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Annual Report
1980

**INTERNATIONAL CENTRE FOR DIARRHOEAL
DISEASE RESEARCH, BANGLADESH**

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Annual Report 1980



INTERNATIONAL CENTRE FOR
DIARRHOEAL DISEASE RESEARCH
BANGLADESH

A *bari* mother preparing *labon-gur* oral rehydration solution.

International Centre for Diarrhoeal Disease Research, Bangladesh
G.P.O. Box 128, Dacca 2, Bangladesh
May 1981

Design: Asem Ansari

Photography: Asem Ansari

Pierre Claquin (p. 34)

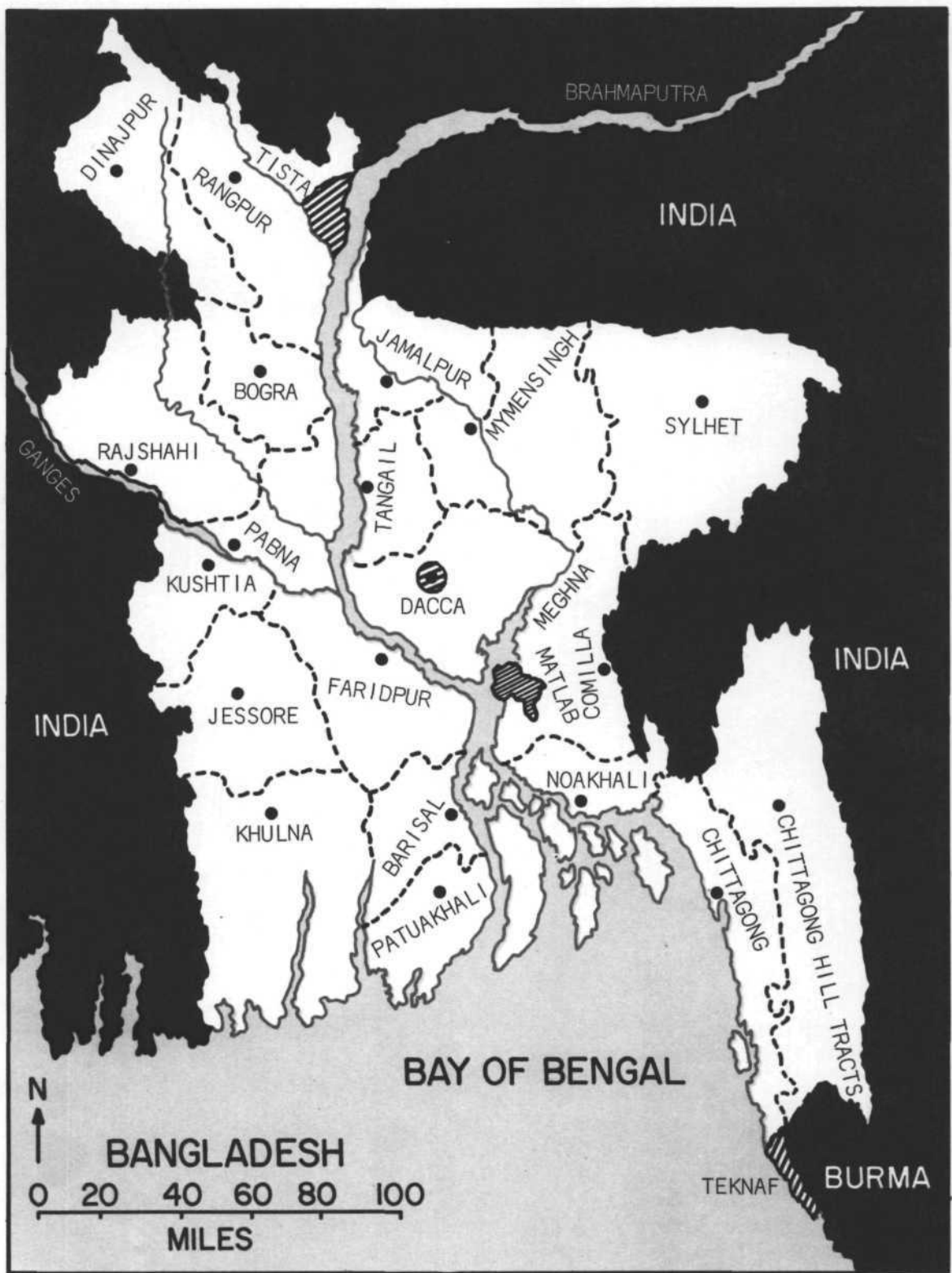
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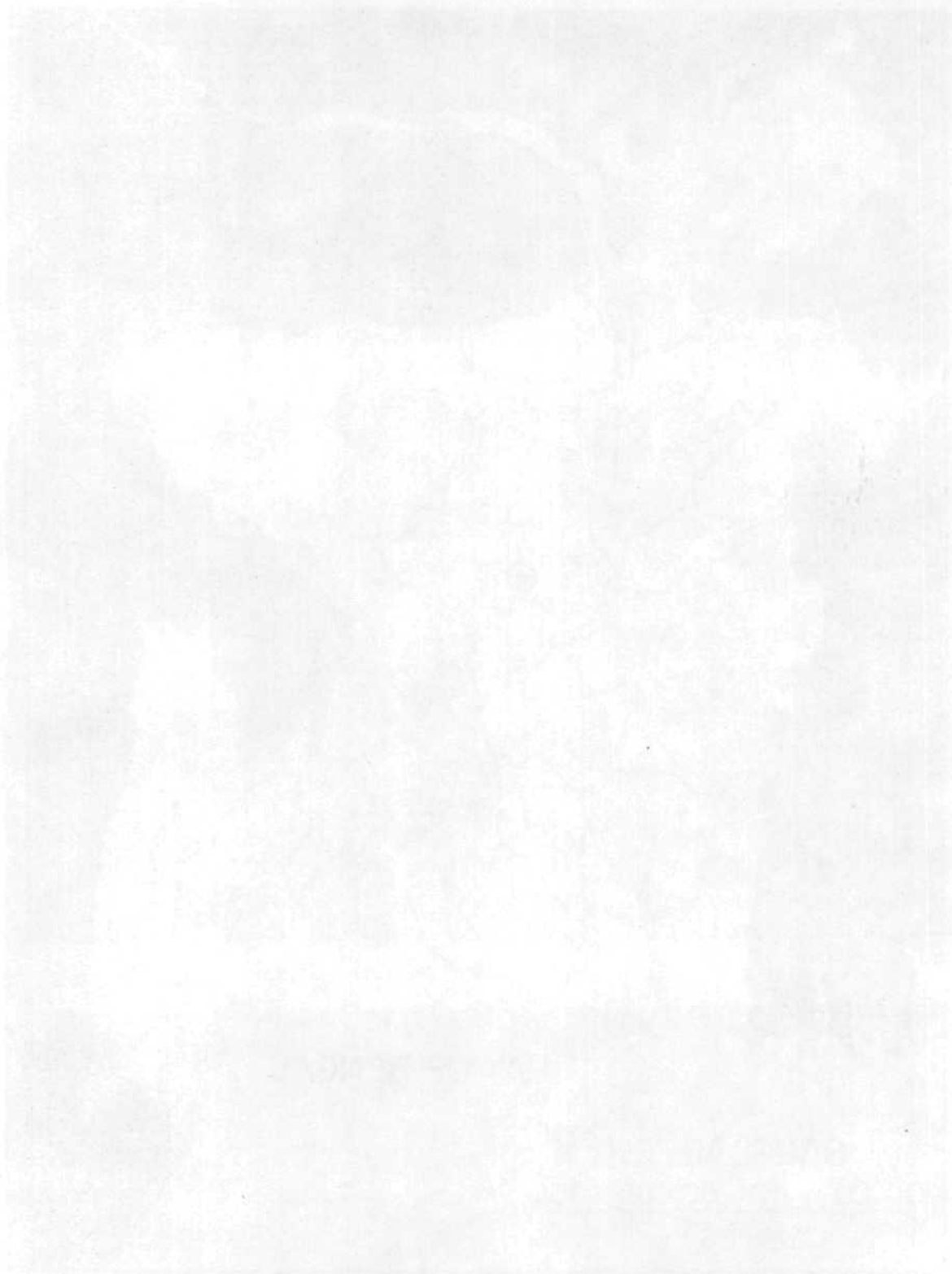
M. U. Khan (p. 16)

Mizanur Rahman (p. 47)

Editors: Jennifer Beckett & Jean Mecartney

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International Centre for Diarrhoeal Disease Research, Bangladesh, Dacca.



Matlab Field Station.

Teknaf Field Station



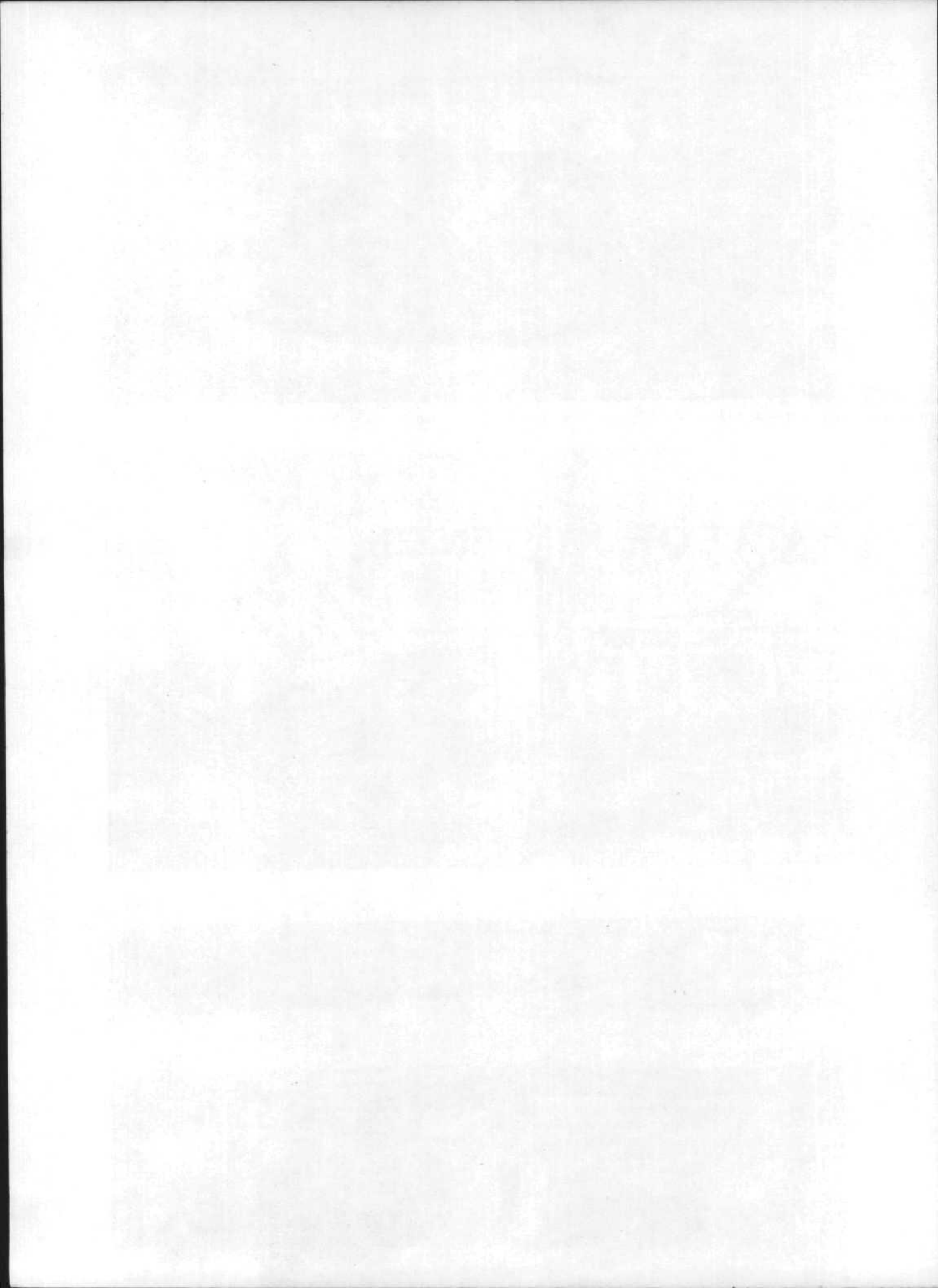
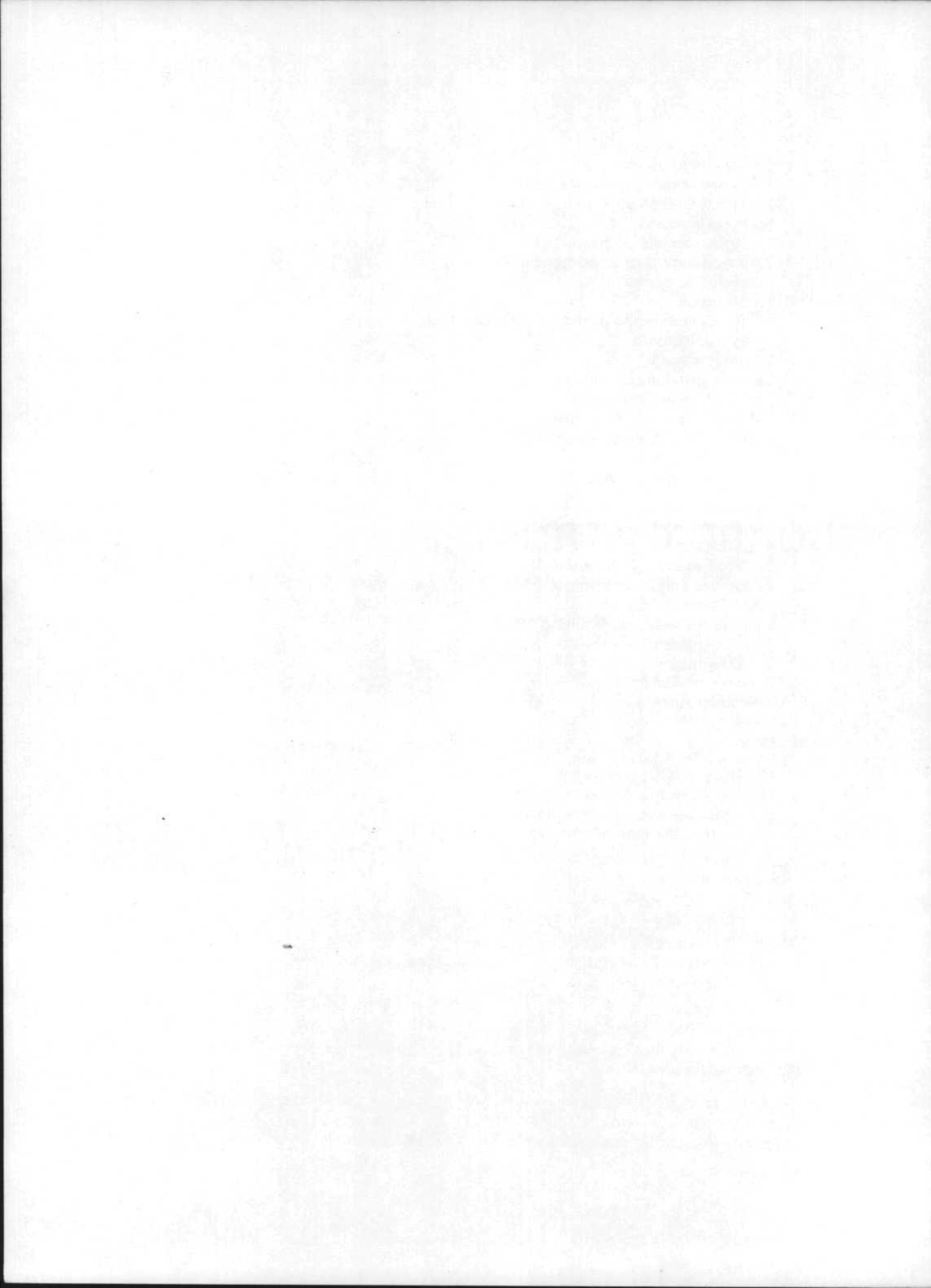


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Switzerland

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M.R. Bashir, BA	Bangladesh	Associate Director Resources Development
Stanislaus D'Souza, PhD	India	Programme Head
Aziz R. Samadi, MD, DPH	Afghanistan	Programme Head (Acting)
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Md. Abdullah, BA, LLB, MBIM	Bangladesh	General Manager Administration
Mark P. Tucker	USA	Physical Plant Manager

SCIENTIFIC STAFF

Community Services Research Programme

Programme Head:

Stanislaus D'Souza, Ph. D.	India	Demography
----------------------------	-------	------------

Working Group Members:

K.M.A. Aziz, MA, MPhil	Bangladesh	Anthropology
Stanley Becker, PhD	USA	Demography
A.K.M. Alauddin Chowdhury, ScD	Bangladesh	Demography
Pierre Claquin, MD	France	Epidemiology
Shafiqul Islam, MA	Bangladesh	Sociology
James Phillips, PhD	USA	Demography
Makhliur Rahman, MA	Bangladesh	Sociology
Susan Zimicki, MS, MS (TH)	USA	Epidemiology

Data Management Branch Head:

Mridul K. Chowdhury, MSc, MPhil	Bangladesh	
---------------------------------	------------	--

Computer Information Systems Branch Head (Acting):

Brian Seaton, MA, MSc, DPhil, AIMLS	UK	
David Leon, MA	USA	Computer Specialist

Matlab Field Station Head (Acting):

Md. Yunus, MBBS	Bangladesh	
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Nutrition Programme

Programme Head:

M. Mujibur Rahaman, MBBS, MSc, PhD	Bangladesh	Nutrition
------------------------------------	------------	-----------

Working Group Members:

Ayesha Molla, MSc, PhD	Bangladesh	Biochemistry
Najma Rizvi, MA (Geog), MA (Anthro) PhD	USA	Nutrition

Biochemistry Branch Head:	
Md. Akbar Ali, BSc	Bangladesh
Teknaf Station Head:	
M.M.H. Munshi, MBBS	Bangladesh
Animal Resources Branch Head:	
K.A. Al-Mahmud, MSc (Vet)	Bangladesh

Disease Transmission Programme

Programme Head (Acting):		
Aziz R. Samadi, MD, DPH	Afghanistan	Paediatrics
Working Group Members:		
Roger Glass, MD, MPH	USA	Epidemiology
M. Imdadul Huq, MSc, DBact, PhD	Bangladesh	Microbiology
M.U. Khan, MBBS, DPH	Bangladesh	Epidemiology
L.N. Mutanda, PhD	Kenya	Microbiology
Microbiology – Immunology Branch Head:		
M. Imdadul Huq, MSc, DBact, PhD	Bangladesh	

Host Defense Programme

Programme Head (Acting):		
William B. Greenough III, BA, MD, FACP	USA	Epidemiology
Working Group Members:		
Ansaruddin Ahmed, MBBS	Bangladesh	Immunology
Shahjahan Kabir, PhD	Bangladesh	Immunology
Leif A. Gothevors, DSc (Med)	Sweden	Immunology
K.A. Al-Mahmud, MSc (Vet)	Bangladesh	Veterinary Science

Pathogenesis and Therapy Programme

Programme Head (Acting):		
William B. Greenough III, BA, MD, FACP	USA	Epidemiology
Working Group Members:		
Md. Hasan Ali, BSc, MBBS, DTCD	Bangladesh	Paediatrics
A. Majid Molla, MBBS, PhD, DHC	Bangladesh	Paediatric Gastroenterology
Md. Rafiqul Islam, MBBS, DTM&H	Bangladesh	Clinical Research
Asma Khanam, MBBS, MPH	Bangladesh	Community Medicine
Golam Hasan Rabbani, MBBS	Bangladesh	Clinical Research
Brian Seaton, MA, MSc, DPhil, AIMLS	UK	Endocrinology
Pieter Speelman, MD	Netherlands	Gastroenterology
Barbara Stoll, MD	USA	Paediatrics
Md. Yunus, MBBS	Bangladesh	Clinical Research
Dacca Station Head:		
Aziz R. Samadi, MD, DPH	Afghanistan	
• Dacca Station Supervisors:		
Md. Hasan Ali, BSc, MBBS, DTCD	Bangladesh	Physician
Md. Rafiqul Islam, MBBS, DTM&H	Bangladesh	Physician
M.U. Khan, MBBS, DPH	Bangladesh	Epidemiology

Training and Extension

Branch Head:

K.M.S. Aziz, PhD

Bangladesh

Associate Director Training
and Extension

Working Group Members:

R. Laila Akbar, MBBS, MPH

Bangladesh

Training Coordination

Wirjawan Djojosugito, MD, MPH

Indonesia

Training and Extension

Abu Eusof, MBBS

Bangladesh

Training and Extension

A.S.M. Mizanur Rahman, MBBS, MSc

Bangladesh

Training and Extension

Library and Publications Branch Head:

Md. Shamsul Islam Khan, MA, DipPM

Bangladesh

Medical Illustration Cell Head:

Asem Ansari, BFA

Bangladesh

Finance and Administration

Md. Shahabuddin

Bangladesh

Controller

Honoraria Niehaus, MSBA, CPA

USA

Financial Consultant

Md. Abdullah, BA, LLB, MBIM

Bangladesh

General Manager Administration

Personnel and General Services Branch

Head:

K. Alauddin Ahmed, BA

Bangladesh

Maintenance Branch Head:

Ashrafuddin Ahmad, BSc MSc

Eng(Mech)

Bangladesh

Supply Branch Head:

M. Golam Morshed, MA, LLB

Bangladesh

Bioengineering Cell Head:

M. Sobhani

Bangladesh

Resources Development

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Bangladesh

Associate Director

A.K. Azad, MA, LLB

Bangladesh

Public Relations and Information

Suzanne Smith, AB

USA

Development Officer

Physical Plant

Mark P. Tucker

USA

Physical Plant Head

A.F.Sarker, MSc (CE), PEEng

Bangladesh
& Canada

Engineering Consultant

INTRODUCTION

The first Annual Report of the International Centre for Diarrhoeal Disease Research, Bangladesh described activities from the inception of the Centre until 31 December 1979. The Annual Report for 1980 surveys all activities and events from 1 January until 31 December 1980. Beginning 1 January 1981 the Financial Year will also coincide with the calendar year. In the present Annual Report the financial information will cover one complete Financial Year from 1 July 1979 through 30 June 1980, and the period from 1 July 1980 through 31 December 1980.

There was increased momentum in the activities of the Centre during 1980. This was particularly visible in new areas of effort such as the Training and Extension Programme and the Computer Branch. During this year ICDDR,B was recognised as a collaborating institution for diarrhoeal diseases by the World Health Organization and held the first inter-regional course on the clinical management of diarrhoea in collaboration with the Control of Diarrhoeal Diseases (CDD) Global Programme of WHO and the inter-regional programme of

UNDP. An IBM Systems 34 computer was delivered, installed and became operational shortly after the middle of the year. It has been in increasingly active use ever since, not only by ICDDR,B scientists but by other users in the Dacca community. Besides new activities the research programmes have been productive publishing 51 original scientific papers, 11 reviews, and have manifested an active participation by 101 presentations, abstracts and letters to local, regional and international meetings.

The Community Services Research Programme completed several important projects this year which include a large-scale comparison in a population of 80,000 of the standard WHO oral rehydration solution with a simple salt-sugar (*labon-gur*) solution available in all villages in rural Bangladesh. An analysis of deaths in relation to socioeconomic status and education was completed with important findings indicating areas for further research. The second three-year period of a now six-year-old intervention trial, first using fertility control methods alone and then adding health

measures, was completed. Although detailed analysis is in progress, it is apparent that the results of the second three-year cycle, where a better educated field worker was recruited to provide health measures with fertility control devices, show impressive effects on both fertility and mortality. In addition to these large studies there was an analysis of the data collection systems and plans were established to streamline the demographic surveillance system (DSS) to make it more applicable in settings where the intensive surveillance employed in Matlab may not be feasible. Studies in this direction will be carefully designed to ensure the high quality of data gathered.

A new Computer Branch was established with an IBM Systems 34 computer; a staff was hired and is in the training process. There has been a steady increase in the use of the computer by the scientists.

The Nutrition Programme completed studies on food absorption in diarrhoea of various etiologies showing that the invasive diarrhoeas, particularly rotavirus, have a marked and lasting effect on the absorption of protein and fat. Despite this, further studies showed that food intake can be maintained, albeit at a level 20 to 30 percent below normal, and that with this level of the absorptive capacity a child experiencing diarrhoea can maintain nutrition even during the acute phases. Compounding the problem of malabsorption and reduction of food intake, presumably due to anorexia, is the newly recognised protein loss in the stool of patients with *Shigella*, rotavirus and other toxigenic *E. coli* diseases. The importance of this finding is yet to be assessed on a quantitative basis. In addition, the study of distribution of food within families in rural Bangladesh showed that males received a higher proportion of available food. The Teknaf Field Station has been the responsibility of the Nutrition Pro-

gramme. The programme initiated an intervention study designed to assess the impact of a good water supply, water seal latrines and health education on the nutritional and health status of the community as compared to communities not experiencing these inputs.

The Disease Transmission Programme established that the simple intervention of hand washing with soap and water can sharply affect secondary transmission of shigellosis even in the worst of urban slum areas. New agents associated with diarrhoea were sought and, in the case of *Campylobacter*, found in surfeit. In this instance since *Campylobacter* could be isolated from more than one-third of all children, often without diarrhoea, many questions are raised about these organisms; this must be investigated to make further advances in the epidemiology of diarrhoeal disease related to this important group of organisms. *Yersinia enterocolitica* was sought and not found in cases of abdominal pain, fever and diarrhoea. Findings on the epidemiology of multiple antibiotic resistant *V. cholerae* were reported but significant new epidemics did not occur during 1980. A close relationship between lack of latrine or piped water to the spread of *Shigella* in young children of *bari** families was found.

The Host Defense Programme showed this year that measurement of antibody in saliva may reflect the production of local antibody further down in the intestinal tract. Studies of local immunity in the gut have been handicapped for many years by lack of a good proxy measure of response to antigens. Further work on the B subunit of cholera toxin was completed this year showing that local immune response can be elicited either by antigen provided orally or by injection.

The Pathogenesis and Therapy Programme completed a full study which confirmed the

**Bari* is a cluster of households situated around a courtyard. All or most of the households in a *bari* are related patrilineally.

effectiveness and defined the limitations of chlorpromazine in reducing fluid output during cholera, and initiated a study on salicylates. A case control study on the substitution of rice for glucose as the basis of an oral rehydration solution was completed and reported at meetings during the year. A study on the usefulness of the specific receptor for cholera toxin G_{M1} ganglioside bound to charcoal showing a significant but small alteration in the severity of disease was published in *Lancet*. Reviews of the incidence and characteristics of hypoglycaemia as a complication of diarrhoea were completed and reported together with information on the incidence of hypernatraemia in diarrhoea patients seen at the Centre.

