretary of the Economic Relations Division, added, "Perhaps there could be no nobler cause." Also at the Support Group meeting, the UNICEF representative, Mr Rolf Carriere, reminded the group that there were just 2,500 days remaining before the turn of the century, the deadline for the global goal of reducing malnutrition by half and child mortality by one third. He stressed that this goal cannot be reached without controlling diarrhoeal disease and that ICDDR,B's work "should not become the victim of any cutbacks, for it continues to play an essential role in achieving the global goal for the 1990s." Contributions received over the past six years are shown opposite.

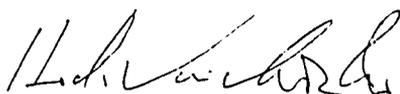
Contributions to ICDDR,B during the last 6 years on the basis of cash received in US\$.

| | 1992 | 1991 | 1990 | 1989 | 1988 | 1987 |
|------------------------------|------------------|------------------|-------------------|-------------------|------------------|------------------|
| Revenue Contributions | | | | | | |
| Aga Khan Foundation | - 10,000 | | | - 69,582 | 155,983 | 45,585 |
| Arab Gulf Fund | 350,000 | | | 235,440 | | 250,000 |
| Australia - AIDAB | 223,970 | 214,803 | 200,277 | 238,033 | 216,893 | 126,325 |
| Bangladesh | 19,720 | 26,458 | 21,042 | 37,288 | 38,071 | |
| Bayer AG | 69,847 | 30,000 | | 122,000 | | |
| Belgium - BADC | | 286,139 | 606,027 | 159,955 | 193,850 | 243,045 |
| BOSTID | | | | 19,337 | 23,221 | 28,425 |
| Canada - CIDA/WUSC | 916,404 | 1,738,338 | 1,143,037 | 1,843,323 | 1,171,022 | 953,979 |
| Case Western University | | | | | | 12,160 |
| Denmark - DANIDA | 220,120 | 83,773 | 131,830 | 662,957 | 511,989 | 509,589 |
| Ford Foundation | 402,500 | 59,475 | 79,574 | 39,226 | 319,498 | |
| France | | 17,752 | 15,698 | 11,445 | | 55,568 |
| Georgetown University | 11,897 | | | | | |
| IBM | | | | | | 30,916 |
| IBRD | | | | 25,110 | 184,000 | 174,753 |
| ICHF | 5,000 | 5,000 | 10,000 | | 9,324 | 4,107 |
| IDRC | 62,719 | 66,357 | 38,332 | 68,082 | | 53,884 |
| Japan | 760,000 | | 380,000 | 380,000 | 310,000 | 295,176 |
| Miles Pharmaceuticals | | | | | | 107,822 |
| Netherlands | 245,405 | 162,005 | 875,748 | 37,817 | 50,000 | 7,335 |
| Norway - NORAD | 126,931 | 110,158 | 199,744 | 395,913 | 308,291 | 459,364 |
| Norwich Eaton | | | | | | 12,086 |
| Rockefeller Foundation | 53,778 | | | | | - 3,078 |
| Saudia Arabia | 58,636 | 57,275 | | 406,333 | 70,000 | 13,438 |
| Searle France | 15,000 | | | 15,000 | 15,000 | 1,000 |
| SKF | | 40,141 | 30,189 | | | 530,708 |
| Sweden - SAREC | | 747,396 | 179,802 | | | |
| Switzerland - SDC | 1,536,800 | 1,163,443 | 1,616,338 | 1,155,908 | 792,931 | 138,920 |
| UNDP | 147,433 | | | | | |
| UNDP/WHO | | 455,218 | 300,000 | 312,138 | | 300,000 |
| UNFPA | 106,000 | | | | | |
| UNICEF | 277,906 | 336,811 | 287,401 | 256,000 | 307,580 | 443,665 |
| United Kingdom - ODA | 323,748 | 280,218 | 526,179 | 253,410 | | 230,302 |
| United States - AID | 3,062,828 | 2,929,969 | 3,420,006 | 4,953,206 | 4,061,737 | 3,439,544 |
| Wellcome Trust | | | | 17,228 | 28,658 | 29,019 |
| WHO | 82,641 | 40,100 | 271,290 | 175,814 | 201,563 | 195,040 |
| Disaster Relief Funds | 22,082 | 278,314 | | 354,474 | 464,494 | |
| Others | 5,164 | 20,440 | 5,324 | 18,118 | 4,352 | 6,793 |
| | 9,096,529 | 9,149,583 | 10,340,838 | 12,123,973 | 9,458,487 | 8,695,470 |
| Capital Contributions | | | | | | |
| Sasakawa Foundation | 300,000 | 300,000 | | | | |
| UNCDF | | 50,568 | 28,788 | 272,159 | 526,420 | |
| | 300,000 | 350,568 | 28,788 | 272,159 | 526,420 | - |
| TOTAL US\$ | 9,396,529 | 9,500,151 | 10,369,626 | 12,396,132 | 9,984,907 | 8,695,470 |

**AUDITORS' REPORT
TO THE BOARD OF TRUSTEES OF
INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH**

We have reviewed the following abridged financial statements comprising the Balance Sheet, Statement of Income and Expenditure and Source and Application of Funds which contain information extracted from the accounting records of the International Centre for Diarrhoeal Disease Research, Bangladesh for the year ended December 31, 1992.

We confirm that the information set out in the following abridged financial statements is consistent with that contained in the audited financial statements for the year ended December 31, 1992 on which we have expressed an unqualified opinion.



