

ANNOTATED BIBLIOGRAPHY ON DIETARY MANAGEMENT OF DIARRHOEAL DISEASES

Editor-in-Chief: Ayesha Molla
December 1985. iii, 91 pages. Specialized bibliography series no. 8
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON ENTEROTOXIGENIC AEROMONAS

Editors-in-Chief: Zeaur Rahim and K M S Aziz
January 1986. iii, 59 pages. Specialized bibliography series no. 9
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON ANTISECRETORY AGENTS IN THE TREATMENT OF DIARRHOEAL DISEASES

Editor-in-Chief: G H Rabbani
February 1986. ii, 86 pages. Specialized bibliography series no. 10
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

DIRECTORY OF ASIAN DIARRHOEAL DISEASE SCIENTISTS AND PRACTITIONERS

Editors-in-Chief: K M S Aziz and M Mujibur Rahaman
June 1985. 155 pages
Price: Developed countries US\$ 20.00 (Inst.) US\$ 15.00 (Indvl.)
Developing countries US\$ 15.00 (Inst.) US\$ 10.00 (Indvl.)

PROCEEDINGS OF THE NATIONAL WORKSHOP ON ORAL REHYDRATION

Editors: K M S Aziz and J L Beckett
October 1980. 23 pages. ICDDR,B Special publication no. 9
Price: US\$ 4.00

PROCEEDINGS OF ICDDR,B WORKSHOP: MEDICAL EDUCATION ON DIARRHOEAL DISEASES AND RELATED SUBJECTS

Editors: A R Samadi and K M S Aziz
September 1981. 33 pages. ICDDR,B Special publication no. 14
Price: US\$ 5.00

PROCEEDINGS OF THE CONFERENCE ON EXPERIMENTAL CHOLERA VACCINES

Editor: Shereen Rahman
November 1981. 155 pages. ICDDR,B Special publication no. 15
Price: US\$ 15.00

THE BI-KEN TEST FOR DETECTION OF ENTEROTOXIGENIC ESCHERICHIA COLI PRODUCING HEAT-LABILE ENTEROTOXIN (LT): A LABORATORY MANUAL

By T Honda, Q Akhter and R I Glass
November 1981. 13 pages. ICDDR,B Special publication no. 16
Price: US\$ 4.00

94

SHIGELLOSIS: A CONTINUING GLOBAL PROBLEM; PROCEEDINGS OF AN INTERNATIONAL CONFERENCE, COX'S BAZAAR, BANGLADESH, 15-20 JUNE 1981

Editors: M M Rahaman, W B Greenough III, N R Novak and S Rahman
September 1983. ii, 250 pages. ICDDR,B Special publication no. 20
Price: US\$ 15.00 (developed countries); US\$ 10.00 (developing countries)

THE INFLUENCE OF MATERNAL EDUCATION ON INFANT AND CHILD MORTALITY IN BANGLADESH

By S Lindenbaum, M Chakraborty and M Elias
May 1985. 24 pages. ICDDR,B Special publication no. 23
Price: US\$ 4.00

MORTALITY CASE STUDY MATLAB, BANGLADESH

By S D'Souza
September 1985. 80 pages. ICDDR,B Special publication no. 24
Price: US\$ 9.00

DEMOGRAPHIC SURVEILLANCE SYSTEM-MATLAB

Volume 13. Cause of death reporting in Matlab; source book of cause-specific mortality rates 1975-1981.

By S Zimicki, L Nahar, A M Sarder and S D'Souza
October 1985. 103 pages. ICDDR,B Scientific report no. 63
Price: US\$ 15.00

BELIEFS AND FERTILITY IN BANGLADESH

By C Maloney, K M A Aziz and P C Sarker
December 1981. xv, 366 pages. ICDDR,B Monograph no. 2
Price: US\$ 30.00

LIFE STAGES, GENDER AND FERTILITY IN BANGLADESH

By K M A Aziz and Clarence Maloney
December 1985. xi, 231 pages. ICDDR,B Monograph no. 3
Price - Foreign offset paper: US\$ 35.00
Local paper : US\$ 25.00

GLIMPSE - ICDDR,B newsletter (bi-monthly).
Annual subscription: Developed countries - Individual US\$ 15.00
Institution US\$ 20.00
Developing countries - Free

* All publications are printed by an offset process with soft/hard covers.

* The cost includes postage by surface mail (book post).

95

- * If airmailing is preferred, please add 20% (Asian countries) or 30% (non-Asian countries) to the total cost.
- * Orders may be placed directly with the International Centre for Diarrhoeal Disease Research, Bangladesh, G P O Box 128, Dhaka 2, Bangladesh.
- * A Cheque/Bank Draft, drawn on any bank in Bangladesh, the USA or the UK, is acceptable.
- * All payments must be in favor of "International Centre for Diarrhoeal Disease Research, Bangladesh".
- * Correspondence and remittances should be sent to Head, Library, Publication and Communications, International Centre for Diarrhoeal Disease Research, Bangladesh, G P O Box 128, Dhaka 2, Bangladesh.

ANNUAL REPORT

Agency for International Development
Library
Room 105 SA-18
Washington, D.C. 20529

INTERNATIONAL CENTRE FOR
DIARRHOEAL DISEASE
RESEARCH, BANGLADESH

15th 6/85



ANNUAL REPORT 1985.



INTERNATIONAL CENTRE FOR
DIARRHOEAL DISEASE
RESEARCH, BANGLADESH

EDITOR	Andrew Hall
MANAGING EDITOR	M Shamsul Islam Khan
PUBLICATION AND PRINTING	M Nurul Huda Hasan Shareef Ahmed
MANUSCRIPT TYPING	M Mahfuzul Hassan
COVER DESIGN	Asem Ansari

September 1986

Copyright © 1986

International Centre for Diarrhoeal Disease Research, Bangladesh
G P O Box 128, Dhaka 2, Bangladesh

Telephone: 600171-600178 (PABX)

Cable: Cholera Dhaka

Telex: 65612 ICDD BJ

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

Printed by the Ruby Printing and Packaging Ltd. in Dhaka, Bangladesh

PREFACE

This is the seventh Annual Report of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B).

This year's Report marks a deliberate change in style from previous years: it is more technical and factual in its description of the research carried out and of the services provided to Bangladesh. It has been written by the scientists of the Centre themselves, so we hope that what it may lack in a consistent style and literary panache will be offset by the details given of the work of the Centre's greatest resource, its staff.

The ICDDR,B is organised into five "Working Groups" of scientists and physicians with similar interests: Community Services Research, Disease Transmission, Host Defence, Nutrition, and Pathogenesis and Therapy Working Groups. The work of each is reported in Sections 2 - 6, though for the sake of clarity and simplicity some research which may have been administered by one working group is reported in the section of another — the divisions between the working groups are not always clear cut. Each Working Group has an Associate Director as its head who reports to the Director. The other Associate Directors are the heads of the Training and Extension Division (which has responsibility for the Library, Publications and Communications Branch), the Resources Development Office and the Finance Office; reports of their work may be found in Sections 7 - 10.

The Director of the Centre answers to the Board of Trustees -- representatives of the Government of Bangladesh and eminent international scientists (see Section 11). The Board of Trustees meets twice a year in Dhaka and are the final arbiters of the Centre's policy, administration and scientific direction. There are two statutory committees which meet to review the practice and ethics of research proposed in the Centre (see Section 12).

The headquarters of the ICDDR,B is in Dhaka, the capital of Bangladesh. The Centre is housed in the building of the Institute of Public Health in Mohakhali and runs a Diarrhoea Treatment Centre on the same site. The Centre also runs two field stations, one in Matlab Upazila of Chandpur District, Comilla Region, and one in Teknaf Upazila of Cox's Bazaar District.

At the end of 1985 the ICDDR,B had 1410 members of staff. Almost half of them (641) worked for the Community Services Research Working Group, while the next largest administrative division (after the Administration itself, with 250 people) were Disease Transmission (188), Pathogenesis and Therapy (138) and Nutrition (84). Senior members of staff are listed in Section 14.

Like many other institutions, the ICDDR,B has its own jargon and acronyms. As little jargon as possible has been used in this report and a list of acronyms is given on page 88. For readers interested in specific aspects of the work of the ICDDR,B an index of major subjects is provided on pages 89 - 92.

If you would like to know more about particular services or research described here, or have any comments on this report, then please write to The Director, ICDDR,B, P.O. Box 128, Dhaka - 2, Bangladesh.

CONTENTS

1. DIRECTOR'S INTRODUCTION	...	...	1
2. COMMUNITY SERVICES RESEARCH WORKING GROUP	...	...	3
3. DISEASE TRANSMISSION WORKING GROUP	...	...	15
4. HOST DEFENCE WORKING GROUP	...	...	20
5. NUTRITION WORKING GROUP	...	...	22
6. PATHOGENESIS AND THERAPY WORKING GROUP	...	...	30
7. TRAINING AND EXTENSION	...	...	36
8. LIBRARY, PUBLICATION AND COMMUNICATIONS	...	...	40
9. RESOURCES DEVELOPMENT	...	...	43
10. FINANCE	...	...	45
11. BOARD OF TRUSTEES	...	...	56
12. MANDATORY COMMITTEES	...	...	58
13. ICDDR,B PUBLICATIONS IN 1985	...	...	62
14. STAFF LIST	...	...	80
15. ACRONYMS AND ABBREVIATIONS	...	...	88
16. SUBJECT INDEX	...	...	89

1. DIRECTOR'S INTRODUCTION

Throughout 1985 the International Centre for Diarrhoeal Disease Research, Bangladesh has continued to pursue its research activities and its commitment to serve and train.

Research workers at the Centre come from three continents, Asia, Europe and America, and from as many as 12 countries. The disciplines they represent indicate the Centre's wide ranging approach to the problems of diarrhoeal diseases and include nutrition, clinical and preventive medicine, pathophysiology, microbiology, biochemistry, clinical pathology, epidemiology, parasitology, biostatistics, demography, anthropology, immunology, computer applications and operations research.

Amongst the many research activities summarised in the following pages one should be mentioned in particular: in 1985 after several years of preparation, the immunization phase of a vast trial of a new oral cholera vaccine was successfully completed in collaboration with the WHO and the Government of Bangladesh. The vaccine itself represents the joint efforts of Swedish researchers, the Institut Merieux of Lyons, France and the ICDDR,B. The ample funds for this complex and costly project were provided by the United States Agency for International Development and the Government of Japan. The first results are most encouraging and if confirmed the prevention of cholera may be in sight.

The service activities of the ICDDR,B continue to be considerable. More than 75,000 patients with diarrhoea, mostly children, have been treated in Dhaka, Matlab and Teknaf. The Urban Volunteer Programme continues to provide help to the least favoured inhabitants of Dhaka, as well as having a strong research component. This combination of research and service also characterises the activities of the Maternal and Child Health programmes in Matlab and Teknaf, and of the Mirzapur Handpump Project.

As in the past, in 1985 the ICDDR,B was very active in providing training, and more than 700 Bangladeshi doctors, researchers and health professionals attended courses in the Centre. Seven two-week international courses on different aspects of diarrhoeal diseases were organised for 58 participants from 6 developing countries. In June, Mahidol University in Bangkok, the National Institute of Cholera and Enteric Diseases in Calcutta and the ICDDR,B jointly organised the 3rd Asian Conference on Diarrhoeal Diseases which was attended by over 300 participants. A one-day national workshop on the use of the mass media to help control diarrhoeal diseases represents a new area of activity for the Centre. The Training Branch also continued its efforts to develop training materials and to perform task analyses of several aspects of diagnosing and treating diarrhoeal diseases.

In addition to the newsletter Glimpse and the Journal of Diarrhoeal Diseases Research, the DISC project published a Directory of Asian Diarrhoeal Disease Scientists and Practitioners, and seven specialised annotated bibliographies. The International Development Research Center has agreed to extend its support of DISC until December 1987.

It is a particular pleasure to report the growing collaboration between the ICDDR,B and several Bangladeshi national institutions, particularly the Bangladesh Medical Research Council, the Department of Paediatrics in the Institute of Post-graduate Medicine and Research and the Dhaka Children's Hospital. I am very grateful to all our colleagues in these institutions.

Contacts with many scientific centres abroad were initiated or expanded in 1985. Too numerous to be cited, these centres are one of the lifelines of our activities. The year also saw the start of a closer collaboration with the WHO, which I hope will grow and strengthen.

The facilities of the Centre have been improved, despite many difficulties. A thorough renovation of the Microbiology and Immunology laboratories is almost complete. Another area of development -- still in progress -- are the facilities for computing and data handling: with generous help from the Canadian International Development Agency (CIDA) an IBM 4331 mainframe computer and allied peripherals has been installed. The considerable work involved in this has been made possible by hiring a team of international level computer staff and with the help of Canadian consultants.

In the early summer of 1985 it became apparent that the ICDDR,B was heading towards serious financial difficulties. The move by some major donors from institutional to project funding and the heavy burden of expensive service commitments were two major factors explaining the Centre's precarious financial state. As soon as the budgetary situation became apparent a policy of strict financial orthodoxy was applied. In November 1985 the Board of Trustees were appraised of the problems and took drastic actions to redress the Centre's finances. Regrettably but inevitably the staff of the Centre were affected by these actions. Salaries were reduced and contracts terminated, so that at the end of the year the Centre had to prepare itself for the departure of many of its international staff. The certainty of a difficult period ahead was alleviated only by the very positive reactions of many donors and the invaluable help of some high officials in both UNICEF and the WHO.

The following pages are but a brief and sober summary of the manifold activities, hard work and dedication of more than 1,400 member of staff. Despite great difficulties the aims set before the International Centre for Diarrhoeal Disease Research, Bangladesh will be pursued: the justified demands and expectations of untold numbers of patients must be met, and met pertinently.



Professor Roger Eeckels
Director

2. COMMUNITY SERVICES RESEARCH WORKING GROUP

[CSRWG]

The main role of the Community Services Research Working Group is to provide health care to reduce morbidity and mortality due to diarrhoeal disease, and to reduce total fertility. The combination of large-scale community work in both rural and urban areas and a concern with population issues has led to a continuing interest in demographic research, which complements studies relating to mortality. Two major resources for this work and for the ICDDR,B as a whole are the Field Stations at Teknaf and Matlab, and the rapidly developing computer services in Dhaka; the latter two fall administratively within the CSRWG.

SERVICES AND RESEARCH IN MATLAB

The main field station of the ICDDR,B is in Matlab Upazila, about 45 km south-east of Dhaka. The Centre's predecessor, the Cholera Research Laboratory, began work there in 1963 in 132 villages containing 110,000 people. In 1966 a Demographic Surveillance System was set up to record vital events and migrations, and at the end of 1977 a Maternal, Child Health and Family Planning programme was instituted for people living in half of the DSS area. The effects of the MCH-FP programme on mortality and fertility in the Matlab "intervention" area are being compared with mortality and fertility in the remainder of the DSS area, the "comparison" area.

Although the Teknaf Field Station falls administratively under the Nutrition Working Group, vital events and migrations are monitored by a part of the CSRWG, the Demographic Surveillance System, and so are reported here.

1 The Demographic Surveillance System (DSS) - Matlab and Teknaf. (Principal Investigators: B Wojtyniak and M Rahman)

The surveillance of vital events (births, deaths, marriages and migrations) continued during 1985 in Matlab among a population of around 195,000 and in Teknaf among 65,000 people. A detailed document was prepared in 1985 recording all aspects of the procedures used to collect data in the field and its subsequent management. When it is completed it will become an ICDDR,B publication and will facilitate the use of DSS data for future research.

A new mainframe computer was installed under the auspices of the DSS; details are provided in the section on Computer Information Services (p 12). A detailed analysis of the DSS database, editing and interlinking files have all been completed, and test data have been extracted, converted and edited. Tasks for files of vital events will be completed by mid-1986 and the completed database for Matlab will be ready by the end of 1986.

A recent analysis of Matlab data has focussed on differential mortality in childhood between the sexes in relation to socio-economic status (SES).

The case fatality rate for measles was 2.7 times greater in girls than in boys, and the rate was 2.2 times greater in low than in high SES households. An inverse relationship between SES and nutritional status in childhood was found to be significant, though it explained less than 10% of the variance; the relationship was much stronger in girls than in boys.

Data from Teknaf showed that overcrowding in the home and inadequate sanitation had a significant effect on mortality in early childhood: the risk of post-neonatal death was 1.5 times greater in crowded households, and 3.1 times greater in households which did not use latrines compared with those which did.

An analysis of data on seasonality collected from 1977 to 1983 showed more deaths among children during the monsoon in Teknaf (June-July) and in the lean or "hungry" period in Matlab (October-November). During the "hungry" period more girls died than boys.

Some demographic trends in Matlab and Teknaf are illustrated below.

Demographic Characteristics of the Matlab intervention area (M interv.), the Matlab comparison area (M comp.) and Teknaf, from 1978-84

Vital rates								
(per 1000)	Area	1978	1979	1980	1981	1982	1983	1984
All deaths	M interv.	12.5	12.1	11.3	11.9	12.5	12.1	13.4
	M comp.	13.8	15.6	14.8	14.4	15.9	18.0	17.3
	Teknaf	14.7	15.9	12.8	14.2	13.6	14.7	17.1
Neonatal deaths	M interv.	69.0	70.9	59.3	66.4	58.1	56.4	57.9
	M comp.	78.7	74.6	72.7	69.5	68.1	70.3	71.4
	Teknaf	78.8	85.6	75.0	88.3	72.8	88.4	96.0
Post-neonatal deaths	M interv.	45.5	43.5	32.6	36.1	47.5	41.8	56.9
	M comp.	47.0	43.3	41.3	45.0	50.2	42.2	55.7
	Teknaf	54.3	57.1	46.8	51.2	46.1	65.4	56.3
Child (1-4 y) deaths	M interv.	22.5	17.1	18.6	19.1	18.8	21.6	23.1
	M comp.	22.1	26.2	25.4	24.8	27.4	35.3	39.2
	Teknaf	16.8	16.9	13.7	14.9	10.6	12.3	22.1
Births	M interv.	32.1	34.9	37.1	35.3	36.9	33.8	30.7
	M comp.	37.8	47.0	45.5	43.8	44.6	42.4	37.3
	Teknaf	45.1	55.6	52.4	51.5	54.2	53.4	54.8
Total fertility*	M interv.	4.5	4.8	5.1	4.8	5.0	4.5	4.0
	M comp.	5.4	6.9	6.7	6.3	6.3	6.4	5.1
	Teknaf	6.7	8.1	8.1	7.7	7.9	7.5	7.8
Natural increase	M interv.	19.6	22.9	25.8	23.4	24.3	22.3	17.3
	M comp.	23.9	31.4	30.6	29.4	28.8	25.8	20.0
	Teknaf	30.4	39.7	39.6	37.3	40.6	38.7	37.7

* per woman.

A critical review of data from Matlab on causes of death, particularly during infancy, has revealed shortcomings. One major example is a substantial over-reporting of neonatal tetanus. Improvements in data collection, its analysis and review have been introduced and registration forms for deaths and other events have been modified and standardized in both DSS areas. Although in general there is evidence in the Matlab intervention area of both a substantially better survival of children and a better regulation of fertility, the achievements in terms of absolute values are still inadequate. With more accurate information it is hoped that further health and family planning interventions may be introduced.

An analysis is in progress of the demographic consequences of marital disruption and of differences in nuptiality in Matlab and Teknaf, in collaboration with Princeton University, USA.

2 Maternal and Child Health and Family Planning (MCH-FP) activities in Matlab.

(Principal Investigators: J F Phillips and M G M Rowland)

The current MCH-FP project delivers services to about 94,000 people. Its aim is to reduce mortality among mothers and children and to achieve a sustained increase in the number of couples practising family planning. Aside from the direct benefits of improved health services for the 14,000 women in the project area and their children, the Demographic Surveillance System makes it possible to conduct health care research, and to measure the impact of services on mortality and fertility. Underlying the programme is the need to identify appropriate priorities and service strategies given the severe constraints that hamper the development of an effective primary health care programme in rural Bangladesh and other South Asian countries. A major feature of this programme is the strong outreach system which provides health care in the home.

As well as consolidating the already very effective family planning activities in 1985, particular aspects of the MCH component have been strengthened. This is timely, coming at a point when the Ministry of Health & Population Control (MOHPC; now the Ministry of Health and Family Planning) of the Government of Bangladesh has identified three priorities: the expanded programme on immunization, oral rehydration therapy and safe-birth practices.

Expanded Programme on Immunization (EPI). Measles immunization was previously delivered to a population of 45,000, covering 87% of children aged from 9 months to 5 years -- 1,500 children in 1984. In 1985 immunization was extended to a neighbouring population of a similar size thereby doubling the coverage. Vaccination will be completed early in 1986, about the time of the annual epidemic of measles. No problems were encountered with the demands on the cold chain to supply vaccines because a close relationship has been maintained with the Bangladesh EPI. Measles immunization will be followed in 1986 by standardizing the delivery of tetanus toxoid to mothers, and later, by immunization against diphtheria as well as polio.