The Training and Extension Programme trained a large number of WHO fellows as well as individuals from local institutions. In addition, it ran workshops for the medical faculties of all medical colleges within Bangladesh and hosted the first inter-regional course on the clinical management of diarrhoea for the WHO-CDD programme and the UNDP inter-regional programme. The Chandpur project was completed. Extension activities are now focusing

on further work with the village practitioners in conjunction with the Government *Palli Chikitshak* programme with a commitment to implement some of the most effective interventions from Matlab studies in four of the Government-served areas of Bangladesh.

Finance and Development of Resources this year saw the Centre's budget grow 15 percent to \$4.11 million. During 1980 two new donor countries made commitments to the Centre and seven new countries and agencies signed the Memorandum of Understanding. A five-year programme budget presented at the Consultative Group meeting in June of 1980 in Geneva was established for the period 1981-1985. The challenge to raise resources to meet this budget is large but with growing interests, attainable.

The Board of Trustees met twice in 1980 in February and December. They established a fully operational set of guidelines on which effective scientific, administrative and financial management can be established. The Search Committee for a new Director completed its task when Dr. Greenough agreed to serve a three-year term beginning in June of 1980.



PROGRAMMES



COMMUNITY SERVICES RESEARCH PROGRAMME



A Community Health Worker discussing MCH-FP activities with women at the Matlab hospital.

A. Research programme. The International Centre for Diarrhoeal Disease Research, Bangladesh operates a demographic surveillance system (DSS) within and adjacent to Matlab Thana, Comilla District, Bangladesh. The system consists of periodic censuses of the study population with intervening registration of vital events including births, deaths and migration. It has been principally through research in this rural setting of a defined population that the goals of this programme have been approached. There are two broad programme objectives. The first is to carry out basic studies on the biosocial determinants of health and disease. Such studies relate the complex variables of socioeconomic status, nutrition education and beliefs with morbidity mortality and fertility. The second broad objective is to assess what are thought to be potentially effective interventions to improve health on a large scale in real community settings. Such studies include assessing acceptability, applicability, use effectiveness and hazards of the interventions.

During 1980 there was great improvement in the data collection and processing activities of ICDDR,B, particularly in relation to the large population under surveillance in the Matlab Thana. Progress was made to establish a system which is more accessible and responsive to research priorities and the needs of individual or group investigators in subsequent years.

1. Methods and procedures of data collection and processing. The current data collection system under the Demographic Surveillance Programme of the Matlab Field Station is a three-tier system. Detection of vital events is primarily the responsibility of 110 female village workers (FVWs). Eighty FVWs undertake the primary detection of the vital events in half of the surveillance area as part of their work, providing village-based maternal child health and family planning services, covering approximately 300 households each fortnight. In the remaining half of the Matlab study area, 30 FVWs visit approximately 500 households each week to do only demographic surveillance work. They record births, deaths, migrations, marriages and marriage

dissolutions (divorces). The work of the FVWs is checked by 12 to 17 male field assistants (FAs) who, accompanied by the FVWs, visit each household monthly to review the completeness of the registration and to record the vital events on standard registration forms. The area covered by an FA is called a field unit and contains about 16,000 people (2,800 households). The work of the FAs is again checked by three or four senior field assistants (SFAs) who visit each household at least three times annually. All of these workers are supervised by the Demographic Surveillance Field Research Officer who, along with two assistant supervisors, randomly checks on the quality and completeness of the field work.

The completed registration forms are checked in Matlab and the events are recorded in the Matlab copy of the census volume. The recorded forms are then transferred to the Data Management Branch in Dacca for coding and transcription onto IBM cards. Although there have been lapses recently, vital event cards are sorted and preliminary demographic information is usually reported annually. In the future, field data will be transferred directly onto the computer and linked with family and individual records.

2. Proposed modifications.

a. Census update. In 1978 an effort was made to update the surveillance data to 1 January 1979 by using the 1974 census and the intervening vital events. The computer work was completed, and in 1980 field checking was done to obtain the best possible estimate of the 1 January 1979 population. As in previous censuses, socioeconomic information will be collected in 1981 which will result in a 1981 update as a by-product.

b. Annual reporting. A system of regular annual reporting has been developed by the Data Management Branch. Future annual demographic reports will be facilitated by the introduction of a fully-computerised population register at the ICDDR,B Computer Branch.

c. Streamlining registration forms. To ensure the continuing usefulness of the data collected on the DSS registration forms, a constant review of current and proposed information on the registration forms is done. Since the demographic data serve multiple functions, the redesign of registration forms has to be undertaken in consultation with scientists at the Centre.

d. Confidentiality. A system to safeguard the confidentiality of the information obtained from the study population has been operating and will be continued.

B. Basic studies. During 1980 analysis of the interaction of some complex variables with mortality was completed. This analysis showed that mortality rates are inversely correlated with socioeconomic status. However, the education of the head of the household is a variable which correlates even more closely with decreased risk of childhood death irrespective of whether a family is poor or comparatively rich. The education of the mother is a very sensitive indicator of mortality risks (Table 1). The findings of these analyses

TABLE 1

MORTALITY RATE (PER 1000) FOR BOTH SEXES IN MATLAB, BANGLADESH BY EDUCATION (YEARS OF SCHOOLING) OF MOTHERS FOR THE AGE GROUP 1-3 YEARS (1975-1977)

	Education of Mother (Years of Schooling)	1975-1977
I	0 (No schooling+maktab)	33.3
II	1-6	20.2
III	7+	6.3
I:III		5.3

will provide a matrix from which specific hypotheses may be tested to determine how education or wealth may prevent childhood disease and death in rural Bangladesh. In addition, the mortality data show a higher female than male mortality from shortly after birth through childbearing age.

This year initial studies on measles were carried out in Matlab. The epidemic pattern was defined (Figure 1) and a case control study

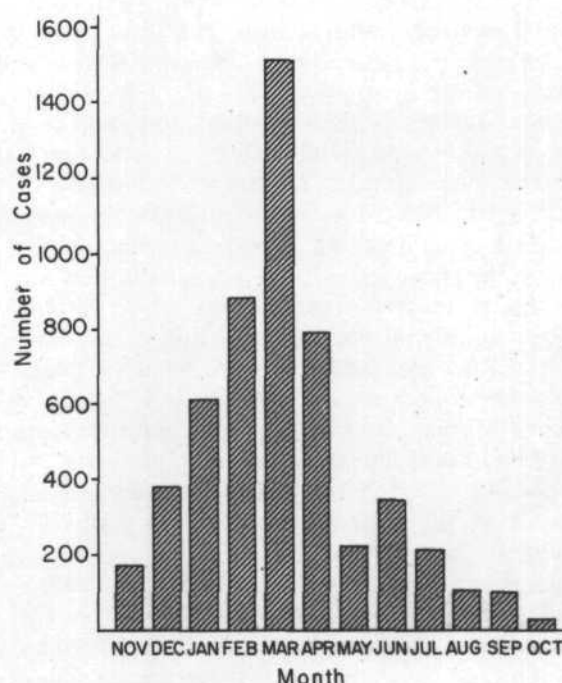


Figure 1: Number of measles cases by month (November 1979-October 1980).

carried out which demonstrated that measles predisposes to shigellosis and is related to a higher incidence of conjunctival dryness or putative vitamin A deficiency. This seems to link diarrhoea with measles, and measles with blindness due to vitamin A deficiency.

Studies of sex socialisation and philosophies of life in relation to fertility behaviours continued with the completion of a thesis showing many misconceptions which influence fertility behaviour. These must be taken into account in developing fertility control programmes.

Basic studies were also carried out to define the endocrinologic characteristics of women in Bangladesh. These indicate a marked departure from data on women in developed countries.

C. Evaluation of health interventions.

1. Oral rehydration. A study initiated in Matlab in January 1979 was completed on 31 December 1980. In this study there was a



Ambulance boats bring patients to Matlab Hospital.

direct comparison between two populations of 40,000, one provided with the WHO standard packaged ORS formula and the other provided with locally available salt and crude brown sugar. In each area the solution was made up by the mothers themselves as taught by a *bari* mother. This *bari* mother was trained by the Matlab field workers. In a third area there were no special interventions; however in comparison areas such as this one, Government programmes are operative. The quality of solutions made, although showing a wider scatter in the salt-sugar solution than in the packaged solution, indicated that both were within the safe range for use in the field. During the years of the trial there was no severe cholera outbreak so the assessment of both methods of oral rehydration could not be measured in epidemic conditions. In both areas there was a

decrease in the hospitalisation rate contrasted with the comparison area. There was no detectable difference in hospitalisation rates, severity of dehydration on admission, or instance of electrolyte abnormalities between the two groups.

2. Maternal child health and family planning intervention. During the first three years of this project the influence of optimum distribution of contraceptives to villages was assessed. It was found that although there was some initial increase in use rates, this was of short duration and dropped back toward baseline rapidly. Following the training of a more educated group of female village workers and linking the provision of contraceptives to some simple health measures, there was a sharp increase in use rate which reached a plateau at about one-

third of the eligible women. Regardless of which baseline is chosen to evaluate the impact of this intervention on fertility, it has been a most successful project (Figure 2).

The impact on neonatal mortality rates is seen through the tetanus immunisation programme (Figure 3).

3. Shotaki Clinic. During 1980 the Shotaki Clinic was established in Matlab Thana. Since diarrhoeal disease cases in this area were previously transported by ambulance boat to

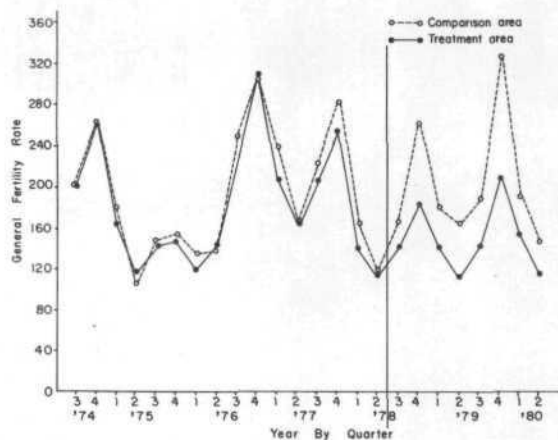


Figure 2: Quarterly general fertility rates in FP/HSP treatment and comparison areas, 1974-1980, Matlab.

the Matlab Field Hospital, the clinic reduces the costs and decentralises the services of the hospital. The clinic is now run by the community with some support from ICDDR,B.

D. Branches. The scientific support work at ICDDR,B is undertaken in Branches, each of which has a specific technical role. The DSS involves three Branches: the Field Station in Matlab, the Data Management Branch and the Computer Information Services Branch in Dacca. Since the Community Services

Research Programme is involved with large-scale data sets, these Branches are placed under the supervision of its Programme Head.

The Demographic Surveillance Programme of the Matlab Field Station, headed by a Field Research Officer, is responsible for the field

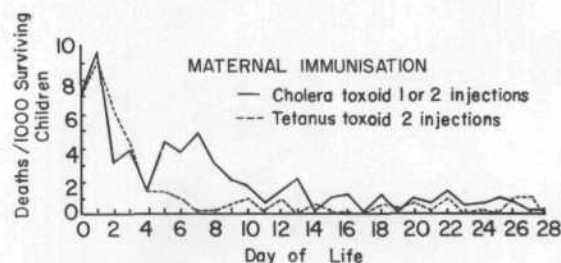


Figure 3: Death rate in neonatal period by age at death, 9-32 months following maternal immunisation, Bangladesh, 1975-1977.

operation and collection of the surveillance data. The Dacca Data Management Branch is responsible for editing, processing, and initial tabulations of the demographic field data. The newly created Computer Branch will be responsible for the computerisation of data. Progressive transfer of data from other computers is being undertaken.

The Data Management Branch operates an HP 85 programmable calculator which is appropriate to the needs of scientists for small-scale data analysis.

The Computer Branch has an IBM Systems 34 computer to handle larger volumes of data. At present its disk storage capacity is 128 megabytes. It has a diskette magazine drive, a printer, three single station terminals and two dual station terminals. The IBM utilities installed include FORTRAN, COBOL, RPGII and BASIC compilers. Programme packages include UNEDIT, UNXTALY, MINI-TAB, MINI-LIFE and WHO ADDRESS under installation.



The new IBM Systems 34 Computer in operation at ICDDR,B.

NUTRITION PROGRAMME



Improvement of sanitation through the introduction of water seal latrines is one of the Nutrition Programme's main interventions.

A. Research programme. Diarrhoea and malnutrition seem inextricably entwined. The broad goals of the Nutrition Programme of ICDDR,B are to unravel the ways in which diarrhoea can produce poor nutrition, to discover whether malnutrition leads to a high incidence of diarrhoea, and to find the points where the diarrhoea-malnutrition cycle can be most effectively and inexpensively interrupted. The methodology to approach these goals includes field observation, clinical observation in hospitals and metabolic units, and laboratory studies often involving equipment which would be regarded as advanced technology.

diseases, rotavirus and *Shigella*, had the greatest effects. Coefficients of absorption of fat, calories and carbohydrates returned rapidly to a higher level in patients with cholera after two weeks of recovery compared to patients suffering from diarrhoea caused by all other agents. Patients with rotavirus showed sustained lower coefficients of absorption, particularly for nitrogen, for up to eight weeks after the illness (Figure 4). These studies suggest that rotavirus may be of unusual importance since it affects children at the most vulnerable age when they are growing rapidly and being weaned.

TABLE 2

INTAKE OF CALORIES (NO.) AND PROTEIN (GMS.) BY AGE AND SEX IN MATLAB, BANGLADESH
JUNE-AUGUST 1978

Age	Calories (No.)			Protein(Gms.)		
	Male	Female	Ratio M/F	Male	Female	Ratio M/F
0-4	809	694	1.16	23.0	20.2	1.14
5-14	1,590	1,430	1.11	50.9	41.6	1.22
14-44	2,700	2,099	1.29	73.6	58.8	1.25
45+	2,630	1,634	1.61	71.8	46.9	1.53
All	1,927	1,599	1.20	55.0	45.5	1.21

B. Basic studies.

1 Food distribution in families in rural Bangladesh. A study was completed on food distribution in families in Matlab. It showed that a sex bias exists with regard to the intake of calories and proteins (Table 2). In all age groups males have a higher intake of both calories and proteins than females. This finding could be related to the higher mortality rates observed among female children in this part of Bangladesh.

2. Diarrhoea and food absorption. This year studies were completed indicating important differences between diarrhoeas caused by various agents and their effects on food absorption. In these studies children were observed having cholera, enterotoxigenic *E. coli* diarrhoea, shigellosis and rotavirus. Although during the acute phase all agents produced significant malabsorption, the invasive

Observations of food intake and stool volume indicated that during acute diarrhoea, despite malabsorption, important amounts of nutrients were absorbed without increasing diarrhoea. The intake of food was reduced by 20 to 30 percent, however for those children continuing to take breast milk there was almost no decrease in intake of this crucial nutrient even during the acute phase of diarrhoea. Underscoring the importance of feeding it was demonstrated that even in lactase-deficient children on milk supplement the diets were well-tolerated and improved nutrition.

3. Protein loss in diarrhoea. Further work on loss of protein from the serum into the stool during diarrhoea was accomplished. As would be expected, those organisms which invade and destroy the lining of the intestinal tract produce losses of serum protein in the stool. *Shigella* and rotavirus are examples of this. It was somewhat surprising to find that a

rather large number of enterotoxigenic *E. coli* cases lost protein in their diarrhoea stool. This suggests that the pathogenesis of these diseases deserves more attention since protein loss is not a feature of cholera. Clearly, the loss of formed plasma protein imposes a burden of synthesis on the liver for new protein as well as the loss of formed body materials. The loss may be substantial, equivalent to 100 to 500 millilitres of whole blood. Further quantitation of the loss is required as well as a careful investigation of the duration of loss in diarrhoea due to the various etiologies.

C. Evaluation of health interventions.

The main intervention study initiated this year was in the Teknaf Field Station. In this study a concerted effort to improve sanitation through the introduction of hand pumps and water seal latrines together with health education will be assessed for the impact on diarrhoeal disease mortality and nutrition. Although this study is only in its early stages it is anticipated that should a beneficial effect occur on the rate of diarrhoea, improvement of the nutritional status of the children in the study areas will also be seen compared to children in other areas where interventions have not been employed.

D. Branches. The Biochemistry Branch is under the supervision of the Head of the Nutrition Programme. In addition to the biochemical analyses carried out by this Branch it supervised the preparation of nearly 200,000

packets of ORS for consumption by the Dacca Treatment Centre. It also served as the oral rehydration therapy quality control lab for Matlab, Dacca and a variety of voluntary agencies. A quality control system involving the analysis of samples from the World Health Organization has been underway. An example of the results of this work is shown in Table 3.

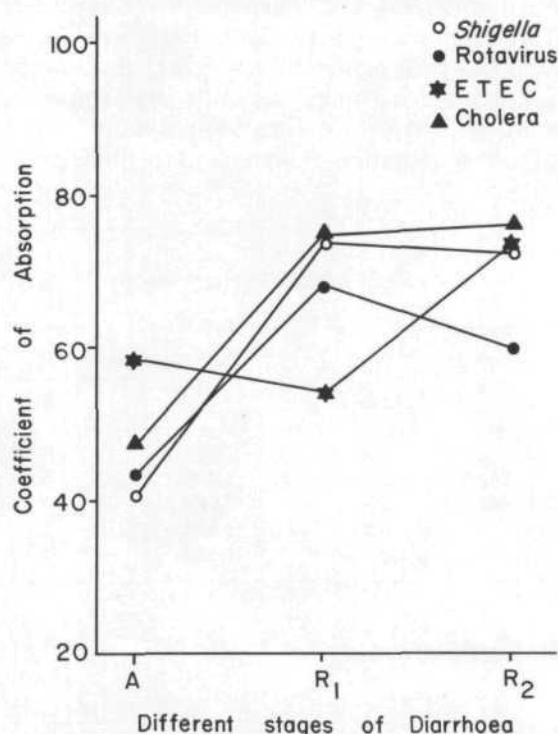


Figure 4: Coefficient of absorption (± 1 SD) of nitrogen during acute (A) diarrhoea and after recovery (R₁ & R₂).

TABLE 3

DATA FROM EXTERNAL WHO QUALITY CONTROL (SERA)

Estimation	% Variation from designated value of WHO quality control										Remarks
	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	
Na ⁺	± 0.8	-0.7	-0.6	-0.3	-0.3	+3.9	+2.2	+0.4	+1.5	+0.7	Random error
K ⁺	+0.2	-0.2	-0.3	-0.8	0	-0.1	0	+1.6	—	+0.1	"
Cl	+1	-0.9	+1	0	+6.3	-1.0	-1.0	+0.9	0	+0.9	"
Urea	+15	-5.5	+2.2	+11.4	-1.2	0	+4.2	+7.1	-4.8	+9.8	"
Glucose	+0	+3.8	-8.9	-2.1	-5.8	-13.4	-14.8	-21.8	-7.4	-15.8	Systematic Error ?
Creatinine	+7.1	-0.9	+8.5	+4.2	+6.3	+24	+28	—	+15	-5.2	Random Error
Total Protein	-3.8	+3.4	+9.3	-1.2	+8.4	+1.9	+1.5	+1.5	-3.3	+6.6	"

T=Test



Hand pumps provide villagers with a clean water source.

DISEASE TRANSMISSION PROGRAMME



Water used for bathing and washing (foreground) is also used for waste disposal (latrines in the background)

A. **Research programme.** In order to establish effective preventive measures it is necessary to identify the agents which cause diarrhoea and to understand how they interact with the host. To do this, detailed knowledge of the infecting agent in the environment, among vectors and in the afflicted individuals is necessary.

B. Basic studies.

1. **New agents.** Field studies identified *Campylobacter* in more than one-third of the children in rural Bangladesh (Table 4). Although there is an association with diarrhoea, the presence of this organism in many healthy children (Table 5) raises significant problems in interpretation of the epidemiological data. A possible explanation is that *Campylobacter* is not a single organism but a group of organisms, some of which are pathogenic. Studies to address this have been initiated but to date there are no strong leads. Since this is an established cause of severe diarrhoea in many other countries, research on this organism will be given emphasis in the coming year.

TABLE 4

ISOLATION OF *C. FETUS* SUBSP. *JEJUNI* FROM VILLAGE CHILDREN, MATLAB CENSUS AREA (GROUP C), MARCH 1980

Age group (mo)	No. of children tested	Isolation rate/100 children
12-23	18	38.9
24-35	37	16.2
36-47	46	19.6
48-65	40	7.5
Total	141	17.7

A report on the EF-6 organism-associated epidemic was published (Figure 5). A careful investigation for *Yersinia enterocolitica* was carried out in patients with abdominal pain and diarrhoea. This organism was not identified in any cases although 243 human and 228 animal stool samples were studied.

TABLE 5

COMPARISON OF THE FREQUENCY OF DIARRHOEAL EPISODES IN CHILDREN INFECTED WITH *CAMPYLOBACTER* AND IN UNINFECTED CHILDREN

Timing of episode	No. of children with a diarrhoeal episode	
	Culture positive (n = 25)	Culture negative (n = 50)
1-7 days preceding culture	5	6
8-14 days preceding culture	3	1
15-30 days preceding culture	10	4
Any time in preceding month	12 (48%) ^a	10 (20%) ^a

^a A child who had diarrhoea during more than one time period was counted only once.

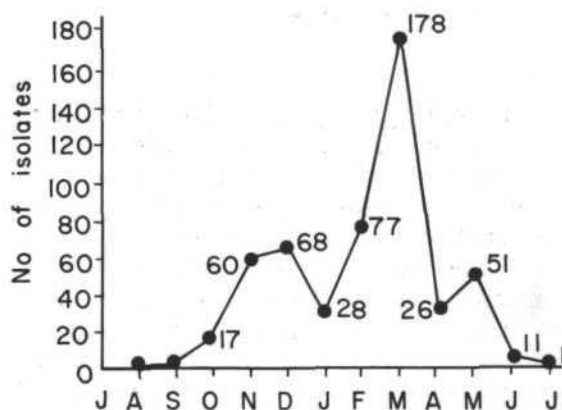


Figure 5: Number of monthly isolates of EF-6 from patients with diarrhoea at the Cholera Research Laboratory during the period July 1976 through July 1977.

2. **Cholera biotypes and resistance.** Basic studies were carried out in the laboratory to characterise the plasmids responsible for antibiotic resistance in *V. cholerae* (Table 6). There were no major outbreaks of tetracycline resistant *V. cholerae* during 1980 although sporadic cases occurred. The laboratory established methods to recognise and work with plasmids at a basic level, and future protocols will approach the problem of antibiotic resis-

tant *V. cholerae* in an even more detailed manner should it recur. Recognition of a particular resistance-bearing plasmid in different organisms is fundamental to further work in the area.

TABLE 6

DRUG RESISTANCE IN *VIBRIO CHOLERA* BIOTYPE EL TOR FROM BANGLADESH

Serovar	No.	R-type	No.
Inaba (n=3)	3	AKSSpTSuTm	2
		AKTSuTm	1
Ogawa (n=7)	7	AKSSpTSuTm	2
		AKTSuTm	2
		ATSuTm	3

Resistance symbols and MICs ($\mu\text{g/ml}$): A=ampicillin (500); K=kanamycin (1250); S=streptomycin (1000). Sp=spectinomycin (MIC not determined); T=tetracyclines (64); Su=sulphonamides (>2000); Tm=trimethoprim (>2000).

3. Recognition of enteropathogens. During the past year a major technological breakthrough was validated in the laboratory. A chemical probe was employed with a radioactive label to specifically identify on culture plates colonies of *E. coli* which produce the diarrhoea-causing toxins (LT and/or ST). The DNA of the genes which code for the production of LT or ST were isolated and made single-stranded. An isotope ^{32}P was introduced to label these DNA "gene probes." Cultures from patients with diarrhoea were prepared on membrane filters. These were treated in such a way that when exposed to the labelled DNA LT and/or ST gene probe, colonies of toxin-producing *E. coli* could be easily recognised.

This procedure allows rapid identification of smaller numbers of toxigenic *E. coli* in the midst of other stool flora. All LT organisms may be recognised by this method; ST is associated with more than one genotype and only about two-thirds of them were recognised with the ST probe used.

In a study of *V. cholerae* biotype El tor, the surprising result was found that in the Dacca

urban area this variant of cholera equalled the infection rates, illness rates and severity of illness of the classical biotypes (Table 7). This change indicated that in Bangladesh El tor is no longer a milder and less virulent variant of *V. cholerae*. This change must be anticipated elsewhere as well.

TABLE 7

INFECTION RATES FOR CONTACTS OF INDEX CASES OF VARYING AGES

Age/sex index	Infection/100	Case/100
Male 15+	6.3 ^a	6.3 ^b
Female 15+	44.4 ^b	37.0 ^f
Children up to 14	31.9 ^c	24.0

a vs b, $P < 0.01$

a vs c, $P < 0.01$

e vs f, $P < 0.05$

Progress has also been made in defining seasonality of diarrhoea due to the major causative organisms (Figure 6).

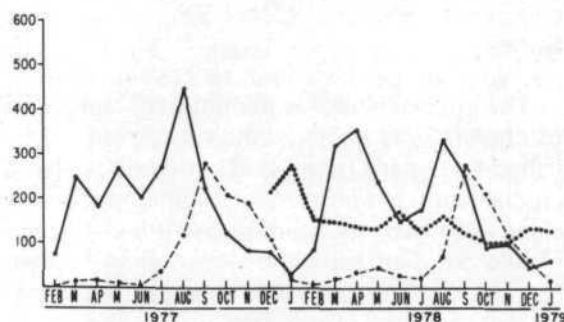


Figure 6: Visits to a diarrhoea treatment centre (Matlab) in rural Bangladesh for diarrhoea associated with *E. coli* (—), *V. cholerae* (---), or rotavirus (.....) for the period February 1977-January 1979.

Rotavirus studies continued this year. Efforts were directed to establish a serotyping capacity in collaboration with the laboratory of Dr. Zissis in Belgium. It was felt that further

TABLE 8

INFECTION RATE^a AMONG PERSONS USING SURFACE WATER FOUND CONTAMINATED AT ITS SOURCE OR IN THE HOUSEHOLD^b

		Source Water		Total
		Positive	Negative	
Household Water	Positive	31/274(11.3) ^c	2/32 (6.3) ^{c,d}	33/306(10.8)
	Negative	1/134(0.75) ^{c,d}	2/162(1.2) ^c	3/296(1.0)
Total		32/408(7.8)	4/194(2.0)	36/602(4.0)

^a Number infected/number exposed. Percentage in parentheses.