HODA VASI CHOWDHURY & CO.
Chartered Accountants



DELOITTE HASKINS & SELLS
Chartered Accountants

Dhaka, March 18, 1993

Balance Sheet (US\$ 000) - Abridged

| | <u>1992</u> | <u>1991</u> |
|--|---------------|---------------|
| Assets | 10,521 | 10,509 |
| Cash and short-term deposits | 4,284 | 5,130 |
| Accounts receivable | 1,702 | 1,433 |
| Inventories | 393 | 351 |
| Property, plant and equipment | 4,142 | 3,595 |
| Total liabilities and fund balances | 10,521 | 10,509 |
| Liabilities | 2,844 | 4,006 |
| Interest-free loan | - | 1,186 |
| Accounts payable and other | 2,844 | 2,820 |
| Fund balances | 7,677 | 6,503 |
| - Fixed assets | 10,604 | 9,512 |
| - Fixed asset acquisition and replacement | 738 | 758 |
| - Reserve | 2,209 | 2,110 |
| - Hospital endowment | 55 | 16 |
| - Operating | (5,929) | (1,893) |

Statement of Income and Expenditure (US\$ 000) - Abridged

| | <u>1992</u> | <u>1991</u> |
|------------------------------------|---------------|---------------|
| Income | 9,900 | 10,381 |
| Donors' contributions | 9,527 | 10,349 |
| Other items - net | 373 | 32 |
| Expenditure | 10,586 | 9,934 |
| Personnel | 6,760 | 6,045 |
| Depreciation | 704 | 569 |
| Other items | 3,122 | 3,320 |
| Operating (deficit)/surplus | (686) | 447 |

Source and Application of Funds (US\$ 000) - Abridged

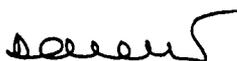
| | <u>1992</u> | <u>1991</u> |
|--|--------------|--------------|
| Sources | 1,886 | 2,143 |
| Operating surplus after adjusting for non cash items | 12 | 1,013 |
| Increase in fund balances | 725 | 1,127 |
| Conversion of loan to grant | 1,135 | - |
| Other items | 14 | 3 |
| Applications | 1,886 | 2,143 |
| Additions to fixed assets | 1,258 | 660 |
| Increase in net current assets | 628 | 1,483 |



Auditors, Finance Director, and the Director gather in the Director's Conference Room to sign the annual accounts

Donors' Contributions (US\$ 000)

| | <u>1992</u> | <u>1991</u> |
|------------------------------|--------------|---------------|
| Revenue Contributions | 9,527 | 10,349 |
| Arat. Gulf Fund | 350 | - |
| Australia - AIDAB | 234 | 232 |
| Bangladesh | 26 | 26 |
| Bayer AG | 19 | 23 |
| Belgium - BADC | 324 | 410 |
| Canada - CIDA/WUSC | 857 | 1,688 |
| Denmark - DANIDA | 239 | 206 |
| France | 17 | 29 |
| Ford Foundation | 149 | 52 |
| Georgetown University | 12 | - |
| IDRC | 64 | 70 |
| Japan | 455 | 435 |
| Netherlands | 149 | 336 |
| Norway - NORAD | 97 | 311 |
| Rockefeller Foundation | 15 | - |
| Saudi Arabia | 59 | 57 |
| SKF | 5 | 35 |
| Sweden - SAREC | 386 | 340 |
| Switzerland - SDC | 1,340 | 1,785 |
| United Kingdom - ODA | 292 | 278 |
| UNDP | 150 | 19 |
| UNDP/WHO | 308 | 337 |
| UNFPA | 91 | - |
| UNICEF | 324 | 326 |
| USAID | 3,423 | 3,005 |
| WHO | 64 | 88 |
| Disaster relief | 46 | 230 |
| Others | 32 | 31 |
| Capital Contributions | 1,435 | 331 |
| Government of Bangladesh | 1,135 | - |
| Sasakawa Foundation | 300 | 300 |
| UNCDF | - | 31 |



Director
ICDDR,B



Member
Board of Trustees

EXTRA – CURRICULAR EVENTS

A PICTORIAL

Souvenir



HOSPITAL ENDOWMENT HOSPITAL ENDOWMENT

Fund-Raising

DINNER

December 3, 1992

Hotel Sonargaon Grand Ball Room
Dhaka, Bangladesh

The Centre's very successful fund-raising dinner offered each guest a souvenir programme with photos, excerpts from messages, advertisements, and information about the endowment fund.