Oral rehydration therapy. The mainstay of treating acute watery diarrhoea continues to be oral rehydration solution (ORS). The case load at the Matlab Treatment Centre fell substantially in 1984 and again in 1985, with a corresponding increase at the three decentralized Community Operated Treatment Centres run by volunteers trained by the ICDDR,B. The cottage industry preparation of WHO oral rehydration salts has changed from 1 litre

to 0.5 litre packets to conform with the practice of the Government of Bangladesh. The distribution of packets at clinics and in households was accompanied by training personnel and educating clients.

There is unconfirmed evidence emerging in Matlab of greater numbers of children dying of diarrhoea. This may be due to an increase in the occurrence of dysentery, a trend observed throughout south-east Asia. For this reason the surveillance of morbidity in Matlab has been intensified with particular attention to diarrhoea. This will help determine the limitations of the present programme and develop new strategies to reduce morbidity and mortality due to diarrhoea.

Safe-birth practices. Neonatal and maternal mortality rates in Matlab are still high and show little improvement (see also p 8). This is mainly due to the dangers of having a baby at home and because women with a high risk of complications are not found and referred for prenatal care. Five hundred traditional birth attendants have been identified and their training is scheduled for mid-1986. By that time "Safe Delivery Kits" will also have been distributed to all pregnant women.

Family planning activities. Each year an average of 175 tubectomies and a few vasectomies have been performed in the Matlab Treatment Centre. About half of the clients came from outside the ICDDR,B study area. The service provided by the ICDDR,B duplicated that provided 25 metres away in the Government of Bangladesh Upazila Health Complex. For this reason and to release space in order to improve nutritional services in the Matlab Treatment Centre, such operations are no longer performed. Although clients are motivated as before, they are then referred to Government colleagues whose work load will increase by an estimated maximum of 20%.

In view of current controversy it is worth noting that the ICDDR,B neither carries out nor actively refers patients for menstrual regulation. The current domiciliary "cafeteria style" contraceptive service is being maintained as before -- clients are offered in their homes a range of contraceptive methods from condoms to Copper-T intra-uterine devices. The current contraceptive acceptance rate has continued to rise, to 46% of eligible couples -- more than twice the national average. In order to improve the service offered, some research on infections which are associated with using contraceptives is being undertaken (see p 7).

The Matlab MCH-FP programme has been able to achieve a reduction in fertility and mortality roughly equal to targets set by the Government of Bangladesh for the next five years. If these official goals are to be met nationwide, then the Matlab experience, or elements of it, may need to be implemented elsewhere: the MOHPC and the MCH-FP Extension Project of the ICDDR,B are already doing this.

3 A cost-effectiveness analysis of the MCH-FP programmes in the Matlab intervention and comparison areas. (Principal Investigators: M Koblinsky and D Balk)

The aim is to identify the level of MCH-FP services which have the greatest effect in reducing population growth for the least expense. A series of rates are being calculated to provide information on the cost per unit of impact of different treatments and the way they change over time. This cost-effectiveness analysis was carried out initially in the MCH-FP

intervention area of Matlab. Considerable care is being taken to distinguish between the costs of the services provided and of concurrent research. Once the technique has been refined in Matlab it will be applied in the more difficult situation of the Extension Project (see p 10).

- 4 Individual and community level variations in fertility and mortality in Matlab: a comparison of intervention and comparison areas.
(Principal Investigator: M Badrud Duza)

This study aims to explore individual and community level variations in vital rates and related factors in the intervention and comparison areas of Matlab. This is to validate if and to what extent variations in mortality and fertility in the two areas are attributable to health interventions by the ICDDR,B, rather than due to unrelated characteristics of the individual and the area, or due to the dynamics of development.

- 5 The impact of the Meghna-Dhonogoda Embankment Scheme on vital rates and migration in Matlab: its implications for the DSS.
(Principal Investigator: M Badrud Duza)

This flood control scheme commenced in 1979 and is now due to be completed in 1987. It is possible that the movement of people brought about by the new earthworks has caused changes in morbidity, mortality and fertility. A study of 149 villages inside and outside the embankment may indicate a need for new interventions. The baseline data may also be used to support other research on epidemiological and ecological aspects of the embankment project.

- 6 Family planning related infections.
(Principal Investigator: J Wasserheit)

The aim of this project was to determine the nature and extent of morbidity due to reproductive tract infections in women who practice family planning. It has involved training staff to detect and manage family planning related infections and developing appropriate new microbiological techniques (see p 16).

A period prevalence study of family planning related infections was carried out in Matlab beginning in August 1985. A total of 2,296 women (95% of those eligible) were screened in their homes by questionnaire and 597 women with a medical history which indicated reproductive tract infections were referred for further examination. Of these women, 456 were successfully investigated and 392 were found to need antimicrobial treatment — about 10% of the population screened.

Passive surveillance is also being continued in the form of research orientated towards service, and 188 women seeking help at clinics have so far been investigated and treated when necessary. The data on the clinical features of infections and on the contraceptives used are now being analysed. This will help to provide some simple algorithms for diagnosing and treating infections. An urban component to this study, based in the Mohammadpur Fertility Services Centre, will begin in 1986.

During 1985 training manuals were developed in both English and Bangla, and training was given to more than 100 medical officers, community health workers and other supervisory and para-medical staff. The training included epidemiology, pathophysiology, identifying clinical signs, and diagnosing and treating infections of the female reproductive tract.

7 **The causes of neonatal and post-neonatal mortality in Matlab.**
(Principal Investigator: S Bhatia)

Symptoms preceding the death of children in the neonatal and post-neonatal periods were obtained by interviewing mothers whose infant had died in 1982 and 1983. The history of their pregnancy and labour and a description of the state of the newborn baby were used to arrive at a diagnosis. The data are now being analysed.

8 **A strategy to develop nutritional interventions by estimating the proportion of under-3 deaths associated with malnutrition using monthly measurements of arm circumference.**
(Principal Investigator: A Briend)

The aim of this study was to estimate the proportion of deaths in children less than three years old from the Matlab comparison area which were associated with malnutrition. This would indicate how many children would have been identified with a high risk of dying by health workers measuring arm circumference each month. This information is intended to help develop and improve simple techniques for future nutrition interventions which can reduce deaths associated with malnutrition (see p 22). A nutrition rehabilitation unit is to be set up in the Matlab Treatment Centre in 1986 to treat severely malnourished children as no such facilities currently exist in the area.

9 **The impact of measles immunization on morbidity and the growth of children in rural Bangladesh.**
(Principal Investigators: N Shahid and Md Yunus)

This study had two main aims: to assess the impact of measles immunization on morbidity due to diarrhoea and on the growth of children in rural Bangladesh; to compare the duration of diarrhoea in children who had received measles immunization with unvaccinated children who later developed measles. Other issues addressed were the reliability of the history of a measles attack, and the serological response to the vaccine in relation to nutritional status.

Field work began in August 1984 and continued throughout 1985. Three hundred and fifty-six vaccinated children aged 9 to 24 months and 990 unvaccinated children matched for sex and age were studied. Data collection included alternate day morbidity surveillance for diarrhoea and other common illnesses, and monthly anthropometry. Blood samples were obtained from 284 vaccinated children and 784 unvaccinated controls after they had been studied for one year. The research will continue in the first half of 1986.

10 **A field comparison of WHO ORS and rice-salt ORS.**
(Principal Investigator: A Bari)

The collection of data for this study was completed in 1985. A preliminary analysis has shown that people using rice-salt ORS experienced shorter episodes of diarrhoea than those using the WHO ORS or any kind of locally available treatment. Children using rice-salt ORS also showed a better gain in weight and height than those using the WHO ORS. It is not clear at this stage if the differences are due purely to the extra energy present in rice-salt ORS or to some specific therapeutic effect on the gut.

SERVICES AND RESEARCH ELSEWHERE

The Community Services Research Working Group also has considerable projects to provide services and conduct research elsewhere in Bangladesh. In 1981 a programme began to provide health care to the urban poor using a workforce of volunteers. More MCH-FP services have been provided since 1982 in Abnognagar in Jessore District and in Sirajganj, Pabna District, and a project to evaluate the impact of providing tubewell water and latrines began in 1983 in Mirzapur about 70 km north-east of Dhaka.

1 The Urban Volunteer Programme (UVP). (Principal Investigator: B Stanton)

The Urban volunteers are illiterate women recruited to work in 16 of Dhaka's 18 districts, and about 1,200 volunteers in total are involved in delivering primary health care. The number of volunteers ranges from 60 to 200 in each district of which the average population is 250,000. Another 50 volunteers carried out health care research in 7 districts, each one responsible for 38 families. All volunteers and their children were immunized against polio, diphtheria, pertussis and measles during 1985.

In 1985 the UVP increased both the scope and magnitude of its service and research activities.

Services. The UVP provided primary health care services in both clinics and at peoples' homes during the year. The 1,200 volunteers treated about 92,000 patients for dehydration due to diarrhoea and used 210,000 half litre packets of ORS. They also distributed 27,000 bars of soap while giving health education.

A survey of signs of vitamin A deficiency in the catchment area of the UVP revealed night blindness and Bitot's spots in just under 2% of the sample. Six hundred children with xerophthalmia were detected and treated with oral vitamin A, seeds were provided to encourage people to grow green leafy vegetables in gardens and on roofs, and nutrition education was augmented to make people aware of the problems.

Two community-based clinics were established in cooperation with the UVP. Over 4,000 moderately and severely dehydrated patients were successfully treated in diarrhoea clinics staffed continuously by urban volunteers.

One hundred and fifteen moderately and severely malnourished children were treated in a UVP community-based day-care nutrition education and rehabilitation centre, also staffed by urban volunteers. Each day the children received four meals and their mothers one meal. The mothers were active participants in comprehensive nutrition education and demonstrations of food preparation. An evaluation of the long-term impact of this intervention on the nutritional status of children is now being carried out.

Research. Among the research activities of the UVP in 1985 was a case control study to identify hygienic practices associated with low rates of diarrhoea among children. These practices, such as washing hands before eating or handling food and keeping the family's living area free of faeces and rubbish, formed the basis of a subsequent health education programme. The impact of this intervention was evaluated from March to October by contrasting hygienic practices and the rates of diarrhoea among children in 38 urban families who were given education, with a similar number who were

not. Improved hygienic practices were observed among the families who had received teaching, and there were 25% fewer cases of diarrhoea among their children: 5.5 episodes of diarrhoea per 100 child weeks in the non-intervention area, and 4.2 episodes in the intervention area. The rates had been shown to be similar prior to the intervention.

The rate of diarrhoea among children in the urban slums where this work took place were not found to be strongly influenced by the socio-economic status of the family. However, a five month study showed that using a sari unhygienically was correlated with a higher rate of diarrhoea among children: 10.8 episodes of diarrhoea among families where misuse was frequent compared with 9.4 where misuse was less frequent.

Information provided by a diary recorded in the home about diarrhoea and scabies correlated well with a general recall of health after two weeks (Kappa 0.83). In contrast, when responses to a KAP questionnaire and a recall of one day's health were compared with direct observations of sanitary and hygienic practices the agreement was found to be low (Kappa 0.39).

2 The MCH-FP Extension Programme. (Principal Investigators: J F Phillips and M Koblinsky)

The MCH-FP Extension Project was initiated in 1982 at the request of the Planning Commission of the Government of Bangladesh as a collaborative project between the ICDDR,B and the MOHPC in two Upazilas, Abhoynagar and Sirajganj. The primary objective of the project was to work with MOHPC staff at Upazila level to identify operational barriers to the national MCH-FP programme, to discuss strategies to overcome them, and through the Government of Bangladesh structure, to implement the interventions. These fall into three categories.

Firstly, human resources have been developed by task-orientated training of health and family planning workers. At the Health and Family Welfare Centres (H&FWC) these workers include Family Welfare Visitors (FWV's), Family Welfare Assistants (FWA's) and Medical Assistants (MA's), union level field supervisors and field workers. Women have been found to have much better access than men to female clients and children in their homes, but are most effective in the vicinity of their own residences.

The efforts to improve coverage using existing staff have had some success, but the current Government of Bangladesh ratio of 1 FWA/FWV for 6,000 people means that one woman must cover 6 villages, a task which cannot be achieved in less than 3 months. Also, there is a negative relationship between the contraceptive prevalence rate and the time spent travelling by the FWA from their homes to their clients. In response to these findings the MOHPC is planning to hire 10,000 new FWA and FWVs under the next Five-Year Plan. The Extension Project will help develop hiring procedures, posting rules, training procedures and other practical guidelines.

Secondly, field management has been improved through a longitudinal record-keeping system, regular work routines for both health and family planning field workers, an improved supply system, regular meetings at H&FWC and Upazila Health Complex levels, and the development of joint management committees at the Upazila level. A better field management at the union level can improve programme performance using existing services: the prevalence of contraceptives trebled to 30% within a year of introducing record keeping, field staff meetings and supervisory support systems.

Finally, technical assistance provided in 1985 included developing community-donated facilities in unions where there are no H&FWCs, a programme of providing injectable contraceptives in the home, and a field-based immunization programme using male Health Assistants.

A close relationship has been maintained between key government officials and the ICDDR,B project staff in order to review the implications for national policy of the MCH-FP extension project.

3 The Mirzapur Handpump Project.

(Principal Investigator: M M Rahaman)

During the second half of 1984, 26 Tara handpumps were installed in Mirzapur in 2 villages with a population of around 5,000. In 1985, 713 two-pit, water-sealed latrines were installed thus providing facilities for 80% of the target households. In addition, a health education programme based on the handpumps and latrines was started, using the services of 86 female volunteers drawn from approximately 10% of households.

Three knowledge, attitude and practice (KAP) surveys were carried out in the intervention area and in a similar-sized, neighbouring comparison area without handpumps or latrines. The KAP surveys showed a marked increase in the use of tubewells in the intervention area. Two water consumption surveys showed that where relatively few people shared access to a pump the consumption of tubewell water per person was higher.

On average, each pump needed minor replacements or repairs about 5 times during the year; this could be done easily by unskilled field staff and even by locally trained housewives. In terms of resources this amounted to US\$ 3.7 and 3.7 man-hours per year per pump.

Latrines were accepted and used only slowly, but once people were persuaded to install traditional screens they were used more often; now more than 80% are in regular use by most people. Steady improvements have been shown in hygiene such as keeping latrines clean, washing hands after defecation and using ash as a cleansing agent. A preliminary analysis of data on morbidity due to diarrhoea derived from weekly household visits shows a fall in incidence, particularly in children in the intervention area aged less than 5. An attempt will be made to determine the relative contributions of the hardware and the health education components to this decline in the incidence of diarrhoea.

4 An evaluation of the National Oral Rehydration Programme (NORP). (Principal Investigator: M Currey)

An evaluation of the National Oral Rehydration Programme was completed at the end of 1985. Its recommendations included a substantial increase in the proposed production of ORS packets, improved record-keeping and a better delivery system. The integration of the Programme with other health delivery services was considered essential. The need to recognize peak seasonal demands and an adequate distribution system from Upazila level to the household was stressed.

SUPPORT FOR RESEARCH

Many of the services and much of the research of the CSRWG require considerable support for its activities. The Demographic Surveillance

Systems in Matlab and Teknaf generate huge amounts of information which have to be processed and analysed: the Data Management Branch, the Biostatistics Cell and the Computer Information Services are all involved in this, as well as providing support for many other activities of the Centre.

The Matlab Field Station runs a Diarrhoea Treatment Centre which provides care for anyone who needs it, whether they come from within or outside the DSS area. The Field Station also provides the base for many of the support services provided in Matlab.

1 The Data Management Branch and the Biostatistics Cell. (K Shaikh and M Rahman)

Besides providing support to scientific projects in 1985, the Data Management Branch also prepared a description of archived material: 90% of all computerized data files are now in the archives. Medical records have also been maintained. Help with creating and maintaining archives has been extended to other institutions in Dhaka including the Combined Military Hospital, the Institute of Statistical Research and Training (ISRT) of Dhaka University, the Bangladesh Medical Association, the Institute of Post-graduate Medicine and Research (IPGMR) and the Ministry of Planning, Government of Bangladesh.

The Biostatistics Cell carried out the following main functions last year: in-house training courses were provided in statistical methods and study design; consultations in statistics were provided for ICDDR,B scientists, project leaders, analyst programmers and others involved in data analysis; statistical reviews of papers submitted for publication in the Journal of Diarrhoeal Diseases Research were carried out; and collaboration with national institutions and NGOs such as Dhaka University and the Bangladesh Rural Advancement Committee (BRAC) were undertaken.

2 Computer Information Services (CIS). (R Banerjee and R Ghosh)

In 1985 the CIS experienced a major change in its hardware, software and wetware — its computers, programmes and personnel. An IBM 4331-LO2 mainframe computer with allied peripherals was installed under the VM/SP operating system. Three major computer languages, COBOL, FORTRAN and RPG, a database management system (SQL/DS), and the SPSS-X statistical programme were installed to meet the needs of the Centre for data processing. The data handling facilities are being enhanced by the installation of DOS/VSE, a guest operating system.

Because of an increased work load it is planned to upgrade the central processor, to increase disc space and to add more terminals. The upgraded computer, an IBM 4361-LO5 with 2.5x10⁹ bytes of disc storage space and 12 terminals, can handle larger and more complex data sets than the IBM 4331 at six times its speed. This will enhance both the scientific and administrative work of the Centre. To improve access to the upgraded computer an IBM 3274 Terminal Cluster Controller will be installed in the main building of the Centre. This will link modified, stand-alone personal computers in the offices of scientists to the mainframe computer.

The CIS provided technical assistance to many scientific projects in 1985 and provided advice on micro-computers and software as well as helping to select and train personnel to work on computers. A major commitment was

made to develop the DSS database which involved extracting data, converting or editing it, and completing census files. This should be finished towards the end of 1986. The CIS also provided technical support to the MCH-FP Extension Programme, to the Urban Volunteer Programme and to field studies on ORS. A Personnel Management and Health Insurance scheme is also being implemented.

3 Matlab Field Station. (Principal Investigator: M Yunus)

The activities of the Matlab Field Station are supervised and coordinated by the Head, Matlab Station, although overall responsibility lies with the Associate Director of Community Services Research. The Matlab Clinical Services provide treatment for patients in the Diarrhoea Treatment Centre and support for the three community run Diarrhoea Treatment Centres, as well as for various research projects, nine of which were carried out in Matlab during 1985.

The ICDDR,B Diarrhoea Treatment Centre adjoins the Upazila Health Complex and has 50 beds. During 1985, 6,539 patients were treated there: 2,455 (38%) were residents of the DSS study area while the remainder came from further afield. Forty-seven patients died, giving a case fatality rate of 0.7%. Fourteen patients were dead on arrival. The three community run Treatment Centres treated 3,529 patients with 8 deaths, a case fatality rate of 0.2%.

Nutritional rehabilitation has been carried out at the Matlab Treatment Centre since 1983. Children are admitted if they have 3rd degree malnutrition -- if they are less than 60% of expected weight-for-age using the Harvard standards. The children are fed frequently a special diet of milk and locally available, energy-dense foods such as "suji" and "khichuri" containing rice, gram flour, oil and vegetables. One hundred and ninety-two children were treated in 1985.

Microbiological culture was carried out on stools from patients in the DSS area during 1985. These patients yielded three main pathogens - Vibrio cholerae (20%), non-cholera vibrios (38%) and Shigella spp. (9%). The Clinical Pathology Laboratory analysed 9,040 stool samples, 1,657 urine specimens and over 3,000 blood samples.

The Matlab Field Station was involved in at least 10 formal training activities during the year as well as hosting many less formal scientific visits.

FUTURE DEVELOPMENTS

The cramped and inadequate facilities of the Treatment Centre and support services at Matlab are well recognised: only limited care can be given to long stay patients and implementing and monitoring health service delivery systems there are constraints on. These facts were recognised and clearly stated during a recent appraisal by the United Nations Capital Development Fund of an application for money to build a new treatment centre and training facilities. The new building, about a kilometre from the current site should be ready in 1988. For this reason the bare minimum of maintenance and renovation is being carried out on the old site. The main impact of the new building will be in improved MCH facilities, particularly for treating malnourished children, and on training at all levels.

STAFF DEVELOPMENT

J Akbar continued to study for an M.Sc. degree in the Department of Population Planning and International Health, School of Public Health, at the University of Michigan, USA (1984-86).

A H Baqui was admitted to Johns Hopkins University, USA, to study for a Ph.D. (1983-1986).