^b Classification of water is based on the samples collected up to one day prior to the detection of infection in each individual or samples collected throughout surveillance period for uninfected individuals.

^c Overall differences between groups are highly significant by log-likelihood ratio ($G = 30.845$, $P < 0.001$). An explanation of the application of the log-likelihood ratio will be found in Sokal, R.R. & Rohlf, F.J. *Biometry*, San Francisco, Freeman, 1969.

^d $P = 0.095$, Fisher Exact Test.

clinical studies to determine differences in severity between serotypes should be undertaken prior to further large-scale field studies to determine the epidemiology by serotype.

4. Water studies. Investigations in collaboration with Dr. Rita Colwell at the University of Maryland and Dr. William Spira at Johns Hopkins University continued to look at the ecology of vibrios in surface waters in Matlab and Teknaf, and Chesapeake Bay in the United States.

The importance of water in the transmission of cholera was demonstrated in a study published this year (Table 8). That water is also a crucial factor in transmission of shigellosis was clearly shown in studies in urban Dacca (Table 9). The separation of human wastes from food and water is also an important determinant of spread (Table 10).

5. The search for a transducing phage for *V. cholerae*. Several phages were isolated from the environment from strains of *V. cholerae* and were investigated at Harvard University. These phages are unique in their characteristics and although not yet demonstrated to carry DNA from one bacteria to another, they have been of sufficient interest to justify extending the studies into 1981. The differences between the new cholera phage and phages isolated

TABLE 9

SECONDARY INFECTION RATE (PER 100 CONTACT) BY WATER SOURCE AND FOR *SHIGELLAE* TYPE AND CONTROL

Water Source	<i>Shigella</i> dysentery type 1		<i>Shigella flexneri</i>	
	Persons	Rate	Persons	Rate
Mixed source Tap/T.well/Dw	124	28.2 ^a	35	23.8
Closed source	116	12.0 ^b	12	17.7

a vs b: $P < 0.01$

TABLE 10

SECONDARY INFECTION RATE (PER 100 CONTACT) BY PLACE OF DEFAECATIONS AND FOR *SHIGELLAE* TYPE AND CONTROL

Place of defaecation	<i>Shigellae</i> dysentery type 1		<i>Shigellae flexneri</i>	
	Persons	Rate	Persons	Rate
Open latrine	170	23.5	42	21.4
Closed latrine	70	12.9	5	20.0



New vibriophage (large hexagon) showing unusual structural features.

from all other bacteria to date are several unusual structural features and unique patterns of their DNA structure.

C. Evaluation of health interventions.

The main intervention study being carried out in the Teknaf Field Station was described under the Nutrition Programme. A concerted planning phase to work toward innovative interventions in water usage and delivery is now under way and will receive increased effort in 1981. Consultation with Dr. James Hughes, Head of the Center for Disease Control water programme and Dr. Richard Feachem of the London School of Hygiene and Tropical Medicine and the Ross Institute of Tropical Hygiene, were catalytic to this effort.

D. Branches. The Immunology and Microbiology Branches have merged this year and are under the supervision of the Disease Transmission Programme. During 1980 new methods were established and standardised to measure antigens and antibodies which may be important in protection against diarrhoeal disease. There was substantial improvement in the equipment of this Branch including the establishment of fluorescent microscopy, a new room for tissue culture, and the technology necessary to sustain the growth of fastidious organisms such as *Campylobacter* and *Yersinia enterocolitica*. Plasmid identification and isolation methods were established. In addition, this Branch is responsible for the protection of intravenous fluids for the clinical units in Dacca and Matlab.

HOST DEFENSE PROGRAMME



Oral B subunit cholera toxin.

A. Research programme. The broad goals of this programme are to determine the ways by which the body defends itself against infecting agents which produce diarrhoea and to develop interventions by bolstering these defenses. Generally this programme stresses defining virulence antigens and the use of such antigens as components of potential vaccines against specific diarrhoeal diseases.

B. Basic studies.

1. New methodology. New methods were developed and reported to determine immunoglobulin type specific antibodies to cholera toxins, and *V. cholerae* lipopolysaccharides and to determine low concentrations of secretory IgA in body fluids. The development of these methods has made it possible to study the antigenicity of newer experimental oral vaccines and to find ways of stimulating the local enteric immune system in humans.

2. Travellers diarrhoea studies. Studies of diarrhoeal disease in a non-Bangladeshi population living in Dacca, initiated in 1979, were continued through 1980. In the study 100 new residents and 100 old residents were followed for the occurrence and cause of diarrhoea during a 12-month period. Clinical surveillance ended during the Fall of 1980 and data analysis is continuing. Preliminary findings suggest that immunity does develop with increased time in Dacca; that enterotoxigenic *E. coli* is the most common pathogen in this group, but that many people with enterotoxigenic *E. coli* do not have symptoms; and that most episodes of diarrhoea were caused by agents which cannot yet be identified but are likely to be bacterial since doxycycline (single dose 200 mg.) is effective in shortening the diarrhoea. A syndrome of non-*Shigella* dysentery was commonly seen during the study and the clinical description of this syndrome may help to identify other diarrhoeal agents.

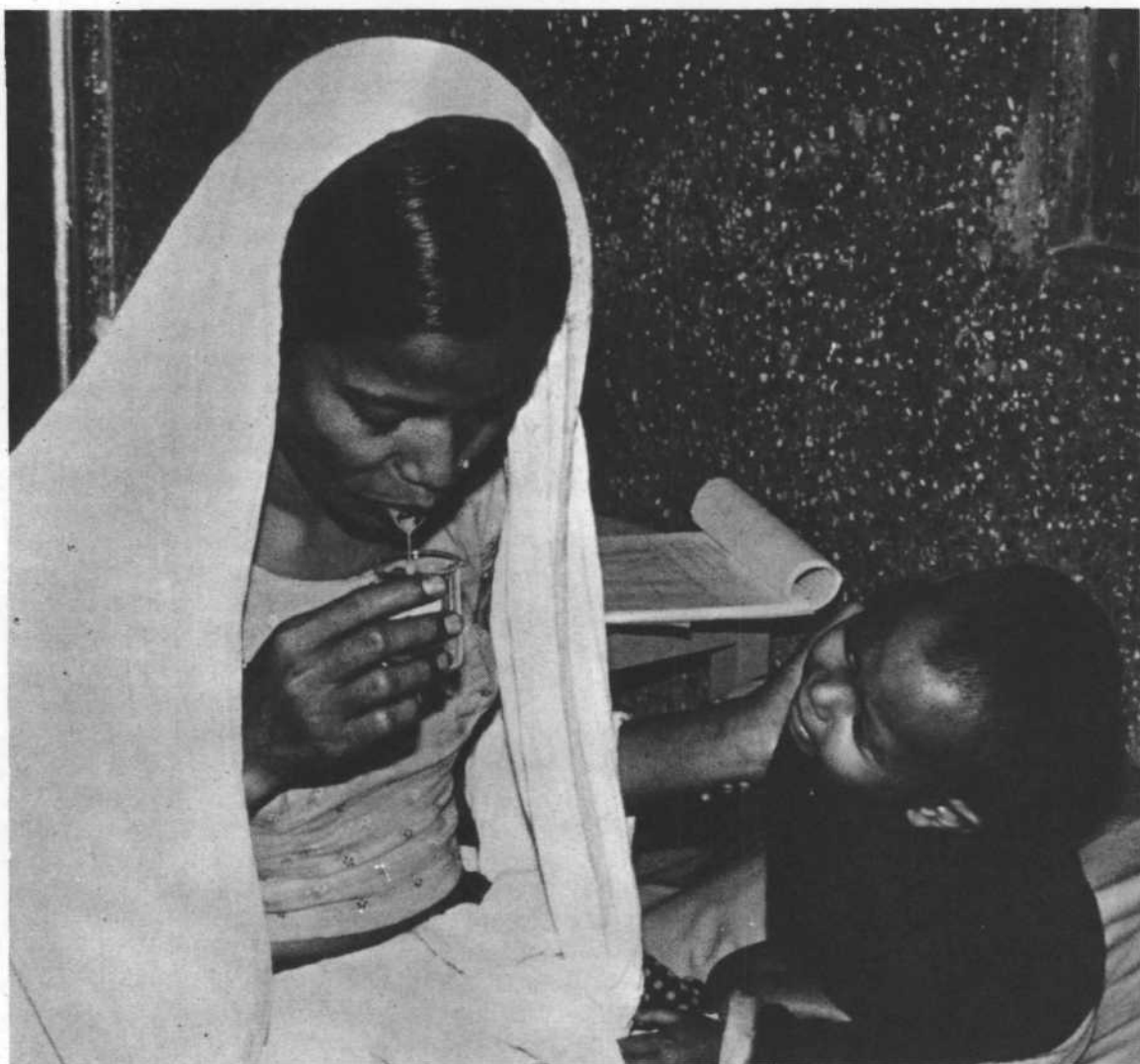
3. Basic studies of local enteric immunity in humans. The ability to study the immunologic response in the intestine and serum in people

exposed to cholera antigens, either because of naturally-acquired disease or through antigens administration of specific non-toxic antigens to volunteers, has allowed approach to some basic problems in defining the way in which the local immune system functions in humans. It is likely that the response to these cholera antigens is typical of other diarrhoeal diseases as well, hence cholera serves as a model disease. These studies have shown that the intestine of patients with cholera does mount an antigen-specific immune response but that this response is brief (less than one month). The response in breast milk has been disappointingly small in cholera patients and the relationship of intestinal immunity to antibody in milk will require further study. The measurement of antibody in various secretions (saliva, milk, etc.) is important in determining features of a "generalised" local immune system and in finding proxy measures of gut immunity.

4. Colonisation of infants with *Giardia lamblia* and the prospective role of breast milk. This study is under way, but after six months only two out of 33 infants had *Giardia* parasites in their stools and antibodies to *Giardia* in their serum. Another two infants were seropositive only. All the children were breast-fed, some also had supplementary food. Some infants were colonised although they were fed milk containing SIgA antibodies against *Giardia*.

5. Natural immunity to tetanus toxin. This investigation has been done by comparing antitetanus antibody levels in mothers of infants with neonatal tetanus with the antibody levels in a control group of mothers. Data are so far not analysed but will also reveal if saliva antibody levels of toxin antibodies are a valid reflection of serum levels.

6. Immunisation with the B subunit of cholera toxin. Studies were carried out in individuals from a periurban village which indicated that good local and systemic antibody can be stimulated by feeding B subunit



Saliva is used for antibody measurement.

by mouth. In addition, local IgA responses in the gut can be elicited by intramuscular injection of B subunit. This data was collected by the cumbersome method of having to lavage the intestinal tracts of subjects with large volumes of saline. During this process relationships between gut antibody and salivary antibody were studied. These seem to indicate a correlation between salivary IgA antibody

against B subunit and IgA antibody measured in the intestinal lavage (Figure 7). Such a correlation was, however, not seen between the IgA responses in milk and intestine.

7. Other antigens. Important information was gathered on other surface antigens of *V. cholerae* demonstrating differences in the endotoxin of this organism compared to those

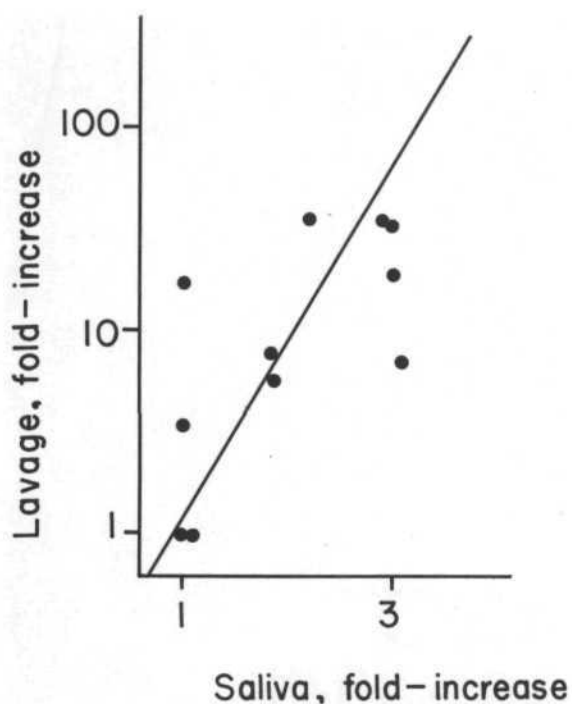


Figure 7: Antitoxin IgA antibody response in lavage and saliva after oral B subunit.

of other gram-negative organisms. A nontoxic protein from the outer cell membrane was isolated which may have promise as an immunising agent. In addition to these two antigens, investigations of colonising factors of both *V. cholerae* and *E. coli* were undertaken. The basic technology for their measurement was established and increasing attention will be given to bacterial antigens which are associated with attachment to and colonisation of the gut and invasion into its lining.

PATHOGENESIS AND THERAPY PROGRAMME



The Dacca Treatment Centre.

A. Research programme. The overall goals of this programme are to understand the basic pathophysiological mechanisms by which micro-organisms and parasites produce diarrhoea. With this knowledge simple and effective treatment and preventive measures can be devised.

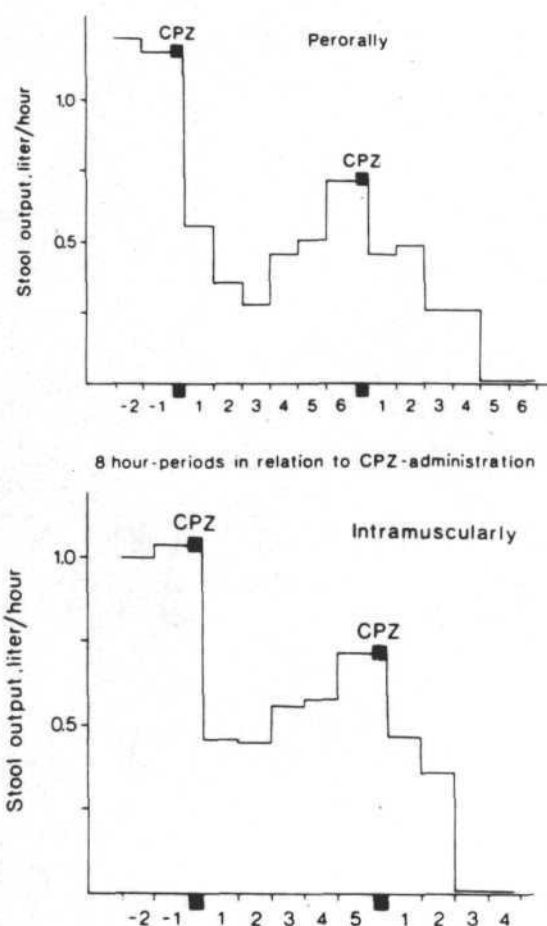


Figure 8: Time course of fluid-loss in two cholera patients receiving 1 mg/kg chlorpromazine at times indicated.

B. Basic studies.

1. Agents which reduce fluid output in diarrhoea. Completed studies on the effect of chlorpromazine in cholera show reduced fluid loss and a lower failure rate in oral rehydration among young children (Figure 8). One problem

is some degree of sedation produced by chlorpromazine at the dose fully effective in reducing fluid loss. Other related compounds are being investigated in animal models to determine the best candidate for the next human trial. A study of the effect of salicylates on diarrhoea was initiated during 1980 to begin research on a completely different class of drug.

2. Agents which interfere with toxin binding.

A study was completed using a charcoal bound G_{MI} ganglioside. The specific receptor for cholera toxin is linked to a solid nonabsorbable matrix. Patients with cholera who drank this had less severe diarrhoea early in the stages of the disease (Figure 9). Although not of great practical importance at the present time, it

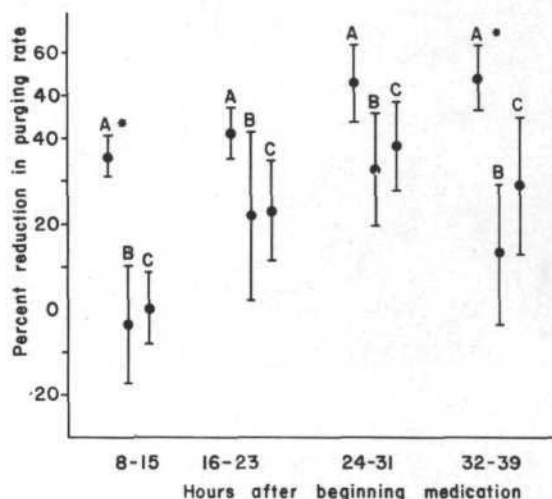


Figure 9: Percentage reduction in purging rate from baseline rate (mean $\pm$ SE) at given time intervals for 46 cholera patients treated with G_{MI} charcoal (A), charcoal (B), or water (C).

establishes the theoretical point that complete binding of toxin in the gut lumen reduces the severity of diarrhoea. It also establishes the fact that the principal site of release of cholera toxin is close to the gut lining, thus not accessible to agents which bind free toxins in the gut lumen.



Oral B subunit cholera toxin being administered to a child of a cholera-affected family.

In a field study the purified B subunit of cholera toxin was administered to contacts of cholera cases to find out whether the blocking of gut receptors could result in protection against the disease. Only small amounts of the material were available, so the calculation of the number of receptors and dose of B subunit could not be accurately judged. However, at the dosage used there was a lower attack rate of cholera in contacts receiving the B subunit than in controls. Once disease became clinically apparent there seemed no difference in its severity.

3. Cereal-based electrolyte solutions. A case

control study was completed demonstrating the effectiveness of a rice-based electrolyte solution in the treatment of diarrhoeal disease. This opens a pathway for the integration of the treatment of diarrhoea by oral rehydration with an increased caloric density to be presented to children, particularly during acute diarrhoea. The next steps in this study will be to determine to what level the caloric density may be increased and still not have an increase in the stool volume.

4. Causes of hypoglycaemia. Investigation of the causes of hypoglycaemia were initiated by reviewing this complication of acute diarrhoea.

It appears that this particular abnormality is closely correlated with a fatal outcome in any child with diarrhoea. Early recognition and correction of this defect is lifesaving in some children; however, it is also clear that in some cases where such a severe general metabolic derangement has occurred, the correction of the blood sugar will not save the patient.

5. Investigations of electrolyte abnormalities in patients with diarrhoea. Both high and low serum sodium is seen in children with diarrhoea at the Dacca Treatment Centre. An analysis of these results and their potential causes was carried out as background material to investigate the influence of introducing oral rehydration into communities in the urban area. In the oral rehydration field trial in Matlab it was shown that there was a lower incidence of electrolyte abnormalities in children using either the WHO formula of ORS or a simple salt-sugar solution based on similar sodium concentrations.

6. Pathogenesis of cholera. In some basic studies in collaboration with Dr. Morishita, Keio University, Tokyo, Japan, it was determined at the Dacca Treatment Centre that there may be some mucosal damage in patients during cholera. In addition, there is a series of derangements of gut hormones during this illness which was defined.

7. Other studies. Full reports were published on the effectiveness of oral rehydration in rotavirus patients (Table 11) and comparison of

glucose- and sucrose-based solutions in children with cholera (Figure 10).

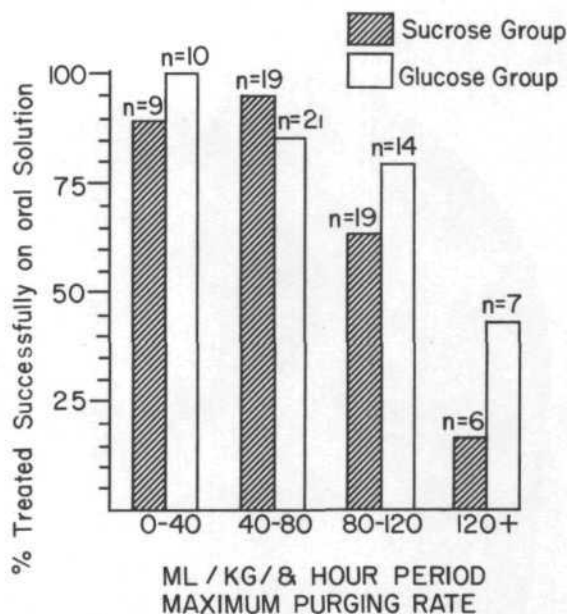


Figure 10: Association of purging rate with oral solution success rate in children with cholera-like diarrhoea.

A comparison of accuracy and sensitivity of methods for recognising *E. histolytica* was reported (Table 12). This allows a choice of tests with knowledge of these sensitivities in hospital and field settings.

A higher death rate in diarrhoea due to invasive organisms such as *Shigella*, even with ORS therapy (Table 13), has led to an increase in research emphasis on these more refractory diseases.

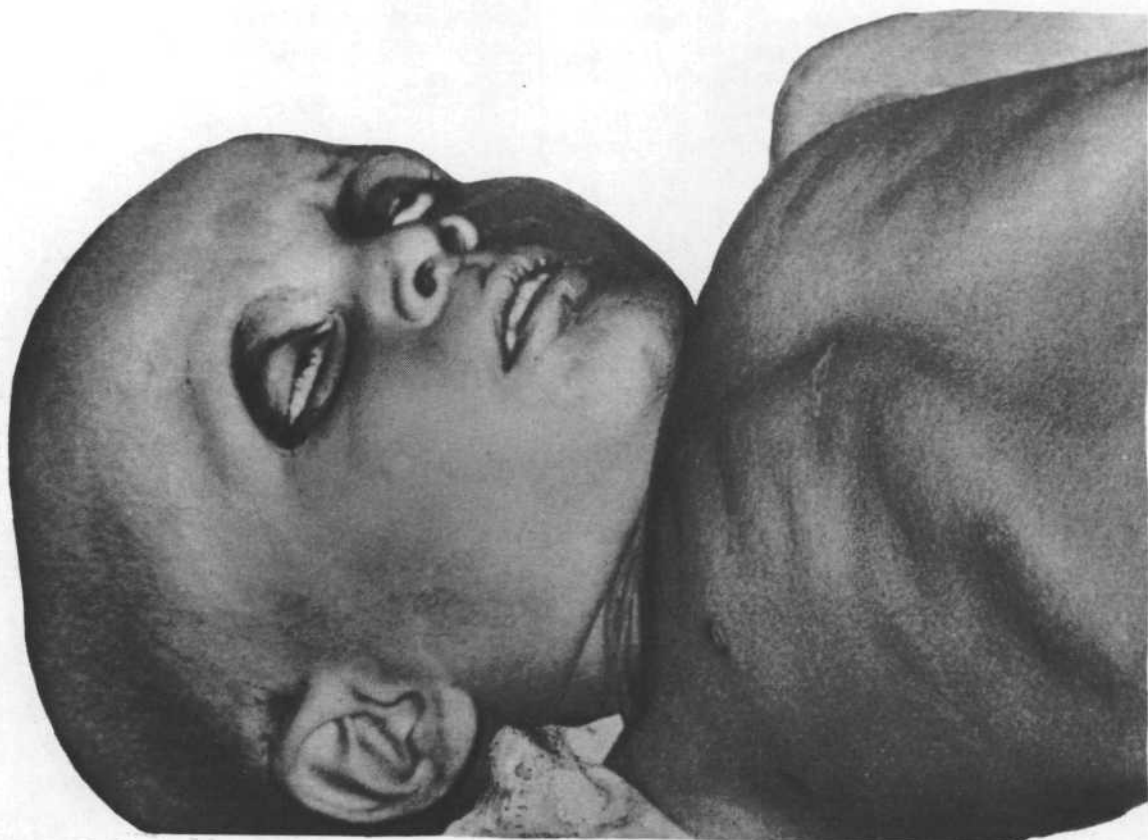
TABLE 11

FREQUENCY OF ORAL REHYDRATION SUCCESSES BY DEHYDRATION STATUS IN ROTAVIRUS CASES

Dehydration	No. cases	Successes with oral treatment	
		No.	%
None	121	119	98
Slight	76	69	90
Moderate/severe	19	17	90

Success rate higher in group with no dehydration than in those with slight, moderate, and severe dehydration ($\chi^2=6.73$, $P<0.01$).

C. Branches. The hospital and treatment centre are under the supervision of the Head of the Pathogenesis and Therapy Programme. A total of 98,586 patients was treated during 1980, of which 0.57 percent were admitted for clinical research studies in the study ward, 3,094 patients, or 3.14 percent were admitted to the general ward with serious complications of diarrhoea. The vast majority of patients, 66,015, was treated on an ambulatory basis with ORS packets while 28,920 were cared for in the treatment centre. Forty-seven patients were brought dead to the treatment centre and



A severely dehydrated young girl.

The same girl several hours later after receiving oral rehydration therapy.