FUND-RAISING TOUR



1989 - 1992



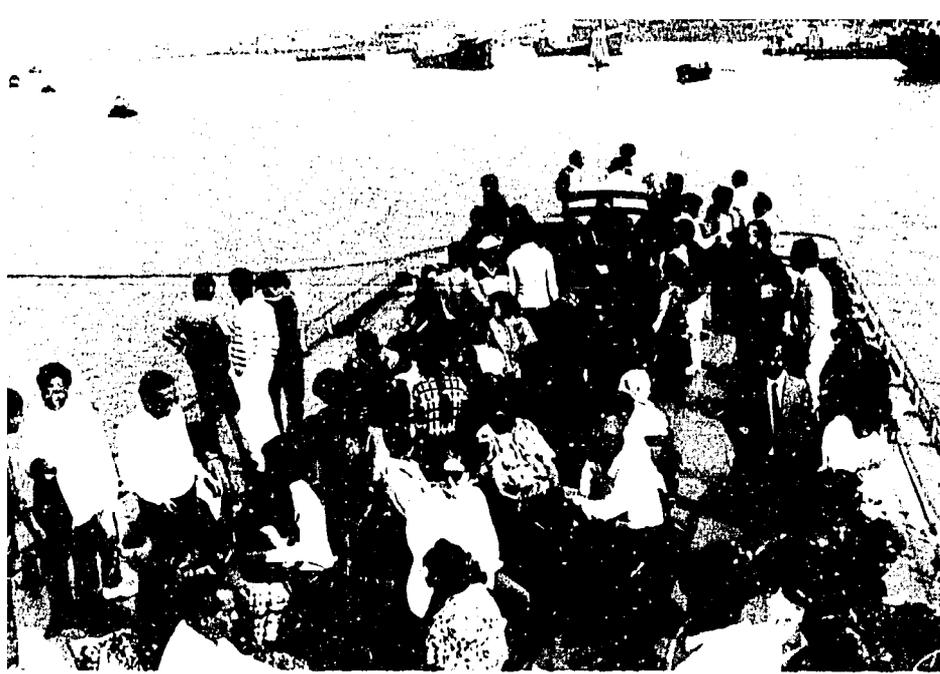
Asem Ansari
18th. Aug. 1992

ICDDR,B TALENT SHOW



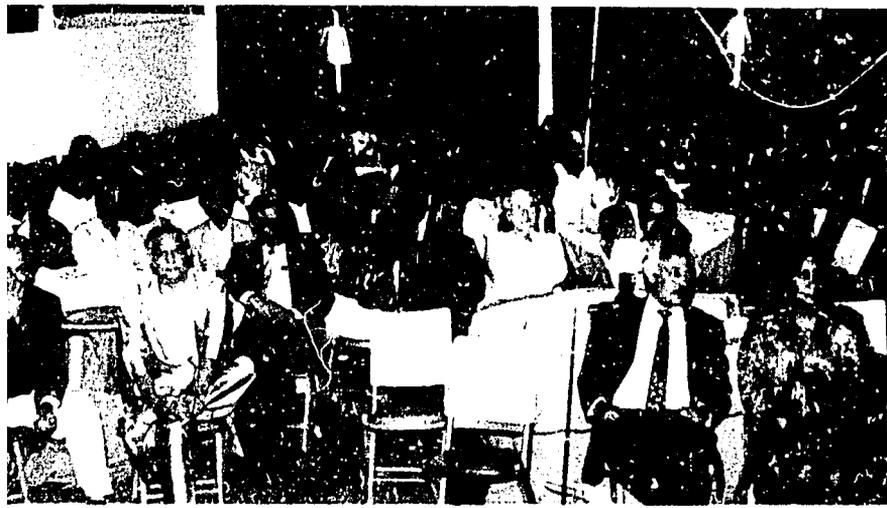
CARTOONS-1992 Asem Ansari

Asem Ansari
19th. Aug. 1992



About 300 staff members and their families had a relaxing day on the river in February. Breakfast, lunch, and tea were served and the children provided entertainment.

R Sack



Fakrul

Three views of the First Annual Banquet and Talent Show where staff members and their families exposed their many talents. It was held at the Guest House in February.

- Above right : the audience at their tables
- Lower : a scene from the skit *Miracle Cure*
- Upper right : dancer - Kanta Jamil, CHD





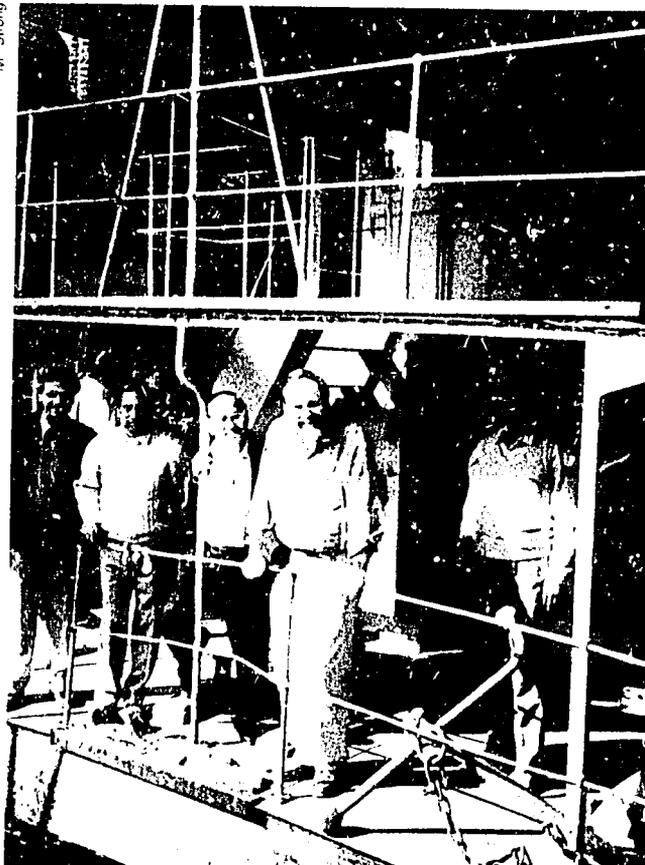
The 1992 inaugural meeting of SWA was held in the IPH Auditorium.

Staff Welfare Association
 President: Mr. Mujibur Rahman

The Staff Welfare Association (SWA) is a recognised body of the Centre. The Director of the Centre is the Patron-in-Chief of this Association. The welfare of staff is the main objective of the organisation. The SWA organises cultural programmes, sporting events, and an annual picnic.

In 1992 the cultural, sports, and annual picnic could not be held due to unavoidable circumstances, but there was get-together of staff at which dinner was served.

M. Strong



Right to left: S.A. Sarker, Richard Cash, and Md. Yunus share memories aboard the barge. This structure which actually floated on the river in Matlab was the laboratory and quarters for the ICDDR,B's first field trials in 1963. It continued to be headquarters for rural research for several years, and there are now plans to make it into a museum.

APPENDIX

Hospital Endowment Fund Contributors 1991 – 1992

FOUNDATIONS, TRUSTS,
CORPORATIONS:

Dr. Sultan Ahmed Chowdhury
Foundation
Scoble and Claire MacKinnon
Trust
United Insurance Co. Ltd.
Reliance Insurance Co. Ltd.
Bangladesh General Insurance
Company
Ganges Travel Service
ICDDR,B Employees Cooperative
Society, Ltd.
World Construction Union
International Child Health
Foundation

INDIVIDUALS:

Abdullah, Mr. Omar R.
Ahmed, Mrs.
Ahmed, Mr. irtekhar U.
Ahmed, Dr. Zia Uddin
Akter, Ms. Helena
Alam, Dr. A.N.
Alam, Mr. Shah
Ali, Mr. Akbar
Azim, Dr. Taznim
Bacer, Mr. David
Bain, Mr. Sarajit K.
Bairagi, Dr. R.
Banu, Ms. Nasim
Begum, Ms. Dilara
Begum, Ms. Khaleda
Bennish, Dr. Michael
Bhuiyan, Mr. F.K.
Brown, Dr. Kenneth*
Butler, Dr. Thomas*
Caldwell, Prof. J.C.
Cash, Dr. Richard A.
Chakraborty, Mr. H.D.
Chowdhury, Justice S.A.
Chowdhury, Mr. Tajek A.
Chowdhury, Ms. Tania
Chowdhury, Ms. Judith
Chunming, Prof. C.