M K Chowdhury continued to study for his PhD at the Banaras Hindu University, India (1983-86).

S Islam was admitted to the London School of Hygiene and Tropical Medicine, UK, to study for an M.Sc. in Human Nutrition.

M Rahman attended a one-month training course at the East-West Center, University of Hawaii, USA.

A Razzaque completed his Masters degree in the Department of Demography, The Australian National University.

U Rob continued to study for a Ph.D. in the Department of Population Planning and International Health, School of Public Health, University of Michigan, USA (1983-86).

A M Sarder received four months training in the Department of Population Dynamics, the Johns Hopkins University, USA.

3. DISEASE TRANSMISSION WORKING GROUP

[DTWG]

The Disease Transmission Working Group is concerned with the problems of preventing the transmission of enteric pathogens and preventing diarrhoeal disease. The two major disciplines within the group are epidemiology and microbiology, and the strength of the working group lies in their combination so that large scale epidemiological studies can be undertaken with accurate and advanced laboratory support.

RESEARCH ACTIVITIES

The major effort of 1985 has been the trial of an oral vaccine for cholera. Other research has continued or has been initiated on other aspects of cholera and organisms which might be a cause of diarrhoea. Two other projects of the DTWG are based in the Dhaka Treatment Centre and are reported in the Pathogenesis and Therapy Working Group report on pages 34-35.

- 1 A field trial of two oral cholera vaccines.
(Principal Investigator: J D Clemens)

Recent research on immunity to cholera has shown three things. First, that cholera vaccines given orally are probably more active than injected ones -- they appear to stimulate intestinal immunity better. Secondly, that the B subunit of cholera toxin is a safe and effective way to stimulate antitoxic immunity. Thirdly, that if antitoxic and antibacterial immunity are stimulated together, the antibody responses are synergistically protective.

In cooperation with the WHO and the Government of Bangladesh, the ICDDR,B began a field trial of two vaccines in January 1985. The vaccines consist of either whole killed Vibrio cells in combination with the B subunit of cholera toxin (WC/B vaccine) or whole killed cells without the B subunit (WC). The placebo used in the trial was prepared from heat killed Escherichia coli (K12 strain). The vaccines and the placebo were administered with an antacid solution in 3 doses 6 weeks apart. The constituents of the vaccines, the dosages, dosing intervals and the antacid used were all based on the results of research at the ICDDR,B and elsewhere which had demonstrated the likelihood that such a vaccine would succeed.

Over a 5 month period about 89,000 people received at least one dose, while about 63,000 people received all three doses of the vaccines or placebo to which they were randomly assigned. Surveillance for cholera will continue for at least one year after vaccination and, because of the services currently provided, surveillance could continue for several years if the first results indicate that the vaccine is effective.

In addition to testing the efficacy of the vaccines for cholera, the trial will have several other scientific benefits. Many biological and socio-behavioural factors which may increase the risk of contracting cholera and other diarrhoeal disease will be assessed comprehensively. Of specific interest are nutritional status, blood groups, serum antibody concentrations,

maternal antibodies in breast milk, gastric acidity, socio-economic status, and environmental contamination.

2 Preventing the transmission of diarrhoeal diseases by handwashing.
(Principal Investigator: N S Shahid)

The analysis of a prospective study in the village of Nandipara has shown that handwashing can reduce the incidence of diarrhoeal disease. It also confirmed a previous study which showed that shigellosis can be prevented by washing hands, and added Campylobacter and enterotoxigenic E. coli (ETEC) to the list.

3 Preventing the transmission of cholera using alum potash.
(Principal Investigator: M U Khan)

Alum potash, called "fitkuri" in Bangla, has been used in Bangladesh for centuries to cleanse contaminated water. With the increased use of tube-wells and other clean water supplies this folk practice has become markedly less common. Recent research at the ICDDR,B has shown that this practice has a sound scientific basis and could be a potentially useful and cost-effective way to purify water when clean water is not available. The alum acts to clear water of suspended material by flocculation, and by reducing the pH it kills all vibrios and most other enteric pathogens within a few hours. The dramatic effect of clarifying the water reinforces the "power" of the treatment, while the acceptability of the method to Bangladeshi people plus its low cost, are all highly desirable. A field trial of fitkuri among families of patients with cholera proved its effectiveness in purifying the household water, but further studies will be needed to determine how and when fitkuri is used best.

4 Non-cholera Vibrionaceae.
(Principal Investigators: J Harris and B Kay)

The family Vibrionaceae includes Vibrio cholerae O1 (also termed epidemic V.cholerae), other serotypes of V.cholerae, other species within the genus Vibrio, as well as Aeromonas and Plesiomonas. As a group they represent the most commonly isolated pathogens from patients with diarrhoea. It is likely however that only some species are truly pathogenic, while others are harmless commensals. In conjunction with the vaccine field trial, studies have been carried out to isolate these organisms from patients attending the treatment centres in Matlab and to identify them specifically. Studies are underway to clarify their pathogenic potential.

Of special interest in this context are studies on the virulence and antigens of the non-cholera Vibrionaceae. Some antigens such as toxins, outer membrane proteins and H antigens may be similar to the antigens in the oral cholera vaccine, so that cross protection between different members of the family may occur.

5 Campylobacter-like organisms.
(Principal Investigator: J Wasserheit)

Campylobacter jejuni has been identified in Bangladesh for several years. Studies published previously by the ICDDR,B have pointed out differences in the epidemiology of C.jejuni infections in developed compared with developing countries. Recently a new group of bacteria termed

Campylobacter-like organisms (CLOs) have been discovered which have similarities with C.jejuni. In other parts of the world CLO's are associated with gastric abnormalities, particularly gastritis. Strains of CLOs have now been recovered from the stool specimens of patients with diarrhoea in Matlab. Although the number recovered so far is small, these organisms may represent another group of diarrhoeal pathogens.

6 The role of Clostridium difficile in diarrhoea in Bangladesh.
(Principal Investigator: S Q Akhter)

Work has continued to define the role of C.difficile as a cause of diarrhoea in Bangladesh. As in other parts of the world it appears that the colitis which can occur during infections is associated with antibiotic use. However, the overall rate of infection in Bangladesh appears to be low in comparison with other infectious causes of diarrhoea.

NEW DIAGNOSTIC TESTS

One of the principal areas of interest of the DTWG is in diagnosing causes of diarrhoea quickly, simply and cheaply. However, many of the tests currently used are lengthy, complicated and costly, so new diagnostic tests are always being sought. The production and use of monoclonal antibodies can increase considerably the sensitivity and specificity of many well established immunological tests of which the enzyme-linked immunosorbent assay (ELISA) is probably one of the most useful. Such tests can eliminate the need for experimental animals and pure cultures of cells on which some diagnostic methods now depend.

1 A rapid test for Escherichia coli heat-labile toxin.
(Principal Investigator: D Sack)

In collaboration with Dr A-M Svennerholm of the University of Goteborg in Sweden, a rapid ELISA using monoclonal antibodies has been established to detect in faeces the heat-labile toxin (LT) of enterotoxigenic E. coli. This allows an overnight diagnosis of diarrhoea due to LT producing ETEC an ability which is crucial to support the studies of ETEC among families taking part in the cholera vaccine trial. The rapid test enables the first cases to be identified quickly so that fieldworkers can visit the family the next day. The test has proved to be highly specific and easy to perform in the laboratory in Matlab. It is expected to replace the traditional CHO cell and Y1 adrenal cell assays for LT producing ETEC.

2 A test for Escherichia coli heat-stable toxin.
(Principal Investigator: D Sack)

Also in collaboration with Dr Svennerholm, a new ELISA to detect the heat-stable toxin (ST) of ETEC has been established. It is expected that this ELISA will replace the current infant mouse test during 1986.

3 An ELISA for Shiga toxin.
(Principal Investigators: M Bennis and G Keusch)

In collaboration with Dr G Keusch of Tufts University, Boston, USA, a monoclonal ELISA was set up to detect in both the stools of patients with

diarrhoea and in bacteria the toxin produced by Shigella dysenteriae type 1 (Shiga toxin). The test detected the toxin in the stools of patients with shigellosis but not in samples from patients with cholera or ETEC diarrhoea. This assay should be useful for future studies of the pathogenesis of shigellosis.

- 4 Developing and evaluating new immunological techniques to diagnose Giardia.
(Principal Investigator: A Hall)

Because the diagnosis of Giardia by microscopy can be unreliable there is a need for a more sensitive diagnostic technique. The aim of this work was to establish a method to detect Giardia antigen in faeces using either counter-current immunoelectrophoresis or a double antibody sandwich ELISA.

Giardia cysts were isolated from faeces, excysted, then grown axenically in vitro to provide trophozoites for immunising rabbits and a goat. A considerable degree of non-specific reaction was encountered in trial assays. Work is continuing to improve the sensitivity of the ELISA by purifying antiserum.

- 5 Phage typing of Escherichia coli.
(Principal Investigator: K A Monsur)

After several years of preliminary work studies have shown that phage typing may be of practical use to identify strains of E.coli. Based on their susceptibility to 25 different phages, strains of E.coli have a unique pattern of susceptibility which can be used to identify them. Each strain can thus be traced as it passes from one person to another. Initial studies also indicate that individual strains of the common enterotoxigenic serotypes may also have a unique phage pattern which may supplement serotyping as a way to identify them. With further validation, the phage typing scheme will greatly aid the ability to track and identify strains of E.coli.

- 6 A Rapid diagnosis of shigellosis by a coagglutination technique.
(Principal Investigator: M Rahman)

Work was begun in 1985 in an attempt to develop a rapid test for different species of Shigella isolated directly from stools using a coagglutination technique with the Cowan strains of Staphylococcus aureus coated with antibody. Preliminary experiments suggest that this test can be developed. Because different species of Shigella are sensitive to different antibiotics a rapid test would mean that the right drug could be given within an hour of collecting a stool specimen. Current diagnostic tests are based on growing the organisms and require live bacteria; the new test does not require live organisms as it detects only antigen, and could thus have important epidemiological uses.

EPIDEMIOLOGICAL TRENDS

As a result of the Dhaka Treatment Centre surveillance system (see p 34), the Matlab vaccine trial surveillance and the epidemic preparedness programme, several trends in diarrhoeal diseases have become apparent during 1985. Of particular importance has been the increase in resistance to antibiotics among common enteric pathogens and the occurrence of epidemics.

1 Cholera.

The incidence of cholera was higher than average during 1985 in Dhaka and Matlab, and outbreaks in other areas of Bangladesh suggest this was a widespread phenomenon. The El Tor and classical strains of Vibrio cholerae continued to coexist, though with somewhat different seasonal patterns.

Strains of V.cholerae resistant to several antibiotics were encountered again in Dhaka. These strains contained a plasmid of incompatibility Group C and were resistant to ampicillin, cotrimoxazole, chloramphenicol, and furoxone, but continued to be sensitive to tetracycline. Other strains, without a plasmid, were resistant only to furoxone. Conjugation experiments suggested that the plasmid provided the resistance to all the antibiotics except furoxone, which was chromosomally mediated.

2 Shigellosis.

Shigella dysenteriae type 1 continued to be epidemic in Bangladesh. Particularly worrying was the acquisition by the epidemic strain of resistance to nearly all clinically useful antibiotics including tetracycline, ampicillin, trimethoprim, sulphonamides and chloramphenicol. Field studies have recorded a high case-fatality rate among children, with deaths occurring even months after the episode.

Independently of epidemic shigellosis, there is a continuing increase in antibiotic resistance among endemic shigellosis due to S.flexneri. The Centre's experience with shigellosis has demonstrated that much more research must be devoted to the prevention and treatment of this disease.

SUPPORT FOR RESEARCH

1 Microbiology Branch (B A Kay and A Huq)

During 1985 the microbiology laboratories were renovated and improved, and several major items of equipment were acquired. The physical improvements were accompanied by a reorganization of the Branch, which now contains nearly 70 well trained staff. The new facilities and organization should contribute in the future to much high quality microbiological research, and if last year was anything to go by, it will be very busy: in 1985 over 50 research projects were supported and over 250,000 specimens were analysed.

STAFF DEVELOPMENT

Dr Nigar Shahid was admitted to the epidemiology programme of the Johns Hopkins School of Public Health, USA.

Dr Mahbubur Rahman rejoined the DTWG having completed one year's training in clinical microbiology in the laboratory of Prof J P Butzler, Free University of Brussels, Belgium.

4. HOST DEFENCE WORKING GROUP

[HDWG]

In 1985 the HDWG was primarily concerned with basic laboratory research on humoral and intestinal immunity to cholera and bacillary dysentery. Work focused on the antibody responses of humans and experimental animals to V. cholerae and S.dysenteriae, and on the antigens which evoke those responses. The identification of the most immunogenic antigens could be exploited to improve or develop new vaccines.

In 1985 two laboratories were renovated and equipped with new apparatus to undertake fundamental molecular analyses of antigens and immunity. The techniques which have been established include polyacrylamide gel electrophoresis, Western blotting, immunoelectrophoresis, ion exchange chromatography, fast protein liquid chromatography and separation methods based on molecular sieving and ultrafiltration.

RESEARCH ACTIVITIES

- 1 Immunochemical analysis of V.cholerae antigens: its implications for vaccine development, and the immunogenicity of a cholera vaccine.
(Principal Investigator: I Ciznar)

Because clinical cholera leaves a patient with a level of immunity far stronger than any vaccine so far tested, research has concentrated on 29 major antigens from V.cholerae detected by crossed immunoelectrophoresis using immune serum raised in animals. Of these antigens 12 react with serum from convalescent patients. Cholera toxin and lipopolysaccharide were found to be the dominant antigens, but flagellar antigen and others derived from the outer membrane were also immunogenic.

An analysis of the antigens present in the oral cholera vaccine (see p 15) showed that it contained 9 of the 29 antigens and that these were all involved in stimulating immunity in clinical cholera. A comparison of the immunity derived from clinical cholera and from the oral vaccine is underway.

- 2 Local and systemic antibody responses to Shigella proteins in patients with dysentery: its implications for vaccine development.
(Principal Investigators: I Ciznar and A Ahmed)

Unlike cholera, shigellosis is characterised by invasive damage to the intestinal wall which causes diarrhoea with blood and mucus. If the penetration of tissues could be inhibited then substantial progress would be made in the control of this dangerous disease.

Using the same approach used to investigate cholera, the immune response to the antigens of S.dysenteriae has been investigated in collaboration with the Department of Microbiology and Immunology, University of Adelaide. Particular factors which may be involved in tissue invasion have been investigated using genetically engineered shigellae prepared by scientists from the Institut Pasteur in Paris and the Karolinska Institute

in Stockholm. A preliminary analysis has shown that antibodies to outer membrane proteins (OMP) are produced by patients attacked by S.dysenteriae type 1. The role of these proteins in attachment and invasion is now being studied.

TRAINING

The new laboratory facilities and equipment have allowed a cooperative project to be undertaken with two students from the Department of Biochemistry of the University of Dhaka. Their work on the OMPs of Shigella will lead to a Master of Science Degree.

SUPPORT FOR RESEARCH

1. Animal Resources Branch. (K A Al-Mahmud)

In 1985 the Animal Resources Branch provided support for 30 research projects within the ICDDR,B and for two from the Institute of Public Health. The Branch provides animals, animal blood and research facilities for the ICDDR,B, for the IPH under the agreement drawn up when the Centre took over the facilities from the IPH, and for other national research institutions. In 1985 the Branch provided the following: 871 rabbits, 35,457 mice, 428 guinea pigs, 478 rats and 54.9 litres of blood. Many of the mice were used in a test for the heat stable toxin of ETEC: this is being replaced by an ELISA (see p 17).

5. NUTRITION WORKING GROUP

[NWG]

The main objectives of the Nutrition Working Group are to investigate the relationships between diarrhoea and malnutrition and to improve the nutritional management of diarrhoea.

RESEARCH ACTIVITIES

1 Selecting children who need nutritional support. (Principal Investigator: A Briend)

An important part of reducing infant and child mortality is to be able to identify those children most at risk of dying. To do this growth must be monitored, ideally by weighing children each month and using "road to health" growth charts. However this is often difficult to do in practice so other measurements and indices of growth have been investigated as alternatives to weighing.

Arm circumference has been used for years as a simple and cheap substitute for weighing, but is usually considered a second choice: there is a poor agreement between arm circumference and the most widely used methods of classifying malnutrition, arm circumference is difficult to measure precisely, and inter-observer variations are much larger than with weight. Whether these disadvantages are important when trying to identify malnourished children at risk of dying has, however, never adequately been tested.

Using modern statistical methods of analysis a survey done 15 years ago in Matlab has shown that arm circumference is a good indicator of the risk of dying and compared favourably with other studies using weight-for-age as a predictor.

A recent study of children in hospital with diarrhoea showed that arm circumference was the best anthropometric indicator of the risk of dying and compared favourably with more complex nutritional classifications.

The findings of these two studies suggest that weight is not necessarily always superior to arm circumference, and has major implications for screening large numbers of children in the community to identify those with a high risk of dying and then refer them for treatment. The value of measuring arm circumference is being assessed in a field study in Matlab (see page 8).

2 Determinants of diarrhoea and malnutrition in two slum communities. (Principal Investigator: F Henry)

The aim of this study was to examine the impact of handpump water and

latrines on the incidence of different types of diarrhoea and forms of malnutrition in two poor communities in Dhaka. In Zinzira 170 families had 10 handpumps and 50 latrines available to them, whereas Nandipara had fewer handpumps per family and no organized form of faeces disposal. After accounting for seasonal fluctuations it was found that children less than 5 years old in Zinzira experienced less diarrhoea than those in Nandipara, but because families were even poorer, there were nearly twice as many stunted children (32% vs 17%). The relative importance of disease and food availability are central to this study and the results are being analysed further to estimate determinants of morbidity which could influence ways to improve conditions in urban areas.

3' Studies on the interaction between diarrhoea and malnutrition.
(Principal Investigator: F Henry)

To define more precisely the relationship between diarrhoea and malnutrition, 723 children aged less than 5 years were studied in Teknaf. Morbidity due to diarrhoea and anthropometric measurements were recorded repeatedly over a 3-year period. The results showed that protracted diarrhoea with blood and mucus is strongly associated with children who were severely stunted. There was no association between watery diarrhoea and severe malnutrition.

Now that oral rehydration has been shown to be highly effective against acute watery diarrhoea, children with prolonged dysenteric diarrhoea have emerged as a new priority for research, for 3 reasons: a high death rate, severe nutritional consequences and complicated case management.

4 The absorption of macronutrients in protein-energy malnutrition (PEM).
(Principal Investigator: A Molla)

The main aim of this study was to compare the weight gain of malnourished children fed on diets containing different concentrations of fat. Two diets, one providing a relatively low concentration of fat (30% of energy) and one providing a relatively high concentration of fat (50% of energy), were used in a nutrient balance study of 23 children, aged 6 to 36 months, with various degrees of malnutrition. The analysis of results is still underway but a preliminary examination indicates that the rates of weight gain were similar in both groups.

5 Zinc supplements and the weight gain of malnourished children.
(Principal Investigator: A N Alam)

This investigation and the next were conducted at the Children's Nutrition Unit of the Save the Children Fund (UK) in collaboration with its Medical Director, Dr S Khanum.

Zinc is a constituent of several important enzymes in the human body and a deficiency may limit recovery from malnutrition. In this study, 30 children with PEM aged 6 months to 6 years were given zinc supplements of 10 mg/kg body weight/day. Compared with an equal number of controls the children who received zinc supplements showed a significantly greater food intake and weight gain.

6 Zinc supplements and the utilization of macronutrients.
(Principal Investigators: Ayesha Molla and A N Alam)

The main aim of this study was to measure the effect of zinc supplements on the intake and absorption of protein and energy by children recovering from PEM. A balance study was carried out in 20 children aged 2 - 3 years recovering from PEM: 10 received zinc supplements and 10 did not. Although the cumulative weight gain was greater among those who received the supplements, the rate of weight gain in g/kg body weight/day was not significantly different between the two study groups.

7 Absorption of nutrients in giardiasis.
(Principal Investigator: Ayesha Molla)

Twenty-four children infected with *Giardia* and without systemic disease were studied to estimate the consumption and absorption of nutrients both before and after treatment. Children were arranged into two groups, 17 who passed only cysts in their stools and 7 who passed both cysts and trophozoites. Before treatment the cyst passers consumed significantly more energy (122 ± 22 kcal/kg body weight/day) than those who passed both cysts and trophozoites (104 ± 21 kcal/kg body weight/day; $p < 0.01$). There was no evidence of malabsorption either before or after treatment.