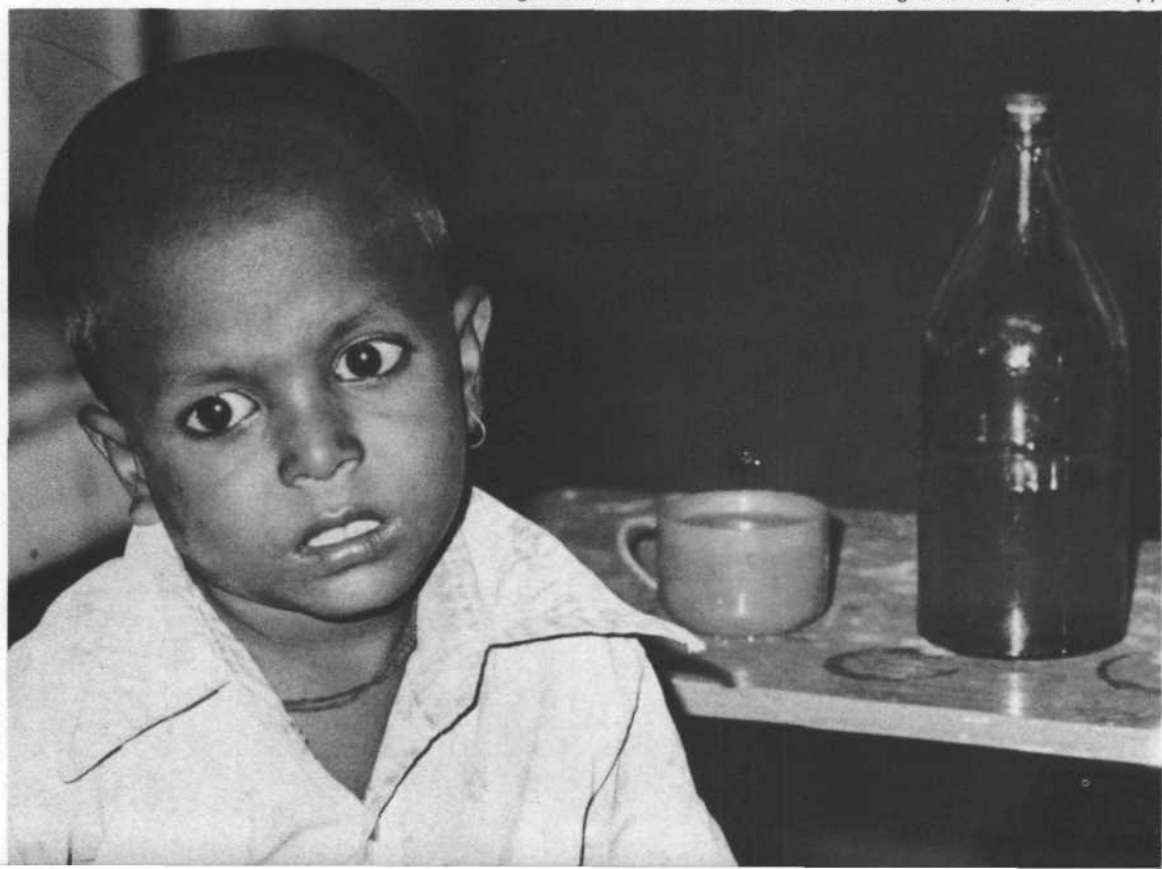


TABLE 12

IDENTIFICATION OF AMOEBAS IN ETHANOL-FIXED RECTAL BIOPSIES STAINED BY FIVE DIFFERENT TECHNIQUES

	Number of biopsies positive for amoebas				
	Total	Direct FA	PAS	H&E	PTAH
Acute amoebic dysentery before treatment	19	16(84%)	14(74%)	11(58%)	10(53%)
Nonamoebic colitis	8	0	0	0	0
P-value (Chi-square)		0.1	0.1	0.1	0.05

FA=Fluorescent antibody test; PAS=Periodic acid Schiff; Trichrome=Masson's trichrome stain; PTAH=Phospho-tungstic acid hematoxylin

TABLE 13

ORAL REHYDRATION FAILURES BY DEHYDRATION STATUS OF PATIENTS* WITH ROTAVIRUS-ASSOCIATED DIARRHOEA TREATED WITH ORAL SOLUTION

Dehydration Status	Oral Rehydration Solution					
	Glucose			Sucrose		
	No. of Failures		Cases	No. of Failures		Cases
	No.	%		No.	%	
None to mild	217	14	6.5	201	22	10.9
Moderate to severe	42	5	11.9	33	5	15.2
Total	259	19	7.3	234	27	11.5

*Includes only patients with diarrhoea while hospitalised.

24 patients died during treatment. Counting those patients brought dead, the mortality rate was less than 0.8 percent. There were 340 deaths among patients with complications admitted into the general ward—a mortality rate of nearly 11 percent. The treatment continued to be principally done by nurses and paramedical staff in the treatment centre while doctors treated patients with complications and the clinical research patients.

TRAINING AND

EXTENSION BRANCH



TRAINING AND EXTENSION



Inter-regional Training Course on Diarrhoeal Disease: Clinical Aspects field training at Matlab.

A. Introduction. The Training and Extension Branch expanded its activities in 1980. ICDDR,B staff members studied in Bangladesh and abroad to bring new information and skills back to the Centre which in turn trained others through courses, seminars, lectures and training programmes. These were attended by national and international participants and led by people from Bangladesh and other countries. Collaborative research programmes have grown as well, with ICDDR,B researchers studying abroad, and international researchers studying at ICDDR,B. Several programmes were set up to facilitate this information exchange.

During 1980, three existing fellowships at ICDDR,B were extended: one in Microbiology and two in Nutrition. Two one-year fellowships were granted: one each in Clinical Epidemiology and Clinical Research. One Nutrition fellowship was completed and one Clinical Research fellowship was terminated.

Twenty-two post-doctoral trainees came to ICDDR,B from nine countries: six from India, four from Thailand, three from Egypt and Japan, two from Indonesia and one each from Philippines, Sudan, United States and Vietnam. The trainees attended 14 courses: eight on the management of diarrhoea including cases which occur in institutions and at home, two on cholera immunology and epidemiological trends, two on paediatrics, one on urban epidemiology and diagnostic procedures involving virology and viral diarrhoea, and one on social medicine, biostatistics and community health.

Pre-doctoral trainees numbered 18, and came from Sri Lanka (12), Republic of Maldives (3), United States (2) and United Kingdom (1). Six training sessions were held: three on clinical, community and rural health diarrhoeal disease control programmes, one on socioeconomic and cultural factors in transmission and contraction of diseases in Bangladesh, one on the use of vital records in field studies, and one on epidemiology and microbiological aspects of different diarrhoeal diseases.

ICDDR,B's national training programme consisted of eight courses: four on management and control of diarrhoea; two on the aetiology, pathophysiology, treatment and epidemiology of diarrhoeal diseases; one on paediatric diarrhoea, elementary chemistry and oral therapy, pathophysiology of diarrhoeal diseases, *E. coli* diarrhoea and microbiological aspects of diarrhoeal diseases; and one orientation course for Female Village Workers (FVWs) from Matlab. Two hundred ninety-one people participated from six sources: FVWs from Matlab (110), Dacca Medical College students (90), FVWs from Comilla (59), staff from BRAC (14) and NIPSOM (12), and doctors from IPGM&R (6).

Two hundred paramedics from 12 organisations attended 17 courses on the treatment of cholera. Nineteen courses on cholera treatment were held to train 938 medical students from six medical colleges.

The ICDDR,B staff development programme sent 18 staff members to seven countries for various programmes for one-month to four-years duration. Nine of these staff members were funded by ICDDR,B grants, four received funds from the British Council, and five benefited from scholarships or fellowships from other sources. Five trainees went to the United Kingdom, four to Thailand, three each to Australia and the United States, and one each to Belgium, Denmark and Yugoslavia.

Twenty-nine ICDDR,B staff members attended courses at six Bangladeshi institutions in accounting, anthropology, computer programming, housekeeping, inventory control, office management, personnel management, plumbing and air conditioning, and secretarial science.

B. Research training. Upon the satisfactory completion of a one-year fellowship in Microbiology, Mrs. Khaleda Haider's fellowship was extended for a second year effective 1 March 1980, supervised by Dr. Imdadul Huq. Her protocol is entitled "Microbiological, Biochemical and Anthropometric Correlates

of Children with Altered Nutrition during Bacillary Dysentery."

Mr. Zahid Mozaffar, a fellow in Nutrition, was extended for a third year effective 25 October 1980, supervised by Dr. Ayesha Molla. Mr. Mozaffar has been working on fat absorption and nitrogen estimation in food and stool samples, and has been doing xylose absorption for all the patients recruited for a food absorption study

Dr. Mohd. Shafiqul Alam Sarkar, fellow in Nutrition, completed his one-year fellowship and was extended for another year effective 1 November 1980. Dr. Sarkar has been working under the supervision of Dr. A.M. Molla and assisting him as co-investigator for Dr. Molla's food absorption study.

Dr. Md. Moshaddeque Hossain was awarded a one-year fellowship in Clinical Epidemiology beginning 15 February 1980, which can be extended. He was the principal investigator for a pilot study entitled "Distribution of Intestinal Parasites in Patients attending the Matlab Diarrhoea Treatment Centre, February–August

1977." He is under the supervision of Dr. Roger Glass and assisted him in the Addendum to the protocol entitled "Epidemiologic and Clinical Studies of Multiple Antibiotic Resistant Vibrios in Matlab."

A one-year fellowship in Clinical Research was awarded to Dr. Syed Masud Ahmed on 1 September 1980 to be supervised by Dr. Rafiqul Islam, Chief Physician. He has been concentrating on training to identify a research programme and draw up research protocols.

At the end of one year, the Nutrition fellowship of Mrs. Mahmuda Huda was completed effective 30 March 1980.

The Clinical Research fellowship of Dr. Momtaz Hossain was terminated effective 11 March 1980 upon resignation.

C. Technical and applied training. During 1980 a number of special courses on technical aspects usually related to practical experiences with clinical or laboratory procedures were organised by ICDDR,B. The following is a summary of these courses:

Dr. Doan Ngoc Anh from Vietnam working in the ICDDR,B laboratory.



1. International post-doctoral trainees.

<u>Trainee</u>	<u>Institution</u>	<u>Area of Interest</u>	<u>Period of Study</u>	<u>Supervisor</u>
Dr. Arun Ranjan Pal	Health Directorate Bhubaneswar, Orissa India	Management of diarrhoeal diseases both institutional and domiciliary with emphasis on oral rehydration; epidemiological studies of diarrhoeal disease outbreak, laboratory diagnosis of diarrhoeal diseases	4 December 1979- 31 January 1980	Dr. Hasan Ali
P.S.K.P. Raju	Public Health Laboratory State Headquarters Hospital, Aizawl, Mizoram India			
Mr. M. Swain	Cuttack, At-City Hospital, Orissa India			
Dr. Doan Ngoc Anh	National Institute of Hygiene and Epidemiology, Hanoi Vietnam	Urban epidemiology and diagnostic procedures in- volving virology and viral diarrhoea.	8 January- 19 February 1980	Dr. M.U. Khan Dr. Md. Yunus
Dr. Dennis R. Labayan	International Institute of Rural Reconstruction Silang, Cavite Philippines	Management and treat- ment of diarrhoeal diseases	11 January- 23 February 1980	Dr. M.U. Khan Dr. Md. Yunus
Dr. H.N. Dutta	Holy Family Hospital New Delhi India	Routine procedures for diarrhoeal diseases	11-16 March 1980	Dr. I. Huq
Mr. Chanin Chareonkul Dr. Anek Hirunraks Mr. Somsak Pinyotanmakorn Dr. Samrerug Yanggratake	Mahidol University Bangkok Thailand	Social medicine, bio- statistics, community health	25 March- 8 April 1980	Dr. S. D'Souza
Dr. T. Ginting	Subdit Kholera & G.E. Jakarta Indonesia	Management and control of diarrhoeal diseases at ICDDR,B, Dacca and Matlab	5-16 May 1980	Dr. M.U. Khan Dr. Md. Yunus

<u>Trainee</u>	<u>Institution</u>	<u>Area of Interest</u>	<u>Period of Study</u>	<u>Supervisor</u>
Dr. Anant Kumar Vyas	Medical & Health Services, Jaipur Rajasthan India	Recent trends in the epidemiology of cholera, biomedical research	4 May-4 July 1980	Dr. M.U. Khan
Dr. M. Mitsuyama 2 students	Kyushu University Fukuoka Japan	Management and control of diarrhoeal diseases and other tropical diseases	18-27 August 1980	Dr. L.N. Mutanda
Dr. Alibasah Matakoesoemah Dr. Susanto Soedarsono	Bandung Indonesia Subdit Kholera & G.E. Jakarta Indonesia	Management and control of diarrhoeal diseases	1 September-31 October 1980	Dr. A. Eusof Dr. Md. Yunus
Prof. Ibrahim Elaraby Miss Mariam Haggag Soliman	University of Alexandria Children's Hospital Alexandria Egypt	Oral rehydration in the treatment of diarrhoeal diseases	20-30 October 1980	Dr. A.M. Molla
Dr. Subra Rao	Institute of Preventive Medicine, Hyderabad India	Cholera immunology	6 November 1980-6 March 1981	Dr. Shahjahan Kabir
Dr. Irma Fiordalisi	Montefiore Hospital and Medical Center, New York New York U.S.A.	Clinical paediatrics	9 November-10 December 1980	Dr. M.M. Rahaman
Dr. Abdel Rahman Hussein El-Mufti	Khartoum Teaching Hospital, Khartoum Sudan	Paediatric gastroenterology	15-23 December 1980	Dr. M.U. Khan
Prof. Ahmed Samir Kassem	University of Alexandria Children's Hospital Alexandria Egypt	Oral rehydration and treatment of diarrhoeal diseases	22-31 December 1980	Dr. A.R. Samadi Dr. R.L. Akbar

2. International pre-doctoral trainees.

<u>Trainee</u>	<u>Institution</u>	<u>Area of Interest</u>	<u>Period of Study</u>	<u>Supervisor</u>
Mr. Steven Guest	Montgomery, Alabama U.S.A.	Use of vital records, participation in field studies, work on on-going projects	5 November 1979- 8 February 1980	Dr. R. Glass
Mr. Peter Schaiberger	School of Public Health University of Michigan Ann Arbor, Michigan U.S.A.	Socioeconomic and cultural factors in the transmission and contraction of diseases in Bangladesh	May-September 1980	Dr. M.M. Rahaman
Mrs. R.P.C. Fernando Mr. G. Kannangara Mr. M.I.M. Moorly Mrs. K.K.D.S.P. Ranaweera Mr. D.S. Sandanayake Mrs. Augustina Senaratus	National Institute of Health Services, Kalutara Sri Lanka	Rural health programme, techniques of management and control of diarrhoeal diseases	16-17 June 1980	Dr. A. Eusof
Mr. Ismail Fulu Mr. Md. Saeed Mr. Md. Shaheed	Public Health Division Ministry of Health Republic of Maldives	Community health care diarrhoeal diseases control programme	23 June- 18 July 1980	Dr. A. Eusof
6 WHO fellows	Sri Lanka	Epidemiology and microbiological aspects of different diarrhoeal diseases including practical work on OPD and oral rehydration development	21-24 November 1980	Dr. A. Eusof Dr. Md. Yunus
Mr. Afzal Hossain	London School of Medicine, London United Kingdom	Clinical management of diarrhoea, complications of diarrhoeal diseases	December 1980	Dr. A.M. Molla

D. National training. Training also has been provided, usually for shorter durations, in a number of areas on request from other organisations in Bangladesh. The following is a list of these courses:

<u>Trainee</u>	<u>Institution</u>	<u>Area of Interest</u>	<u>Period of Study</u>	<u>Supervisor</u>
6 doctors	Institute of Post-graduate Medicine and Research, Dacca	Paediatric diarrhoea, elementary chemistry and oral therapy, pathophysiology of diarrhoeal diseases, <i>E. coli</i> diarrhoea and microbiological aspects of diarrhoeal diseases	10-12 March 1980	Dr. A.M. Molla
12 DPH students	NIPSOM, Dacca	Management and control of diarrhoeal diseases	18 March 1980	Dr. Md. Yunus
110 FVWs	ICDDR,B, Matlab	Orientation course	29 September-12 November 1980	Dr. Abu Eusof
59 students	FVW Training Institute Comilla	Diarrhoea management, oral rehydration, nutrition, laboratory diagnosis, family planning methods	10-28 November 1980	Dr. Abu Eusof
7 supervisory staff members	BRAC, Dacca	Management of diarrhoeal diseases	22 December 1980	Dr. Abu Eusof
45 final year medical students	Dacca Medical College	Aetiology, pathophysiology, treatment and epidemiology of diarrhoeal diseases	24 December 1980	Dr. Abu Eusof
7 supervisory staff members	BRAC, Dacca	Management of diarrhoeal diseases	27 December 1980	Dr. Abu Eusof
45 final year medical students	Dacca Medical College	Aetiology, pathophysiology, treatment and epidemiology of diarrhoeal diseases	29 December 1980	Dr. Abu Eusof

1. Paramedical training in treatment of cholera.

<u>Organisations</u>	<u>Trainees</u>	<u>Courses</u>	<u>Months</u>	<u>Days</u>
Paramedical Institute	61	3	1	
NIPSOM	2	1	3	
Defense Science Organisation	2	1	1	
Village Education Resource Center	1	1	1	
Bangladesh Air Force	1	1	1	
American International School	25	3	1	
NORP	2	1		9
AMICMB (Bangladesh Air Force)	44	1		1
Family Welfare Worker Students	21	1		1
Radda Barnen	1	1		15
New Life Centre	19	2		1
NIPORT	21	1		1

2. Medical students training in treatment of cholera.

Dacca Medical College	278	10	1
Rangpur Medical College	117	1	1
Rajshahi Medical College	232	3	1
IPGM&R	25	3	4
Barisal Medical College	104	1	1
Chittagong Medical College	182	1	1



Messrs. Fulu, Saeed, and Shaheed from the Republic of Maldives visiting the Dacca Treatment Centre.

E. Collaborative training.

1. Workshops, courses and seminars. Between 15 and 21 November 1980, a workshop on Medical Education in Diarrhoeal Diseases was sponsored and hosted by ICDDR,B with organisational help from the Government of the People's Republic of Bangladesh. This workshop convened people from medical colleges and health programmes in Bangladesh to develop a sound theoretical and practical curriculum for medical colleges in Bangladesh and neighbouring countries.

Between 8 and 19 December 1980 an inter-regional course on Diarrhoeal Disease: Clinical Aspects was conducted at ICDDR,B in collaboration with WHO. Doctors who treat diar-

rhoea in hospitals and who also train National Health Workers participated to increase their competence in these two areas and thereby support these two elements of national programmes on Diarrhoeal Diseases Control. Participants came from Burma, China, Fiji, India, Indonesia, Laos, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. The faculty members were from WHO; Harvard University School of Public Health; Johns Hopkins University; University of Göteborg; Kothari Centre of Gastroenterology, Calcutta; National Institute of Cholera and Enteric Diseases, Calcutta; Directorate of Health Services, Dacca; and ICDDR,B.

During 1980 ICDDR,B organised the following seminars in conjunction with the Bangladesh Society of Microbiologists (BSM):

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. K.M.S. Aziz Associate Director Training & Extension ICDDR,B Mohakhali Dacca	Experience of the Recently Concluded GIAM-VI Conference at Lagos, Nigeria	5 October 1980
Dr. M. Sujayetullah Chowdhury Department of Food & Dairy Technology Faculty of Agriculture University of Basrah Basrah Iraq	Microbiological Safety of Foods	6 November 1980
Prof. J.K. Battacharjee Professor Department of Microbiology Miami University Oxford, Ohio U.S.A.	Role of Nutrition using Mouse Models	24 December 1980

2. Other collaborative programmes.

ICDDR,B has a collaborative programme with Professor Rita R. Colwell, Department of Microbiology, University of Maryland, Baltimore, Maryland, U.S.A. on characterisation of *V. parahaemolyticus* and non-agglutinable vibrios isolated from aquatic environments of Bangladesh. Mr. Anwarul Huq of ICDDR,B has been doing research for a Ph.D. thesis at the University of Maryland and in April 1980 Mr. Huq, accompanied by Ms. Elaine Remmer, visited Dacca to collect samples in Matlab and Teknaf. Dr. K.M.S. Aziz is a member of the Committee for Mr. Huq's doctoral programme along with other faculty members of the University of Maryland. Dr. K.M.S. Aziz and Dr. Imadul Huq of ICDDR,B visited the University of Maryland to discuss the progress of this research.

A collaborative research programme was established with Dr. B. Rowe and Dr. J. Threlfall on the multiple antibiotic resistant *V. cholerae* isolated in the ICDDR,B laboratory. Dr. Rowe is also collaborating with the laboratory on the serotyping of *E. coli* strains isolated from two studies done in Dacca and Matlab.

ICDDR,B set up a collaborative programme with Professor S. Falkow of the University of Washington, Seattle, Washington, U.S.A. on simpler methods of isolating *E. coli* LT and ST by DNA hybridisation techniques. The pilot work is completed and a full protocol is under way.

To study Zoonotic Diseases, ICDDR,B started a collaborative programme with the Department of Medicine and Surgery, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh, concentrating

on the incidence of diarrhoeal disease in domestic animals. Dr. N.C. Devnath will be working on this project.

When the University of Dacca opened the Department of Microbiology, ICDDR,B offered both theoretical and practical exercises to the students of the newly established department. Dr. K.M.S. Aziz taught a course on Environmental Microbiology in collaboration with Dr. M.R. Khan of Dacca University, while a similar course on immunology was offered by Dr. Shahjahan Kabir. The laboratory exercises were conducted in the ICDDR,B Training Laboratory.

Two students, Mr. Haroon-ur-Rashid and Mrs. Naima Ahmad, worked on their Masters theses at the Centre. Mr. Haroon-ur-Rashid studied environmental microbiology under the guidance of Dr. K.M.S. Aziz while Mrs. Naima Ahmad, supervised by Dr. Shahjahan Kabir, studied neuraminidase production by *V. cholerae* and some diarrhoeagenic enteric bacteria.

Dr. M. Imadul Huq, Head of the ICDDR,B Microbiology-Immunology Branch, was invited to deliver lectures to the students of the Institute of Nutrition and Food Science, Dacca University.

On request from the Government, three of the ICDDR,B research personnel spent part of their time training paramedical students. Lectures were delivered at the Paramedical Institute, Dacca, by Messrs. M.A. Wahed, A.K.M. Golam Kibria and Mofizuddin Ahmed in the areas of Biochemistry, Microbiology and Clinical Pathology, respectively; each gave one lecture per week.

F. ICDDR,B staff development. Under its staff development programme, ICDDR,B has encouraged staff members to increase their skills and knowledge. Promising and motivated staff members who received training during 1980 are listed here:

1. Advanced staff development.

<u>Staff Member</u>	<u>Funding Institution</u>	<u>Degree, Institution</u>	<u>Period of Study</u>
Dr. Ansaruddin Ahmed	Post-graduate training fellowship from Australian Development Assistance Bureau	Department of Microbiology and Immunology, University of Adelaide, Adelaide Australia	1979-1981
Dr. Asma Islam	ICDDR,B	M.P.H., Harvard School of Public Health, Boston Massachusetts U.S.A.	September 1979-February 1980
Dr. G. H. Rabbani Dr. A.S.M. Mizanur Rahman	ICDDR,B British Council, Dacca	M.Sc., Community Health in Developing Countries London School of Hygiene and Tropical Medicine, London United Kingdom	October 1979-October 1980
Mr. Shafiqul Islam	British Council, Dacca	Population Studies, London School of Hygiene and Tropical Medicine, London United Kingdom	January-May 1980
Mr. Anwarul Huq	University of Maryland scholarship	Ph. D., Microbiology, University of Maryland College Park, Maryland U.S.A.	January 1980-December 1983
Mr. Makhlisur Rahman	ICDDR,B	Ph. D., Australian National University, Canberra Australia	1 March 1980-1 March 1981*

*Subject to extension on annual evaluation.

<u>Staff Member</u>	<u>Funding Institution</u>	<u>Degree, Institution</u>	<u>Period of Study</u>
Miss Rita Baidya	Organising Committee, International Conference of Nurses	International Conference of Nurses, Copenhagen Denmark	June 1980
Mr. Shamsul Islam Khan	ICDDR,B	International Conference on Information and Communication Services, Belgrade Yugoslavia	August 1980
Dr. M.H. Munshi	ICDDR,B	Public Health General Programme, Harvard School of Public Health, Boston Massachusetts U.S.A.	August 1980- August 1981
Mr. Mizanur Rahman	Belgian Government scholarship	M.A., Demography, Vrije Universiteit, Brussels Belgium	August 1980- August 1982
Ms. Momtaz Khandokar Ms. Makhduma Khatoon Mr. M.A. Rahim Mrs. Anita Stephen	ICDDR,B	Nutrition and Metabolic Studies, Chiangmai Thailand	September- November 1980
Mr. P.K.B. Neogi	Post-graduate fellowship from British Council, Dacca	Department of Immunology University of Birmingham Birmingham United Kingdom	September 1980- September 1981
Mr. A.R.M. Abdul Alim	British Council fellowship	Bacteriology-Enteric Pathogens, Central Public Health Laboratory, London United Kingdom	December 1980- December 1981

<u>Staff Member</u>	<u>Funding Institution</u>	<u>Degree, Institution</u>	<u>Period of Study</u>
Mr. M.A. Kashem Shaikh	Training fellowship from Australian National University	M.A., Demography, Australian National University Canberra Australia	March 1981 - March 1982

2 In-country staff development.

<u>Staff Member</u>	<u>Institution</u>	<u>Area of Study</u>	<u>Period of Study</u>
Dr. G.H. Rabbani	Bangladesh University of Engineering and Technology, Dacca	Computer programming	26 January - 9 February 1980
Ms. Taj Farhana Khan Mrs. Probashi Mahmud	Rapport Bangladesh, Ltd., Dacca	Office management and communication	February-March 1980
Mr. Md. Shahidullah Khan Mr. Nazmul Ahsan	Bangladesh Shatlipi Academy, Dacca	Secretarial science	February-April 1980
Mr. Abul Hashem Mr. Bazlur Rahman	Rapport Bangladesh, Ltd., Dacca	Accounting for mid- and junior-level executives	29 February - 30 April 1980
Mr. M.A. Jabbar	Rapport Bangladesh, Ltd., Dacca	Personnel management	15 May-10 July 1980
Mr. S.M. Hossain	Bangladesh Porjatan Corporation, Dacca	Housekeeping	June-August 1980
18 persons from ICDDR,B Maintenance Branch	Dacca Polytechnic Institute, Dacca	Plumbing, air conditioning and refrigeration	2 June - 1 October 1980
Mr. A'K.M. Abdul Matin	Rapport Bangladesh, Ltd., Dacca	Inventory control and stores management	1 September - 30 October 1980
Mr. K.M.A. Aziz	Institute of Bangladesh Studies Rajshahi University, Ph.D. in Anthropology	Sex socialisation and philosophies of life in relation to fertility behaviour - an anthropological approach	October 1980

G. Extension activities. During 1980 a number of extension activities formed the base for research and training. The following is a summary of such activities:

1. National

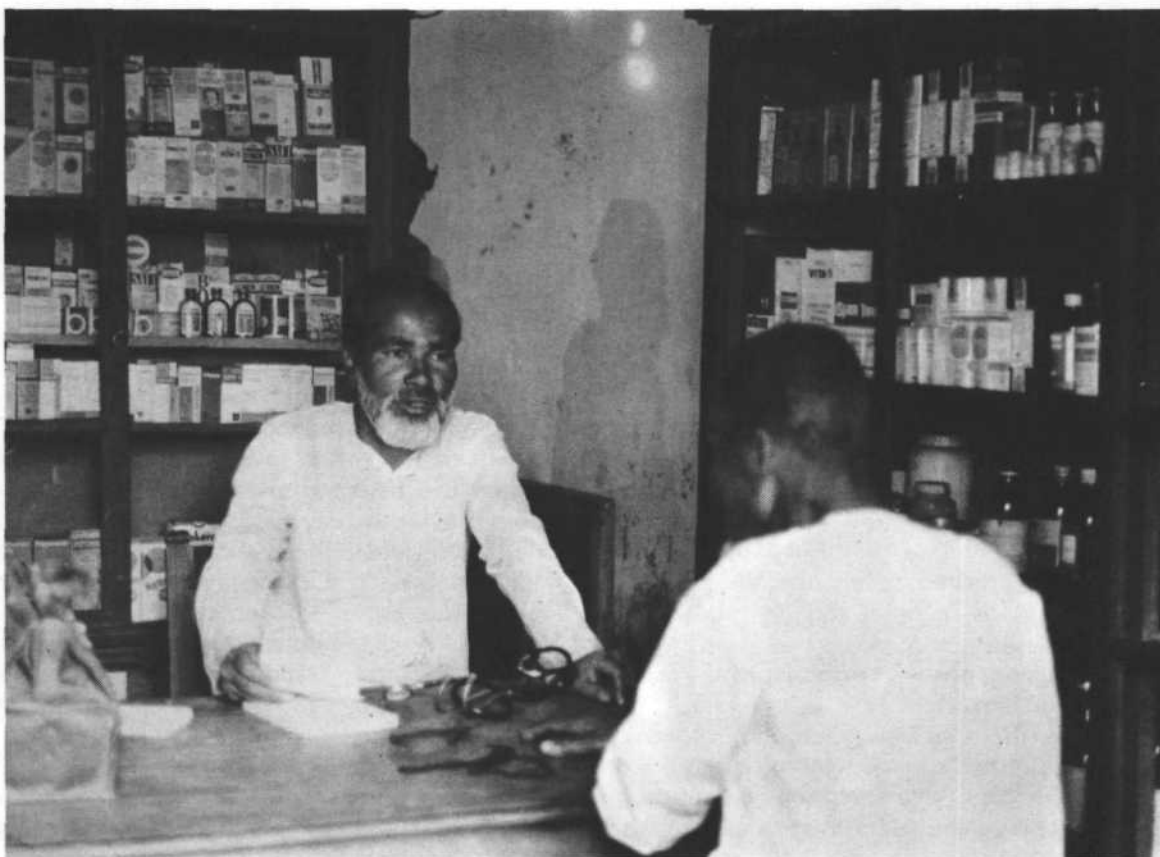
a. Community training project: Chandpur

This project was to find suitable and effective community groups to be trained in oral rehydration, and the most effective way to train such groups to result in wide acceptance and use of oral rehydration for diarrhoea management.