Cornaz, Dr. I.
Das, Mr. Rabindra
Ellickson, Dr. Jean
Eeckels, Prof. R.
Fujita, Dr. Takashi
Gall, Dr. Grant
Ghose, Ms. Shadhana R.
Gore, Dr. Sheila
Haaga, Dr. John
Habte, Prof. D.
Hamburger, Ms. Maravene*
Hamilton, Dr. J.R.
Handelmann, Dr. G.
Haque, Mr. Monzurul
Hasnat, Mr. Abul
Hausdorff, Mr. William
Henderson, Dr. R.H.
Hirschhorn, Dr. Norbert
Hossain, Mr. K.S.
Islam, Mr. M. Shafiqul
Jagdeo, Ms. Churamonie
Kabir, Mrs. Obaida
Kabir, Mr. Ahsan
Khan, Mr. A. Rashid
Khan, Dr. Mobarak H.
Khanam, Ms. Sajal A.
Khatun, Ms. Khodeza
Khatun, Ms. Abeda
Kay, Dr. Bradford
Law, Dr. Maureen
Lindberg, Prof. A.A.
Mahalanabis, Dr. Dilip
Mazhar, Mr. Ahmed H.
Meeuwisse, Dr. Gunnar
Mhalu, Prof. F.
Miah, Mr. A. Sattar
Mollah, Mr. Sirajul I.
Mondol, Mr. Gabriel
Monsur, Mr. Hafiz
Mostafa, Mr. Golam
Muller, Prof. A.S.
Paljor, Mr. N.
Poddar, Dr. Goutam
Qadri, Dr. F.
Rafique, Mr. K.M.
Rahman, Dr. Fazlur
Rahman, Mr. Nokibur

Rezwani, Ms. Nilufar
Robin, Mr. Wynn
Rohde, Dr. John E.
Ross, Dr. James L.
Rothermel, Dr. Timothy
Sachar, Dr. David B.
Sack, Dr. and Mrs. R.B.*
Saha, Mr. B.R.
Samad, Mr. A.
Spencer, Mr. Edson W.
Stenat, Dr. and Mrs. Q.C.
Sultana, Mrs. Nahid
Tipping, Mr. K.J.J
Tsunashima, Mr. Mamoru
Tulloch, Dr. Jim
Unicomb, Ms. Leanne
van Loon, Dr. Fred
Wahed, Mr. M.A.
Wal, Dr. Lokky
Wright, Mr. Graham A.

MISCELLANEOUS:

Travellers Clinic profits
Sale of fish from Matlab Pond
Anonymous
Sale of Raffle tickets
Dhaka Chorus
Fund – raising Dinner

CONTRIBUTORS OF PRIZES
FOR FUND – RAISING DINNER:

Siddique, Dr. A.K.M.
Ganges Travel Service
Air India
Singapore Airlines
Travel Centre
Sonargaon Hotel
Dolce Vita Restaurant
Panda Garden Restaurant
Lemon Grass Restaurant
Lever Brothers, Bangladesh
Fisons, Bangladesh
Pacific World Travel
Video Connection
Thai Airways International, Ltd.

*Gifts made through the International Child Health Foundation. The Board of Trustees of the International Child Health Foundation (ICHF) voted in 1991 to accept contributions on behalf of ICDDR,B from residents of the USA, thereby providing the donor a tax credit. The ICHF is an action agency whose mission is to support the development of practical, low-cost methods to prevent and treat the most common afflictions of children in underserved areas of the USA and in developing countries in all parts of the world.

INDEX

Items and names in Publications, Committees, Visitors, Awards, Obituary, and Retirement are not included in the index.

- Aaby, P. 4
 Accidents 34
 Acute respiratory infection 16, 18, 22, 23, 24, 28, 34, 85
 Adenovirus 39, 49
 Administration and Personnel Division 63
Aeromonas 51
 Aga Khan Community Health Programme 70
 Ahmad, Q.S. 53
 Ahmed, H.S. 70, 71
 Ahmed, Tahmid 51
 Ahmed Wahabuzzaman 63, 82
 Ahmed, Zia U. 4, 42, 43, 72
 AIDAB 91, 94
 Akbar, J. 58, 82
 Akbar, M.S. 45
 Akbar, R.L. 5, 82, 85
 Akramuzzaman, S.M. 16, 81
 Alabi, Sunday A. 64
 Alam, A.N. 5, 6, 16, 63, 85
 Alam, J. 37
 Alam, K. 45
 Albert, M. John 10, 39, 41, 44, 45, 46
 Algorithm 11
 Ali, M.M. 72
 Ali, Md. 82
 Ali, Md. A. 54
 Al-Mahmud, K.A. 50
 Amin, Selina 28, 71
 Ampicillin 20, 45
 Amylase-enriched germinated cereal flour 4, 13, 14
 Animal Ethics Experimentation Committee 88
 Animal Resources Branch 50
 Annual Scientific Conference 2
 Ansari, Asem 70, 71, 73
 Antenatal care 24
 Anwar, U.S. 4
 Ara, Fakir A. 71, 81
 Ara, Shamim 34
 Arab Gulf Fund 90, 91
Ascaris lumbricoides 19
 Ashraf, Hasan 11, 16
 Audio-visual Unit 73
 Auditors' report 92
 Australia 91
 Autopsies 53
 Awards 66
 Azad, A.K. 4
 Azim, Tasnim 4, 46, 47
 Aziz, K.M.A. 4, 19, 72
 Bacterial Genetics Laboratory 42
Bacteroides fragilis 35, 36, 38, 42, 44, 45
 BADC 25, 31, 91
 Bairagi, R. 56, 57, 58
 Balk, D. 4
 Banaripara 38
 Bangladesh, Govt. of 2, 9, 17, 28, 29, 34, 59, 60, 89, 90, 91
 Bangladesh Medical Research Council 87
 Banquet and Talent Show 96
 Banu, Khaleda 39
 Banu, N.N. 39
 Baqui, Abdullah Hel 4, 23, 27, 28, 33, 34, 72
 Bardhan, P.K. 4, 10, 11, 72
 Barge 97
 Bateman, Masee 4, 10, 11, 72
 β -carotene 21
 Bayer 91
 Becker, S. 4
 Begum, Husna A. 27
 Begum, Saleha 72, 82
 Behaviour 18, 19
 Belgium 91, 94
 Bern, Caryn 49
 Bhuiya, A. 4, 19, 56, 57, 70, 72
 BIDS 55
 Biochemistry and Nutrition Laboratory 43
 Bioengineering Cell 54
 Biosafety 85, 41, 54, 84
 Biostatistics 83
 BIRDEM 13, 70
 BIRPEHT 55
 Birth spacing 8, 27, 58, 85
 Board of Trustees 2, 86, 89
 BRAC 4, 55, 90
 BRAC/ICDDR,B project 1, 56, 58
 Breastfeeding 4, 28
 Brown, Ken 85
 Cambell, C. 59
Campylobacter 9, 39
 Canada 34, 38, 91
 Cartoons 95
 CDC 49
 CD-ROM 69
 Chakraborty, J.M. 21, 23, 24, 25, 34, 36