8 Hydrolysed wheat-based ORS in acute diarrhoea.
(Principal Investigator: A N Alam)

The aim of the study was to evaluate the relative efficacy of oral rehydration solution containing either partially hydrolysed wheat grain, cooked rice, or glucose. Seventy-eight children of similar age, body weight, duration of diarrhoea and degree of dehydration were organised into three groups of 26. Rehydration was initiated using intravenous Dacca solution for the first 1-2 hours then the different solutions were given. During the first 48 hours patients given wheat or rice ORS consumed significantly less solution than those given glucose ORS ($p < 0.01$) and their stool output was significantly lower. This trend continued for the next 24 hours but was less significant ($p < 0.05$).

9 Nutritional anaemia in rural Matlab.
(Principal Investigator: A N Alam)

A prospective field study to determine the prevalence and type of nutritional anaemia was conducted among every member of all households in two villages in the Matlab DSS area where the Centre's MCH-FP programme was not being implemented. Using WHO guidelines, 1,428 (42%) out of 3,395 people were considered to be anaemic by measuring packed red cell volumes (haematocrit). A sample of 245 people in 5 age groups who had a haematocrit below WHO guidelines by 10% or more were studied in greater detail. A high prevalence of eosinophilia and worm infestations (74%) was observed in these subjects. Twelve people had low concentrations of serum vitamin B12 and 3 had low serum folic acid. Of 171 tested, 136 had low levels of serum ascorbic acid. About 40% of the sample were found to have iron deficiency anaemia.

10 **Bioavailability of iron from Bangladeshi meals.**
(Principal Investigator: A N Alam)

Nutritional anaemia in most countries is due to a dietary deficiency of iron. This is often because the iron is poorly absorbed even though there are adequate amounts in the diet. The aim of this study was to determine the availability of iron from different Bangladeshi foods. Twenty healthy volunteers (9 American and 11 Bangladeshi) were fed Bangladeshi foods containing small amounts of radioactive iron. The preliminary results suggest that substances in the Bangladeshi diet may inhibit the absorption of iron.

11 **Wheat syrup as an energy supplement for malnourished children.**
(Principal Investigator: A N Alam)

The nutritional rehabilitation of acutely malnourished children can take four to six weeks or even longer, and foods with a high energy density should be provided during this period. However, the physical bulk of many starchy foods, the limited capacity of the stomach, and above all, reduced intestinal absorption, can make it difficult to ensure enough food is consumed to achieve the greatest possible weight gain. In this study a palatable syrup prepared from partially hydrolysed powdered wheat grain was used as a food supplement. This low-fibre, energy-dense preparation is rich in protein, low in fat and virtually free of lactose. It was used to feed 24 severely malnourished children, aged 2-5 years, arranged into two groups. The study group received about 30% more energy given as wheat syrup during the two-week investigation compared with the controls ($p < 0.001$). A greater intake of energy during the first week was not significantly associated with a faster rate of weight gain (11.2 ± 5.2 vs 9.8 ± 4.7 gm/kg body weight/day). However, supplementation during the 2nd week was accompanied by a significantly increased rate of weight gain (11.3 ± 5.8 vs 6.5 ± 2.4 g/kg body weight/day; $p < 0.05$). The rapid weight gain achieved with a relatively modest protein intake of about 4.8 g/kg body weight/day suggests that the wheat extract could be useful as an energy supplement for malnourished children.

12 **The intake and utilization of energy from cereal-based ORS.**
(Principal Investigator: A M Molla)

This study demonstrated that using rice powder in ORS at a concentration of 80 g/l was more effective at reducing stool volume (by 50%), ORS consumption (by 40%) and vomiting (by 60-70%) than traditional glucose ORS. Digestibility was not found to be a problem in children.

13 **Water and Sanitation Intervention Study, Teknaf.**
(Principal Investigator: M M Rahaman)

This 3-year prospective evaluation of the benefits to health of providing handpump water continued during 1985. A large amount of information has been generated and will take a considerable time to be analysed in detail. However, some preliminary conclusions may be drawn.

Handpump water was found to be coveted by the inhabitants of both the study and the comparison villages, and with rare exceptions, all inhabitants made efforts to obtain supplies of drinking water from handpumps. Families

in the comparison area without access to handpumps obtained their water for household uses (other than drinking) from open sources such as ditches and ponds.

A health education programme was highly successful in preventing the inhabitants from using polluted surface water or water from ditches for their domestic use. Health education efforts made it possible for every family in the study area to purchase a water-sealed latrine, though it is too early to measure their impact on health.

A so called "sanitation score" used in this project was found to be a new and successful method for evaluating changes in hygienic standards. Health education was quite successful in improving sanitary habits in the study area as indicated by an improved sanitation score, and produced a decrease in the incidence of diarrhoea. Consuming only handpump water also resulted in a decrease in the incidence of diarrhoea. The distribution of cases of diarrhoea was found to be related to the distance away from the handpumps.

The overall incidence of diarrhoea during the project has shown a consistent decline in both the study and the comparison areas. It was particularly reduced in the study area, but only during the first year was the difference highly statistically significant.

Although not statistically significant because of a small sample size, a beneficial impact of handpump water was noted on child mortality, on diarrhoea-related mortality and on diarrhoea case-fatality rates.

As expected no decline in the overall incidence of infections with Ascaris lumbricoides and Trichuris trichiura were noted between the study and comparison areas. However, a sharp drop in the incidence of infection with hookworms was seen in both areas, which may be due to an indirect influence of frequent home-visits by the health assistants and their health education.

Experience in the field indicates that it is possible to isolate and identify a causative organism in most cases of diarrhoea and that buffered glycerol saline is superior to direct plating for isolating Shigella spp.

14 **Health Education, Teknaf.**
(Principal Investigator: K M A Aziz)

Despite the fact that changes in behaviour take a long time to become apparent after a health education programme, some beneficial effects have already been observed in the Teknaf Water and Sanitation Intervention area.

Knowledge about health can be given to a predominantly illiterate population by personal communication and group discussion, as well as by actual demonstration. An appreciable improvement in the use, handling and storage of water was observed in the study population: there was no reversion to using traditional water sources once handpumps had been installed. Substantial improvements in sanitary practices such as washing hands with ash or soap after defecation were observed after health education had been given.

15 **Video programme, Teknaf.**
(Principal Investigator: M M Rahaman)

The Teknaf Water and Sanitation Study featured in a successful IDRC

video film entitled "Prescription for Health". The film emphasized the fact that technical solutions to water supplies and sanitation are of little value unless accompanied by measures to break the faecal-oral transmission of diarrhoeal diseases. The film was aimed at health workers and sanitary technicians, but some agencies have also found it useful for village health meetings.

16 A Family level evaluation of primary health care.
(Project Investigator: N Rizvi)

This study was done at the request of the United Nations University, which also provided the funding. The health care seeking behaviour of the adult household members of 36 rural families located in two Upazilas of Tangail district was examined through informal interactions and interviews. The study showed that nutrition received limited attention in the primary health care (PHC) network and included only advice on eating more leafy green vegetables and the occasional distribution of a few vitamin A capsules.

An analysis of health care seeking behaviour revealed that decisions regarding the choice of treatment were influenced by beliefs and many pragmatic assessments such as the success rate of health care providers and their facilities, knowledge about doctor-patient relationships, and the distance and costs involved in obtaining care. Attitudes towards PHC services were based on experiences or received information. The unavailability of medicines, inadequate care, inconvenient opening hours and the expense and difficulties of transport were all taken into account. The study suggested a number of measures to increase the use of PHC services and to improve the nutritional element of the PHC network.

17 Anthropological studies to promote cereal-based ORS.
(Principal Investigator: N Rizvi)

Diarrhoea is recognized by rural Bangladeshi people as a major health problem but the perception of its cause differs from the biomedical view. Diarrhoea is perceived as a "hot" disease caused by overheating the body. The concept of "hot" does not refer to temperature or any other observable or taste-related factors, it refers to an innate characteristic of a food or a body condition. Both natural and supernatural factors are believed to increase the heat and thereby upset the digestive system. Supernatural explanations are used when the condition becomes severe in a short time or when a breast-fed child gets diarrhoea. Natural explanations include eating too much hot food in hot season or at the wrong time, and consuming spoiled food.

The concept of hot and cold can be used to promote ORT because of its familiarity and use in indigenous treatments. Although the concept of dehydration is unknown, thirst is recognised as a symptom of severe diarrhoea. The traditional treatment emphasizes reducing stool volume and frequency by giving foods with binding properties such as unparboiled rice gruel or plantain soup curry, and cooling the heated stomach by giving soaked 'chira' (beaten rice), green coconut water or rice soaked in water.

Although rice ORS is not yet established, people already use unparboiled rice gruel to treat diarrhoea and mothers are generally receptive to ORS. Positive attitudes were encountered to rice ORS but not to wheat-based ORS. However, the only rice believed to be suitable for use in ORS is the unparboiled variety.

18 Feeding patterns and nutrition education of mothers.
(Principal Investigator: N Rizvi)

The aim of this study was to examine factors which influence how mothers feed their children from birth to 2 years of age. The study showed that in rural Bangladesh the overwhelming majority of mothers breast feed for two years, and some for even longer. One-third of mothers began breast feeding within 24 hours of delivery and not all mothers discarded colostrum as is generally supposed. Although breast feeding was universally practiced for many months, the proportion of exclusively breast-fed infants dropped to 85% by 1 month and to 65% by 3 months after birth. The traditional supplementary liquid foods, such as fresh milk from cows or goats, are being replaced by imported milk powder and skimmed condensed milk which are often over-diluted with consequent dangers to health. Solid foods were not found to be introduced on a regular basis until the child was about a year old. To prepare the child for solids, snacks are given before the family staple; fish and vegetables are introduced later.

A study of beliefs related to feeding infants showed that breast milk was considered the ideal food and was an important part of motherhood. While prolonged breast feeding can be explained by the beliefs held about breast milk and breast feeding, the early introduction of supplements such as milk powders and canned milk cannot be explained by household factors alone. The exposure to the advertisements of milk companies and the availability of canned milk in the village market have been found to erode the mother's confidence in their ability to breast feed exclusively.

The age at which solid food was introduced was found to be influenced by beliefs related to digestion: a child's ability to feed itself indicates a readiness to digest solid food, thereby encouraging the introduction of solid food. Any delay in giving solid food can result in undernutrition in the second half of first year of life.

The mothers of 30 children were given nutrition education designed to increase their child's food intake using available food and current culinary techniques. The feeding pattern of these children is being compared with 27 children whose mothers received no nutrition information. Preliminary results have shown that mothers are reluctant to give the family's usual food before 8 months of age, but mothers with children between the ages of 10-12 months have been more receptive to nutrition education. Considering the mother's apprehensive attitude to introducing solid food before 8 months, any intervention to promote an early introduction of solid food is not likely to have much success.

This study and the analysis of data is continuing.

19 A protein-losing enteropathy in post-measles diarrhoea.
(Principal Investigator: S A Sarker)

The aim of this study was to estimate protein loss into the gut of children aged 6 months to 6 years with post-measles diarrhoea by measuring the clearance of alpha-1-antitrypsin (A-1-AT) in the faeces. Nineteen children with a history of measles and diarrhoea showed a significantly higher faecal loss of A-1-AT than 15 children with diarrhoea alone ($p < 0.01$). Also the faecal clearance of A-1-AT was significantly higher in both groups during the acute rather than recovery stage of diarrhoea ($p < 0.01$). The

greatest faecal losses of A-1-AT were observed in 6 children with post-measles diarrhoea due to Shigella; the losses appeared to be persistent suggesting a protein-losing enteropathy. All children with diarrhoea due to rotavirus showed high but transient losses of A-1-AT during the acute stage only.

SUPPORT FOR RESEARCH

Besides having facilities in Mirzapur for the Handpump Project, the main part of the MWG outside Dhaka is Teknaf Station. This field station is situated in the far south-east of Bangladesh near the border with Burma. It was established in 1973 after an epidemic of shigellosis.

The MWG is also responsible for running the biochemistry laboratories in the main building of the Centre in Dhaka, which provides clinical chemistry services and other tests for the hospital and for research.

1. Teknaf Station. (M H Munshi)

Two diarrhoea treatment centres are maintained, one in Shahpuridwip with two beds, and for inpatients the other in Teknaf itself with four beds. During 1985 3,631 patients were treated for diarrhoea at Teknaf Station, mostly as outpatients, and faecal cultures were prepared on 3,405 of which 24.5% isolated species of Shigella. The diagnostic laboratory examined 3,517 stool specimens under the microscope.

2. Biochemistry Branch. (M A Ali and M A Wahed)

In 1985 the Biochemistry Branch performed 62,905 assays on 23,308 specimens of blood, urine, faeces, i.v. fluid, special diets and ORS, which were provided by the DTC, the i.v. fluid unit, the ICDDR,B ORS Cooperative and on payment from other hospitals and clinics in Dhaka. The Branch also provided support for 13 research projects during the year and continued to take part in a quality control scheme sponsored by the WHO.

STAFF DEVELOPMENT

Dr Anowar Hossain, a Medical Officer, left for one year's training in clinical microbiology at the St. Pierre Hospital, Brussels.

6. PATHOGENESIS AND THERAPY WORKING GROUP

[PTWG]

AND DHAKA TREATMENT CENTRE

The Pathogenesis and Therapy Working Group conducts research on the mechanisms of diarrhoea and its treatment. Most of this research is carried out in the clinical research units and wards of the Dhaka Treatment Centre.

The research activities of the PTWG can broadly be grouped into two main and one minor area: research on invasive diarrhoea (Nos. 1-4), the archetype of which is shigellosis; research on watery diarrhoeas (Nos. 5-12), the archetype of which is cholera; and research on parasites (No. 13).

- 1 Plasma prostacyclin levels during the haemolytic-uraemic syndrome.
(Principal Investigator: A N Alam)

Serum prostacyclin levels were measured on three occasions, during acute illness, early convalescence, and after recovery, in 12 children with a haemolytic-uraemic syndrome during shigellosis. A stable metabolite of PGI₂, 6-keto-PGF₁-alpha, was measured by a radioimmunoassay. Its concentration was found to be low during the acute illness and was significantly higher during the two subsequent sampling periods, returning to normal at the time of the last sample. These results suggest that plasma prostacyclin may be involved in the development of the syndrome.

- 2 The antimicrobial treatment of shigellosis.
(Principal Investigators: A Salar and M Bennis)

Infections with strains of Shigella which are resistant to the two most commonly used drugs, ampicillin and cotrimoxazole, have become increasingly common in the Asian sub-continent. At the moment approximately 65% of species of Shigella isolated in the ICDDR,B Treatment Centre are resistant to these two drugs. Field studies have recorded high death rates of between 5 and 20% during epidemics due to strains resistant to currently available antimicrobial agents.

Because Shigella spp can rapidly develop resistance to drugs, studies to identify alternative effective antimicrobial substances were undertaken. Among these were two clinical trials -- one evaluating nalidixic acid and the other ciprofloxacin. The nalidixic acid study has been completed. The results show that nalidixic acid is equal to ampicillin in achieving a clinical cure, although somewhat slower in terms of a bacteriological response. On the basis of this study nalidixic acid has become the drug of choice to treat shigellosis at the ICDDR,B. A clinical study of ciprofloxacin is currently underway.

- 3 A trial of ceftriaxone vs. chloramphenicol in typhoid fever.
(Principal Investigator: A Islam)

To find an effective, shorter and more convenient treatment for typhoid

fever, ceftriaxone was compared with chloramphenicol, the drug of choice. Sixty-two patients whose blood or stools were found to contain Salmonella typhi by culture were enrolled in the study. Patients were randomly assigned to receive either chloramphenicol at a dose of 60 mg/kg/day until defervescence and then 40 mg/kg/day, or ceftriaxone at a dose of 75 mg/kg/day for children and 3 or 4 g daily in adults. The ceftriaxone was given as a single daily intravenous dose for seven days and the chloramphenicol was given in four divided daily doses, either orally or intravenously, for 14 days.

There was no significant difference in the mean number of days to defervescence in the two groups but the diarrhoea resolved earlier in the group treated with ceftriaxone. The patients who received chloramphenicol were found more likely to be bacteraemic on the third day of treatment (16/30 vs 0/32, $p < 0.05$). These results suggest that a seven-day course of once daily ceftriaxone is a promising alternative to 14 days of treatment with chloramphenicol to treat typhoid fever.

As a part of this study new and rapid methods to detect S.typhi infections have been evaluated. A promising method is a lysis and centrifugation blood culture system: blood is first placed in a tube in which the white cells are lysed and then directly cultured on agar plates. Preliminary results suggest that this is both a more sensitive and a faster means of detecting bacteraemia with S.typhi.

4 Clinical and epidemiological studies on diarrhoea associated with measles.

(Principal Investigators: A Islam and S Huq)

Field studies in Bangladesh and in many other less developed countries have shown a high death rate associated with measles. The factors responsible remain unclear although it is thought that diarrhoea during or after measles is a major contributor to the high death rate. To identify pathogens associated with diarrhoea following measles a study was conducted in the Nandipara field area. Seventy-three patients with measles and an equal number of matched controls were followed for four to eight weeks. Patients with measles had a higher incidence of diarrhoea (78% vs 58%). Shigella spp. were more often isolated from patients who had diarrhoea in association with measles (14%) than from control patients with diarrhoea alone (7%).

In addition to the field studies being conducted in Nandipara, basic MCH services are provided to approximately 400 mothers and children, who attend the Nandipara clinic every month.

5 Studies on oral rehydration therapy.

(Principal Investigators: A M Molla and Ayesha Molla)

The improvement and refinement of ORS remains a major subject of research at the Centre. Recent studies have shown that when rice is substituted for glucose as the carbohydrate source in ORS the volume of both diarrhoeal stool and vomitus are reduced. As a follow-up to these initial studies, further investigations to evaluate other staple foods for use in ORS were undertaken. In a study of 200 adults and children with diarrhoea the efficacy of ORS made from maize, millet, sorghum, wheat and potato was

evaluated. All of these preparations proved to be superior to the standard WHO glucose-based ORS when evaluated in terms of total ORS consumption, stool output and the amount of vomitus: stool output was reduced by about 50% in the group receiving cereal and potato ORS and 40% less ORS was consumed. The digestibility of the different formulations was also studied to determine which provides the greatest nutritional benefit. The analysis of this part of the study is not yet complete.

In the studies to date conducted on cereal-based ORS, salt and other electrolytes have been added using measured amounts in packets. If cereal-based ORS is to be an effective alternative for treatment in the field, mothers who prepare ORS will have to use crude household salt rather than sachets of pure salt and electrolytes. To determine whether this can be done effectively, a comparison of plantain-salt, rice-salt, and standard ORS is being conducted. As part of this study the digestibility of plantain ORS will be evaluated.

6 Berberine sulphate as an antisecretory treatment for watery diarrhoea.
(Principal Investigators: G H Rabbani and T Butler)

To evaluate the antisecretory activity of berberine sulphate in acute, infectious diarrhoea, a randomized controlled trial was conducted in adults with diarrhoea due to ETEC and V.cholerae. In patients with diarrhoea due to ETEC, 48 hours following a single oral dose of 400 mg of berberine sulphate the volume of stool was reduced by about 50% when compared with controls (p <0.05). In patients with cholera, the same dose of berberine sulphate had a significant but less dramatic impact on stool output.

7 Single dose furoxone in cholera.
(Principal Investigator: G H Rabbani)

To evaluate the therapeutic efficacy of a single dose of furoxone in acute cholera, a randomized, double-blind trial was conducted in adults and children with cholera. All patients received intravenous rehydration. Furoxone was given by mouth at a dose of 7 mg/kg body weight either as a single dose or as three doses over a period of three days. The study involved 240 patients and the results are being analysed.

8 Loperamide for traveller's diarrhoea.
(Principal Investigators: F P L van Loon and M Bennis)

This study involved 50 expatriates resident or travelling in Bangladesh with watery diarrhoea who came to the Traveller's Clinic in the Dhaka Treatment Centre. A random trial indicated that loperamide reduced the frequency of stools during the first two days after the treatment began, and thus may have a role in treating watery diarrhoea.

9 The role of endogenous prostaglandins in diarrhoea due to cholera and E. coli.
(Principal Investigators: F P L van Loon and G H Rabbani)

To establish the role of endogenous prostaglandins (PG) in mediating diarrhoea due to V.cholerae and E.coli, the concentration of PG was measured in jejunal aspirates taken from patients during both acute illness and convalescence. In 1985 49 patients were studied: 45 with cholera and 4 with diarrhoea due to toxin-producing E.coli. It was found that administering

indomethacin intravenously reduced concentrations of intestinal PG by approximately 50% and reduced the rate of purging to a lesser degree. Further studies will attempt to define the role of other related mediators of intestinal secretion such as serotonin and calcium antagonists.