Village practitioners, family members/mothers and volunteers were identified as such groups, and different combinations of these groups were trained in five zones of the project area of approximately 30,000 people. Village practitioners and volunteers were trained through lectures and practical demon-

strations on case management. Family members/mothers in two zones were trained at home by field workers who demonstrated the preparation and use of ORS and reinforced the training through follow-up visits to the family. In one zone the family members/mothers were not directly trained by the field workers; instead, posters and pamphlets indirectly supplemented with distribution of special measuring spoons were used to train the group. Following the training, activities in the field were monitored by field surveillance and weekly reports from the trained village practitioners.

Subject matter for training consisted primarily of diarrhoea treatment using ORS prepared with locally available salt and sugar. The village practitioners were also given basic training in the use of intravenous rehydration with appropriate solutions for moderately severe and severe dehydration.



A Chandpur village practitioner.

In a one-year period after training, 5,898 diarrhoea cases were treated in the whole area, with an overall ORS use rate of 60 percent (range 36-80 percent). Case fatality was 0.38 percent, only two percent of the cases had to be hospitalised and 87 percent were cured.

A total of 113 practitioners was enrolled in the training course. About 83 percent of them practice allopathic medicine, the rest practice homeopathic or indigenous medicine in addition to allopathic medicine. Very few (12 percent) had some formal medical education, but more than 70 percent had a secondary level general education. More than 60 percent had been practising for ten years or more. About 40 percent attended patients from six to ten villages; 44 percent received patients from three to five villages; while only 15 percent received patients from more than ten villages. Overlapping areas of practice were common. The treatment of diarrhoea was limited to only six to ten diarrhoea cases per month.

About 30 to 35 percent of the trained practitioners reported having treated over 10,000 diarrhoea cases inside and outside the 22 project villages during one year after training. About 84 percent of the patients treated by the village practitioners received only ORS. Use of I.V. fluid was restricted to severely and moderately dehydrated cases (27 percent). Success rate of treatment by practitioners was about 99 percent, only one percent were referred to hospital and case fatality was only 0.08 percent.

Within the project area, village practitioners treated 17 percent of all diarrhoea cases whereas individually trained family members/mothers attended 50 percent of the diarrhoea cases. Family members/mothers in one area who were trained using posters, pamphlets and spoon distributions treated 67 percent of all diarrhoea patients in that area. Volunteers contributed very little to diarrhoea management in any of the areas. Though village practitioners contributed only 17 percent of diarrhoea treatment, their output was greater in adjoining areas outside the project area where no other trained persons

were available. They also handled more severely dehydrated cases which were not able to be treated by other groups.

Distribution of posters, pamphlets and measuring spoons appears to promote better acceptance and use of oral rehydration by family members/mothers in the community but time and perseverance are needed to achieve the desired level of acceptance and use. For quick and wide use of oral rehydration therapy at minimum cost and effort, the training and use of village practitioners appears to be a good strategy.

Ideally, a combined training programme for village practitioners with family members/mothers using pamphlets, posters, and measuring spoons, should achieve highly satisfactory results in a community-based diarrhoea management programme. Use of locally available ORS ingredients, independent of an outside supply system, should also be fruitful.

b. Epidemic aid. Reports of diarrhoeal disease epidemics were received from different parts of the country, and on request from the Government, ICDDR,B sent investigation teams to the affected areas: Ulipur, Tangail, Hajiganj, Faridganj and Chandpur in three districts of Bangladesh.

The teams consisted of physicians and a microbiologist. The immediate aim of the team was to provide assistance to local health staff to reduce high diarrhoea mortality during the epidemic. This was done by training on diarrhoea management using oral rehydration in the field and setting up surveillance and case follow-up systems. The teams carried out epidemiological and bacteriological investigations and prepared detailed reports of the outbreaks, including recommendations to the health authorities regarding possible preventive measures that could be taken in the future.

2. International. Dr. A.M. Tomkins from the London School of Hygiene and Tropical Medicine was at ICDDR,B for three weeks in January 1980. During this time he developed a

INTER-REGIONAL TRAINING COURSE

IN DIARRHOEAL DISEASES CONTROL-CLINICAL ASPECTS

DEC. 8-20, 1980



Opening Session of the Inter-regional Training Course. Dr. W.B. Greenough III, Director, ICDDR,B; Professor M.A. Matin, Minister of Health and Population Control, Government of the People's Republic of Bangladesh; Mr. Michael Hyland, Deputy Resident Representative, UNDP, Bangladesh; Dr. Aung Myat, Public Health Administrator, WHO, Egypt.

paper on oral rehydration therapy training by ICDDR,B with particular regard to the Division of Population Control and Family Planning. His consultancy was arranged through the British Council.

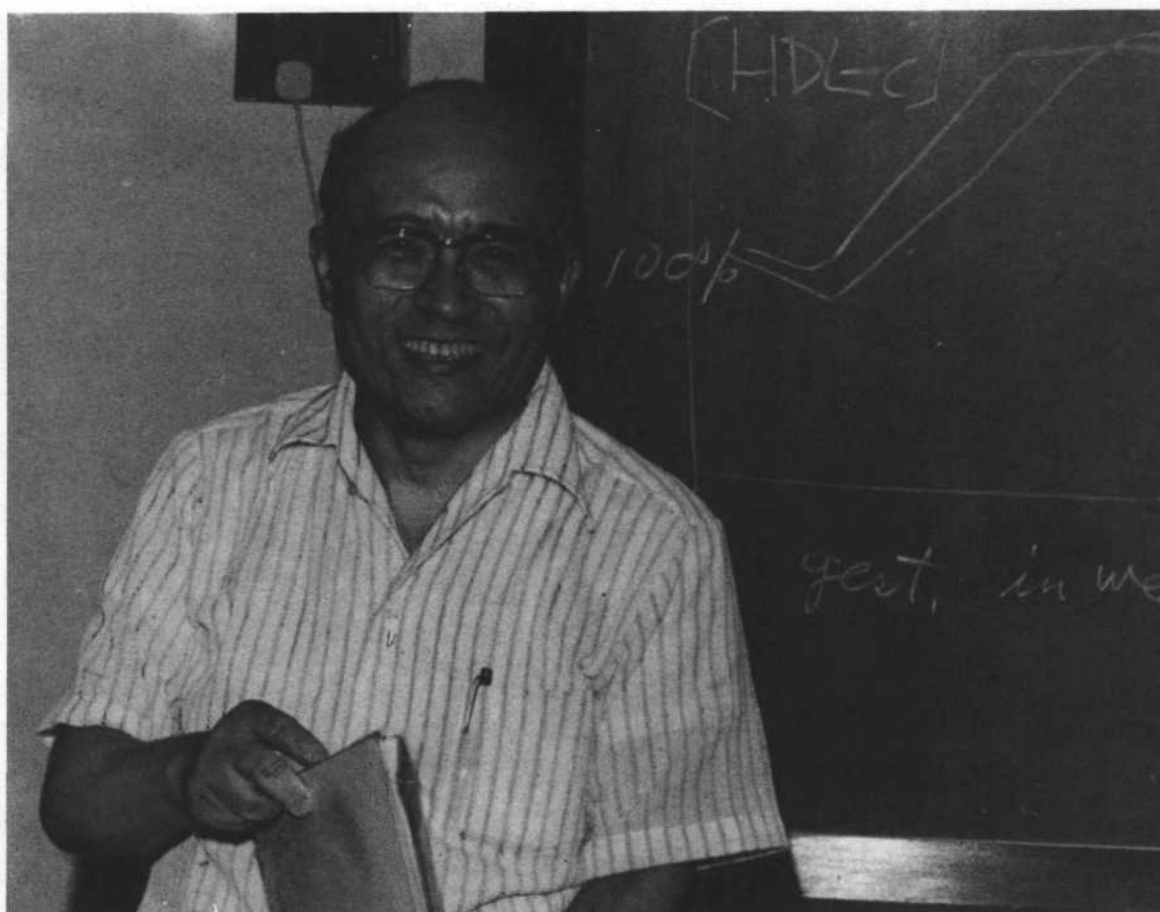
Dr. Richard Cash, a fellow at the Harvard Institute for International Development and the Harvard School of Public Health, arrived at ICDDR,B in December 1979 for four months as

a consultant to the Training and Extension Branch. Dr. Cash worked on the initial phases for the development of three inter-regional courses: 1) Management and Control of Diarrhoeal Diseases: Clinical Aspects; 2) Current Methods of Laboratory Diagnosis of Diarrhoeal Disease; and 3) Monitoring and Evaluating Health Care Services at the Community Level: Special Emphasis on Diarrhoeal Control and Tetanus Immunisation Programmes.

H. **Seminar programme.** During 1980 the following seminars were held in the library/lecture room of the International Centre for Diarrhoeal Disease Research, Bangladesh as a part of the Centre's communication programme.

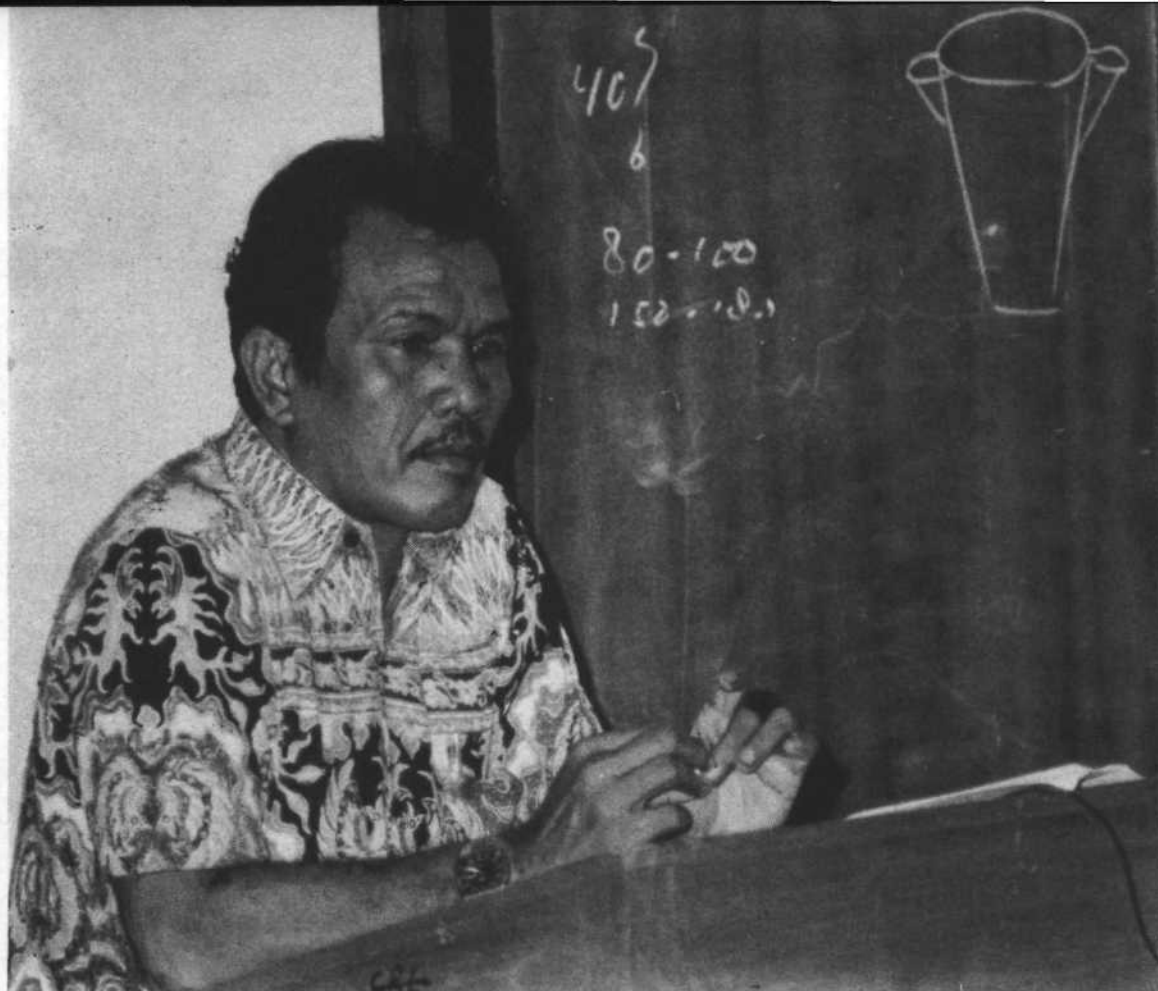
<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. Andrew Tomkins Department of Human Nutrition London School of Hygiene and Tropical Medicine London United Kingdom	Folate Deficiency in Tropical Malabsorption	25 January 1980
Prof. J. K. Kostrzewski Chief, Department of Epidemiology National Institute of Hygiene Warsaw Poland	Changing Patterns of Dysentery in Poland	8 February 1980
Dr. Dennis R. Labayan Specialist Rural Health International Institute of Rural Reconstruction Cavite Philippines	The Role of Health in Rural Development in the Province of Cavite, Philippines, by International Institute of Rural Reconstruction	15 February 1980
Mr. Steven Moseley Department of Micro- biology & Immunology University of Washington Seattle, Washington U.S.A.	Detection of ETEC by DNA Hybridisation	22 February 1980
Prof. M.A. Jalil Additional Project Director Blindness Preventive Programme Dacca Bangladesh	The Use of Water Soluble Vitamin A Injection in the Treatment of Vitamin A Deficiency and Xerophthalmia	29 February 1980
Dr. R. E. Black Center for Vaccine Development University of Maryland College Park, Maryland U.S.A.	Epidemiology of Rotavirus and Enterotoxigenic <i>E. coli</i> Diarrhoea	6 March 1980

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. Taro Inoue The National Institute of Nutrition Toyamacho, Shinjuku-ku Tokyo Japan	Anaemia and Pregnancy	10 March 1980 12 March 1980
Dr. Martin J. Blaser Epidemic Intelligence Officer Enteric Disease Branch Bureau of Epidemiology Center for Disease Control Atlanta, Georgia U.S.A.	<i>Campylobacter Fetus</i> ssp <i>jejuni</i> : A new Enteric Pathogen	21 March 1980



Dr. Taro Inoue from the National Institute of Nutrition, Japan, giving a seminar on Anaemia and Pregnancy.

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. Anek Hirunraks Mr. Chanin Chareonkul Mahidol University Bangkok Thailand	Thailand—An Introduction and Health Profile	2 April 1980
Dr. Tetsuo Morishita Division Gastroenterology Department of Internal Medicine Keio University Tokyo Japan	Endoscopy and GI Hormones in Human Cholera	15 April 1980
Prof. Kieran Burns Department of Physiology University of Galway Galway Ireland	Causes of Birth Defects	25 April 1980
Dr. Michael Rosenberg Family Planning Evaluation Division Bureau of Epidemiology Center for Disease Control Atlanta, Georgia U.S.A.	How Many Subjects Do We Need for a Study?	9 May 1980
Dr. T. Ginting Chief, Section for Rehy- dration in Diarrhoeal Diseases Subdit Kholera & G.E. Jakarta Indonesia	Oral Rehydration Programme in Indonesia	16 May 1980
Dr. Wei Shi-Hua Deputy Director Shanghai Institute of Biological Products Shanghai People's Republic of China	Biological Products Prepara- tion in China	20 May 1980
Mr. Imdadul Huq Head, Microbiology Branch ICDDR,B Mohakhali, Dacca Bangladesh	Microbiological Studies in Children in Riyadh, Saudi Arabia	28 May 1980

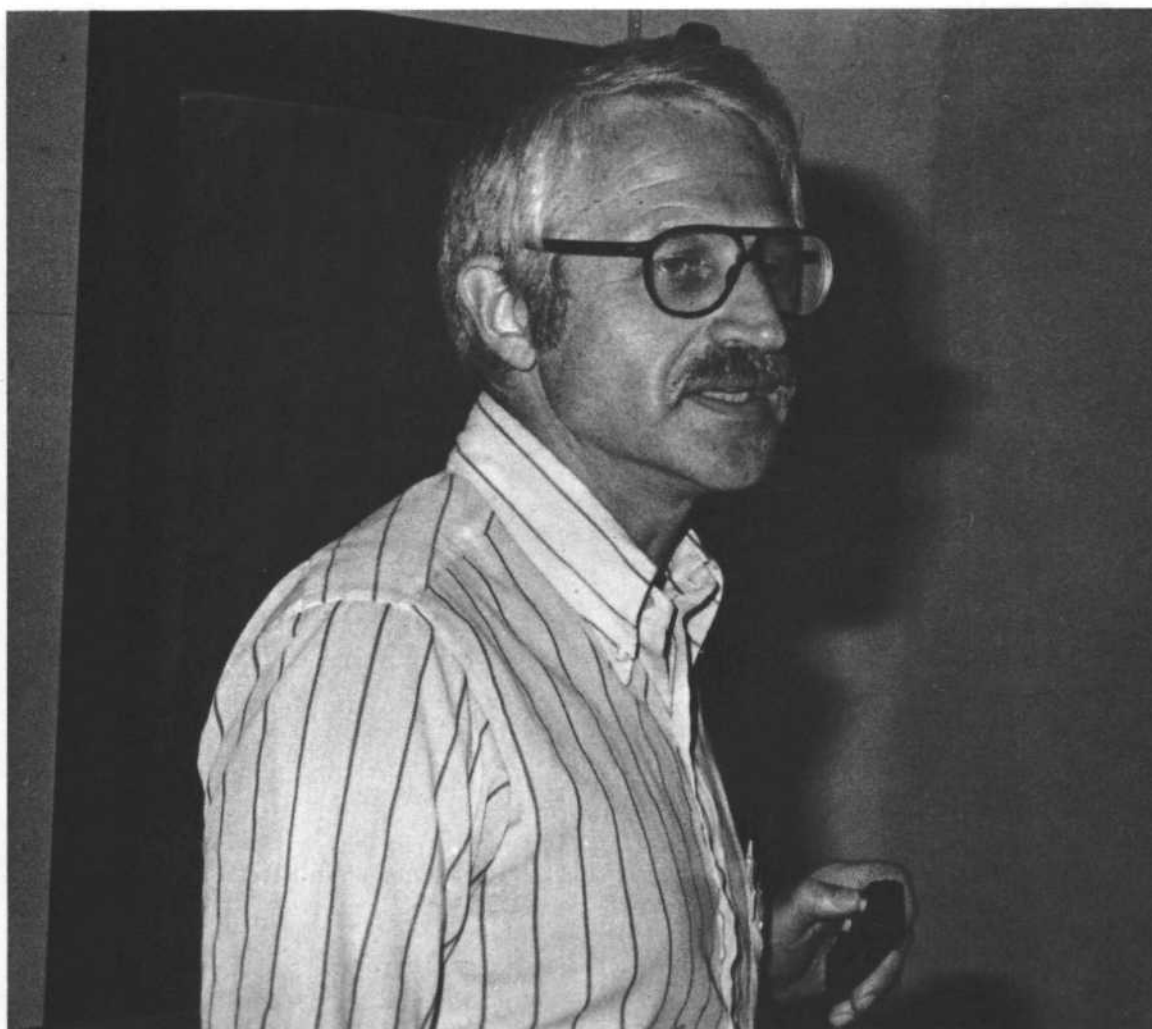


Dr. T. Ginting, International Post-doctoral trainee from Indonesia giving a seminar on Oral Rehydration Programmes in Indonesia.

Dr. Anant Kumar Vyas Medical Officer In-charge Cholera Control Team Jaipur, Rajasthan India	Health Services Delivery in Rajasthan, India	30 May 1980
Ms. Molly Reid British Council Dacca Bangladesh	Materials for Training	13 June 1980
Dr. W.M. Spira Division of Geographic Medicine Johns Hopkins University Baltimore, Maryland U.S.A.	The Temporarily Ligated Rabbit Intestine: A "New" Model for Diarrhoeal Disease Research	20 June 1980
Dr. Ansaruddin Ahmed ICDDR,B Mohakhali, Dacca Bangladesh	Immune Response by Enumeration of IgA Producing Plasma Cells in Inbred CBA Mice after Systemic Transfer of Processed Antigen from Payer's Patches of Mice Primed Orally with <i>V. cholerae</i>	2 July 1980

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. John Cameron Chief, Bacterial Vaccines Institute Armand Frappier Quebec Canada	The Production of Bacterial Vaccines	4 July 1980
Prof. Aziz R. Samadi Chief and Professor of Paediatrics School of Medicine University of Kabul Afghanistan	The Problem of Diarrhoeal Diseases of Children in Kabul	9 July 1980
Dr. Charles L. Aird Director, Management Information Systems Supreme Court of Virginia Richmond, Virginia U.S.A.	Project Management	11 July 1980
Prof. G. Zissis Professor Medical Virology Department of Microbiology Free University of Brussels St. Pierre Hospital Brussels Belgium	Significance of Infectious Agents: As a Cause of Acute Gastroenteritis in Paediatric Practice	16 July 1980
Mr. Mohamed Ismail Fulu Mr. Mohamed Shaheed Mr. Mohamed Saeed Public Health Division Ministry of Health Republic of Maldives	Maldives	17 July 1980
Dr. Shamsuddin Ahmed University of Maryland College Park, Maryland U.S.A.	Organ Culture of Colon— A Model System	18 July 1980
Dr. Roger A. Feldman Chief, Enteric Branch Bacterial Disease Division Bureau of Epidemiology Center for Disease Control Atlanta, Georgia U.S.A.	Human Diseases Caused by Vibrios—Clinical and Epidemiologic Findings	25 July 1980

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Prof. J.F.T. Glassgow Department of Child Health Queens University Belfast Northern Ireland	An Overview of Reye's Syndrome (Toxin Encephalopathy)	6 August 1980
Prof. Irwin Rosenberg Department of Medicine University of Chicago Chicago, Illinois U.S.A.	Faltering Growth Infection and Tropic Enteropathy	7 August 1980



Prof. Irwin Rosenberg giving a seminar on Faltering Growth Infection and Tropic Enteropathy.

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. Rafiqur Rahman Department of Biochemistry Dacca University Dacca Bangladesh	Stimulation of Insulin of the Pyruvate Transporter of Fat Cell Mitochondrion	15 August 1980
Dr. M. Mitsuyama Assistant Professor Department of Microbiology Kyushu University Fukuoka Japan	Contribution of Non-immune Phagocytes to Resistance against Infection	22 August 1980
Dr. A.K.M. Alauddin Chowdhury ICDDR,B Mohakhali, Dacca Bangladesh	Infant Deaths, Determinants and Dilemmas	5 September 1980
Dr. Gordon Nicholson Gastroenterology Depart- ment Auckland Hospital Auckland New Zealand	Unusual Bowel Disease in the Pacific and New Zealand	16 September 1980
Dr. M. Mujibur Rahaman Deputy Director, ICDDR,B Mohakhali, Dacca Bangladesh	Impact of Improvement of Water and Sanitation on Nutrition	3 October 1980
Dr. Nicholas L. Petrakis Professor of Preventive Medicine Chairman, Department of Epidemiology and Inter- national Health University of California San Francisco, California U.S.A.	Epidemiological Studies of Cancer	9 October 1980
Dr. Sandra L. Huffman Office of Policy Planning and Evaluation United States Department of Agriculture, Food and Nutrition Service Washington, D.C. U.S.A.	Breastfeeding and Postpartum Amenorrhoea in Rural Bangladesh	24 October 1980

<u>Speaker & Affiliate</u>	<u>Topic</u>	<u>Date</u>
Dr. Ibrahim Elaraby Assistant Professor of Paediatrics Alexandria University Children's Hospital Alexandria Egypt	Diarrhoea Diseases Control Programme in Egypt	30 October 1980
Mr. N.J. Butler Head, Computer Services Oxford Polytechnique Oxford United Kingdom	Computers in Research and Educational Institutions	21 November 1980 1 December 1980
Dr. Michael Katz Chairman, Department of Paediatrics Babies Hospital Columbia Presbyterian Medical Center New York, New York U.S.A.	Does Control of Infection with Intestinal Helminths Aid in Control of Malnutrition?	28 November 1980
Dr. Tetsuo Morishita Division of Gastroentero- logy Department of Internal Medicine Keio University Tokyo Japan	Endoscopy and GI Hormones in Non-cholera Diarrhoea	19 December 1980
Dr. Stanley Becker ICDDR,B Mohakhali, Dacca Bangladesh	First Results from the Validation Study of Pregnancy History Data in Matlab	23 December 1980

I. Ethical Review Committee. In conformity with the resolution of the ICDDR,B Board of Trustees and the provisions of the Ordinance establishing the Centre, an Ethical Review Committee has been functioning with a view to carrying out research on human subjects. There are three members from ICDDR,B and nine members from other sources. The list of members is as follows:

ICDDR,B Members

Dr. K.M.S. Aziz (Basic Scientist & Chairman)
Dr. M.M. Rahaman (Clinician & Relieving Chairman)
Dr. B. Seaton (Laboratory Scientist)

Other Members

Mrs. Tahrunnesa Abdullah (Behavioural Scientist)
Dr. Sufia Ahmed (Woman and Non-scientific Member)
Mr. K.Z. Alam (Legal Professional)
Dr. Khaleda Banu (Paediatrician)
Dr. T.A. Chowdhury (BMRC Representative)
Dr. Humayun K.M.A. Hye (Pharmacologist)
Mrs. Husnara Kamal (Behavioural Scientist)
Mr. Md. Mofazzal Hussain Khan (Religious Representative)
Dr. Z. Sestak (WHO Representative)

In a meeting of the Ethical Review Committee held on 5 February 1980 a Sub-committee to Monitor Ethical Procedures at the Implementation Level was constituted. The members of the sub-committee are: Dr. Humayun K.M.A. Hye, Dr. Sufia Ahmed, Mr. K.Z. Alam and Mr. Md. Mofazzal Hussain Khan. Mr. K.Z. Alam will act as convenor for this sub-committee and will co-ordinate the activities of the committee.