- Child Health Programme 6, 7
 Child mortality 1, 4, 28, 56, 57, 61
 Child survival 22, 57
 Cholera 4, 10, 18, 42, 85
 Cholera vaccine 85
 Chowdhury, A.K. 13
 Chowdhury, Hafiz 82
 Chowdhury, H.R. 23, 2
 Chowdhury, M.K. 4
 Chowdhury, M.R. 70
 CIDA 25, 91
 Clinical Laboratory 50, 51
 Clinical Research and Service Centre 1, 5, 6, 41, 50, 71, 85
 Clinical Sciences Division 4, 5
Coccidia 50
 Coconut - oil - based diet 11
 Committees 86
 Community Health Division 3, 17
 Community Health Worker 22, 24, 25, 26
 Community Operated Treatment Centres 19
 Computer Information Services 55, 62
 Consortium on Reproductive Health 55
 Consultants 64
 Consultative Management Committee 88
 Contraception 4, 22, 27, 58, 59, 61
 Co - trimoxazole 24
 Council of Associate Directors 88
 Current Awareness Service Bulletin 70
 Current Contents 70
 Cytokines 10
- DANIDA 7
 Data Archiving 55, 62
 Databases 70
 DaVanzo, J. 58
 Day - care centres 25
 de Francisco, Andres 4, 21, 23, 24, 25, 26, 82
 Dearden, Kirk 31
 Demographic Surveillance System 1, 19, 34, 55, 57, 58, 71
 Denmark 91, 94
 Deuterated retinol technique 43
 Dhaka Shishu Hospital 16, 39, 45, 52
 Dhaka Medical College 43, 53
 Dhaka University 13, 47, 72, 84
 Diabetes 13
 Diarrhoeal Diseases Information Services Centre 69
 DNA probes 48
 Dolan, Pauline 63
 Donor history files 90
 Donors 2
 Drug resistance 45
 Dysentery 10, 14, 58
- Elahi, B. 39
- El Arifeen, S. 27, 33
 Electrocardiogram 7
 ELISA 1, 46, 49, 52
 Engineering Branch 68
Entamoeba histolytica 1, 4, 19, 47, 48, 49
 Enteric Bacteriology Laboratory 44
 Environmental Microbiology Laboratory 46
 Environmental health 34, 37
 EPI 1, 23, 33
 Epidemic Control Preparedness Programme 2, 38, 39
 Epidemics 5, 17
 Epidemiology 1, 18, 38, 83
 Erny, Samuel 23
Escherichia coli 11, 39, 44
 Estate Office 68
 Ethical Review Committee 87
 External Relations 90
 Extra - curriculum events 95
- Faisal, N.I. 31
 Family planning 1, 4, 8, 21, 22, 27, 29, 30, 59
 Faruque, A.S.G. 4, 12, 13, 15, 16
 Faruque, Shah M. 44, 48
 Fast Bulletin 70
 Fellowship programmes 83, 84
 Felsenstein, Albert 35
 Fertility 4, 58, 61, 62
 Finance Division 89
 Floods 37
 Foetal loss 58
 Folic acid 16, 60
 Ford Foundation 24, 31, 90, 91
 Foster, A. 4
 France 91
 Fronczak, Nancy 28, 63
- GARNET 34
 Georgetown University 91
 Gender preference 4, 58
 General Administration Branch 67
 General Services 67
 Generator 54
 Gene transfer 4
 Genetic analysis 44
Giardia lamblia 19, 50, 51
 Glimpse 70, 71
 Glutamine 13
 Grameen Bank 58
- Haaga, John G. 59
 Habte, Demissie 2, 15, 70, 71, 73
Hafnia alvei 51
 Haider, Khaleda 4, 44, 48, 82
 Haider, R. 13, 82
 Hall, Andrew 35, 48
 Hamidullah, Md. 67