- 10 Studies on the effect of citrate on the absorption of sodium and water during diarrhoea.
(Principal Investigator: F C Patra)

An important disadvantage of oral rehydration salts containing bicarbonate is that in humid environments the bicarbonate reacts with glucose to form brownish furfural compounds. To avoid this problem sodium citrate, which does not form furfural compounds with glucose, is increasingly being substituted for bicarbonate in packets of oral rehydration salts. Preliminary studies have shown that solutions containing citrate decrease stool volume when compared with bicarbonate containing ORS. Studies are now underway using a perfusion technique in rabbits to determine the impact of citrate on the absorption of water and sodium from the ileum and jejunum.

- 11 The impact of a zinc deficiency on the intestinal transport of water and electrolytes.
(Principal Investigator: S K Roy)

An overt zinc deficiency is associated with diarrhoea. A possible mechanism to explain this is an impaired transport of water and electrolytes in the intestine. Using substances which act as markers in experimental animals it has been demonstrated that the absorption of water and electrolytes was significantly diminished in animals made zinc deficient, and that the transport of water and electrolytes could be restored to normal following zinc repletion. It was also demonstrated that intestinal structural changes in zinc deficient animals were reversed following zinc repletion.

- 12 A comparison of intravenous rehydration solutions prepared with or without glucose.
(Principal Investigators: O Rahman and M Bennis)

Intravenous rehydration remains the mainstay of treatment for patients with severe dehydration due to diarrhoea. A major problem with the current intravenous solutions is that they do not provide a source of glucose and some patients will develop life-threatening hypoglycaemia while being rehydrated. In this study intravenous solutions prepared with and without glucose were compared and the glucose-containing solution was found to be safe and effective in preventing hypoglycaemia.

- 13 Treating the Fasciolopsis buski infections of children: a comparison of six different drugs.
(Principal Investigator: G H Rabbani)

Four relatively new anthelmintics were compared with two older drugs for treating heavy infections with Fasciolopsis buski, an intestinal fluke. Only one drug, tetrachloroethylene, was found to be effective. Two drugs, including tetrachloroethylene, were associated with anaphylactic reactions which could be prevented by the prior administration of antihistamines.

THE DHAKA TREATMENT CENTRE (DTC)

The ICDDR,B runs a hospital in Dhaka on the same site as the main Centre. It provides free treatment for people with diarrhoea and contains a small Nutrition Rehabilitation Unit and two study wards, as well as several large wards for inpatients.

During 1985 57,350 patients received care free of charge at the Treatment Centre. The majority of these patients had watery diarrhoea and were successfully treated with oral or intravenous rehydration solutions and discharged within 24 hours. About 8% of patients (4,553) with more serious illness were admitted to the inpatient ward of the Treatment Centre and stayed for an average of five days. The inpatients were mainly young malnourished children with complications of invasive enteropathogens, primarily *Shigella* spp. A smaller group of inpatients had chronic diarrhoea, a problem for which our understanding and therapeutic options are as inadequate and limited as for organisms causing invasive diarrhoea.

The Treatment Centre has served for a number of years as a model for providing low-cost, "technology appropriate" care of impoverished urban dwellers with diarrhoea. During 1985 the Treatment Centre continued to expand beyond this limited role by enhancing its efforts to provide other inexpensive, basic child health care. These include upgrading and expanding programmes to provide health education to parents and patients, developing a programme to stimulate children, and enlarging the nutritional rehabilitation programme. During the coming year an immunization programme will be started.

SURVEILLANCE

- 1 The surveillance of causes of diarrhoea in the Dhaka Hospital.
(Principal Investigators: A N Alam, M U Khan and D Sack)

Providing the appropriate treatment remains the most cost-effective means of preventing complications and deaths from diarrhoeal diseases. This treatment depends on knowing what organisms cause diarrhoea, their relative occurrence and pathogenic potential, and their susceptibility to antimicrobial substances.

By means of an analysis of the causes of diarrhoea in a systematically selected annual sample of 4% of patients at the Dhaka Treatment Centre (DTC) during the last 5 years, several trends have been observed. The number of cases has declined from a peak of 100,000 to 75,000 annually: the same number of severely ill patients seek treatment as before but fewer mildly ill people attend the DTC which suggests that they are treated at home.

Using conservative assumptions it is estimated that the DTC has prevented about 35,000 deaths during the last 5 years. Most of the deaths averted are probably people who would have died from severe dehydration but were saved simply by being rehydrated. If the costs of the DTC are divided by the deaths averted it is estimated that it has cost about US\$ 90 to avert each death during the last 5 years.

2 Cryptosporidium in the Dhaka Treatment Centre.
(Principal Investigators: N S Shahid and M Rahman)

Cryptosporidiosis was once thought to be only a disease of patients with an impaired immune response, but this view is now changing. Patients in Dhaka with cryptosporidiosis do not appear to be immunodeficient nor to be any more malnourished than other patients who attend the DIC. However, the disease does tend to be more prolonged and may be more severe. Cryptosporidium has been detected in about 4% of patients in the systematic sample taken in the DIC. Person to person transmission appears to be rare, and most cases occur in the warm and wet summer months and in children less than 5 years old.

STAFF DEVELOPMENT

Dr P Bardhan spent 1985 in Basel, Switzerland being trained in gastroenterology by Dr. Klaus Gyr.

Dr I Kabir also received training in gastroenterology but at Case Western Reserve University, USA with Dr. John Banwell.

Dr S K Roy continued his training in Nutrition with Dr Andrew Tomkins at the London School of Hygiene and Tropical Medicine.

7. TRAINING AND EXTENSION

TRAINING

In 1985 a total of 1,894 scientists, doctors and health personnel from Bangladesh and abroad received training in the Centre, an increase of 29% on the previous year. There were 7 international training courses on clinical, epidemiological, diagnostic and educational aspects of diarrhoeal diseases attended by 58 people from 6 countries, and 8 national courses attended by 133 people.

1 International training courses.

Participants from China, Sri Lanka, Bangladesh, Vietnam and Tanzania attended 4 courses on Clinical Aspects of Diarrhoeal Diseases, in which they learned about the diagnosis and clinical management of diarrhoea in both hospitals and the community. Eight participants from China and Tanzania took part in a course on Epidemiological Aspects of Diarrhoeal Disease. They learned among other things how to conduct surveys and how to evaluate methods to control and prevent the transmission of diarrhoea.

Nine people from Tanzania, Vietnam, Saudi Arabia and Bangladesh took part in a training course on Laboratory Diagnostic Aspects of Diarrhoeal Diseases in which they learned about methods to isolate and identify bacteria and viruses responsible for diarrhoeal diseases.

A course with special emphasis on Health Education and Diarrhoeal Diseases was attended by 10 people from China and Bangladesh. The course dealt with among other things, the control of diarrhoeal disease through health education, and the use of the mass media and audio-visual aids.

Each course was evaluated by their participants and were generally considered to be excellent and useful for their jobs.

2 National training courses.

In 1985 the Centre provided 8 training courses for the staff of Bangladesh government and non-government institutions, many of whom came from BRAC, the Bangladesh Rural Advancement Committee. The courses for 112 BRAC personnel provided tuition on the causes of diarrhoea, on rehydration using intravenous fluid and ORS, and on malnutrition and child mortality. The participants subsequently organised courses for other BRAC workers and went on to teach village leaders what they had learned themselves.

Two courses on the management of patients with diarrhoea were held for 7 students of the Bangladesh Institute for Child Health and for 14 students of Dhaka Medical College.

3 Short-term training.

During 1985 training was provided for 1,663 people from medical colleges and voluntary organization on the use of ORS in diarrhoeal diseases, while paramedical students spent two weeks in each of the Biochemistry, Clinical Pathology and Microbiology laboratories.

4 National workshops.

During 1985 three national workshops were organised. The Bangladesh Society of Microbiologists arranged a one-day Workshop on Filtration Techniques. A Workshop on the "Use of Mass Media in the Control of Epidemics and Management of Diarrhoeal Disease in Bangladesh" was attended by 26 people in the field of health communication. Eight papers were presented and the general conclusion was that the mass media had a great but unexploited potential for delivering health education. The last workshop was on "Water and sanitation intervention related to diarrhoeal diseases in Bangladesh". It was attended by 44 representatives of the Government of Bangladesh, UNICEF, the WHO and voluntary organisations.

5 Seminars.

The Centre has organised 41 seminars at which both resident and visiting scientists have met to talk and exchange knowledge and views. The Dhaka hospital also held 52 clinical seminars and case studies in 1985, many of which have involved eminent visiting physicians.

6 International conference.

The Third Asian Conference on Diarrhoeal Diseases was held in Bangkok from 10th to 14th June 1985. It was organised jointly by the Centre, the Mahidol University and the Ministry of Public Health in Thailand, and the National Institute for Cholera and Enteric Diseases, Calcutta. The Centre sent 27 out of the 327 participants.

7 Fellowship programme.

The ICDDR,B has established a programme to provide students from both developed and developing countries with the opportunity for specialised study with an assigned preceptor. A total of 39 fellows from 10 countries other than Bangladesh were trained during 1985 in different aspects of diarrhoeal diseases, for periods from 8 days to one year.

8 Training materials development.

1985 was designated the year of developing training resource materials, and manuals on the following subjects were produced: microbiological agents in diarrhoeal disease; the pathophysiology of diarrhoeal diseases; the natural history of diarrhoeal diseases; the clinical management of diarrhoeal diseases; ORS and the home management of diarrhoeal diseases; the nutritional care and management of diarrhoea; drug therapy in acute diarrhoeal diseases; planning a national diarrhoeal disease control programme; diarrhoeal diseases for medical students and practitioners; a manual for nurses; and a manual on the treatment and prevention of diarrhoea for mid-level health workers.

In addition, a number of technical publications were drafted: an annotated bibliography of research in different working groups; a monograph on voluntary health workers in diarrhoeal disease control programmes; and a manual on health education aspects of the management of diarrhoea. These should be available soon.

Three slide and tape presentations were produced to show the following: ICDDR,B activities, ORS and the home management of diarrhoea, and the use of rice ORS. Work is in progress on four more concerning research in Teknaf,

MCH-FP activities in Matlab, the clinical management of diarrhoea and the epidemic control preparedness programme.

9 Collaboration.

The Centre continued to collaborate with the Directorate General of Health Services and other national institutions not only in providing training, services, materials and experimental animals (see p 21), but also in research. Six collaborative research proposals on aspects of diarrhoeal diseases were instigated. The Centre cooperated with 52 national institutions and provided expert services to develop their research and service capabilities.

EXTENSION

1 The Epidemic Control Preparedness Programme.

In a major endeavour to help the Bangladesh National Diarrhoeal Disease Control Programme, the ICDDR,B has undertaken this project in collaboration with the Government of Bangladesh, the Ford Foundation and UNICEF. The main objectives of the project are to develop trained manpower, to provide resources for a national programme to control diarrhoeal diseases, and to develop effective measures to control epidemics using the available health services and resources.

As a part of these objectives 8 training courses were provided for 114 government health officials. For Upazila health officials a 5-day course for 7 Health and Family Planning Officers, 9 Medical Officers and 9 Sanitary Inspectors was provided. These officials were taught about the management of diarrhoea using ORS and intravenous fluid, how to investigate epidemics of diarrhoea, how to establish community treatment centres and how to pass on their knowledge to rural health workers.

In 7 six-day courses for senior health officials at the district level, 48 Civil Surgeons, 23 Deputy Civil Surgeons and 17 teachers from Medical Assistant Training Institutes were instructed. A total of 72 of 88 district officers representing 49 districts took part in an effort to improve the overall national surveillance and management of diarrhoeal diseases.

2 Long-term training.

Ten doctors working for the Government of Bangladesh completed training at the ICDDR,B in 1985 and returned to their jobs to start organising training for other health officials in their respective Upazilas. Eight other doctors will have completed 6 months training by January 1986 and 17 more by May 1986.

3 A one-day national workshop.

The Directors of all Bangladesh Medical Colleges and the Superintendent of the Institute of Post-graduate Medicine and Research attended a workshop on the importance of diarrhoeal diseases in Bangladesh and on epidemic control and management.

4 Diarrhoea epidemic intervention.

The aim of this programme is to study, develop and incorporate into the

existing health services methods to control the spread of diarrhoea during epidemics and to prevent deaths. Seven ICDDR,B medical officers and the Government physicians undergoing long-term training managed 55 outbreaks of diarrhoea working in teams of three. Forty teams spent 316 days investigating outbreaks, treated 1,050 active cases of diarrhoea and collected 634 rectal swabs for microbiological culture.

5 Strengthening the Government surveillance system and epidemic control methods.

Two trained government medical officers are now supervising the monitoring of diarrhoeal diseases in Bangladesh. With more efficient reporting in 1985 1.07 million cases of diarrhoea were identified compared with 0.66 million in 1984, 0.45 million in 1983 and 0.70 million in 1982. The number of epidemics of diarrhoea during 1985 were no more than expected.

The new government approach to diarrhoea epidemic control and management involves trained epidemic control teams at upazila and union levels, and the maintenance of stocks of supplies for treating outbreaks at upazila health complexes.

In December 1985 a detailed investigation of 43 deaths due to diarrhoea at Barura Upazila was undertaken. This revealed that 39 deaths were due to acute watery diarrhoea and that 80% of fatal cases were treated by unqualified rural practitioners even though most people were close to a Upazila health complex. Only the better-off families used the services of qualified health personnel. These findings suggest that traditional village doctors should be incorporated into future treatment programmes.

STAFF DEVELOPMENT

This programme was instituted to improve the skill, knowledge and productivity of staff members.

A course on statistical methods and data analysis was attended by 25 members of staff. A total of 44 people were sent to institutions within Bangladesh to be trained in fields such as computer software, refrigeration, air conditioning, office management, inventory control and stock management, surgical sterilization procedures and personnel management.

In 1985 eighteen members of staff went to the USA, Thailand, India, Belgium, Australia, Singapore, the Netherlands, Japan and France on short course or training (15) or to enroll in degree courses (3). The fields covered include population dynamics, nutritional epidemiology, clinical microbiology, computer programming, micrographic equipment operation, computer applications to library information services and monoclonal antibody techniques.

Extensions to stay abroad were granted to 3 members of staff and 13 returned to the Centre having completed their training.

8. LIBRARY, PUBLICATION AND COMMUNICATIONS

The Library, Publication and Communications Branch played an important role in 1985 in acquiring, processing and disseminating information and materials on diarrhoeal diseases, and on the related subjects of nutrition and fertility. These efforts have supported the Centre's research activities and of diarrhoeal disease scientists of Asia in general. The branch also met specific requests from individuals and organisations from many countries by providing them with references, bibliographies, photocopies and reprints. Copies of the Centre's own publications have also been distributed by subscriptions, direct sale and by supply at no cost.

By its variety of publications and services the Library, Publication and Communications Branch has not only facilitated access to published and unpublished literature but has strengthened the exchange and use of information through the development of an effective information service.

LIBRARY

1985 was a busy year for the Library. It had 6,959 visitors other than members of staff; it loaned 18,561 books and journals; it acquired 330 books, of which 152 titles were purchased and 178 were received as gifts or by exchange; it subscribed to 317 periodicals and received 205 titles as gifts or by exchange; it lent 415 books and journals to local libraries and borrowed 43; it provided photocopies of 11,229 items; it received 18 MEDLARS and 15 POPLINE literature searches; and it procured 225 reprints directly from the authors, from the National Library of Medicine, USA, the National Library of Australia, the HELLIS Network, India and from other sources, as a part of its collection development programme.

To keep scientists aware of recent acquisitions and of relevant new publications, the library published 22 issues of the Current Awareness Service Bulletin which were distributed among staff members, in Bangladesh and abroad. The organisation of the Bulletin was changed to conform with international standards, and a charge was introduced to recover production costs.

DISC

The first three and a half year phase of DISC, the name given to the International Diarrhoeal Disease Information Service and Documentation Centre, ended successfully in December 1985. It is financed by the International Development Research Centre (IDRC), Canada. As the world's first and only clearing-house solely devoted to diarrhoeal diseases, DISC made major progress towards fulfilling its targets. In 1985 DISC enrolled 111 individuals and organisations as members and published 3 issues of the Journal of Diarrhoeal Diseases Research (JDDR) and 3 issues of the Annotated Bibliography of Asian Literature on Diarrhoeal Diseases (within the JDDR). These works have been acclaimed by both readers and reviewers. The JDDR is now indexed by the Index Medicus, MEDLINE, Current Contents (Clinical Practice), ISI/BIOMED, Excerpta Medica, Tropical Diseases Bulletin, Indian

Science Abstracts, Current Awareness in Biological Sciences, and the Database BIRD (International Children's Centre, Paris). The contents of the bi-monthly newsletter, Glimpse, were widened to highlight research in progress at the ICDDR,B, to cover abstracts of ICDDR,B publications, news on forthcoming meetings and conferences, and information on diarrhoeal disease research projects in Asian countries, as well as information on the programmes and activities of DISC.

Seven annotated issues of the Specialized Bibliography Series were published in 1985. The topics covered were: nutrient absorption and the diarrhoea-malnutrition cycle; oral rehydration therapy; the composition of oral rehydration solutions; anthropological studies in diarrhoeal diseases; classical Vibrio cholerae; drug resistance of Shigella; and the pathogenesis of shigellosis. Abstracts of 550 papers were included in these bibliographies. Three additional bibliographies (dietary management of diarrhoeal diseases, enterotoxigenic Aeromonas, and antiseptics) were also begun.

A Directory of Asian Diarrhoeal Disease Scientists and Practitioners was compiled and published in 1985. The directory lists 497 scientists and medical practitioners and includes information on their education, training, achievements, scientific interests, publications and current address. The directory is expected to facilitate the exchange of information among Asian scientists.

DISC also continued its question-and-answer and document delivery services. Replies to 17 questions received from 6 countries were given. Photocopies of 27 items were supplied on request.

A complete microfiche preparation laboratory and two IBM-PC/XTs were ordered in 1985. The computers will speed up the storage and retrieval of information, and will be used to prepare future publications and to create databases on diarrhoeal disease publications.

Because many DISC productions required indexing by subject, the development of a list of subject headings became necessary. A glossary of diarrhoeal disease-related terms with brief notes was produced. A manual of library, documentation and information services was also developed to record working procedures.

To develop its database, DISC collected 271 reprints on diarrhoeal diseases directly from the authors and from libraries throughout the world.

In June 1985, DISC organised a one-day Workshop on Diarrhoeal Disease Information and Documentation Services in conjunction with the Third Asian Conference on Diarrhoeal Diseases in Bangkok, Thailand. This Workshop was attended by over 75 participants. In all there were 5 key presentations, three from the ICDDR,B, one from Thailand and one from Japan. The Workshop reviewed the existing DISC publications, programmes and services and made suggestions for future developments.

A survey was undertaken for the ICDDR,B Programme Coordination Committee (see p 58) of current or completed research projects on diarrhoeal diseases and the directly related subjects of nutrition and fertility in Bangladesh. This is in addition to the regular survey of current research projects on diarrhoeal diseases in Asia, some of which were reported in Glimpse.

The IDRC have acknowledged the success of the first phase of the DISC project by agreeing to support the second phase from 16 January 1986 to 31 December 1987.

PUBLICATIONS

In 1985 the Publications Unit produced the 1984 annual report, 2 scientific reports, 1 monograph, 4 special publications submitted by scientific staff of the Centre, 5 issues of the bi-monthly newsletter Glimpse, and 3 issues of the Journal of Diarrhoeal Diseases Research. Publications and brochures were sent to scientists, libraries and organisations throughout the world as follows: 28,495 copies of Glimpse, 2,510 copies of the 1984 annual report, 3,240 copies of the JDDR, 2,785 copies of other scientific publications, 2,388 copies of specialized bibliographies, 208 copies of the Directory of Asian Scientists and Practitioners, 6,181 copies of brochures about DISC, the JDDR and ICDDR,B, and 473 reprints of ICDDR,B external publications.

Increased efforts were made to promote the Centre's publications as well as improving their quality. Some income was generated by selling the Centre's publications and by membership of DISC. The JDDR received 305 subscription orders and membership fees during 1985.

Details of some publications of the ICDDR,B may be found at the end of this report.

STAFF DEVELOPMENT

The Branch Head, the Publication Officer, and the Head of the Medical Illustration Cell successfully completed training courses on "Computer applications to library information services" in Australia, "Production of publications, editorial techniques and promotion" in India, and "Micrographics fundamentals" in Singapore.

9. RESOURCES DEVELOPMENT

In 1985 the work of the Resources Development Office has become more challenging as the continuing international economic recession has resulted in reduced money for aid. This has affected the way in which donors are funding the Centre: they are tending to prefer to provide money for specific programmes and projects rather than for the institution in general. This has led to a temporary imbalance in the Centre's finances.