It is expected that the sub-committee will check to ensure that (1) informed consent is being obtained properly, (2) patients do not feel exclusion from the study means less

medical care, and (3) the procedures as outlined in the protocol and stated in the consent forms (taking samples, specimens, etc.) are followed.

The committee has taken an initiative to hold a Workshop on Ethical Considerations in Research on Human Subjects: Special Reference to Developing Countries in conjunction with ICDDR,B, WHO and the Government of the People's Republic of Bangladesh. The workshop is proposed to be held in Dacca between 8 and 12 February 1982 for which an Organising Committee has been formed with the representatives from the Government, WHO, ICDDR,B and other organisations.

Dr. K.M.S. Aziz, Chairman of the committee, attended the Workshop on Bioethics held at Westminster College at the University of Western Ontario, London, Ontario, Canada between 6 and 12 July 1980. The Workshop was co-sponsored by the Hastings Center, Institute of Society, Ethics and the Life Sciences—Westminster Institute for Ethics and Human Values, and, the Department of Philosophy, University of Western Ontario, London, Ontario, Canada. Following the workshop Dr. Aziz led a discussion in the Hastings Center, Institute of Society, Ethics and the Life Sciences in New York, New York, U.S.A. The discussion was held on ethical problems of carrying out research involving human subjects in a predominantly illiterate society.

J. Research Review Committee. The Research Review Committee is composed of Drs. W. B. Greenough III, M.M. Rahaman, K.M.S. Aziz and M. Molla. They meet once a month, generally a few days after the Ethical Review Committee meeting, to review the scientific aspects of research protocols. Should the need arise, the committee meets on other occasions. The committee decides the scientific value, significance and relevance of each protocol, if the investigators are capable of carrying out the research, whether it is feasible

to do the project at ICDDR,B, if the budget is realistic and the plan for data analysis is sufficient. All investigators are invited to attend the meetings as non-committee members.

During 1980 the committee reviewed 32 protocols. Of these 19 were approved. The following are the protocols which were submitted to the committee during 1980.

Detection of Enterotoxigenic *E. coli* from Stool Cultures and Environmental Samples by Hybridisation with Specific ³²P Labelled DNA Probe

Principal Investigators: Drs. S. Moseley and I. Huq

Status: Approved

Bio-clinical Studies on Diarrhoeal Diseases
Principal Investigators: Drs. T. Morishita, R. Islam and P.K. Bardhan

Status: Disapproved. Should be a pilot study. P.I. to be encouraged to write a full protocol while working on the pilot study.

Gram-negative Shock: Effect of Corticosteroids

Principal Investigator: Dr. R. Islam

Status: Approved

Interactions between Maternal Nutrition, Morbidity and Reproductive Process

Principal Investigator: Dr. A.K.M.A. Chowdhury

Status: Approved

Surveillance of Urban Diarrhoeal Patients

Principal Investigator: Dr. B. Stoll

Status: Approved

Epidemiologic and Clinical Studies of Multiple Antibiotic Resistant Vibrios (MARVs) in Matlab

Principal Investigators: Drs. R. Glass, I. Huq and M. Yunus

Status: Approved

Surveillance of *Campylobacter*

Principal Investigators: Drs. R. Glass, I. Huq, M.U. Khan and B. Stoll

Status: Pilot project—now part of protocol 80-010

Evaluation of Tetracycline Therapy in Patients with Cholera due to Tetracycline Resistant Cholera

Principal Investigator: Dr. M. Yunus

Status: Withheld

Epidemiological Studies of Multiple Antibiotic Resistant Cholera Cases Reported in Dacca Hospitals

Principal Investigators: Drs. M.U. Khan, I. Huq and R. Islam

Status: Approved

Surveillance of *Campylobacter* in Matlab

Principal Investigator: Dr. R. Glass

Status: Approved

Isolation and Characterisation of Multiple Antibiotic Resistant *V. cholerae* in Cases, Contact and Environmental Samples

Principal Investigators: Drs. I. Huq, L.N. Mutahda and A.R.M. Alim

Status: Pilot project

Review of Salmonellosis in Dacca and Matlab

Principal Investigators: Mr. M. Blaser, Ms. S. Zimicki, Drs. I. Huq and R. Glass

Status: Pilot Project

Composition and Immunological Properties of the Outer Membrane Proteins of *Vibrio cholerae*

Principal Investigator: Dr. S. Kabir

Status: Approved

Endoscopic Studies on Diarrhoeal Disease

Principal Investigators: Drs. T. Morishita, R. Islam, P.K. Bardhan and A.M. Molla

Status: Approved

Serotyping of Rotavirus

Principal Investigators: Drs. L.N. Mutanda and G. Zisis

Status: Principally approved—needs to be revised and submitted for final approval

Naturally Acquired Immunity to Tetanus Toxin

Principal Investigator: Dr. B. Stoll

Status: Approved

Malabsorption Tests in Apparently Healthy Bangladeshi Children

Principal Investigator: Dr. Z. Mozaffar

Status: To be discussed later

Food Intake in Diarrhoea

Principal Investigator: Dr. M. A. Sarker

Status: Approved

Analysis of Growth and Development Data of Meheran

Principal Investigator: Dr. M.U. Khan

Status: Approved

Distribution of Intestinal Parasites in Patients Attending the Matlab Diarrhoea Treatment Centre

Principal Investigator: M.M. Hossain

Status: Pilot project

Mortality and Socioeconomic Status

Principal Investigator: Dr. S. D'Souza

Status: Pilot project

Water Sanitation Intervention—Teknaf

Principal Investigator: Dr. M.M. Rahaman

Status: Approved

Risk of Child Mortality after Hospitalisation at Matlab Treatment Centre—Analysis Collected Data

Principal Investigators: Dr. L.C. Chen and Ms. S. Zimicki

Status: Pilot project

Treatment of Travellers Diarrhoea with Chlorpromazine

Principal Investigators: Drs. A. Eusof and D. Sack

Status: Approved

Infant Diarrhoea in Bangladesh; A Study of the Colonisation of Mother and Child with *Giardia lamblia* and the Protective Role of Breast Milk

Principal Investigators: Drs. A. Khanam, B. Stoll and G. Hultdt

Status: Approved

Non-*Shigella* Dysentery in Travellers

Principal Investigators: Drs. P.K. Bardhan and D. Sack

Status: Approved

Aspirin as an Antisecretory Agent: A Clinical Trial in Cholera

Principal Investigator: Dr. A. Khanam

Status: Approved

B Subunit Blocking of Cholera Toxin in Family Contacts of Cholera Patients

Principal Investigators: Drs. R. Glass, J. Holmgren and W.B. Greenough III

Status: Approved

Local and Systemic Immune Responses to Cholera B Subunit and Whole Cell Vaccine in Persons with Different Immune Preparations

Principal Investigator: Dr. A.M. Svennerholm

Status: Protocol will be considered again for approval after revision

Complications a Following Measles Epidemic in Rural Bangladesh

Principal Investigator: Dr. N. Shahid

Status: Pilot project

Investigations on the Resistant and Sensitive Strains of *V. cholerae*.

Principal Investigator: S.Q. Akhtar

Status: Protocol disapproved in present form. Needs to be rewritten and resubmitted to Research Review Committee after Working Group approval.

Experimental Hemolytic-Uremic Syndrome

Principal Investigator: Dr. T. Butler

Status: Approved

Note: Pilot projects are submitted to the Research Review Committee for information only.

K. Collaborative research protocols.

Scientists and Institutions

Dr. Martin J. Blaser
Bureau of Epidemiology
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Sirajul Haque
Infectious Diseases Hospital
Mohakhali, Dacca
Bangladesh

Dr. J. Holmgren
Institute of Medical Microbiology
University of Goteborg
Goteborg
Sweden

Dr. Takeshi Honda
Department of Bacteriology and
Serology
Research Institute for
Microbiological Diseases
Osaka University, Osaka
Japan

Dr. G. Hult
Statens Bakteriologiska Laboratory
Stockholm
Sweden

Johns Hopkins University
Baltimore, Maryland
U.S.A.

Max-Planck Institut fur
Immunbiologie
Freiburg
Germany

Microbiological Chemistry
Research Laboratory
University of Newcastle-on-Tyne
Newcastle-on-Tyne
United Kingdom

Protocol

Surveillance of *Campylobacter* in Matlab

Naturally-Acquired Immunity to Tetanus
Toxin

B Subunit Blocking of Cholera Toxin in
Family Contact of Cholera Patients

Evaluation of a Modified Elek Test for
Detection of Heat Labile LT Toxin of
Enterotoxigenic *E. coli* in Field
Laboratories

Infant Diarrhoea in Bangladesh, A Study
of the Colonisation of Mother and Child with
Giardia lamblia and the Protective Role of
Breast Milk

Demographic Surveillance System, Matlab

Composition and Immunological Properties
of the Outer Membrane Proteins of
V. cholerae

Investigations on the Resistant and
Sensitive Strains of *V. cholerae*

Scientists and Institutions

Dr. Tetsuo Morishita
Division of Gastroenterology
Department of Internal Medicine
Keio University
Tokyo
Japan

Dr. Tetsuo Morishita
Division of Gastroenterology
Department of Internal Medicine
Keio University
Tokyo
Japan

Mr. Steven Moseley
Department of Microbiology and
Immunology
University of Washington
Seattle, Washington
U.S.A.

Dr. David Sack
Division of Geographical Medicine
Johns Hopkins University
Baltimore, Maryland
U.S.A.

Dr. David Sack
Division of Geographical Medicine
Johns Hopkins University
Baltimore, Maryland
U.S.A.

Dr. A.M. Svennerholm
University of Goteborg
Goteborg
Sweden

UNICEF, Dacca
Bangladesh

Prof. G. Zissis
Professor of Medical Virology
Department of Microbiology
Free University of Brussels
St. Pierre Hospital
Brussels
Belgium

Protocol

Bioclinical Studies in Diarrhoeal
Diseases

Endoscopic Studies on Diarrhoeal
Disease

Detection of Enterotoxigenic *E. coli*
from Stool Culture and Environmental
Samples by Hybridisation with Specific
³²P Labelled DNA Probe

Non-*Shigella* Dysentery in Travellers

Treatment of Travellers Diarrhoea with
Chlorpromazine

Local and Systemic Immune Responses to
Cholera B Subunit and Whole Cell Vaccine
in Persons with Different Immune
Preparations

Water Sanitation Intervention—Teknaf

Endoscopic Studies on Diarrhoeal
Disease

ORGANISATION MANAGEMENT AND STAFF



A. Board of Trustees. During 1980 the Board of Trustees of ICDDR,B met twice, in February and December. In their meetings they reviewed the evolving scientific programme of the Centre and emphasised the priorities of task-oriented scientific research, increased work in community health, and collaboration with various scientific institutions in other countries for effective dissemination of information.

Important decisions taken by the Board include the following:

1. Dr. W.B. Greenough III, was appointed as the Director of ICDDR,B for a further term extending through June 1983.
2. The fiscal year has been changed to match the calendar year of January-December, beginning in 1981. This will simplify donor reporting.

3. The Board approved Price, Waterhouse & Co., in association with Rahman, Rahman & Huq, to audit the Centre's accounts for its fiscal year July 1979 through June 1980, and the six-month period of July-December 1980.

4. Phase one of the Centre's Capital Development programme, involving the ground floor construction of the new treatment centre in Dacca and additions in Matlab and Teknaf, was approved. It is expected that this first phase will be completed in 1981.

5. The Board ranked all scientific and senior management staff of ICDDR,B and appointed 12 to the international level in both science and management, most of whom are from developing countries. It also formed a Selection Sub-committee for evaluating and recommending future candidates for international-level positions.

Mr. B. Zagorin, Mr. Bradford Morse, Mr. William T. Mashler, Dr. Halfden Mahler and Dr. Julie Sulianti Saroso at the Consultative Group meeting in Geneva.



The first Consultative Group meeting of donors and interested countries and agencies was sponsored by UNDP and held during its Governing Council in June in Geneva. Due to the success of the first Consultative Group meeting, the Board decided to hold a second meeting in New York in 1981 during the UNDP Governing Council.

As a result of efforts to diversify the Centre's staff, citizens of 14 different countries are now working at ICDDR,B. The Board continues to emphasise recruitment of staff from developing countries. In its December meeting the Board recognised the need to recruit senior scientific leadership for the overall benefit of the scientific programme.

B. Management and Administration. Mandates from the Board of Trustees and management of ICDDR,B are executed through the Director through the Management Committee. This committee is composed of the Director, Deputy Director, Associate Director Resources Development, Associate Director Training and Extension, Programme Heads, Controller, Financial Consultant, General Manager Administration and the Physical Plant Manager. They meet as required in the Director's Office.

An Advisory Committee of staff from both the scientific and management personnel of ICDDR,B convene monthly with the Director to discuss the internal problems and new policies which might affect all employees. This Advisory Committee consists of six scientists, one from each programme as well as one from Matlab and Tekanf; and two representatives from the administrative staff.

A major accomplishment of the Administration during 1980 was to develop an organisational chart and write new job descriptions to fit all employees into its framework. This was completed on 1 July 1980; however, attention to every function and individual continued until the end of the year. The transition was carried out with excellent cooperation by the staff, but required an intense effort by all.

An Administrative Manual was initiated as an active and working document. This was not available under CRL and now provides a vehicle for all staff to understand policy and procedure. A simple method to initiate changes was established.

An Employees' Health Plan was introduced which not only will provide needed care but also ensure that no employee or dependent will die of easily preventable diseases such as diphtheria, whooping cough, tetanus, measles or polio.

A new transportation system for employees was started, made possible by the arrival of two Ashok-Leyland diesel buses. Regular routes with pick up and drop points made transport to and from work cost effective for the first time. Additional new cars of a smaller size and diesel minibuses increased fuel efficiency of the transport system.

Planning for a new building for the Centre was undertaken. Provision of funds by OPEC through UNDP together with a contribution from the Kingdom of Saudi Arabia permitted selection of the architects and rapid progress toward completion of the first floor which will be a hospital and clinical research facility.

Development of housing in field areas will provide accommodation for trainees. Staff quarters are also planned in remote areas.

Since reasonably priced accommodations are scarce in Dacca, ICDDR,B has maintained a guest house to provide less expensive but comfortable rooms and meals to consultants, Trustees and other visitors. A second guest house has been made available this year to expand the number of rooms. A third facility provides flats for longer-term consultants.

1. Staff Clinic. Before 1971 an employees' clinic was run by a part-time physician. After 1971 employees sought advice from any physician, but mainly from the Chief and Deputy Physicians. The necessity to reorganise an employee health plan for ICDDR,B arose in



Mrs. Anjoli Boidya and Dr. Thelma Leifert treating patients in the Staff Clinic.

August 1980 when the need for health care increased to the point where the informal system was not capable of serving the large numbers of employees and dependents seeking health services.

In October 1980 a Branch Head was hired and the clinic began to function. Medical benefit rules were redrafted; budget, supplies, and space were allocated; medical record forms were devised and printed; and interviews were held to fill the posts of nurse and pharmacist. A nurse was hired in December 1980.

Medical care is available for all ICDDR,B staff and their dependents. The clinic treats emergencies and patients with illnesses,

but it also dispenses disease prevention information (immunisations, investigation and treatment of chronic diseases and blood grouping) and conducts a health education programme including hygiene, nutrition and diet, prevention of common ailments (diarrhoea, skin infections, etc.), emergency first aid procedures, maternal and child health care and literacy for women and children.

Complete treatment is provided for life-threatening diseases. Medicine which is essential for severe illnesses, and medicines for non-life-threatening illnesses are dispensed. Specialist consultations, laboratory investigations, house calls and ambulance transportation are provided as necessary.

It is estimated that 5,000 persons (employees and eligible dependents) are qualified to benefit from the clinic's services. Three hundred twenty-seven patients have been seen since 1 October when the clinic started to function. Three people were treated for TB, ten were under hypertension control, 15 were admitted to hospital, ten were referred to specialists, one patient died and two operations were performed.

2. Staff Welfare Association. The Staff Welfare Association is a recognised organisation supported by the ICDDR,B management and with a constitution prescribing the guiding principles of its operation. The SWA is committed to promoting the welfare of the staff of the Centre irrespective of rank and status and to maintain a congenial working atmosphere and harmony among the staff. The association organises recreational activities such as the

annual drama; annual picnic; inter-departmental tournaments, sports and games; and literary and cultural functions. The SWA maintains a library and provides stipends to the meritorious dependents of the staff. The stipend programme was started in 1978 with a donation from Dr. L.J. Mata.

In the coming year the SWA is expected to start a night school for illiterate staff, establish a benevolent fund and proposes publishing an annual magazine.

The activities of the association are not limited to these routine tasks. It works for the attainment of the Centre's objectives and acts as a harmonious link between management and staff in the belief that the success of the Centre, both nationally and internationally, depends on the combined efforts of the staff and management.



Installation meeting of the Staff Welfare Association with Mr. A.K. Azad, President-elect speaking.

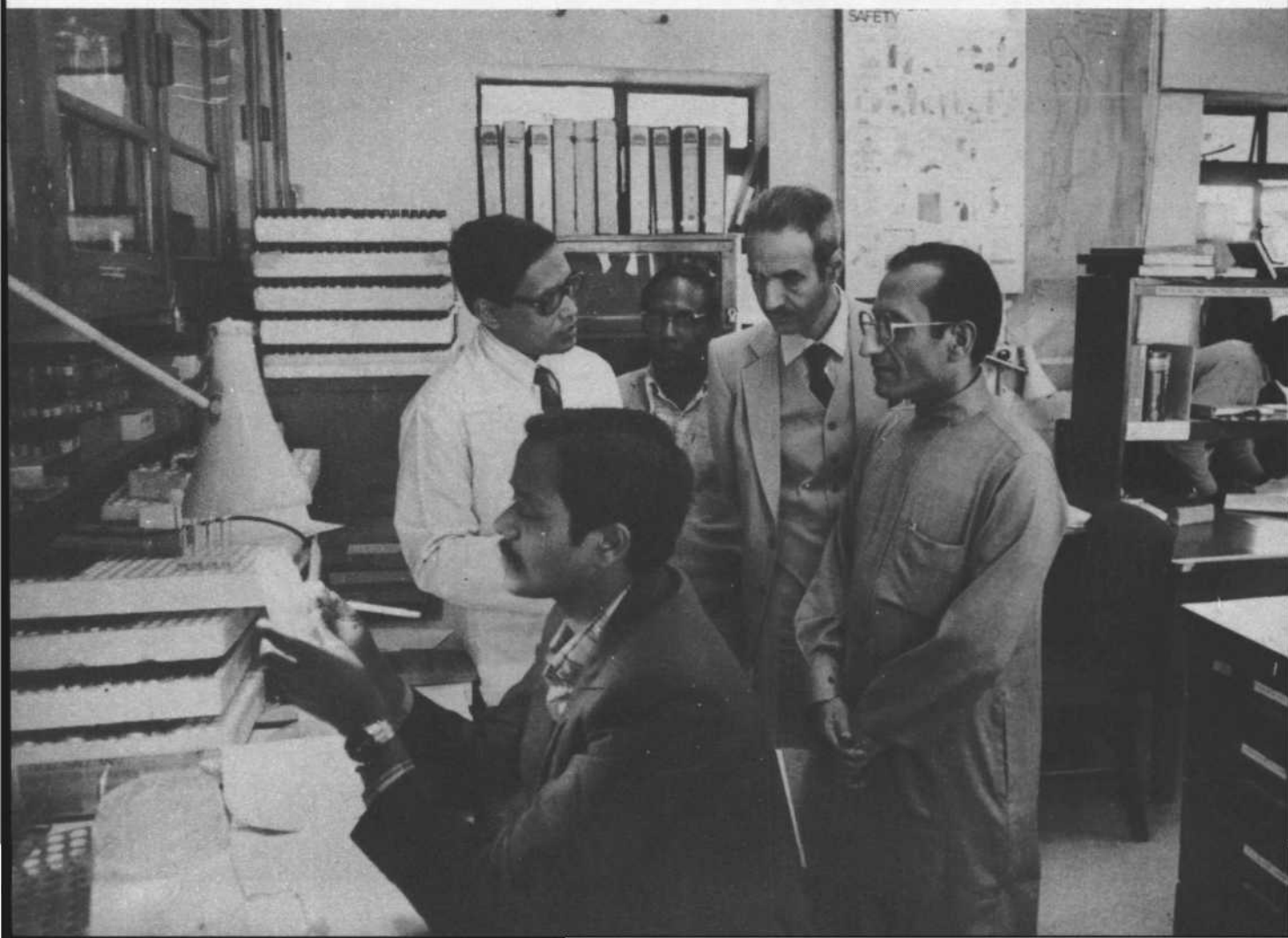
C. Resources Development. As an autonomous philanthropic research organisation, ICDDR,B looks for its support to countries and agencies which share its concern for the impact of diarrhoeal diseases on societies of the developing world. It also looks to other countries and agencies for development of scientific cooperation and collaboration which are central to effective research and application.

The Centre's primary document of international cooperation is the Memorandum of Understanding, whose signatories indicate their agreement with the goals and objectives of ICDDR,B. Twenty-five countries/agencies have signed the Memorandum: Australia, Bangladesh, Belgium, Colombia, Ecuador, Egypt, The Ford Foundation, India, Indonesia, Kuwait, Nepal, People's Republic

of China, Philippines, The Population Council, The Rockefeller Foundation, Saudi Arabia, Sri Lanka, Switzerland, Thailand, UNDP, UNFPA, UNICEF, United Kingdom, United States of America and WHO. This document is open to further signatures (seven were added in 1980) and is an excellent indication of a country's interest in the severity of the diarrhoeal disease problem.

Many of the signatories of the Memorandum are also contributors to the Centre: Australia, Bangladesh, The Ford Foundation, The Population Council, The Rockefeller Foundation, UNFPA, UNDP, Saudi Arabia, Switzerland, United Kingdom, WHO. In addition, Sweden and IDRC of Canada are contributing to the Centre's work but have not yet signed the Memorandum.

Dr. Hashim S. Al-Dabbagh and Dr. Mohammed S. Al-Shoura from Saudi Arabia visiting the Microbiology Laboratory.



An important part of resources development is the growth of scientific collaboration; ICDDR,B has continued to broaden the scope of its scientific work with other countries. Its programme includes both research collaboration and the provision of training. Twenty-seven WHO fellows came to the Centre from Egypt, Indonesia, Japan, Republic of Maldives, Sri Lanka and Thailand in 1980. Collaboration is now being planned with the Ministry of Health Kenya which will enable the Centre to extend its effective range beyond Asia. In addition, ICDDR,B has already established scientific collaboration with the government of Saudi Arabia.

The wide interest in the work of the Centre necessitated a forum for discussion of the Centre's overall objectives as well as the actual scientific work it is carrying on. To meet this need, UNDP sponsored a Consultative Group of interested countries and agencies during its Governing Council, which met in Geneva in June 1980. Thirty-five representatives attended this meeting and expressed a keen interest in the work of the Centre; representatives from donor countries expressed satisfaction with the programme activities and raised many useful points for discussion. The consensus was that the Consultative Group served its purpose by providing an opportunity for potential donors to examine ICDDR,B. The second Consultative Group meeting will be held in June 1981 in New York, again in conjunction with the UNDP Governing Council.

The generation of core contributions continues to be a high priority for the Centre. The Centre is pressing a campaign to enlist further participation in both its technical programmes and its financing. One of the most serious constraints to the development of the Centre is likely to be the availability of funds. Governments and agencies will have an important role to play in improving the situation in this respect.

D. 1980 Financial Report. With the establishment of the International Centre for

Diarrhoeal Disease Research, Bangladesh, the first fiscal year began on 1 July 1979. The assets and liabilities of the Centre's predecessor organisation, the Cholera Research Laboratory, were transferred to the International Centre. As compared with the programme of the CRL, the Centre's budget adds strong emphasis to research to improve community health services, training and extension, as well as communication to disseminate findings and to support national organisations in their own work.

As a result of these new commitments, the Centre's FY 1980 budget was \$4.11 million, which was approximately 15 percent larger than that of 1979. It was devoted primarily to the research and training programmes comprising the five working groups of Community Services Research, Nutrition, Disease Transmission, Host Defense and Pathogenesis and Therapy; the Training Branch; field stations at Matlab and Teknaf; Dacca Health Station hospital; and such support facilities as laboratories, library, and Data Management Branch.

A large number of donors are contributing various amounts to the Centre's budget. In order to meet their different reporting requirements, the Board of Trustees approved changing the Centre's fiscal year from July-June to January-December, beginning January 1981. The accounts of the first 18 months, July 1979-June 1980 and July-December 1980, have been closed and audited. Income and expenditures are summarised in Tables 14 and 15.

The budget for FY 1981 is \$6.1 million of which approximately \$4.5 million has thus far been committed. The Centre's Five Year Programme budget from 1981 to 1985 is \$44 million, which includes both a continuing inflation rate and a real increase in the Centre's activities (Table 16).

ICDDR,B has also undertaken a Capital Development programme to relieve the acute shortage of space and enable it to move into its own building. The Government of Bangladesh

TABLE 14

INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH

 RECEIPTS AND EXPENDITURES STATEMENT FOR THE
 PERIOD FROM JULY 1979 THROUGH DECEMBER 1980
 (US Dollars)

FUND CARRYOVER FROM CRL TO ICDDR,B		\$ 811,525
RECEIPTS		
Bangladesh Government	\$ 56,000	
USAID—Dacca	783,776	
AID—Washington	2,060,000	
Ford Foundation	324,350	
United Kingdom	264,000	
Saudi Arabian Government	350,000	
Switzerland Government	1,250,667	
Australian Government	113,333	
UNDP/WHO	823,940	
OPEC/UNDP/WHO	562,000	
IDRC of Canada	28,333	
UNFPA	407,690	
SAREC (Swedish Agency for Research Cooperation)	33,634	
UN University, Japan	8,070	
UNICEF	6,000	
Other receipts	184,349	
		\$ 7,256,142
USAID—Dacca—Assets		651,751
TOTAL FUNDS AVAILABLE		\$ 8,719,418
EXPENDITURES		
Operational	\$ 5,790,504	
Capital	1,330,459	
		\$ 7,120,963
BALANCE		\$ 1,598,455

has recently donated four acres of land for the new facilities. The programme will be taken up in two phases; the first phase of construction includes the ground floor of the main building and facilities at the two field stations. Estimated cost for completion of the first phase is approximately \$2 million, of which \$800,000 has thus far been made available by the OPEC Fund and the Government of Saudi Arabia. Phase two will include completion of the final six storeys of

the main building at Dacca, and the completion of buildings at the two field stations. The total cost of the second phase will be roughly \$10 million.