- Handwashing 1, 4, 18, 34, 36
 Haque, Rashidul 4, 48
 Hasan, Jafrul 85
 Hasan, Y. 71
 Haskell, Marjorie 43, 64
 Health education 8, 29
 Helen Keller International 25
Helicobacter pylori 2
 Histopathology Laboratory 52
 Holman, Darryl 58
 Holy Family Hospital 39
 Hookworm 19
 Hoque, Bilqis Amin 4, 34, 35, 36, 39
 Hospital Endowment Fund 3, 95, 98
 Hossain, Akhtar 85
 Hossain, Farhad 72
 Hossain, Kh. S. 67
 Hossain, Md. Anowar 50, 52, 82
 Hossain, M.B. 4, 59
 Hossain, Shahadat 15
 Huque, M. Aminul 71
 Hyperimmune bovine colostrum 4
- IBRD 91
 IDRC 34, 91
 Immunisation 8, 23, 61
 Immunology Laboratory 46
 Infant mortality 4, 58, 61
 Institute of Postgraduate Medicine and Research 52
 Institute of Public Health 53, 69
 Intensive Care Unit 6
 Interdivisional Forums 4, 85
 International Child Health Foundation 38, 91
 International courses 84
 Iron 16, 60
 Islam, Asma 4
 Islam, Dilara 4, 48
 Islam L.N. 47
 Islam, M. 59
 Islam, M. Aminul 4, 7, 14, 31, 81
 Islam, M.N. 71
 Islam, M.R. 10
 Islam, Md. Sirajul 4, 46
 Islam, Moyenuh 41, 53
 Islam, Nazrul 52
 Islam, S. 13
 IV fluids 7, 41, 53
- Jahan, R.A. 28
 Jahangir, N.M. 27
 Jala, S.R. 82
 Jamil, Kanta 4, 27
 Japan 81, 91
 Jarecki Khan, Kerstin 49
 JDDR 53, 70, 72
 Johns Hopkins University 58
- Junker, T. 35, 60
- Kabir, I 82
 Karolinska Institute 45, 47, 48
 Kay, Bradford 4, 41, 85
 Khan, Arifuzzaman 71
 Khan, Eradul H. 25
 Khan, M.A. 82
 Khan, M.S.I. 69, 70, 71, 72
 Khan, S. Akhtar 82
 Khan, T.A. 68
 Khanam, A. 14
 Khatoon, M. 28
 Khatun, J. 28, 31
 Kjolhede, Chris 85
 Koenig, Michael 59, 60
- Laboratory Archive Unit 53
 Laboratory Manager's Office 54
 Laboratory Sciences Division 3, 41
 Laston, Sandra 4, 28, 38, 63
 Lebanthal, E. 4
 Lerman, Charles 4
 Leukaemia reaction 49
 Library 69
 Library Association of Bangladesh 72
 Logistic and Field Support 67
 London School of Hygiene 51
 Low birth weight 28
- Mahalanabis, D. 5, 9, 11, 12, 13, 14, 15, 16
 Mahbub, M.A. 63, 70
 Mahlu, Fred 85
 Maintenance Office 68
 Majumder, R.N. 9
 Malaria 4
 Malek, M.A. 53,
 Malnutrition 4, 8, 9, 13, 14, 15, 16, 25, 47, 49
 Maru, R. 59
 Maternal mortality 4, 24, 57, 58, 60
 Maternity care 22, 24
 Matlab Diarrhoea Treatment Centre 2, 19, 20, 25, 37, 41, 53, 67
 Matlab embankment 1, 4, 35, 36
 Matlab Field Laboratory 53
 Matlab Staff Clinic 19
 MCH - FP Extension Project 55, 59
 MCH - FP Project 1, 17, 21
 MCH - FP Clinic 25
 Measles 4, 28
 MEDLINE database 69
 Menken, J. 59
 Micronutrients 1, 16
 Midwives 24, 26
 Miller, J. 59
 Ministry of Health and Family Welfare 60
 Mirza, T. 4

- Mirzapur 35, 52
 Mita, R. 4, 60
 Mitra, Amal K. 4, 14, 16, 71, 82
 Molecular Biology Laboratory 48
 Monoclonal antibody 46, 47, 49
 Morshed, M. Golam 68
 Mostafa, A.H. 62
 MUAC 25, 28
 Muhuri, P. 59
 Myaux, Jacques 25, 31, 36
- Nahar, Lulfun 81
 Nalidixic acid 20, 26, 45
 Nandipara 5
 Narayananj 5
 Nasreen, S. 27
 Nath, S.K. 5, 85
 National courses 84
 National Institute of Preventive and Social
 Medicine 69, 71
 Nazrul, H. 27, 28
 Nessa, Fazilatun 81
 Netherlands 58, 90, 91
 Newsletter 71
 NGOs 17, 28, 29, 34, 69
 Non - cholera vibrios 6, 9, 19, 20
 NORAD 25, 91
 Norway 91
 Nurani, Sufia 27
 Nutrition 1, 9, 21, 28, 61, 85
 Nutrition Rehabilitation Unit 8, 23, 25, 31
- Obituaries 66
 ODA 91
 Oral 5 - aminosalicyclic acid 10
 ORS/ORT 4, 12, 13, 23, 28, 29, 33, 58, 71
- Paljor, Ngudup 25, 27, 63
 Paramedics 24, 26
 Parasitology Laboratory 48
 Pebley, A. 59
 Persistent diarrhoea 11, 12, 14, 15, 28, 48
 Personnel Office 63
 Pneumonia 16, 23
 Poliomyelitis 31
 Polymerase Chain Reaction 4, 44, 48
 POPLINE database 69
 Population Council 55, 57, 85
 Population Science and Extension Division 55
 Population Studies Centre 55, 56
 Postgraduate students 84
 Preston, S. 59
 Previous birth technique 57
 Programme Coordination Committee 86
 Publications 71, 74
- Qadri, Firdausi 46
- Rabbani, G.H. 4, 70
 Rabbits 50
 Rafique - ul - Islam 82
 Rahman, A.K.S. Mahmudur 82
 Rahman, A.S.M. Mizanur 13, 71
 Rahman, Fazlur 57, 59
 Rahman, M. Mujibur 4, 14, 15, 71
 Rahman, Matiur 69
 Rahman, Mizanur 4, 58, 81
 Rahman, Mujibur 67, 68
 Rahman, Mukhlesur 71
 Raquib, Rughana 4, 47
 RAND 58
 Rasul, Golam 82
 Razzak, Abdur 82
 Record - keeping System 1, 21, 23, 61
 Relative dose response 43
 Reproductive health 55
 Reproductive tract infection 1
 Research Review Committee 33, 33, 87
 Retirement 66
 Riley, Ann P. 85
 Risk factors 12, 24
 RITARD test 43, 50
 River cruise 96
 RNA fingerprinting 48
 Rockefeller Foundation 58, 90, 91
 Ronan, Anne 64
 Rotavirus 4, 9, 32, 39, 49, 52
 Roy, M. 82
 Roy, S.K. 4, 72
- Sack, David A. 85
 Sack, Josephine 70
 Sack, R. Bradley 17, 23, 34, 35, 36, 37, 41, 43,
 45
 Safe delivery kit 8, 23
 Saha, B.R. 81
 Salam, M.A. 5, 6, 10
Salmonella 6, 9, 19, 39, 51
 Salway, Sarah 27, 63
 Sample Surveillance System 61
 Santosham, M. 31
 Sarder, A.M. 26
 SAREC 42, 45, 47, 91
 Sarker, J.N. 82
 Sarker, S.A. 4, 82
 Sasakawa Foundation 2, 3, 68, 90, 91
 Sasakawa International Training Centre 2, 3, 68
 Saudi Arabia 91
 Scientific Review Committee 87
 SDC 12, 13, 14, 16, 39, 46, 81, 91
 Searle 91
 Seminars 85
 Shaheen, R. 23
 Shahid, Nigar S. 39
 Shahidullah, Md. 57, 82