Faced with this development the activities of the Resources Development Office were directed primarily to maintain current contributions by donors, to emphasize the importance of support to sustain the Centre's core programmes, and to provide funds to initiate new research. If the ICDDR,B is to remain a leading international research institute on diarrhoeal diseases then adequate and sustained financial support is vital.

DONORS

The United States Agency for International Development (USAID) continued in 1985 to be the Centre's single largest donor. Although the major portion of the support has traditionally been to the institution in general, the 1985 grant was committed entirely for the Centre's largest project — the Oral Cholera Vaccine Trial. In 1986, Resources Development will seek renewed core funding from USAID as well as direct project support.

The Dhaka mission of the USAID, which has separate funds, has extended its commitment to the Maternal Child Health and Family Planning Extension Project until the middle of 1987. The Dhaka USAID also made a grant for emergency relief to the Centre after the tragic cyclone and tidal wave of May, 1985. With this assistance the ICDDR,B medical teams were equipped and sent to treat victims in areas that were struck by outbreaks of diarrhoea.

The Canadian International Development Agency (CIDA) continued to fund the Demographic Surveillance System in Matlab and Teknaf, and provided support to the Training Branch for international courses in preventing and treating diarrhoeal diseases.

UNICEF was a major donor to the Centre in 1985 with both core funding and project funding for developing training materials, for research on cereal-based ORS and for the Urban Volunteers Programme (also supported by Belgian aid).

The Ford Foundation continues to be a cooperative and supportive donor with a grant to the Epidemic Control Preparedness Programme. The Ford Foundation also gave support for a study on family planning related infectious diseases which continues into 1986, for Operations Research, for an evaluation of the National Oral Rehydration Programme, and for visits by financial consultants from the Population Council.

The Government of Bangladesh remains a generous supporter of the Centre and in 1985, as in previous years, has granted core funds as well as in-kind support to the ICDDR,B. In both implementing projects and raising funds, the assistance of the Bangladesh Government has been invaluable.

The United Nations Development Programme (UNDP) continued to support

clinical research in 1985. The UNDP has also renewed its agreement with the Centre to support the Urban Volunteers Programme and it sponsored the annual Consultative Group Meeting in New York in June, 1985.

The Norwegian Agency for Development (NORAD) became a new donor to the Centre in 1985 with its support of the MCH-FP services in Matlab.

Financial support was also received from the following countries during the years: Australia, Saudi Arabia, Sweden, Switzerland and the United Kingdom. Programme and project contributions were received from Japan, the Arab Gulf Fund, Belgium, the World Bank, the World Health Organization, the International Development Research Centre, France, the Aga Khan Foundation, the National Academy of Sciences, the Population Council and the Johns Hopkins University.

The World University Service of Canada (WUSC) continued to provide technical personnel to the Centre and a second phase of assistance is being planned. Belgium (BADC), the French organization ORSTOM and the London School of Hygiene and Tropical Medicine all continue to support scientific personnel at the Centre.

COLLABORATIVE ACTIVITIES

In January 1985 a formal agreement was signed between the ICDDR,B and the Ministry of Public Health of the People's Republic of China to provide training and technical assistance.

The Diarrhoea Treatment Centre in Damman, Saudi Arabia continues to operate with technical assistance from the ICDDR,B, and a new Centre has been opened in Riyadh.

THE RESERVE FUND

The Resources Development Office continues to seek support for the Centre's Reserve Fund which was enlarged in 1985 by a generous contribution from the Ford Foundation. Efforts are being made to obtain further contributions.

CONSULTATIVE GROUPS

Two Consultative Group meetings took place in 1985: a local one held in Dhaka and an international one held during the UNDP Governing Council meeting in New York. The management of the Centre and the UNDP, sponsors of the meeting, have come to the conclusion that a Consortium comprising representatives of donors would be much more productive than the traditional Consultative Group. Plans are underway for this Consortium to meet in Dhaka in the second half of 1986 to enable participants to acquaint themselves directly with the programmes and progress of the ICDDR,B.

CAPITAL DEVELOPMENT

Negotiations with the United Nations Capital Development Fund on the Centre's capital development activities at Matlab field station are in an advanced stage, and an agreement is expected to be signed early in 1986. The new facilities, to be built on the Centre's own land, will enhance the field station's research training and service capabilities (see p 13).

10. FINANCE

In 1985 the Centre's total operating expenditure exceeded its total receipts by US\$ 1,638,602.

Although contributions by donors of \$7.5 million in 1985 were at about the same level as in 1984, the amount was significantly lower than expected and the shift to restricted project funding accelerated sharply. The shortfall in income had only a small impact on the operating deficit and accounted for about US\$ 240,000. The overwhelming impact on the deficit was due to reduced core funding from \$2.9 million in 1984 to less than \$ 1 million in 1985. The response required to deal with this radical shift from core to project funding was in the short run clearly beyond the Centre's capability.

The effort to slow the change from core to project funding was regrettably unsuccessful and is now a fact of life the Centre is adjusting to. These adjustments include ensuring that projects are charged for all directly allocatable costs in order to reduce pooled indirect costs.

At the same time, and more importantly, vigorous efforts were made to reduce expenditure, particularly if core funded. A freeze on hiring was implemented in July, a number of international level positions were collapsed and there was a review of further action required. More drastic steps to cut staff and stop all core funded research was not put forward at the time as the new management had not yet become sufficiently confident of all of the Centre's operations, both scientific and administrative, to propose an appropriate course of action.

When it became increasingly clear that the 1986 financial position would not be materially different from 1985, the Board of Trustees at its November 1985 meeting initiated actions to improve donor funding support and to reduce expenditure in order to return the Centre to the fiscal responsibility of the past. The Centre's management was directed to stop all core funded research in 1986 and significantly reduce the number of international and local staff employed. These and other actions by the Board should reduce considerably the gap between projected income and expenditure. Even with these actions there still remained for 1986 a significant shortfall in the amount of income available to cover core expenditure, illustrating the great difficulty the Centre is having in reducing core expenditure in a relatively short time. The Board has therefore strongly urged donors to consider funding a number of worthwhile activities now paid for entirely with core funds.

CASH FLOW

The bank overdraft which stood at \$1.6 million at the end of 1984 increased to \$2.8 million by the end of 1985. Interest costs were largely offset by a foreign exchange gain of over \$300,000. An increase in the line of credit from \$2.0 million to \$3.0 million eased the persistent cash flow pressures.

RESERVE FUND

A Reserve Fund was established in 1982 to generate income to support promising new research which was not sufficiently advanced to attract donors. Under restricted conditions, the Fund could also be used to bridge the temporary gap between the receipt and expenditure of income. There were no transactions other than the receipt of interest and of contributions during 1985.

The Centre gratefully acknowledges the grant of \$500,000 provided by the Ford Foundation in 1985. The assets of the reserve fund including accumulated income amounted to \$1.4 million at the end of 1985.

AUDITORS REPORT TO THE BOARD OF TRUSTEES

We have audited the Balance Sheet of the International Centre for Diarrhoeal Disease Research, Bangladesh as of December 31, 1985 and the relative Receipts and Expenditure Account for the year ended on that date, which are in agreement with the book and records maintained by the Centre and produced to us. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, and to the best of our information and according to the explanations given to us, the Balance Sheet and the Receipts and Expenditure Account, subject to item No. 3 (ii) of the 'notes to accounts' attached thereto, give respectively a true and fair view of the state of affairs of the Centre as of December 31, 1985 and the results of its operations for the year then ended.



DELOITTE HASKINS + SELLS
CHARTERED ACCOUNTANTS



AHMED SHAHID & CO.
CHARTERED ACCOUNTANTS

Dhaka, April 4, 1986

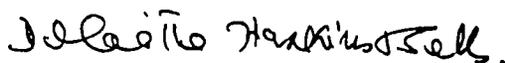
INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH

BALANCE SHEET AS AT DECEMBER 31, 1985

	Schedule	1985	1984
Fixed Assets/less depreciation	1	<u>4,290,652</u>	<u>3,875,751</u>
Current Assets			
Stock of stores and spares	2	579,067	765,735
Employee retirement fund deposits		1,415,650	964,904
Advances, deposits and prepayments	3	567,720	978,485
Cash and bank balances	4	<u>1,613,345</u>	<u>942,062</u>
		<u>4,175,782</u>	<u>3,651,186</u>
Less:			
Current Liabilities			
Bank overdraft	5	2,820,314	1,612,021
Interest free loan (from Bangladesh Bank)		1,186,080	1,186,080
Other current liabilities	6	<u>295,413</u>	<u>483,084</u>
		<u>4,301,807</u>	<u>3,281,185</u>
Net Current Assets		<u>-126,025</u>	<u>370,001</u>
Represented By	US \$	<u>4,164,627</u>	<u>4,245,752</u>
Capital Development Fund	7	5,216,813	4,669,403
Operating Fund	8	-3,868,786	-2,230,184
Reserve Fund	9	1,400,950	841,629
Employees Retirement Fund		<u>1,415,650</u>	<u>964,904</u>
	US \$	<u>4,164,627</u>	<u>4,245,752</u>

NOTES FORM PART OF THE ACCOUNTS


Director
ICDDR,B

Member
Board of Trustees

Deloitte Haskins + Sells
Chartered Accountants

Ahmed Shahid & Co.
Chartered Accountants

Dhaka, April 4, 1986

**RECEIPTS AND EXPENDITURE ACCOUNT (OPERATING FUND)
FOR THE YEAR ENDED DECEMBER 31, 1985**

	Schedule	1985	1984
Receipts:			
Contributions	10	7,487,397	7,398,637
Other receipts		208,932	234,104
		<u>7,696,329</u>	<u>7,632,741</u>
Less:			
Transferred to Capital Development Fund to the extent of capital Contribution		547,410	781,003
		<u>7,148,919</u>	<u>6,851,738</u>
Exchange gain/-loss		306,083	12,523
		<u>7,455,002</u>	<u>6,864,261</u>
Expenditure:			
Personnel services and benefits		5,678,716	4,930,702
Supplies and materials		1,288,644	980,347
Travel expenses		473,369	571,827
Transportation of materials		163,028	146,703
Rent, communication and utilities		200,653	97,353
Printing and reproduction		166,759	42,287
Other contractual services		706,313	366,997
Depreciation		416,122	333,658
		<u>9,093,604</u>	<u>7,469,874</u>
Surplus/-Deficit:	US \$	<u>-1,638,602</u>	<u>-605,613</u>

SOURCES AND APPLICATION OF FUNDS AS AT DECEMBER 31, 1985

	1985	1984
Source:		
Capital Development Fund receipts	547,410	781,003
Reserve Fund receipts	559,321	0
Decrease in working fund	496,026	0
Retirement Fund receipts	450,746	964,904
Depreciation (net)	415,058	329,830
	US \$ <u>2,468,561</u>	<u>2,075,737</u>
Application:		
Additions to fixed assets (net)	829,959	591,179
Loss on sale of assets	0	10,892
Increase in working fund	0	868,053
Deficit as per Receipts and Expenditure Account	<u>1,638,602</u>	<u>605,613</u>
	US \$ <u>2,468,561</u>	<u>2,075,737</u>

SCHEDULE 1

FIXED ASSETS

Capital Development Fund	COST			Total	Rate	DEPRECIATION			Total	BALANCE
	Opening balance on 1.1.85	Additions this year	Sales Adjustments			As at 1.1.85	Charge for the year	Adjustment		As at 31.12.85
Land	66,758	4,604		71,362						71,362
Buildings	1,745,256	70,441	15,456	1,800,241	2%	66,952	36,005	309	102,648	1,697,593
Vehicles	399,458	45,764	900	444,322	20%	133,498	88,864	360	222,002	222,320
Furniture	343,674	33,104	1,933	374,845	10%	63,486	37,485	387	100,584	274,261
Equipment	1,786,955	691,187	42	2,478,100	10%	332,317	247,810	8	580,119	1,897,981
Other assets	115,978	3,190		119,168	5%	11,001	5,958		16,959	102,209
Work-in-progress	24,926			24,926						24,926
US	<u>\$4,483,005</u>	<u>848,290</u>	<u>18,331</u>	<u>5,312,964</u>		<u>607,254</u>	<u>416,122</u>	<u>1,064</u>	<u>1,022,312</u>	<u>4,290,652</u>

SCHEDULE 2

STOCK OF STORES AND SPARES	1985	1984
Capital Development Fund:		
Capital assets	42,446	153,804
Operating Fund:		
Supply stores	394,690	439,844
Maintenance stores	141,931	172,087
	536,621	611,931
US \$	579,067	765,735

SCHEDULE 3

ADVANCES, DEPOSITS AND PREPAYMENTS

Capital Development Fund:		
Advance against capital expenditure	147,780	308,394
Operating Fund:		
Advance against supplies and services	164,299	307,807
Advance against expenses	230,433	317,104
Other advances	20,012	39,005
Deposits	5,196	6,175
	419,940	670,091
US \$	567,720	978,485

SCHEDULE 4

CASH AND BANK BALANCES		
	1985	1984
Cash at Banks (US \$ Account)		
American Express Bank Ltd., Reserve Account	20,820	20,820
American Express Bank Ltd., Switzerland	7,969	4,776
American Express Bank Ltd., Dhaka	63,252	12,031
American Express Bank Ltd., Dhaka-Reserve Account	29,131	16,809
American Express Bank Ltd., Call Deposit	1,351,000	804,000
American Express Bank Ltd., BOSTID Account	6,212	0
American Express Bank Ltd., MSF Account	16,063	0
American Express Bank Ltd., US AID-MCH	8,536	0
Janata Bank, Dhaka	1,274	1,275
Bank of Credit and Commerce Int. (Overseas) Ltd.	228	0
	<u>1,504,485</u>	<u>859,711</u>
Taka Account		
Bank of Credit and Commerce Int. (Overseas) Ltd.	44,727	0
Janata Bank, Dhaka	1,373	1,723
Agrani Bank, Dhaka	20,874	43,046
Agrani Bank, Dhaka	26	32
Agrani Bank, Matlab	3,349	5,235
Agrani Bank, Teknaf	317	60
Agrani Bank, Sirajgonj	1,353	557
Agrani Bank, Noapara	269	35
Agrani Bank, Chandpur	346	346
Agrani Bank, Mirjapur	4,646	476
American Express Bank Ltd.	5,578	9,077
	<u>82,858</u>	<u>60,587</u>
UK £ Account		
American Express Bank Ltd., London	15,634	4,927
SFR Account		
American Express Bank Ltd., Switzerland	6,594	12,840
SR Account		
Saudi American Bank, Dammam	1,510	1,565
Cash in hand	2,264	2,432
	<u>1,613,345</u>	<u>942,062</u>
	=====	=====
US \$	1,613,345	942,062

SCHEDULE 5

BANK OVERDRAFT		
	1985	1984
US \$ Account		
American Express Bank Ltd., New York	1,075,620	438,443
Taka Account		
American Express Bank Ltd., Dhaka	1,744,694	1,173,578
	<u>2,820,314</u>	<u>1,612,021</u>
	=====	=====
US \$	2,820,314	1,612,021

SCHEDULE 6

OTHER CURRENT LIABILITIES	1985	1984
Capital development Fund:		
For capital expenditure	0	56,194
Operating Fund:		
For supplies and materials	86,399	91,209
For expenses	171,792	325,196
Security and other deposits	37,222	10,485
	<u>295,413</u>	<u>426,890</u>
US \$	<u>295,413</u>	<u>483,084</u>
	=====	=====

SCHEDULE 7

CAPITAL DEVELOPMENT FUND		
Balance as at January 1	4,669,403	3,899,292
Add: Transferred during the year from Receipts and Expenditure Account	547,410	781,003
	<u>5,216,813</u>	<u>4,680,295</u>
Less: Loss on sale of assets	0	10,892
	<u>5,216,813</u>	<u>4,669,403</u>
US \$	<u>5,216,813</u>	<u>4,669,403</u>
	=====	=====

SCHEDULE 8

OPERATING FUND		
Balance as at January 1	-2,230,184	-1,182,942
Deficit for the year ended December 31	-1,638,602	-605,613
	<u>-3,868,786</u>	<u>-1,788,555</u>
Less: Transferred to Reserve Fund	0	441,629
	<u>-3,868,786</u>	<u>-2,230,184</u>
US \$	<u>-3,868,786</u>	<u>-2,230,184</u>
	=====	=====

SCHEDULE 9

RESERVE FUND		
Balance as at January 1	841,629	400,000
Add: Transferred from Operating Fund	0	441,629
Received from The Ford Foundation	500,000	0
Interest earned on deposits	59,321	0
	<u>1,400,950</u>	<u>841,629</u>
US \$	<u>1,400,950</u>	<u>841,629</u>
	=====	=====

SCHEDULE 10 - CONTRIBUTIONS

Unrestricted:		
Australia	143,365	161,078
Bangladesh	0	32,760
Saudi Arabia	100,000	100,000
Sweden	0	207,280
Switzerland	310,813	324,271
United Kingdom	171,741	168,516
UNICEF	250,000	0
USAID-Washington	0	1,898,000
Others	139	0
	<u>976,058</u>	<u>2,891,905</u>
Restricted:		
Arab Gulf Fund	485,440	280,000
Aga Khan Foundation	52,260	0
Bangladesh/German (FRG) Technical Co-operation	13,671	0
Belgian Administration for Development Co-operation (BADC)	0	7,906
Belgium	68,115	0
BOSTID (National Academy of Science)	13,312	0
Canadian International Development Agency (CIDA)	807,806	1,407,016
France	12,600	49,220
IDRC - Canada	85,468	58,610
IBRD-Handpump Project	85,986	41,162
Japan	260,000	240,000
Norwich Eaton Pharmaceuticals	10,500	0
NORAD-Matlab Health Services	228,837	0
Princeton University	3,748	5,493
PRITECH-Asian ORT meeting	10,500	0
Roche Far East Research Foundation	0	5,000
Swedish Agency for Research and Cooperation (SAREC)	0	36,579
Saudi Arabia	275,053	485,614
The Population Council	32,474	27,167
The Ford Foundation	354,544	256,900
The Johns Hopkins University	11,141	9,224
The Rockefeller Foundation	5,380	0
UNFPA - MCH FP	75,375	26,000
- DSS	0	16,400
UNICEF - ORT and Training	253,645	451,244
UNDP/WHO	187,000	349,567
UNDP - UCVP	96,470	0
UNDP/UNROB	43,570	0
UN University, Japan	0	5,787
US AID - Vaccine Trial Program Fund	2,300,000	0
- Dhaka - MCH FP Extension	563,033	655,672
- Emergency Relief	100,000	0
- Jakarta - Training	3,755	60,817
- Manila - Training	0	14,241
- NIROG Project	13,894	12,603
WHO - Vaccine Trial	50,000	0
- Double Blind Trial	7,762	4,510
	<u>6,511,339</u>	<u>4,506,732</u>
US \$	<u>7,487,397</u>	<u>7,398,637</u>

NOTES TO ACCOUNTS DECEMBER 31, 1985

1. ACCOUNTING POLICIES

- (i) Receipts and Expenditure Account and Balance Sheet of the Centre are maintained in the manner as prescribed and approved by the Board of Trustees.
- (ii) Fixed assets have been brought to account at material cost upto August 1981. Subsequent to that date incidental expenses such as labour, freight, insurance etc. (excluding clearing charges) have also been included in arriving at the cost of fixed assets.
- (iii) Stock of stores and spares are valued at material cost only.
- (iv) 'Receipts' and 'Expenditure' of the Centre for the year to December 31, 1985 are accounted for on 'cash' and 'accrual' bases respectively in accordance with past practice. The Centre has decided to adopt the accrual accounting method for receipts as well commencing in 1986. Contributions received during 1985 included an amount of US \$310,813 which relates to 1986. Under a full accrual method contributions received in advance would be treated as a liability item.
- (v) Depreciation on fixed assets has been charged on a straightline basis. No provision for depreciation has been made up to December 31, 1982.
- (vi) The accounts have been prepared on a "historical cost" basis. For advances, liabilities, cash and bank balances the year end exchange rate was used for converting non-US currencies to US dollars. For other transactions, average monthly exchange rates were used for conversion purposes.
- (vii) All assets costing \$ 50 or less are expensed. The Centre maintained a separate register for such assets upto December 31, 1983 which has not been up-dated since then.
- (viii) Beginning in 1985 the Centre has charged the cost of books to the expenditure account. Value of books capitalised upto 1984 remain in the accounts.

2. FIXED ASSETS

- (i) 4.10 and 0.51 acres of land situated at Mohakhali (Dhaka) and Matlab (Comilla) received as donations from the Government of Bangladesh and a private party respectively have not been brought to account.
- (ii) Buildings include an amount of US\$ 101,646 spent on the extension of the Institute of Public Health, owned by the Government of Bangladesh and at present partly accommodating the Centre. The new extension was built for use by the ICDDR,B.