The Centre looks forward to new donors supporting its activities, its scientific collaboration with other countries, and dissemination of information leading to the prevention and control of diarrhoeal diseases.

TABLE 15

INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH
BREAKDOWN OF EXPENDITURES BY PROGRAMME

	OPERATIONAL EXPENDITURES BY PROGRAMME	% OF TOTAL EXPENDITURE
	(US DOLLARS)	
RESEARCH PROGRAMMES		
Disease Transmission	405,335	7.00
Pathogenesis & Therapy	205,563	3.55
Host Defense	254,782	4.40
Nutrition	228,725	3.95
Community Services Research	709,338	12.25
RESEARCH PROGRAMME TOTAL	1,803,743	31.15
Research Facilities	1,795,053	31.00
Training & Extension	270,996	4.68
RESEARCH AND TRAINING TOTAL	3,869,792	66.83
Maintenance and logistics	676,331	11.68
Management	1,050,978	18.15
Resources Development	193,403	3.34
OPERATIONAL EXPENDITURE TOTAL	5,790,504	100.00

TABLE 16

INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH
SUMMARY OF FIVE YEAR PROGRAMME BUDGET

	Person - Months 1981			1981	1982	1983	1984	1985	Total
	Scientist	Support	Total	US \$	US \$	US \$	US \$	US \$	US \$
RESEARCH PROGRAMME	300	3,276	3,576	2,304,200	2,789,400	3,146,700	3,681,500	4,307,300	16,229,100
1. Community Services Research	72	2,196	2,268	857,700	1,046,400	1,224,300	1,432,400	1,675,900	6,236,700
2. Nutrition	48 ^a	324	372	365,700	446,200	522,100	610,800	714,600	2,659,400
3. Disease Transmission	60	300	360	314,700	384,000	449,300	525,700	615,000	2,288,700
4. Host Defense	60	216	276	431,800 ^b	505,000 ^b	473,900	554,400	648,700	2,613,800
5. Pathogenesis and Therapy	60	240	300	334,300	407,800	477,100	558,200	653,100	2,430,500
TRAINING AND EXTENSION	96	336	432	946,000	1,154,100	1,350,300	1,579,800	1,848,400	6,878,600
PROGRAMME SUPPORT	-	3,324	3,324	1,047,700	1,278,200	1,495,500	1,749,700	2,047,100	7,618,200
MAINTENANCE & LOGISTICS	-	1,068	1,068	841,600	1,026,800	1,201,400	1,405,600	1,644,500	6,119,900
MANAGEMENT AND									
ADMINISTRATION	24	1,356	1,380	955,400	1,165,600	1,363,800	1,595,600	1,866,900	6,947,300
Sub-Total	420	9,360	9,780	6,094,900	7,414,100	8,557,700	10,012,200	11,714,200	43,793,100
WORKING FUND :									
10% of 1981 operating Budget:	-	-	-	609,500	-	-	-	-	609,500
GRAND TOTAL	420	9,360	9,780	6,704,400	7,414,100	8,557,700	10,012,200	11,714,200	44,402,600

^a Plus 12 person-months of Deputy Director shown under Management.

^b Includes \$100,000 for Vaccine Field Trial.

E. Changes in senior staff.

1. New appointment.

Ashrafuddin Ahmad, BSc, MSc
Eng (Mech)
Kazi Alauddin Ahmed, BA
R. Laila Akbar, MBBS, MPH
Pierre Claquin, MD
Wirjawan Djojosugito, MD, MPH
Leif A. Gothefors, DSc (Med)
David Leon, MA
Md. Golam Morshed, MA, LLB
Honorie Niehaus, MSBA, CPA
James Phillips, PhD
Aziz R. Samadi, MD, DPH
Najma Rizvi, MA (Geog),
MA (Anthro), PhD
A.F. Sarker, MSc (CE), PEng
Suzanne Smith, AB
Pieter Speelman, MD
Susan Zimicki, MS, MS (TH)

Bangladesh	Engineering/Maintenance
Bangladesh	Personnel Administration
Bangladesh	Physician/Training
France	Epidemiology/Extension
Indonesia	Medicine/Training
Sweden	Paediatrics/Immunology
USA	Analytic Programmer
Bangladesh	Administration/Supply
USA	Finance
USA	Population Studies
Afghanistan	Paediatrics/Public Health
USA	Anthropology
Canada	Engineering/Construction
USA	Development
Netherlands	Physician/Gastroenterology
USA	Epidemiology

2. Departure.

Stanley Becker, PhD
Lincoln C. Chen, MD, MPH
David A. Sack, MD

USA	Demography
USA	Nutrition/Epidemiology
USA	Physician/Immunology

3. Leave of absence.

Ansaruddin Ahmed, MBBS
M.M.H. Munshi, MBBS
A.S.M. Mizanur Rahman, MBBS, MSc

Bangladesh	Physician/Immunology
Bangladesh	Physician/Epidemiology
Bangladesh	Physician/Epidemiology

F. Personnel summary. On 31 December 1980 ICDDR,B had 894 employees. Of the total ICDDR,B staff, 515 are working in research areas. They may be classified as follows:

1. Scientists (Investigators)	40
2. Medical Officers	22
3. Technicians	233
4. Scientific Support	220
Total	515

The rest of the staff are Administrative and Maintenance/Logistic personnel for the support of the research work. They may be classified as follows :

1. Officers	40
2. Mid-level	78
3. Lower-level	261
Total	379

MANUAL ON
TREATMENT AND
PREVENTION
OF DIARRHOEA



PROCEEDINGS OF
THE CONSULTATIVE
GROUP MEETING
OF THE

International
Centre for
Diarrhoeal Disease
Research
Bangladesh

PUBLICATIONS



1979
ANNUAL
REPORT

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VISITORS



In 1980 the ICDDR,B stations at Dacca, Matfab and Teknaf received many visitors from Embassies, International and Voluntary agencies in Bangladesh, as well as interested persons living in or passing through Dacca. In addition, scientists and consultants came for longer periods of time to carry out collaborative research. Below is a list of some of the visitors.

Dr. Amparo C. Adias
Medical Officer
WHO Fiji School of Medicine
Fiji

Dr. S.W. Adnan
Department of Public Health
Medical Faculty
University of Jakarta
Jakarta
Indonesia

Dr. Shamsuddin Ahmed
University of Maryland
College Park, Maryland
U.S.A.

Dr. Charles L. Aird
Director
Management Information Systems
8337 Beaudet Lane
Richmond, Virginia
U.S.A.

Dr. Hashim Al-Dabbagh
Director General
Preventive Medicine
Ministry of Health
Riyadh
Kingdom of Saudi Arabia

A group of Ambassadors, High Commissioners and Chargés d'Affairs visiting the Centre to acquaint themselves with the activities of ICDDR,B. They represented Australia, Belgium, Burma, France, Nepal, Sweden and Vietnam.



Dr. Mohammad Al-Shoura
Director General
Laboratory Services and Blood Bank
Riyadh
Kingdom of Saudi Arabia

Dr. Doan Ngoc Anh
National Institute of Hygiene
and Epidemiology
Hanoi
Vietnam

Dr. Linda Atkinson
Programme Officer
Population Office
The Ford Foundation
New York, New York
U.S.A.

Dr. Selwyn Baker
Professor of Medicine
Chief, Gastroenterology
St. Boniface General Hospital
Manitoba
Canada

Dr. Dhiman Barua
Programme Manager
Diarrhoeal Diseases Control Programme
World Health Organization
Geneva
Switzerland

Dr. Barzelatto
Secretary
Research Strengthening Group
Tropical Diseases Research
World Health Organization
Geneva
Switzerland

Professor J.K. Battacharjee
Department of Microbiology
Miami University
Oxford, Ohio
U.S.A.

Mr. Robert E. Bell
General Manager
Price Waterhouse Associates
Prince's Building
Hong Kong

Dr. Theodore L. Bell
Health Communication Consultant
1717 Mott-Smith Drive⁵
Honolulu
Hawaii
U.S.A.

Dr. Shushum Bhatia
Johns Hopkins University
School of Hygiene and Public Health
Department of Population Dynamics
Baltimore, Maryland
U.S.A.

Dr. Shakuntala Bhatnagar
Centre for Community Medicine
All India Institute of Medical Science
New Delhi
India

Dr. Robert E. Black
Chief, Epidemiology
Centre for Vaccine Development
University of Maryland
Baltimore, Maryland
U.S.A.

Dr. John Bland
Editor
World Health
World Health Organization
Geneva
Switzerland

Dr. Martin Blaser
Bureau of Epidemiology
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Sawat Rama Boot
Medical Officers Division of General
Communicable Diseases
Department of Center for Disease Control
Ministry of Public Health
Bangkok
Thailand

Dr. Daryl Booth
Assistant Director General
International Health, Commonwealth
Department of Health
Canberra, A.C.T.
Australia

Dr. Nicholas Butler
Head of Computer Services
Oxford Polytechnique
Oxford
U.K.

Dr. Thomas Butler
Department of Medicine
Lakeside Hospital
Case Western Reserve University
Cleveland, Ohio
U.S.A.

Ms. Catherine Cameron
Programme Manager
UNFPA
Dacca
Bangladesh

Dr. John Cameron
Chief, Bacterial Vaccines
Institute Armand-Frappier
Quebec
Canada

Mr. Paul Caouette
USAID
Dacca
Bangladesh

Ms. Carol Carpenter-Yaman
Population Officer
USAID
Dacca
Bangladesh

Dr. Richard Cash
Harvard Institute for International
Development
1737 Cambridge Street
Cambridge, Massachusetts
U.S.A.

Dr. and Mrs. Casterline
World Fertility Survey
London
U.K.

Mr. C. Chanin Chareonkul
Mahidol University
Bangkok
Thailand

Dr. E.J. Charlebois
Health Specialist
Health and Population Social
Development Division
CIDA
Hull, Quebec
Canada

Dr. Claude Cherton
Computer Consultant
Faculty Universitaires
Notre Dame De La Paix
Namur
Belgium

Dr. Chu Chia-Yung
Senior Scientist
Shanghai Institute of Biological
Products
Shanghai
People's Republic of China

Dr. Saidul Hoq Chowdhury
Associate Professor of Paediatrics and
Paediatricians
Allama Iqbal Medical College
Lahore
Pakistan

Mr. D. Cook
Representative
Crown Agents
Kuala Lumpur
Malaysia

Dr. George Curlin
Chief
Epidemiology and Biometry Branch, MIDP
NIAID
National Institute of Health
Bethesda, Maryland
U.S.A.

Ms. Birgitta Dahl
Swedish Free Mission
Dacca
Bangladesh

Dr. Susanto Soe Darsoho
Director General
Center for Disease Control
Ministry of Health
Jakarta
Indonesia

Ms. W.R. Dayawathye
Public Health Midwife
Sri Lanka

Dr. S.N. De
Calcutta Institute of Technology
SCH 52
Calcutta
India

Mrs. Rebecca B. Decherd
Oberlin
Ohio
U.S.A.

Mr. Crisonta de Joya
Chief of Hospital
E. Rodriguez Boulevard
Quezon City
Philippines

Mr. Daniel De Lange
Programme Officer
UNDP
Dacca
Bangladesh

Mr. Jeff Denahy
Second Secretary
(Development Assistance)
The Australian High Commission
Dacca
Bangladesh

Dr. H.N. Dutta
Holy Family Hospital
New Delhi
India

Mr. William Dyal
Consultant
The Ford Foundation
New York, New York
U.S.A.

Professor Barry Edmonston
Assistant Professor
Sociology
International Population Programme
Cornell University
Ithaca, New York
U.S.A.

Dr. Ibrahim Elaraby
Assistant Professor of Paediatrics
University of Alexandria Children's
Hospital
Alexandria
Egypt

Dr Abdel Rahman El-Mufti
Khartoum Teaching Hospital
Khartoum
Sudan

Mr. Paul Erb
Chargé d'Affaires
Embassy of Switzerland to Bangladesh
Dacca
Bangladesh

Dr. Oswald Erler
Neuwiesen SF 40
6 Frankfurt
Federal Republic of Germany

Mr. Ezzeldin Essa
The Ambassador of Egypt to
Bangladesh
Dacca
Bangladesh

Dr. John R. Evans
Director
Population Health and Nutrition
Department
World Bank
Washington, D.C.
U.S.A.

Dr. P.L. Fazzi
WHO Chief Medical Advisor to UNICEF
United Nations International Children's
Fund
866 United Nations Plaza
New York, New York
U.S.A.

Dr. Roger Feldman
Chief, Enteric Diseases Branch
Bureau of Epidemiology
Center for Disease Control
Atlanta, Georgia
U.S.A.

Mrs. R.P.C. Fernando
National Institute of Health Services
Kalutara
Sri Lanka

Dr. Irma Fiordalisi
Montefiore Hospital and Medical
Center
New York, New York
U.S.A.

Dr. Andrew Fisher
Chief Technical Advisor
UNFPA
Dacca
Bangladesh

Dr. Takahiko Fukushimae
Department of Microbiology
School of Medicine
Kyushu University
Fukuoka
Japan

Mr. Mohamed Ismail Fulu
Public Health Division
Ministry of Health
Republic of Maldives

Mr. W.W. Furth
Assistant Director General
World Health Organization
Geneva
Switzerland

Dr. Barry E. Gaberman
Acting Officer in Charge
Programme Related Investments
The Ford Foundation
New York, New York
U.S.A.

Dr. Pierce Gardner
World Health Organization
Regional Office for South East Asia
New Delhi
India

Dr. T. Ginting
Chief
Section for Rehydration in
Diarrhoeal Diseases
Subdit Kholera & G.E.
Jakarta
Indonesia

Dr. and Mrs. George A. Glass
Somerset Hospital
Somerville, New Jersey
U.S.A.

Dr. John F.T. Glassgow
Department of Child Health
Queen's University of Belfast
Belfast
Northern Ireland



Dr. Hein, Vietnam; Dr. Arini, Indonesia; and Dr. Adnan Wiharta, Indonesia (left to right).

Dr. Gilles Goulet
Medical Officer
Canadian High Commission
New Delhi
India

Mr. Harold Graves
Consultant
4816 Grantham Avenue
Chevy Chase, Maryland
U.S.A.

Mr. Zhang Guanghui
Regional Programme Officer
Ministry of Economic Relations with
Foreign Countries
People's Republic of China

Mr. Steven Guest
Montgomery
Alabama
U.S.A.

Dr. Klaus Gyr
Department of Innere Medizin
Kantonsspital Hospital
Basel
Switzerland

Mr. Peter Haller
Swiss Radio International
Geneva
Switzerland

Ms. Ingrid L. Hansen
Travel Consultant
Pan American Airways
Los Angeles, California
U.S.A.

Mr. Oscar Harkavy
Officer in Charge
Population Office
The Ford Foundation
New York, New York
U.S.A.

Dr. Gisela Hayfa
Sociologist
German Technical Cooperation
MCH-FP Project
Dacca
Bangladesh

Mr. John Helble
Chargé d'Affaires
The Embassy of the United States of
America
Dacca
Bangladesh

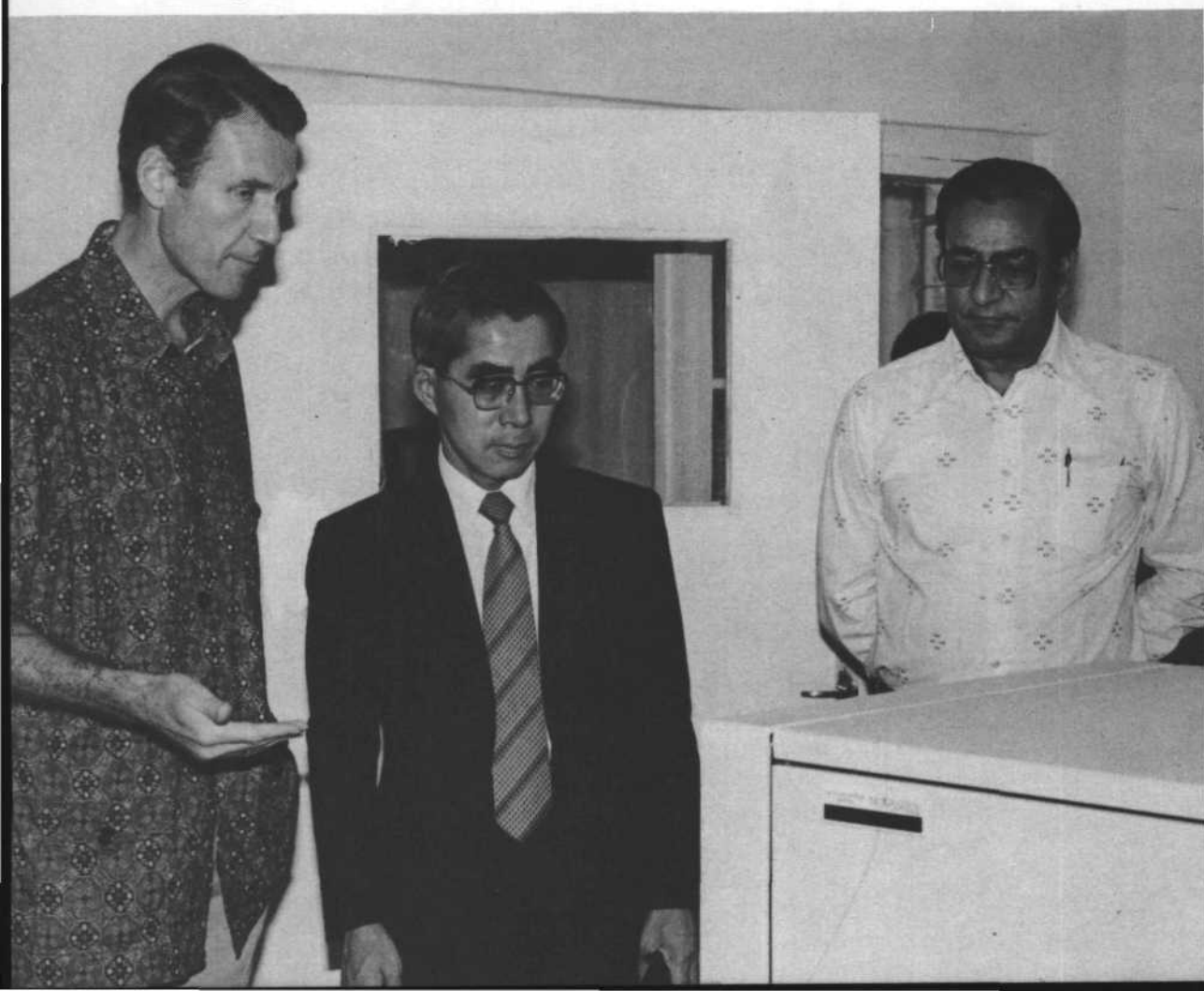
Dr. Anek Hirunraks
Mahidol University
Bangkok
Thailand

Ms. Susan Horton
Harvard University
Boston, Massachusetts
U.S.A.

Mr. Afzal Hossain
London School of Medicine
London
U.K.

Dr. Ghassemi Hossein
Nutrition Advisor to the Executive
Director
UNICEF
New York, New York
U.S.A.

Mr. Y. Ishigaki, Director of the South-West Asian Affairs Division, Ministry of Foreign Affairs of Japan, touring the Centre and meeting with senior staff members in December 1980.



Dr. Sandra Huffman
Office of Policy, Planning and
Evaluation
U.S. Department of Agriculture
Food and Nutrition Service
Washington, D.C.
U.S.A.

Mr. Sun Huiyuan
Division Chief
Ministry of Economic Relations with
Foreign Countries
People's Republic of China

Dr. Gunnel Hultdt
National Bacteriological Laboratory
Stockholm
Sweden

Mr. Samuel Hulet
National Bacteriological Laboratory
Stockholm
Sweden

Mr. Singer Humngstrom
National Bacteriological Laboratory
Stockholm
Sweden

Dr. Taro Inoue
The National Institute of Nutrition
Toyamacho, Shinjuku-ku
Tokyo
Japan

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Dacca
Bangladesh

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World Health Organization
Geneva
Switzerland

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Batchwath
U.K.

Dr. Marianne Jertborn
Institute of Medical Microbiology
University of Göteborg, Göteborg
Sweden

Dr. Denis Johnsen
Scientific Attaché
Embassy of the United States of
America
New Delhi
India

Dr. Aeini Jutomo
Health Medical Section
Infectious Disease Hospital
Jakarta
Indonesia

Mr. Lenni W. Kangas
USAID, Population Advisor
Washington, D.C.
U.S.A.

Mr. G. Kannangara
National Institute of Health Services
Kalutara
Sri Lanka

Dr. K.J.D. Karki
South Medical Officer, Doti Hospital
Silgodi, Doti Seti Zone
Nepal

Dr. Berith Karlsson
Ingenjorsgatan, 1
Karlskrona
Sweden

Dr. Ahmed Samir Kassem
Professor of Paediatrics
Faculty of Medicine
Alexandria University
Alexandria
Egypt

Dr. Michael Katz
Professor
College of Physicians and Surgeons
Columbia University
New York, New York
U.S.A.

Dr. Marjorie Koblinsky
Programme Officer
Health Service
IDRC Asia Regional Office
Singapore

Gunnther Koendic
Foreign Office of the Federal
Republic of Germany
Bonn
West Germany

Dr. Sharad Kumar
Director
National Institute of Communicable
Diseases
New Delhi
India

Ms. P. Kumarge
Public Health Nurse
Sri Lanka

Mr. Michael Lackner
UN Statistical Office
United Nations
New York, New York
U.S.A.

Ms. Judith Law
Leicester
England
U.K.

Mr. Arne Lellki
The Ambassador of Sweden to
Bangladesh
Dacca
Bangladesh

Dr. S. Lindenberg
Standtleangenhau
3180 Wolfberg
West Germany

Dr. Inger Ljungstrom
Paraintologen SBL
10521 Stockholm
Sweden

Mr. J.O. Lundberg
SAREC
Sweden

Dr. Donald Mackay
Deputy Director
London School of Hygiene and Tropical
Medicine
Ross Institute of Tropical Hygiene
London
U.K.

Dr. Dilip Mahalanabis
Calcutta Hospital Medical
Research Centre
7/2 Diamond Harbour Road
Calcutta
India

Dr. Sathaparan Manatsathit
Medical Officer
Bamrasnaradura Hospital
Nonthaburi
Thailand

Mr. Nguyen Dac Mao
Chargé d' Affaires
The Embassy of the Socialist
Republic of Vietnam in Bangladesh
Dacca
Bangladesh



Prof. M.A. Matin, Minister of Health and Population Control, Government of the People's Republic of Bangladesh, visiting a village sub-centre during a tour of the ICDDR,B Field Station at Matlab.

Dr. Alan Margolis
Professor of Reproductive Science
San Francisco
California
U.S.A.

Dr. Alibasah Matakoesoemah
Bandung
Indonesia

Dr. Matsushima
Medical Research Officer
World Health Organization
Regional Office
New Delhi
India

Dr. Anthony Measham
Programme Officer
The Ford Foundation
Dacca
Bangladesh

Dr. Chris Miller
London School of Hygiene and
Tropical Medicine
London
U.K.

Dr. Masao Mitsuyama
Assistant Professor
Department of Microbiology
School of Medicine
Kyushu University
Fukuoka
Japan

Mr. M.I.M. Moorly
National Institute of Health Services
Kalutara
Sri Lanka

Mr. Loie Moreau
The Ambassador of France to
Bangladesh
Dacca
Bangladesh

Dr. Tetsuo Morishita
Department of Internal Medicine
School of Medicine
Keio University
Tokyo
Japan

Dr. Glen Morris
Bureau of Epidemiology
Bacterial Diseases Division
Enteric Diseases Branch
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Steven Moseley
Department of Microbiology and
Immunology
University of Washington
Seattle, Washington
U.S.A.

Dr. Daw Myat
Paediatrician
Bassin General Hospital
Burma

Mr. R. Narmar
The Australian High Commission
Dacca
Bangladesh

Dr. Gordon Nicholson
Gastroenterology Department
Auckland Hospital
Auckland
New Zealand

Baron Patric Nothomb
The Ambassador of Belgium to
Bangladesh
Dacca
Bangladesh

Dr. Arun Ranjan Pal
Health Directorate
Bhubaneshwar
Orissa
India

Dr. C.O. Pannenberg
The Netherlands Embassy in
Bangladesh
Dacca
Bangladesh

Dr. Clifford A. Pease
Deputy Director
USAID
Office of Health
Washington, D.C.
U.S.A.

Ms. Bonnie Pederson
Health/Training Consultant
The Center for Population Activities
1717 Massachusetts Avenue, N.W.
Washington, D.C.
U.S.A.

Dr. M.F. Peiris
Physician-in-charge
Fever Hospital
Angoda
Sri Lanka

Mr. D.H. Perera
Tutor Public Health
National Institute of Health Sciences
Kalutara
Sri Lanka

Dr. Nicholas L. Petrakis
Professor of Preventive Medicine
Chairman, Department of Epidemiology
and International Health
University of California
San Francisco, California
U.S.A.

Dr. Phonc Phep
Laos People's Democratic Republic



Dr. Clifford A. Pease, Mr. A.A. Muhith, Ambassador David T. Schneider, Dr. Julie Sulianti Saroso and some members of the ICDDR,B Board of Trustees at the 20th anniversary of the inauguration of the Cholera Research Laboratory.

Mr. A. Pierl
Administrative Officer
World Health Organization
Geneva
Switzerland

Ms. Barbara Pitsburg
Chief of Evaluation, Asia Bureau
USAID
Washington, D.C.
U.S.A.

Mr. Somsak Pinyotanmakorn
Mahidol University
Bangkok
Thailand

Ms. Vivian Ponniah
UNFPA, Bangladesh Desk
New York, New York
U.S.A.

Dr. Juan de Dion Pozo-Olano
President
Health Services International, Inc.
McLean, Virginia
U.S.A.