- Shaikh, M.A.K 82
 Shasthya Sanglap 1, 3, 71, 73
Shigellae 4, 6, 9, 10, 15, 19, 20, 21, 25, 26, 34, 39, 42, 44, 45, 46, 47, 51, 53, 85
 Short - term courses 85
 Siddique, A.K.M. 4, 17, 23, 33, 38
 Simmons, R. 59, 60
 Sisterhood method 59
 Slote, Adam 64
 SmithKline Beecham 91
 Social Science 19
 Staff Clinic 50, 52, 67
 Staff Development 81
 Staff Welfare Association 88, 97
 Streetfield, K. 56
 Strong, Michael A. 4, 19, 55, 57, 58
 Supply Office 68
 Sullivan, Amy 64
 Surveillance Programme 5, 9
 Sweden 91, 94
 Switzerland 90

 Tauxe, R.V. 85
 Tetanus 28
 Tetracycline 7
 Tipping, Ken 89
 TMP - SMX 11, 20, 45
 Traditional birth attendants 24, 26, 30
 Training 1, 8, 26, 50, 52
 Training Coordination Bureau 83
 Travel Office 67
 Travellers Clinic 7, 50, 5
Trichuris trichiura 19
 Trussell, J. 59
 Tuberculosis 8
 Tubewells 35, 36

 UK 69, 91
 UNCDF 91
 UNDP 9, 53, 58, 90, 91
 UNFPA 58, 90, 91
 UNICEF 16, 17, 31, 38, 58, 69, 91
 Unicom, Leanne 4, 31, 49
 University of Alabama 43
 University of California 43
 University of Kyoto 44

 UNROB loan 2, 89, 90
 Urban Health Extension Project 17, 26, 27, 29
 Urban slums 1, 4, 18, 26, 30, 33
 Urban Surveillance System 1, 26, 29, 58
 Urban Volunteer Program 26
 Urban volunteers 4, 31
 USAID 9, 10, 11, 13, 15, 16, 21, 23, 26, 27, 28, 31, 33, 34, 36, 37, 42, 43, 44, 59, 60, 70, 84, 91
 Uzma, Amatul 31, 33, 82

 Vaccine 8, 18, 31, 42, 85
 Vanneste, Anne Marie 24
 Vaughan, B. 59
 Veterinary Clinic 50
Vibrio cholerae 6, 9, 19, 20, 43, 48, 51, 53
 Violent death 59
 Virology Laboratory 49
 Visitors 64
 Vitamin A 1, 15, 16, 21, 23, 28, 30, 33, 43, 85
 Volatile fatty acids 10
 Volunteer service delivery system 26, 28

 Wahed, M.A. 4, 13, 35, 43
 Wai, Lokky 64
 Water and sanitation 1, 17, 31, 34, 35, 36, 37, 38, 71
 Water purifying tablets 39
 Watery diarrhoea 1, 12, 14, 16, 28, 34, 49
 Weaning foods 1, 13, 14
 Wellcome Trust 91
 Whittaker, M. 59, 60
 WHO 9, 11, 13, 31, 43, 51, 53, 87, 91
 Winblad, Uno 85
 Wolfson Research Laboratory 51
 Women's roles/status 4, 31, 55, 58, 60
 Wright, Graham 63, 90
 WUSC/CIDA 25, 90

 X-ray 7

 Yoghurt 14
 Yunus, Md. 19, 23, 25, 26, 72

 Zeitlyn, Sushila 12, 24, 38
 Zinc 4, 15, 16, 35

AN APPEAL



ICDDR,B Endowment Fund

Each year, ICDDR,B treats over 70,000 patients attending its two hospitals, one in urban Dhaka, the other in rural Matlab. Though they are planted in Bangladeshi soil, they grow because of the dedication of thousands of concerned people throughout the world. The patients are mostly children with diarrhoea and associated illnesses and the services are offered free to the poorer section of the community.

Since these services are entirely dependent on financial support from a number of donors, now we at the ICDDR,B are establishing an entirely new endeavour: an ENDOWMENT FUND. We feel that, given securely implanted roots, the future of the hospitals can confidently depend upon the harvest of fruit from perpetually bearing vines.