3. PERSONNEL SERVICES AND BENEFITS

- (i) An amount of US\$ 42,909 (1984 US\$ 35,088) was paid as honorarium to the members of the Board of Trustees.
- (ii) Retirement liability to the extent of US\$ 158,900 (approx.) has not been provided for in the accounts in respect of: ICDDR,B employees not covered by WHO scale US\$ 26,700; Interest on retirement fund to March 31, 1984 US\$ 108,900; International level staff while on ICDDR,B local pay scale US\$ 23,300.

4. RENT, COMMUNICATION & UTILITIES

US\$ 29,021 was paid for electricity consumption for the new hospital building for prior years.

5. CURRENCY TRANSLATION

<u>Currency</u>	<u>Average monthly exchange rates</u>	<u>Year end exchange rates</u>
Tk. 1.00	0.035	0.033
UK £ 1.00	1.445	1.445
SFR 1.00	0.480	0.482
SR 1.00	0.274	0.274
S \$ 1.00	0.475	-

6. CONTINGENT LIABILITIES

Claims against the Centre not acknowledged as debt - US\$ 2,442.

7. CAPITAL COMMITMENT

In the opinion of the management, the commitment is US\$ 96,235 (approx.).

8. OTHERS

Grants by way of various services rendered by the donor agencies to the Centre have not been considered in the accounts.

Previous year's figures have been rearranged and regrouped whenever found necessary.

11. BOARD OF TRUSTEES

The Board expressed its appreciation to departing trustees Dr F Assaad, Dr D J Bradley, Mr A B M Golam Mostafa and Mr M Munir-uz-Zaman. The Board welcomed the following new members: Mr M K Anwar, Dr R G Feachem, Dr S Joseph, Mr Manzoor-ul Karim and Dr M H Merson. Their titles and addresses are given below.

At the meeting in May the Board said farewell to Dr W B Greenough, III, Director of the Centre since 1979 and welcomed as his successor, Dr Roger Eeckels.

BOARD MEMBERS

Dr Abdul Rahman Al Swailem
Honourable Deputy Minister of Health
Government of the Kingdom
of Saudi Arabia

Mr M K Anwar
Secretary
External Resources Division
Ministry of Finance
Government of Bangladesh

Professor David E Bell - Chairman
Chairman
Department of Population Sciences
Harvard University, Boston
USA

Dr Immita Cornaz
Swiss Development Cooperation
and Humanitarian Aid
Berne
Switzerland

Professor Roger Eeckels
Director, ICDDR,B
Dhaka, Bangladesh

Dr Richard G Feachem
Head, Department of Tropical Hygiene
London School of Hygiene and
Tropical Medicine
London, UK

Mr Manzoor-ul Karim
Secretary
Ministry of Health &
Family Planning
Government of Bangladesh

Dr Leonardo J Mata
Professor and Director
Instituto de Investigaciones
en Salud (INISA)
Universidad de Costa Rica

Dr M H Merson
Director
Diarrhoeal Diseases Control
Programme, WHO
Geneva, Switzerland

Professor V Ramalingaswami
Director-General
Indian Council of Medical Research
New Delhi
India

Professor Derrick Rowley
Department of Microbiology &
Immunology
The University of Adelaide
Adelaide
Australia

Maj Gen M Shamsul Haq
Honourable Minister
Ministry of Health &
Family Planning
Government of Bangladesh

Dr Stephen Joseph
Special Coordinator
Child Health & Survival
Health & Nutrition Section
United Nations Children's
Fund (UNICEF)
New York, USA

Professor J Kostrzewski
Polska Akademia Nauk
Palac Kultury in Nauki
Warsaw
Poland

Dr Sulianti Saroso
Former Advisor, Ministry of Health
Jakarta, Indonesia

Dr D B Sebina
Secretary for Health
Ministry of Health
Gaborone
Botswana

Dr Yoshifumi Takeda
Chairman
Department of Bacterial Infections
The Institute of Medical Science
The University of Tokyo
Tokyo
Japan

12. MANDATORY COMMITTEES

The Board of Trustees of the ICDDR,B has established several committees to coordinate research, to prevent any action prejudicial to Bangladesh's research interests in similar fields and to ensure an ethical review process.

PROGRAMME COORDINATION COMMITTEE (PCC)

In order to coordinate, strengthen and facilitate research efforts by Bangladeshi organizations, the Board of Trustees established in December 1982 a Programme Coordination Committee (PCC). The PCC has 40 members: seven from the ICDDR,B, and the rest from leading Government and private Bangladeshi institutions concerned with science, health, rural development, education, nutrition and population studies. There is a Standing Committee of 13 members.

In 1985 the PCC met twice, and recommended the following: the production of a book on herbal medicine (in progress); the approval of a protocol entitled "Randomized clinical trial to compare efficacy of ampicillin with hirtacin in shigellosis", a joint collaboration between the Institute of Nutrition & Food Science, University of Dhaka and the ICDDR,B; a workshop on "Water and Sanitation Intervention Related to Diarrhoeal Diseases in Bangladesh" (held November 17th to 19th, 1985); a workshop on collaboration between the ICDDR,B and the national institutions of Bangladesh; and a joint research project entitled, "An evaluative research project on the impact of the Meghna-Dhonagoda Irrigation Project (MDIP) in Bangladesh on health, nutrition and demographic behaviour".

The PCC also advised the ICDDR,B management and Board of Trustees regarding research on diarrhoeal diseases and related subjects; to establish links between international and national efforts; as follows to build national research capacities; to strengthen and coordinate research in the areas of the ICDDR,B expertise; to identify and mediate in any research which overlaps with national institutions; to maintain an inventory of diarrhoea-related research and scientific personnel, for both the ICDDR,B and national institutions; to train qualified staff of national institutions; to prepare research protocols; and where appropriate, to help them obtain funds for approved research protocols for collaborative projects.

Professor M A Matin is President of the PCC, Professor Kamaluddin Ahmad is Vice-President, and Dr K M S Aziz is Member-Secretary.

- | | |
|---|---|
| <p>*1 Prof M A Matin
Bangladesh College of
Physicians and Surgeons</p> | <p>*3 Maj Gen M R Chowdhury
Commandant
Armed Forces Institute of
Pathology & Transfusion
Dhaka Cantonment
Dhaka</p> |
| <p>*2 Prof Kamaluddin Ahmad
Director
Institute of Nutrition &
Food Science
Dhaka University</p> | <p>*4 Dr A K Khan
353 Elephant Road
Dhaka</p> |

* Members of the Standing Committee.

- *5 Prof A K M Aminul Haque
Vice-Chancellor
Bangladesh Agricultural University
Mymensingh
- *6 Dr Mofazzal Hussain/
Dr Md Muslimuddin Khan
Project Director
National Oral Rehydration Project
Government of Bangladesh
Dhaka
- *7 Brig M Hedayetullah
Director-General
Health Services
Government of Bangladesh
Dhaka
- *8 Dr Humayun K M A Hye
Drug Administrator
Government of Bangladesh
Dhaka
- *9 Dr Mobarak Hossain
Director
Directorate of Health Services
Government of Bangladesh
Dhaka
- *10 Prof Nurul Islam
Director & Prof of Medicine
Institute of Post-Graduate
Medicine & Research
Dhaka
- 11 Prof Md Ibrahim
President
Bangladesh Institute of Research
& Rehabilitation in Diabetes,
Endocrine & Metabolic Disorders
Dhaka
- 12 Dr Ekramul Ahsan
Chairman
Bangladesh Agricultural
Research Council
Dhaka
- 13 Prof M Mobarak Ali/Prof A J M
Mizanur Rahman
Director
National Institute of Preventive
& Social Medicine
Government of Bangladesh
Dhaka
- *14 Mrs Gole Afroz Mahbub
AST/CIDA
Dhaka
- 15 Mr F H Abed
Executive Director
Bangladesh Rural Advancement
Committee
Mohakhali, Dhaka
- 16 Dr S S M A Khorasani
Chairman
Bangladesh Council of
Scientific & Industrial
Research
Government of Bangladesh
Dhaka
- 17 Dr Munawara Binte Rahman/
Dr B Chowdhury
Director
Institute of Public Health
Dhaka
- 18 Prof M Shamsul Huq
Vice-Chancellor
Dhaka University
Dhaka
- 19 Dr S Waliullah
Director-General
National Institute of
Population Research &
Training
Government of Bangladesh
Dhaka
- 20 Mr Shafiqur Rahman Chowdhury
Director
Management Information System
Directorate of Population
Control
Government of Bangladesh
Dhaka
- 21 Prof M S Akbar
Consultant Paediatrician
Dhaka Shishu Hospital
Dhaka
- 22 Dr Sultana Khanum
Medical Director
Children's Nutrition Unit
Save the Children (UK)
Dhaka

- 23 Dr Shafiqur Rahman/Dr Ferdausi
Khanam
Director
Bangladesh Fertility Research
Programme
Government of Bangladesh
Dhaka
- 24 Dr M Muslimuddin Khan/
Dr Mofazzal Hussain
Principal
Para Medical Institute
Government of Bangladesh, Dhaka
- 25 Dr M R Khan
Director (Research)
Bangladesh Institute
of Development Studies, Dhaka
- 26 Dr Hajera Mahtab
Medical Director
BIRDEM
Dhaka
- 27 Dr S A Akanda
Director
Institute of Bangladesh Studies
Rajshahi University
Rajshahi
- 28 Dr M A Sattar/Dr Shafiqur
Rahman
Director
Bangladesh Medical Research Council
Dhaka
- 29 Maj Gen M Shamsul Haq
Hon'ble Minister
Health & Population Control
Government of Bangladesh
Dhaka
- 30 Mr A B M Golam Mustafa/
Mr Manzoor-ul-Karim
Secretary, Health Division
Government of Bangladesh
Dhaka
- 31 Dr A Rahman
Director
Institute of Public
Health Nutrition
Government of Bangladesh
Dhaka
- 32 Dr Farida Huq
Head, Microbiology,
Institute of Public Health
Dhaka
- 33 Dr Ghyasuddin Ahmed
Associate Professor
Population Dynamics
NIPSOM
Dhaka
- *34 Dr W B Greenough, III/
Prof Roger Eeckels
Director, ICDDR,B
- 35 Dr M Mujibur Rahaman
Associate Director
Nutrition Program, ICDDR,B
- *36 Dr K M S Aziz
Associate Director, Training,
Extension and Communication
ICDDR,B
- 37 Dr Ivan Cizar
Associate Director
Host Defense, ICDDR,B
- 38 Dr David A Sack
Associate Director, Disease
Transmission, ICDDR,B
- 39 Dr M G M Rowland
Associate Director, Community
Studies Research, ICDDR,B
- *40 Mr M R Bashir
Associate Director
Resources Development, ICDDR,B

THE ETHICAL REVIEW COMMITTEE (ERC)

The ERC meets monthly to examine and monitor ethical aspects of research involving human subjects. It has 13 members: three from the ICDDR,B, one from the PCC's Standing Committee (one member of the Bangladesh Medical Research Council), and eight people representing different professions.

The ERC has a five-member sub-committee that checks the implementation of ethical principles and informed consent procedures, makes certain patients know that the quality of medical care would be unaffected if they do not agree to participate in a study, and checks that protocol procedures are followed strictly. In 1985 the ERC met 12 times and considered 41 research protocols, approving 38.

The ERC members were in 1985:

Dr K M S Aziz*	-	Scientist and Chairman
Dr M M Rahman*	-	Clinician and Relieving Chairman
Dr A Briend*	-	Nutritionist
Dr Humayun K M A Hye	-	Pathologist
Dr Khaleda Banu	-	Paediatrician
Dr Jamal Ara Rahman	-	Non-Scientific Member
Mr Md Mofazzal Hussain Khan	-	Religious Representative
Mr K Z Alam	-	Legal Professional Representative
Mrs Husnara Kamal	-	Behavioural Scientist
Mrs Taherunnessa Abdullah	-	Behavioural Scientist
Prof T A Chowdhury	-	Gynaecologist (Representative, Bangladesh Medical Council)
Dr Z Sestak/		
Dr A N A Abeysondere	-	WHO Resident Representative
Dr Kamaluddin Ahmad**	-	Biochemist/Nutritionist (Representative of PCC's Standing Committee)

RESEARCH REVIEW COMMITTEE (RRC)

The RRC is made up of researchers from the ICDDR,B and one representative from the PCC Standing Committee. The RRC reviews research protocols, examines their scientific value, significance, feasibility and researcher's capabilities, as well as their relationship to the Centre's objectives and financial means. During 1985 the RRC met 14 times and considered 23 protocols, approving 20.

The RRC members were:

Dr K M S Aziz (Chairman)
 Prof W B Greenough, III/Prof R Eeckels (Relieving Chairman)
 Dr M M Rahman
 Dr Ivan Ciznar
 Dr David A Sack
 Dr M G M Rowland
 Maj Gen M R Chowdhury**
 Dr M U Khan
 Dr M Yunus
 Dr A K M Alauddin Chowdhury/Dr Badrud Duza
 Dr A N Alam

The following external reviewers reviewed research proposals during the year:

1 Prof T A Chowdhury, IPGM&R	9 Dr Farida Huq, IPH
2 Prof M S Akbar, DSH	10 Dr Aftabuddin Khan, CDD/GOB
3 Prof M Q-K Talukder, IPGM&R	11 Dr Shafiqur Rahman, BMRC
4 Dr Khaleda Banu, DSH	12 Prof M R Khan, IPGM&R
5 Prof Kamaluddin Ahmad, CDD/GO	13 Col (Dr) A S M M Rahman, AFIP&T
6 Prof Nurul Islam, IPGM&R	14 Prof A K Azad Khan
7 Dr S S Qadri, DU	15 Dr Humayun K M A Hye, Ministry of Health
8 Dr Sultana Khanum, CNU	

* ICDDR,B Members of the ERC

** Representative of the PCC

13. ICDDR,B PUBLICATIONS IN 1985

INTERNAL PUBLICATION SERIES:

ICDDR,B Annual Report 1984. May 1985. 60 p.

Scientific Report

- 63 Zimnicki S, Nahar L, Sarder AM, D'Souza S. Demographic Surveillance System-Matlab. Volume 13. Cause of death reporting in Matlab; source book of cause-specific mortality rates 1975-1981. Oct 1985. 103 p.
- 64 Shaikh K, Mostafa G, Bhuiya A, Sarder AM, Molla I, Wojtyniak B. Demographic Surveillance System-Matlab. Volume 14. Vital events and migration-tables 1983. Dec 1985. 61 p.

Special Publication

- 21 Faruque ASG, Eusof A, Saha BR, Dale CB. An evaluation of the ICDDR,B training programme: diarrhoeal disease epidemic control. Apr 1985. 37 p.
- 22 Proceedings of the Consultative Group Meeting of the International Centre for Diarrhoeal Disease Research, Bangladesh, Geneva, 5 June 1984. Apr 1985. 66 p.
- 23 Lindenbaum S, Chakraborty M, Elias M. The influence of maternal education on infant and child mortality in Bangladesh. May 1985. 24 p.
- 24 D'Souza S. Mortality case study Matlab, Bangladesh. Sep 1985. 80 p.

Journal and Newsletter

- 1 Journal of Diarrhoeal Diseases Research (also includes: Annotated Bibliography of Asian Literature on Diarrhoeal Diseases). v. 3, nos. 1-4, 1985.
- 2 Glimpse. v. 7, nos. 1-6, 1985.

Specialized Bibliography Series

- 1 Annotated bibliography on nutrient absorption and diarrhoea-malnutrition cycle, compiled by M S I Khan, Iftekharul Islam, M A Matin and Mostaque A Chowdhury. Abstractor: Iftekharul Islam. Editor-in-Chief: Ayesha Molla. Scientific Editor: Naomi R Novak. Dec 1984. iv, 53 p.*

* Not listed in earlier annual reports.

- 2 Annotated bibliography on oral rehydration therapy, compiled by M S I Khan, Iftekharul Islam, M A Matin and M A Chowdhury. Abstractor: Iftekharul Islam. Editor-in-Chief: A M Molla. Scientific Editors: Naomi R Novak and Arifuzzaman Khan. Mar 1985. ii, 83 p.
- 3 Annotated bibliography on composition of oral rehydration solutions, compiled by M S I Khan, Iftekharul Islam, M A Matin and M A Chowdhury. Abstractor: Iftekharul Islam. Editor-in-Chief: A M Molla. Scientific Editors: Naomi R Novak and Arifuzzaman Khan. Mar 1985. iii, 38 p.
- 4 Annotated bibliography on anthropological studies in diarrhoeal diseases, compiled by M S I Khan, M A Matin, Iftekharul Islam and M A Chowdhury. Abstractors: K M A Aziz and Iftekharul Islam. Editor-in-Chief: K M A Aziz. Scientific Editor: Arifuzzaman Khan. Jun 1985. iv, 47 p.
- 5 Annotated bibliography on classical Vibrio cholerae, compiled by M Shamsul Islam Khan, Iftekharul Islam, M A Matin and M A Chowdhury. Abstractors: Iftekharul Islam and Habib M Nasirullah. Editor-in-Chief: K M S Aziz. Scientific Editor: Arifuzzaman Khan. Jun 1985. iii, 72 p.
- 6 Annotated bibliography on drug resistance of Shigella, compiled by M Shamsul Islam Khan and Abdul Matin. Abstractors: Khaleda Haider and Ashfaque Hossain. Editor-in-Chief: Khaleda Haider. Scientific Editor: Arifuzzaman Khan. Jul 1985. iii, 49 p.
- 7 Annotated bibliography on pathogenesis of shigellosis, compiled by M Shamsul Islam Khan and Abdul Matin. Abstractors: Ashfaque Hossain and Khaleda Haider. Editor-in-Chief: Ashfaque Hossain. Scientific Editor: Arifuzzaman Khan. Jul 1985. iii, 47 p.
- 8 Annotated bibliography on dietary management of diarrhoeal diseases, compiled by M Shamsul Islam Khan, M Motasem Ali and Abdul Matin. Abstractor: Iftekharul Islam. Editor-in-Chief: Ayesha Molla. Scientific Editor: Arifuzzaman Khan. Dec 1985. iii, 91 p.

Directory

- 1 Directory of Asian diarrhoeal disease scientists and practitioners, compiled by M Shamsul Islam Khan, M A Matin, Iftekharul Islam, M Motasem Ali, Hasan Shareef Ahmed and M A Chowdhury. Editors: K M S Aziz and M M Rahaman. Jun 1985. ii, 155 p.