Mr. Jehan Raheem
Deputy Resident Representative
UNDP
Dacca
Bangladesh

Dr. P.K.S.P. Raju
Public Health Laboratory
State Headquarters Hospital
Aizawl
Mizoram
India

Mrs. K.K.D.S.P. Ranaweera
National Institute of Health Services
Kalutara
Sri Lanka

Dr. M. Subra Rao
Institute of Preventive Medicine
Hyderabad
India

Mrs. Susan Reeves
The British Council
Dacca
Bangladesh

Mr. Shafik Rehman
Chartered Accountant
North Finchley
London
U.K.

Ms. Kristina Renlund
Kemigranod 16
S-90241
Umea
Sweden

Dr. Roger W. Rochat
Deputy Director
Family Planning Evaluation
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Michael J. Rosenberg
Epidemiology Studies Branch
Family Planning Evaluation Division
Bureau of Epidemiology
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Irwin Rosenberg
Professor of Medicine
University of Chicago
Chicago, Illinois
U.S.A.

Dr. Derrick Rowley
Department of Biology and
Immunology
University of Adelaide
Adelaide
Australia

Dr. Lado T. Ruzicka
Department of Demography
Australian National University
Canberra, A.C.T. 2600
Australia

Dr. R. Bradley Sack
Director
Johns Hopkins University
Division of Geographic Medicine
Baltimore City Hospital
Baltimore, Maryland
U.S.A.

Dr. Jeffery Sacks
Bureau of Epidemiology
Center for Disease Control
Atlanta, Georgia
U.S.A.

Mr. Md. Saeed
Public Health Services
Ministry of Health
Republic of Maldives

Mr. D.S. Sandanayake
National Institute of Health Services
Kalutara
Sri Lanka

Mr. Peter Schaiberger
Department of Epidemiology
School of Public Health
The University of Michigan
Ann Arbor, Michigan
U.S.A.

Mr. David T. Schneider
The Ambassador of the United States of
America to Bangladesh
Dacca
Bangladesh

Dr. S.P.F. Senaratne
18 Palmyrah Avenue
Colombo
Sri Lanka

Mrs. Augustina Senaratus
National Institute of Health Services
Kalutara
Sri Lanka

Mr. Md. Shaheed
Public Health Division
Ministry of Health
Republic of Maldives

Dr. Wei Shi-Hua
Deputy Director
Shanghai Institute of Biological
Products
Shanghai
The People's Republic of China

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Public Health Inspector
Sri Lanka

Professor Zdenko Skrabalo
Director
Institute for Diabetes, Endocrinology
and Metabolic Diseases
University of Zegreb
Zegreb
Yugoslavia

Dr. John Snyder
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Susanto Soedarsono
Subdit Kholera & G.E.
Jakarta
Indonesia

Miss Mariam Haggag Soliman
University of Alexandria Children's
Hospital
Alexandria
Egypt

Sir Michael Scott, the High Commissioner of The United Kingdom, visiting ICDDR,B after signing the Memorandum of Understanding.





Mr. W. Sinninghe-Damsté, the Ambassador of the Netherlands to Bangladesh, visiting ICDDR,B.

Dr. Saune Soubvong
Chief Hygiene
Laos People's Democratic
Republic

Mr. Harka Bahadur Thapa
The Ambassador of Nepal to
Bangladesh
Dacca
Bangladesh

Dr. William M. Spira
Johns Hopkins University
School of Medicine
Division of Geographic Medicine
Baltimore City Hospital
Baltimore, Maryland
U.S.A.

Dr. Andrew Tomkins
Senior Lecturer
Department of Human Nutrition
London School of Hygiene and
Tropical Medicine
London
U.K.

Dr. Ann-Mari Svennerholm
Institute of Medical Microbiology
University of Göteborg
Göteborg
Sweden

Dr. Jim Tulloch
Consultant
World Health Organization
Geneva
Switzerland

Mr. M. Swain
Cuttack At-City Hospital
Cuttack, Orissa
India

Dr. Anant Kumar Vyas
Medical Officer In-charge
Cholera Control Team
Jaipur
Rajasthan
India

Dr. Kaye Wachsmuth
Enteric Section
Center for Disease Control
Atlanta, Georgia
U.S.A.

Dr. Abdul Waheed
Associate Professor of Paediatrics
K.E. Medical College
Lahore
Pakistan

Dr. Masakazu Washio
Department of Microbiology
School of Medicine
Kyushu University
Fukuoka
Japan

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Bangladesh

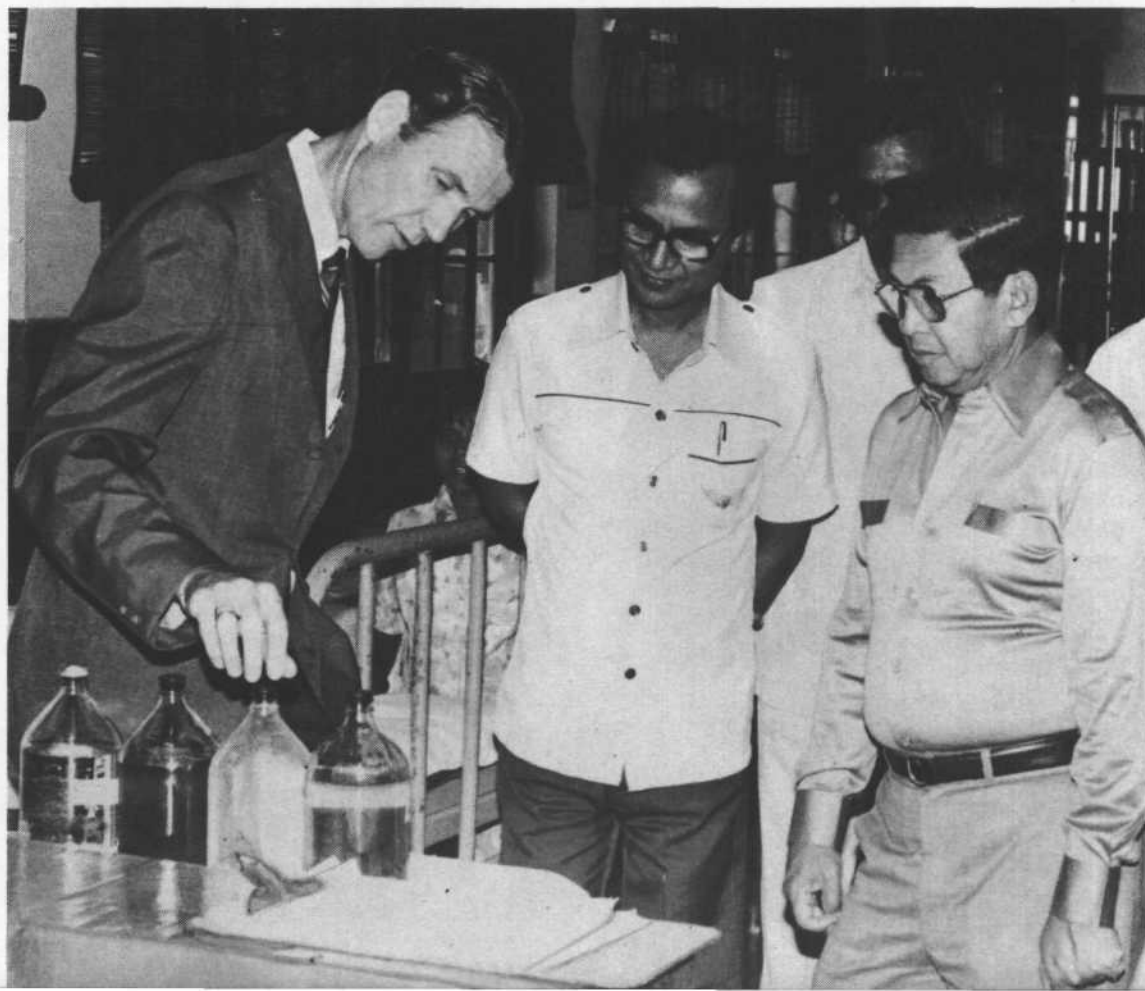
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Center for Disease Control
Atlanta, Georgia
U.S.A.

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Center for Disease Control
Atlanta, Georgia
U.S.A.

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The Ambassador of Burma to
Bangladesh
Dacca
Bangladesh

Dr. Soewardjono Suryaningrat, Minister of Health, Government of the Republic of Indonesia, visiting the Centre in November 1980.





Baron Walther von Marschall, The Ambassador of the Federal Republic of Germany and Mr. Arthur Robert Wright, The High Commissioner of Canada signing the visitors' book during their visit to the Centre.

Mr. Ray Witlin
245 West 107th Street
New York, New York
U.S.A.

Mr. M. Wolfson
OECD Development Centre
Paris
France

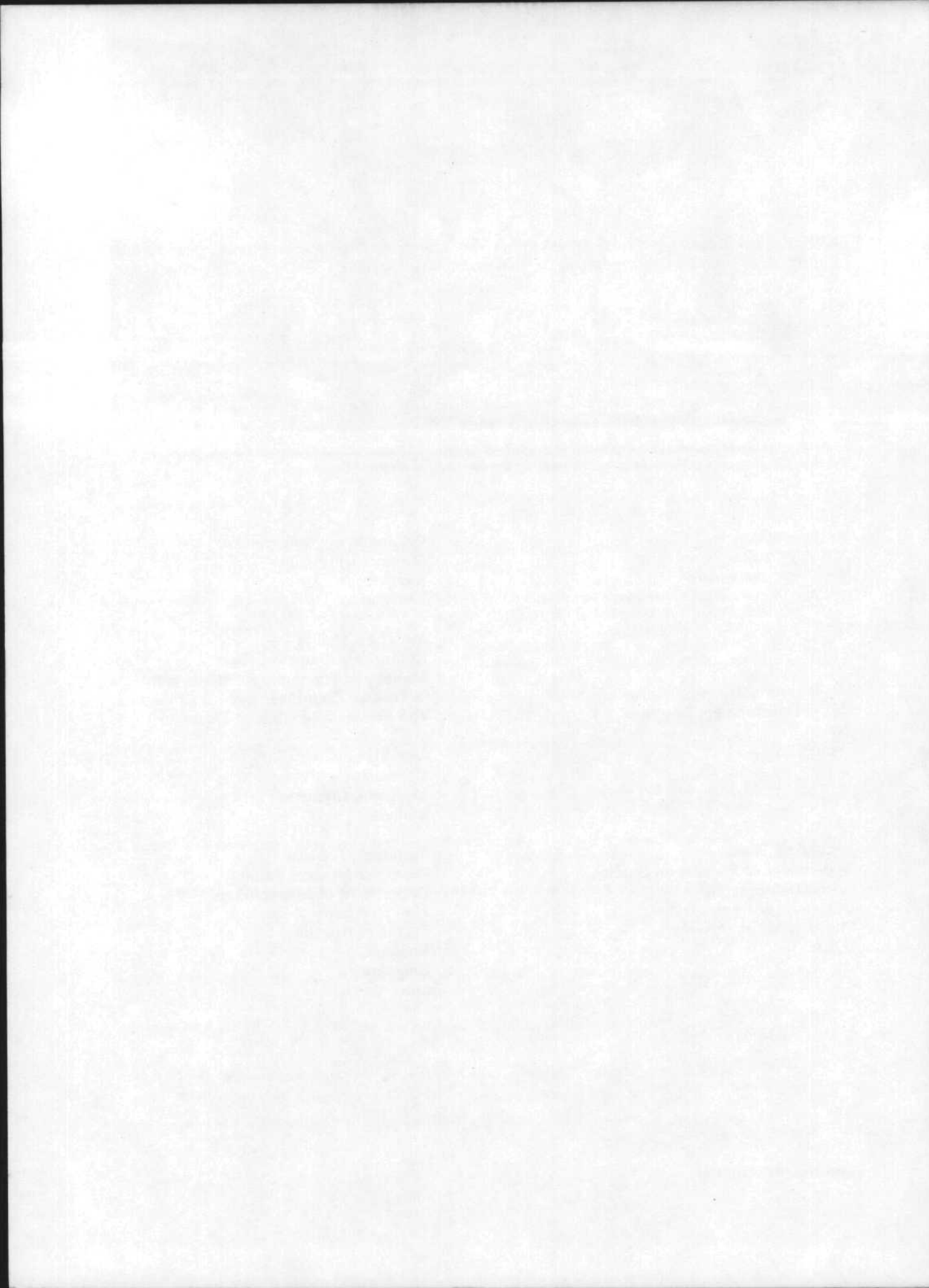
Dr. Van de Walle
Department of Population Studies
and Demography
University of Pennsylvania
Philadelphia, Pennsylvania
U.S.A.

Dr. Samrerug Yanggratake
Mahidol University
Bangkok
Thailand

Mr. Zhou Yipling
Country Programme Officer
Ministry of Economic Relations with
Foreign Countries
The People's Republic of China

Mrs. Lise Zaman
Consultant
Montreal, Quebec
Canada

Professor G. Zissis
Professor Medical Virology
Department of Microbiology
Free University of Brussels
St. Pierre Hospital
Brussels
Belgium



ICDDR,B publications can be obtained from Head, Library and Publication Branch, International Centre for Diarrhoeal Disease Research, Bangladesh, G.P.O. Box 128, Dacca 2, Bangladesh.

- A. CRL Annual Report 1976.
CRL Annual Report 1977.
CRL Annual Report 1978.
ICDDR,B Annual Report 1979.

B. **Working Paper :**

No. 1. The influence of drinking tubewell water on diarrhoea rates in Matlab Thana, Bangladesh by George T. Curlin, K.M.A. Aziz, M.R. Khan. June 1977 (2nd Rep. Sept 1980). 21 p.

No. 2. Water and the transmission of El Tor cholera in rural Bangladesh by James M. Hughes, John M. Boyce, Richard J. Levine, Moslemuddin Khan, George T. Curlin. Dec 1977 (Rep. Mar 1980). 27 p.

No. 3. Recent trends in fertility and mortality in rural Bangladesh 1966-1975 by A.K.M. Alauddin Chowdhury, George T. Curlin. Jan 1978 (Rep. Oct 1979). 14 p.

No. 4. Assessment of the Matlab contraceptive distribution project—implications for program strategy by T. Osteria, Makhlisur Rahman, R. Langsten, Atiqur R. Khan, Douglas H. Huber, W. Henry Mosley. Apr 1978 (Rep. Feb 1981) 25 p.

No. 5. A study of the field worker performance in the Matlab contraceptive distribution project by Makhlisur Rahman, T. Osteria, J. Chakraborty, Douglas H. Huber, W. Henry Mosley. Jul 1978 (Rep. Feb 1981). 17 p.

No. 6. Constraints on use and impact of contraceptives in rural Bangladesh: some preliminary speculations by R. Langsten, J. Chakraborty. Aug 1978 (Rep. Feb 1981). 23 p.

No. 7. The demographic impact of the contraceptive distribution project by T. Osteria, W.H. Mosley, A.I. Chowdhury. Sept 1978. 17 p.

No. 8. Development of milk teeth in rural Meheran children of Bangladesh by Moslemuddin Khan, George T. Curlin. Sept 1978. 23 p.

No. 9. A follow-up survey of sterilization acceptors in Matlab, Bangladesh by Makhlisur Rahman, Douglas Huber, J. Chakraborty. Oct 1978 (Rep. Jul 1980). 31 p.

No. 10. The demographic impact of sterilization in the Matlab village-based MCH-FP program by T. Osteria, S. Bhatia, J. Chakraborty, A.I. Chowdhury. Nov 1978 (Rep. June 1980). 23 p.

No. 11. Parental dependency on children in Matlab, Bangladesh by Makhlisur Rahman. Dec 1978. 28 p.

No. 12. An areal analysis of family planning program performance in rural Bangladesh by T. Osteria, S. Bhatia, A.S.G. Faruque, J. Chakraborty. May 1979. 19 p.

No. 13. The people of Teknaf : births, deaths and migrations (1976-1977) by Mizanur Rahman, M. Mujibur Rahaman, K.M.S. Aziz, Yakub Patwari, M.H. Munshi, M. Shafiqul Islam. May 1979. 46 p.

No. 14. Pilot study of the calendar rhythm method in the Matlab area of Bangladesh by Stan Becker, Rasheda Akhter. Nov 1980. 23 p.

No. 15. Comparison of measures of childbearing: patterns by age and parity in Matlab, Bangladesh by Stan Becker, Helen Hiltabiddle. Mar 1981. 29 p.

No. 16. Demographic studies in rural Bangladesh—May 1969-April 1970 by A.I. Chowdhury, K.M.A. Aziz, Kashem Shaikh. April 1981. 28 p.

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C. Scientific Report:

- No. 1. Double round survey on pregnancy and estimate of traditional fertility rates by A.K.M. Alauddin Chowdhury. Jul 1977 (Rep. May 1978). 28 p.
- No. 2. Pattern of medical care for diarrheal patients in Dacca urban area by Moslemuddin Khan, George T. Curlin, Md. Shahidullah. Aug 1977 (Rep. June 1978). 20 p.
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- No. 5. Household distribution of contraceptives in Bangladesh—the rural experience by Atiqur R. Khan, Douglas H. Huber, Makhlisur Rahman. Sept 1977 (Rep. Dec 1979). 19 p.
- No. 6. The role of water supply in improving health in poor countries (with special reference to Bangladesh) by John Briscoe. Sept 1977 (Rep. Feb 1979). 37 p.
- No. 7. Urban cholera study, 1974 and 1975, Dacca by Moslemuddin Khan, George T. Curlin. Dec 1977 (Rep. May 1980). 24 p.
- No. 8. Immunological aspects of a cholera toxoid field trial in Bangladesh by George T. Curlin, Richard J. Levine, Ansaruddin Ahmed, K.M.A. Aziz, A.S.M. Mizanur Rahman, Willard F. Verwey. Mar 1978. 16 p.
- No. 9. Demographic Surveillance System—Matlab. Volume One. Methods and procedures. Mar 1976. 28 p.
- No. 10. Demographic Surveillance System—Matlab. Volume Two. Census 1974 by Lado T. Ruzicka, A.K.M. Alauddin Chowdhury. Mar 1978. 48 p.
- No. 11. Demographic Surveillance System—Matlab. Volume Three. Vital events and migration, 1975 by Lado T. Ruzicka, A.K.M. Alauddin Chowdhury. Mar 1978. 45 p.
- No. 12. Demographic Surveillance System—Matlab. Volume Four. Vital events and migration, 1975 by Lado T. Ruzicka, A.K.M. Alauddin Chowdhury. Mar 1978. 48 p.
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- No. 14. Ten years review of the age and sex of cholera patients by Moslemuddin Khan, A.K.M. Jamiul Alam, A.S.M. Mizanur Rahman. May 1978. 18 p.
- No. 15. A study of selected intestinal bacteria from adult pilgrims by M.I. Huq, G. Kibriya. Aug 1978 (Rep. Feb 1980). 15 p.
- No. 16. Water sources and the incidence of cholera in rural Bangladesh by Moslemuddin Khan, W. Henry Mosley, J. Chakraborty, A. Majid Sarder, M.R. Khan. Dec 1978. 19 p.
- No. 17. Principles and prospects in the treatment of cholera and related dehydrating diarrheas by William B. Greenough, III. Jan 1979. 20 p.
- No. 18. Demographic Surveillance System—Matlab. Volume Six. Vital events and migration 1977 by Aporn Samad, Kashem Shaikh, A.M. Sarder, Stanley Becker and Lincoln C. Chen, Feb. 1979, 65 p.
- No. 19. A follow-up survey of sterilization acceptors in the modified contraceptive distribution projects by Shushum Bhatia, Trinidad Osteria, J. Chakraborty, and A.S.G. Faruque. Feb 1979. 25 p.
- No. 20. Cholera due to the El Tor biotype equals the classical biotype in severity and attack rates by Moslemuddin Khan and Md. Shahidullah. Mar 1979. 20 p.

- No. 21. An estimation of response bias of literacy in a census of rural Bangladesh by M. Shafiqul Islam, George T. Curlin and K.M.A. Aziz. Mar 1979. 26p.
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- No. 23. M.R. Clients in a village based family planning programme by Shushum Bhatia and Lado T. Ruzicka. Apr 1979. 26 p.
- No. 24. Passive hemagglutination assays for quantitation of cholera antitoxin: gluteraldehyde and chromium chloride used as coupling reagents to sensitize human erythrocytes with purified cholera toxin by Anisaruddin Ahmed, Kh. Abdullah Al-Mahmud, George T. Curlin. June 1979. 25 p.
- No. 25. Investigation of outbreak of dysentery due to *Shigella sonnei* in a small community in Dacca by M.I. Huq. June 1979. 21 p.
- No. 26. Indigenous birth practices in rural Bangladesh and their implications for a maternal and child health programme by Shushum Bhatia, J. Chakraborty, A.S.G. Faruque. Jul 1979. 24 p.
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- No. 28. Growth and development studies: Meheran by Moslemuddin Khan, George T. Curlin, J. Chakraborty. Jul 1979. 33 p.
- No. 29. Report on reactogenicity and immunogenicity of Wellcome Cholera Toxoids in Bangladeshi volunteers by Robert E. Black, Md. Yunus, Abu Eusof, Anisaruddin Ahmed, M.R. Khan, David A. Sack. Jul 1979. 55 p.
- No. 30. Strongyloides Stercoralis Larvae recovered from patients with diarrhoea and dysentery by G.H. Rabbani, Robert H. Gilman, Asma Islam. Jul 1979. 18p.
- No. 31. The condom in rural Bangladesh—a special effort is needed by Douglas Huber, Makhlisur Rahman, J. Chakraborty. Aug 1979. 14 p.
- No. 32. The Matlab contraceptive distribution project by Makhlisur Rahman, W.H. Mosley, Atiqur Rahman Khan, A.I. Chowdhury, J. Chakraborty. Dec 1979. 119 p.
- No. 33. Epidemiologic study of dysentery cases of Dacca urban area by Moslemuddin Khan, Md. Shahidullah. Jan 1980. 30 p.
- No. 34. The gut as an immune organ by A.M. Molla. Feb 1980. 51 p.
- No. 35. Microbiological surveillance of intra-neighbourhood El Tor cholera transmission in rural Bangladesh by W.M. Spira, Y.A. Saeed, M.U. Khan, M.A. Sattar. Mar 1980. 39 p.
- No. 36. Labon-gur (common salt and brown sugar) oral rehydration solution in the diarrhoea of adults by M.R. Islam, W.B. Greenough III, M.M. Rahaman, A.K. Azad Chowdhury, D.A. Sack. Apr 1980. 19 p.
- No. 37. Utilisation of a diarrhoea clinic in rural Bangladesh: influence of distance, age and sex on attendance and diarrhoeal mortality by M. Mujibur Rahman, K.M.S. Aziz, I.A.H. Munshi, Yakub Patwari, Mizanur Rahman. June 1980. 22 p.
- No. 38. Birth care practice and neonatal tetanus in a rural area of Bangladesh by M. Shafiqul Islam, M. Mujibur Rahman, K.M.S. Aziz, M.H. Munshi, Mizanur Rahman, Yakub Patwari. Jul 1980. 19 p.
- No. 39. Hours of onset of cholera classical and El Tor and diarrhoea by Moslemuddin Khan. Aug 1980. 18 p.
- No. 40. Socio-economic differentials in mortality in a rural area of Bangladesh by Stan D'Souza, Abbas Bhuiya, Mizanur Rahman. Nov 1980. 31 p.
- No. 41. Reduction of neonatal mortality by immunization of non-pregnant women and women during pregnancy with aluminum adsorbed tetanus toxoid by Makhlisur Rahman, Lincoln C. Chen, J. Chakraborty, Md. Yunus, A.I. Chowdhury, A.M. Sarder, Shushum Bhatia, George T. Curlin. Jan 1981. 25 p.

No. 42. Are there barefoot doctors in Bangladesh: a study of non-government rural health practitioners by A.M. Sarder, Lincoln C. Chen. Jan 1981. 28 p.

No. 43. Factors related to acceptance of tetanus toxoid immunization among pregnant women in a maternal-child health programme in rural Bangladesh by Makhlisur Rahman, Lincoln C. Chen, J. Chakraborty, Md. Yunus, A.S.G. Faruque, A.I. Chowdhury. Jan 1981. 33 p.

No. 44. Infant mortality in rural Bangladesh: an analysis of causes during neonatal and postneonatal period by M. Shafiqul Islam, M. Mujibur Rahaman, K.M.S. Aziz, Mizanur Rahman, M.H. Munshi, Yakub Patwari. Apr 1981. 21 p.

D. Special Publication:

No. 1. Management of cholera and other acute diarrhoeas in adults and children—World Health Organization. Sept 1977 (2nd Rep. Nov 1980). 26 p.

No. 2. Index to CRL publications and scientific presentations 1960-1976 by Susan Fuller Alamgir, M. Shamsul Islam Khan, H.A. Spira. Aug 1978. 70 p.

No. 3. Working manual for *E. coli* enterotoxin assay and ELISA assay for rotavirus antigen by M.I. Huq, D.A. Sack, R.E. Black. Apr 1979. 32 p.

No. 4. Index to CRL publications and scientific presentations 1977-1978 and addenda for 1962, 1964-1976 by M. Shamsul Islam Khan. Jan 1980. 69 p.

No. 5. ICDDR,B Progress Report 1979-1980. Apr 1980. 60 p.

No. 6. The treatment of acute diarrhoea in children: an historical and physiological perspective by Norbert Hirschhorn. May 1980. 68 p.

No. 7. *Campylobacter fetus* SSP *jejuni* a laboratory manual by Martin J. Blaser. June 1980. 40 p.

No. 8. Standing orders for evaluation and treatment of patients with diarrhoea symptoms who come to the Travellers Clinic at ICDDR,B. Sept 1980. 11 p.

No. 9. Proceedings of the National Workshop on Oral Rehydration. Oct 1980. 32 p.

No. 10. Proceedings of the Consultative Group meeting of the International Centre for Diarrhoeal Disease Research, Bangladesh. Nov 1980. 58 p.

No. 11. A review of findings on the impact of health intervention programmes in two rural areas of Bangladesh by Makhlisur Rahman, Stan D'Souza. Nov 1980. 30 p.

No. 12. Training manual on treatment and prevention of diarrhoea—instruction to trainers. Dec 1980. 20 p.

E. Monograph Series:

No. 1. Kinship in Bangladesh by K.M. Ashraful Aziz. May 1979. 250 p. (Price Tk. 85.00/£5.00/US \$ 10.00).

F. Thesis and Dissertation:

No. 1. Chlorpromazine as a therapeutic antisecretory agent in cholera and related diarrhoeas by G.H. Rabbani. Dec 1980. 73 p.

No. 2. Village practitioners of Bangladesh: their characteristics and role in an oral rehydration programme by A.S.M. Mizanur Rahman. Feb 1981. 72 p.

G. Newsletter:

Glimpse: V 1, nos. 1-12, Jan-Dec 1979.
V 2, nos. 1-12, Jan-Dec 1980.