To generate enough income to cover most of the patient costs of the hospitals, the fund will need about five million US dollars. That's a lot of money, but look at it this way:

JUST \$150 IN THE FUND WILL COVER THE COST OF TREATMENT FOR ONE CHILD EVERY YEAR FOREVER!

We hope you will come forward with your contribution so that we can keep this effort growing forever or until the world is free of life-threatening diarrhoea. IT IS NOT AN IMPOSSIBLE GOAL.

Dr. Dilip Mahalanabis
Chairman, Hospital Endowment Fund Committee
GPO Box 128, Dhaka, 1000, Bangladesh

Telephone: 600-171 through 600-178
Fax: (880-2)-893116

Azra Ansari

My contribution to the Hospital Endowment Fund is enclosed. Amount _____

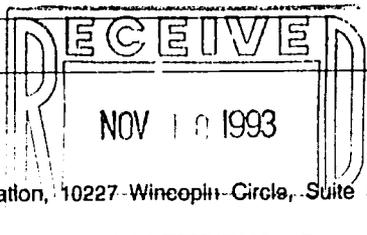
Name _____

Address _____

Make out cheque and mail with this page to:

In the USA: The International Child Health Foundation, 10227 Wineoplin Circle, Suite 325, Columbia, MD 21044.

Elsewhere: ICDDR,B Hospital Endowment Fund, GPO Box 128, Dhaka 1000, Bangladesh



Thank you.

Signature

donations are tax deductible

ward, a 10-bed metabolic ward, specific wards for persistent and invasive diarrhoea, a nutrition rehabilitation ward for children who have become severely malnourished from diarrhoeal diseases, and a laboratory to provide a wide range of biochemical and microbiological tests. In Matlab, the new two-storey hospital complex also provides facilities for medical and maternity care, training, and research.

Research laboratories

There are well equipped and well staffed laboratories for research in bacteriology, bacterial genetics, histopathology, immunology, molecular biology, environmental microbiology, nutritional biochemistry, parasitology, and virology. The Centre has a walk-in cold room and freezer, facilities for growing and isolating pathogens, a large animal house, and many items of test equipment including an atomic absorption spectrophotometer, a cobas-bio analyser, a gas-liquid chromatograph, a high performance liquid chromatograph, a centrifugal analyser, and a polymerase chain reaction machine.

Demographic surveillance

Information collected on vital events concerning 200,000 people in the Centre's Matlab field area over the last 27 years currently provides an unrivalled opportunity to study demographic trends, to investigate the epidemiology of ill-health, and to examine the effect of providing new health services on morbidity and mortality. These data allow a multidisciplinary approach, integrating insights from the social and behavioural sciences with those gained from biomedical research.

Computing facilities

The Centre operates an IBM 4361 mainframe computer with eight megabytes (MB) of real memory and an on-line storage capacity of 3,000 MB. It is connected to 25 terminals. This system provides a capacity to analyse large data sets and is complemented by over 100 personal computers scattered throughout the Centre.

Diarrhoeal Diseases Information Services Centre (DISC)

DISC provides access to the scientific literature on diarrhoeal diseases, nutrition, population studies, and health in general by means of MEDLINE and POPLINE databases on CD-ROMS, and Current Contents on diskettes, 23,970 books and bound journals, over 11,000 reprints and documents, and subscriptions to 360 current journals. DISC publishes the quarterly *Journal of Diarrhoeal Diseases Research*, annotated bibliographies on diarrhoeal diseases, a DISC Bulletin, a bimonthly newsletter (Glimpse), a quarterly Bengali newsletter (Shasthya Sanglap), scientific publications, and monographs.

Staff

The Centre currently has over 200 scientific researchers and medical staff from more than nine countries doing research and providing expertise in the many disciplines related to the Centre's areas of research. ■

The INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH (ICDDR,B) is an autonomous, non profit making organisation for research, education, training and clinical service. It was established in December 1978 as the successor to the Cholera Research Laboratory, which had been established in Bangladesh in 1960.

The mandate of the ICDDR,B is to undertake and promote research on diarrhoeal diseases and the related subjects of acute respiratory infections, nutrition and fertility, with the aim of preventing and controlling diarrhoeal diseases, and improving health care. The ICDDR,B has also been given the mandate to disseminate knowledge in these fields of research, to provide training to people of all nationalities, and to collaborate with other institutions in its fields of research.

The Centre, as it is known, has its headquarters in Dhaka, the capital of Bangladesh, and operates a field station in Matlab thana of Chandernagore District, which has a huge rural area under regular surveillance. A smaller rural and a large surveyed urban population provide targets for research activity, and four thanas within the government system are test sites for collaboration. The Centre is organised into four scientific divisions: Population Science and Extension, Clinical Sciences, Community Health, and Laboratory Sciences. At the head of each Division is an Associate Director, the Associate Directors are responsible to the Director who in turn answers to an international Board of Trustees consisting of eminent scientists and physicians and representatives of the Government of Bangladesh.

The Centre is funded by organisations and nations which share its concern for the health problems of developing countries. At present (May 1993), the major donors to the Centre include the aid agencies of the Governments of Australia, Bangladesh, Belgium, Canada, Denmark, France, Japan, the Netherlands, Norway, Saudi Arabia, Sweden, Switzerland, the United Kingdom and the United States; international organisations including the United Nations Development Programme, United Nations Population Fund (UNFPA), the United Nations Children's Fund and the World Health Organization, and private foundations including the Ford Foundation and the Sasakawa Foundation.

RESEARCH FACILITIES AT THE ICDDR,B

Bangladesh has many major health problems in common with other developing countries, such as diarrhoeal diseases and malnutrition. It has widespread poverty and illiteracy, an increasing population, and a health system poorly equipped to respond to these challenges. The Centre is therefore in an exceptional position to conduct research in a natural setting on the problems of diarrhoea, nutrition, fertility, and public health.

Clinical facilities

A large number of patients with diarrhoeal diseases attend the Centre's two hospitals each year, one in urban Dhaka, the other in rural Matlab. The Clinical Research and Service Centre in Dhaka has a 25 bed research