ORIGINAL SCIENTIFIC PAPERS (Including Short Communications):

- Alam AN, Khanum S, Khatun A, Molla A, Rahaman MM. Acceptability and digestibility of a wheat syrup. *Nutr Rep Int* 1985 Feb;31(2):463-8
- Bairagi R, Chowdhury MK, Kim YJ, Curlin GT. Alternative anthropometric indicators of mortality. *Am J Clin Nutr* 1985 Aug;42(2):296-306
- Begum HA, Chowdhury AKMA. Reporting bias in marriage age among rural Bangladesh females. *Demogr India* 1985 Jan-Jun;14(1):124-9

Blaser MJ, Black RE, Duncan DJ, Amer J. Campylobacter jejuni-specific serum antibodies are elevated in healthy Bangladeshi children. *J Clin Microbiol* 1985 Feb;21(2):164-7

Brown KH, Black RE, Robertson AD, Becker S. Effects of season and illness on the dietary intake of weanlings during longitudinal studies in rural Bangladesh. *Am J Clin Nutr* 1985 Feb;41(2):343-55

Butler T, Rahman H, Al-Mahmud KA, Islam M, Bardhan P, Kabir I, Rahman MM. An animal model of haemolytic-uraemic syndrome in shigellosis: lipopolysaccharides of Shigella dysenteriae 1 and S. flexneri produce leucocyte-mediated renal cortical necrosis in rabbits. *Br J Exp Pathol* 1985 Feb;66(1):7-15

Butler T, Bennish M, Schachter J, Stoll BJ. Serological evidence for chlamydial infection in patients with acute diarrhoea. *Trans R Soc Trop Med Hyg* 1985;79(1):42-3

Chowdhury AI, Phillips JF. Socio-economic status differentials among currently married women of reproductive age: FP services project, 1974 Matlab census. *J Fam Welf* 1985 Jun;31(4):3-11

Chowdhury AKMA, Rahman M. Fertility and mortality trends in rural area of Bangladesh. *Demogr India* 1984 Jan-Dec;13(1-2):92-9*

Faruque ASG, Eusof A, Islam ABMQ, Akbar SMF, Sarkar MAH. Community participation in a diarrhoeal outbreak: a case study. *Trop Geogr Med* 1985 Sep;37(3):216-22

Faruque ASG, Eusof A, Huq S, Akbar SMF, Sarkar MAH, Saleh QA. Study of diarrhoea management practices in rural Bangladesh. *Bangladesh J Child Health* 1985 Sep;9(3):169-73

Faruque ASG, Rahman ASMM, Zaman K. Young childhood diarrhoea management by mothers and village practitioners in rural Bangladesh. *Trop Geogr Med* 1985 Sep;37(3):223-6

Faruque ASG, Rahman ASMM, Zaman K. Young childhood diarrhoea morbidity patterns in rural Bangladesh. *Bangladesh Med J* 1985 Oct;14(4):66-9

Gilman RH, Brown KH, Visvesvara GS, Mondal G, Greenberg B, Sack RB, Brandt F, Khan MU. Epidemiology and serology of Giardia lamblia in a developing country: Bangladesh. *Trans R Soc Trop Med Hyg* 1985;79(4):469-73

Glass RI, Holmgren J, Haley CE, Khan MR, Svennerholm A-M, Stoll BJ, Hossain KMB, Black RE, Yunus M, Barua D. Predisposition for cholera of individuals with O blood group: possible evolutionary significance. *Am J Epidemiol* 1985 Jun;121(6):791-6

Glass RI, Svennerholm A-M, Khan MR, Huda S, Huq MI, Holmgren J. Seroepidemiological studies of El Tor cholera in Bangladesh: association of serum antibody levels with protection. *J Infect Dis* 1985 Feb;151(2):236-42

Gothefors L, Ahren C, Stoll B, Barua DK, Orskov F, Salek MA, Svennerholm A-M. Presence of colonization factor antigens on fresh isolates of fecal Escherichia coli: a prospective study. *J Infect Dis* 1985 Dec;152(6):1128-33

- Haider K, Huq MI, Samadi AR, Ahmad K. Plasmid characterization of Shigella spp. isolated from children with shigellosis and asymptomatic excretors. J Antimicrob Chemother 1985 Dec;16(6):691-8
- Huffman SL, Wolff M, Lowell S. Nutrition and fertility in Bangladesh: nutritional status of nonpregnant women. Am J Clin Nutr 1985 Oct;42(4):725-38
- Huq MI, Aziz KMS, Colwell RR. Enterotoxigenic properties of Vibrio fluvialis (Group F vibrio) isolated from clinical and environmental sources [short communication]. J Diarrhoeal Dis Res 1985 Jun;3(2):96-9
- Huq MI, Al Swailem AR, Fares S, Alim ARMA. Studies on the etiologic agents of infantile diarrhea in Riyadh. Indian J Pediatr 1985 May-Jun;52(416):293-8
- Islam AKMN, Morshed MG. Occurrence of diatom-bloom in the coastal area of Bangladesh [short communication]. Bangladesh J Bot 1985 Dec;14(2):185-7
- Islam MR. Can potassium citrate replace sodium bicarbonate and potassium chloride of oral rehydration solution? Arch Dis Child 1985 Sep;60(9):852-5
- Kabir S. The serological properties of the cell surface proteins of Vibrio cholerae. J Gen Microbiol 1983;129:2199-2206*
- Karim A, Chowdhury AKMA, Kabir M. Nutritional status and age at secondary sterility in rural Bangladesh. J Biosoc Sci 1985 Oct;17(3):497-502
- Khan MU, Roy NC, Islam MR, Huq MI, Stoll B. Fourteen years of shigellosis in Dhaka: an epidemiological analysis. Int J Epidemiol 1985 Dec;14(4):607-13
- Khan MU. Influence of mother's haemoglobin level and weight on newborn's haemoglobin level and weight. Nutr Rep Int 1985 Nov;32(5):1081-7
- Khan MU, Haque E, Khan MR. Prevalence & causes of blindness in rural Bangladesh. Indian J Med Res 1985 Sep;82:257-62
- Molla AM, Ahmed SM, Greenough WB, III. Rice-based oral rehydration solution decreases the stool volume in acute diarrhoea. Bull WHO 1985;63(4):751-6
- Monsur KA, Miah AL, Huq MI, Huq F, Poddar G, Salek MA, Begum YA. Use of bacteriophage as a marker for identification of freshly-isolated individual Escherichia coli strains. J Diarrhoeal Dis Res 1985 Sep;3(3):131-7
- Morshed MG, Aziz KMS, Islam MS, Khan MR. Presence of coliform bacteria and their relative abundance in three sampling stations on Buriganga river. Bangladesh J Microbiol 1985;2(1-2):6-10
- Neogi PKB, Shahid NS, Sanyal SC. First isolation of Yersinia enterocolitica from stool of a diarrhoea patient in Bangladesh. Bangladesh J Child Health 1985 Mar;9(1):10-4
- Neogi PKB. Yersinia enterocolitica infection in Bangladesh. Trop Geogr Med 1985 Dec;37(4):362
- Pebley AR, Huffman SL, Chowdhury AKMA, Stupp FW. Intra-uterine mortality and maternal nutritional status in rural Bangladesh. Pop Stud 1985 Nov;39(3):425-40

- Rabbani GH, Butler T. Indomethacin and chloroquine fail to inhibit fluid loss in cholera. *Gastroenterology* 1985 Nov;89(5):1035-7
- Rabbani GH, Gilman RH, Kabir I, Mondel G. The treatment of Fasciolopsis buski infection in children: a comparison of thiabendazole, mebendazole, levamisole, pyrantel pamoate, hexylresorcinol and tetrachloroethylene. *Trans R Soc Trop Med Hyg* 1985;79(4):513-5
- Rahim Z, Aziz KMS, Huq MI, Saeed H. Isolation of Aeromonas hydrophila from the wounds of five species of brackish water fish of Bangladesh. *Bangladesh J Zool* 1985;13(1):37-42
- Rahim Z, Aziz KMS, Molla MAZ. Isolation of Aeromonas hydrophila from the root system of five common water plants of Bangladesh [short communication]. *Bangladesh J Botany* 1985 Jun;14(1):90-1
- Rahim Z, Aziz KMS, Islam S, Huq MI. A preliminary survey of the relative abundance of fecal coliform bacteria in water and sediment and in the fresh water bivalve, Lamellidens marginalis, of the Buriganga river, Bangladesh (short communication). *Microbial Ecol* 1985;11(4):277-80
- Rahman ASMH, Sanyal SC, Al-Mahmud KA, Sobhan A. Cryptosporidium diarrhoea in calves & their handlers in Bangladesh. *Indian J Med Res* 1985 Dec;82:510-6
- Rahman ASMM, Bari A, Molla AM, Greenough WB, III. Mothers can prepare and use rice-salt oral rehydration solution in rural Bangladesh. *Lancet* 1985 Sep 7;2(8454):539-40
- Rahman M, Rahaman MM, Wojtyniak B, Aziz KMS. Impact of environmental sanitation and crowding on infant mortality in rural Bangladesh. *Lancet* 1985 Jul 6;2(8445):28-31
- Roy SK, Speelman P, Butler T, Nath S, Rahman H, Stoll BJ. Diarrhea associated with typhoid fever. *J Infect Dis* 1985 Jun;151(6):1138-43
- Samadi AR, Chowdhury AI, Huq MI, Shahid NS. Risk factors for death in complicated diarrhoea of children. *Br Med J* 1985 Jun 1;290(6482):1615-7
- Samadi AR, Ahmed SM, Bardhan PK, Huq MI, Islam MR, Wahed MA. Treatment of infantile diarrhoea with standard oral rehydration solution and early introduction of milk feeds. *J Trop Pediatr* 1985 Jun;31(3):162-6
- Sarker SA, Rahaman MM, Ali A, Hossain S, Alam AN. Prolonged depression of serum zinc concentrations in children following post-measles diarrhoea. *Hum Nutr Clin Nutr* 1985 Nov;39C(6):411-7
- Seaton B. Noncompliance among oral contraceptive acceptors in rural Bangladesh. *Stud Fam Plann* 1985 Jan-Feb;16(1):52-9
- Shahid NS, Rahaman MM, Haider K, Banu H, Rahman N. Changing pattern of resistant Shiga bacillus (Shigella dysenteriae type 1) and Shigella flexneri in Bangladesh. *J Infect Dis* 1985 Dec;152(6):1114-9
- Shahid NS, Rahman ASMH, Anderson BC, Mata LJ, Sanyal SC. Cryptosporidiosis in Bangladesh (short report). *Br Med J* 1985 Jan 12;290(6262):114-5

- Shaikh K. Nuptiality pattern in rural Bangladesh. *Demogr India* 1984 Jan-Dec; 13(1-2):42-53*
- Shaikh K, Becker S. Socioeconomic status and fertility in rural Bangladesh. *J Biosoc Sci* 1985 Jan;17(1):81-9
- Simmons R, Phillips JF, Rahman M. Strengthening government health and family planning programs: findings from an action research project in rural Bangladesh. *Stud Fam Plann* 1984 Sep-Oct;15(5):212-21*
- Speelman P, Rabbani GH, Bukhave K, Rask-Madsen J. Increased jejunal prostaglandin E2 concentrations in patients with acute cholera. *Gut* 1985 Feb;26(2):188-93
- Speelman P. Single-dose tinidazole for the treatment of giardiasis. *Antimicrob Agents Chemother* 1985 Feb;27(2):227-9
- Stanton B, Clemens J, Koblinsky M, Khair T. The urban volunteer programme in Dhaka: a community based primary health care and research initiative. *Trop Geogr Med* 1985 Jun;37(2):183-7
- Stoll BJ, Banu H, Kabir I, Molla A. Nightblindness and vitamin A deficiency in children attending a diarrheal disease hospital in Bangladesh. *J Trop Pediatr* 1985 Feb;31(1):36-9
- Struelens MJ, Patte D, Kabir I, Salam A, Nath SK, Butler T. Shigella septicemia: prevalence, presentation, risk factors, and outcome. *J Infect Dis* 1985 Oct;152(4):784-90
- Svennerholm A-M, Gothefors L, Sack DA, Bardhan PK, Holmgren J. Local and systemic antibody responses and immunological memory in humans after immunization with cholera B subunit by different routes. *Bull WHO* 1984;62(6):909-18*
- Turnbull PCB, Lee JV, Miliotis MD, Still CS, Isaacson M, Ahmad QS. In vitro and in vivo cholera toxin production by classical and El Tor isolates of Vibrio cholerae. *J Clin Microbiol* 1985 Jun;21(6):884-90
- Zaman K, Islam MR, Baqui AH, Yunus M. Hypokalaemia in children with diarrhoea in rural Bangladesh. *Indian J Med Res* 1985 Feb;81:169-74

EDITED BOOKS, REVIEW ARTICLES, PROCEEDINGS AND BOOK CHAPTERS:

- Akbar RL, Doherty E. Orientation to community treatment model. *Qld Nurs* 1985 Mar;4(2):6-11
- Aziz KMA, Hasan KZ, Patwary MY, Aziz KMS, Rahaman MM. Acceptability of water-sealed latrines in Mirzapur: a rural area of Bangladesh. In: Islam AS, Haque MM, Ameen M, Ahmed N, Haque MS, eds. Proceedings of the Regional Seminar on Protecting the Environment from Degradation, South Asian Regional Cooperation Seminar, Dhaka, 13-16 May 1985. Dhaka: Science & Technology Division, Ministry of Education, Govt. of Bangladesh 1985:166-71

- Aziz KMA, Maloney C. Life stages, gender and fertility in Bangladesh. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1985. xiv, 235 p. (Monograph series, no. 3)
- Aziz KMA. Model for evaluating the health protection of improved water supply and sanitation with health education on rural preschool children in Bangladesh. In: Proceedings of the First Annual Conference of the National Social Scientists. Dhaka: National Social Scientists Association, 1985:104-30
- Aziz KMS. Cooperation in health care: a case study, Bangladesh. In: Ahmed M, ed. Proceedings of the Conference on International Cooperation in Science and Technology for Developing Countries, Dhaka, 14-18 Jan 1984. Dhaka: Bangladesh Academy of Sciences, 1985:195-202
- Becker S, Mahmud S. A validation study of backward and forward pregnancy histories in Matlab, Bangladesh. Netherlands: International Statistical Institute, 1984. 37 p. (Scientific reports, 52)*
- Butler T, Knight J, Nath SK, Speelman P, Roy SK, Azad MAK. Typhoid fever complicated by intestinal perforation: a persisting fatal disease requiring surgical management. *Rev Infect Dis* 1985 Mar-Apr;7(2):244-56
- Chowdhury AI, Phillips JF, Rahman M. Predicting the adoption of contraception: a multivariate analysis of contraceptive intentions and subsequent use in Matlab Thana, Bangladesh. In: Srivastava RN, Verma BL, Shukla GD, eds. Principles and practice of statistics in medicine. Bombay: Himalaya Publishing House, 1985:271-80
- Chowdhury MAR, Aziz KMS, Rahim Z, Kay BA. Vibrio mimicus as a component of pollution of urban water body. In: Islam AS, Haque MM, Ameen M, Ahmed N, Haque MS, eds. Proceedings of the Regional Seminar on Protecting the Environment from Degradation, South Asian Regional Cooperation Seminar, Dhaka, 13-16 May 1985. Dhaka: Science & Technology Division, Ministry of Education, Govt. of Bangladesh, 1985:108-13
- Colwell RR, Singleton FL, Huq A, Xu H-S, Roberts N. Ecology of Vibrio cholerae, Vibrio parahaemolyticus and related vibrios in the natural environment. In: Takeda Y, Miwatani T, eds. Bacterial diarrheal diseases. Tokyo: KTK Scientific Publishers, 1985:273-95
- Doherty E. A queensland nurse in Bangladesh. *Qld Nurs* 1985 Jan-Feb;4(1):8-10
- Eusof A. Dysentery (in Bengali). *Shishu Diganta (A Children's Horizon)* 1985 Dec;(14):17-8
- Greenough WB. Cholera. In: Conn's Current therapy, 1985. Philadelphia: Saunders, 1985:16-8
- Greenough WB, III. Specific public health measures. In: Halstead SB, Walsh JA, Warren KS, eds. Good health at low cost; proceedings of a conference, held at the Bellagio Conference Center, Italy, 29 Apr - 3 May 1985:215-9
- Greenough WB, III. Vibrio cholerae. In: Mandell GL, Douglas RG, Jr., Bennett JE, eds. Principles and practice of infectious diseases. 2d ed. New York: Wiley, 1985:1208-18

- Hall A. Nutritional aspects of parasitic infection. *Prog Food Nutr Sci* 1985;9:227-56
- Hoque BA. Biomass conversion as a source of energy conservation and recovery. *In: Islam AS, Haque MM, Ameen M, Ahmed N, Haque S, eds. Proceedings of the Regional Seminar on Biomass Production, South Asian Association for Regional Cooperation, 15-18 Apr 1985. Dhaka: Science & Technology Division, Ministry of Education, Govt. of Bangladesh, 1985:74-8*
- Huffman SL, Huque AAZ. Pre-school child malnutrition in Bangladesh: causes and interventions. Baltimore, MD.: Johns Hopkins University, 1983. 65 p.*
- Islam MS, Patwary Y, Rahaman MM, Aziz KMS. Certain observations on Chakma and Mug life in Teknaf area. *In: Qureshi MS, ed. Tribal cultures in Bangladesh. Rajshahi: Institute of Bangladesh Studies, 1984:267-73**
- Khan MSI. Diarrhoeal disease information service network in Asia: problems and prospects. *In: Proceedings of the 5th International Congress on Medical Librarianship, Tokyo, 30 Sep-4 Oct 1985. Tokyo: Japan Organizing Committee, 5th International Congress on Medical Librarianship, 1985:345-52*
- Khan MU, Greenough WB, III. Epidemiology of diarrhoeal diseases in Bangladesh. *In: Takeda Y, Miwatani T, eds. Bacterial diarrheal diseases. Tokyo: KTK Scientific Publishers, 1985:37-52*
- Khan MU. Interruption of transmission of diarrhoeal agents. *In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:173-80*
- Molla AM. Absorption of macronutrients during the acute stage and after recovery from diarrhoea of different aetiologies. *In: Rand WM, Wauy R, Scrimshaw NS, eds. Protein-energy requirement studies in developing countries: results of international research; report of a workshop of the International Union of National Sciences, Berkeley, California, 10-14 Aug 1981. Tokyo: United Nations University, 1984:289-305**
- Molla AM. Cereal-based ORS: a new horizon in the treatment of diarrhoea (in Bengali). *Shishu Diganta (A Children's Horizon) 1985 Dec;(14):11-6*
- Molla AM. Cereal-based oral rehydration therapy: its community level application. *In: Planning and managing primary health care programmes; report of a workshop held in Nairobi, Aug 1984:70-3**
- Molla AM, Sarker SA, Molla A, Khaton M, Greenough WB, III. Rice based oral rehydration therapy in acute diarrhoea: a superior therapy and a medium for calorie supplementation. *In: Eeckels RE, Ransome-Kuti O, Kroonenberg CC, eds. Child health in the tropics; Sixth Nutricia - Cow & Gate Symposium, Leuven, 18-21 Oct 1983. Dordrecht, The Netherlands: Nijhoff, 1985:65-70*
- Monsur KA, Greenough WB, III. Cholera. *In: Conn RB, ed. Current diagnosis 7. Philadelphia: Saunders, 1985:128-32*
- Morishita T, Islam R, Bardhan PK, Munakata Y, Hibi T, Asakura H, Tsuchiya M. Endoscopy of the small intestine in ETEC and NAG *Vibrio* diarrhea. *In: Kuwahara S, Pierce NF, eds. Advances in research on cholera and related diarrheas. Tokyo: KTK Scientific Publishers, 1983:151-7**

Morshed MG, Aziz KMS, Islam MS, Khan MR. Physico-chemical factors and the pollution level by faecal coliform bacteria in the Buriganga river. In: Islam AS, Haque MM, Ameen M, Ahmed N, Haque MS, eds. Proceedings of the Regional Seminar on Protecting the Environment from Degradation, South Asian Regional Cooperation Seminar, Dhaka, 13-16 May 1985. Dhaka: Science & Technology Division, Ministry of Education, Govt. of Bangladesh 1985:124-27

Rabbani GH. Intestinal helminth infection and malnutrition: the role of individual versus mass chemotherapy. Bangladesh J Child Health 1985 Mar; 9(1):45-52

Rahaman MM. Diarrhoea in Bangladesh: an overview of research conducted between 1962-1984. In: Tzipori S, Barnes G, Bishop R, Holmes I, Robins-Browne R, eds. Infectious diarrhoea in the young: strategies for control in humans and animals; proceedings of an International Seminar on Diarrhoeal Disease in South East Asia and the Western Pacific Region, Geelong, Australia, 10-15 Feb 1985. Amsterdam: Elsevier Science Publishers, 1985:69-72

Rahim Z, Aziz KMS, Islam MS. Current environmental pollution by human faecal contamination. In: Islam AS, Haque MM, Ameen M, Ahmed N, Haque MS, eds. Proceedings of the Regional Seminar on Protecting the Environment from Degradation, South Asian Regional Cooperation Seminar, Dhaka, 13-16 May 1985. Dhaka: Science & Technology Division, Ministry of Education, Govt. of Bangladesh, 1985:232-7

Rahman M, Rahaman MM, Aziz KMS. A multivariate analysis of factors related to infant mortality in a rural area of Bangladesh. In: Srivastava RN, Verma BL, Shukla GD, eds. Principles and practice of statistics in medicine. Bombay: Himalaya Publishing House, 1985:260-70

Rizvi N. Nutrition and health of women in Bangladesh. In: Integration of women in development; proceedings of a national seminar, United Nations Information Centre, 8-9 Nov 1984:53-66*

Rowland MGM. Health care implications of growth chart. In: Talukder MQ-K, Rahman MH, Rabbi SF, Rahaman MM, Mannan MA, Alam AKMA, eds. Proceedings of the Workshop on Growth Monitoring in Children. Dhaka: National Nutrition Council, 1985:11-3

Svennerholm A-M, Jertborn M, Gothefors L, Karim A, Sack D, Holmgren J. Secretary immunity to Vibrio cholerae bacteria and cholera toxin: prospects for an improved cholera vaccine. In: Takeda Y, Miwatani T, eds. Bacterial diarrheal diseases. Tokyo: KTK Scientific Publishers, 1985:169-74

ABSTRACTS, ANNOTATIONS, EDITORIALS, LETTERS, NOTES, ETC.:

Ahmed A, LaBroony JT. The nature of systemic and local antibody responses to Vibrio cholerae in mice by various immunization regimens [abstract]. In: Abstracts; proceedings of the International Symposium on Bacteria and the Host, Prague, 1985:82

Ahsan CR, Ansaruzzaman M, Ciznar I. Detection of spontaneously released V. cholerae and E. coli Lps of immunodiffusion (abstract). In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:80

- Ahsan CR, Sanyal SC. Enterotoxicity of Vibrio furnissii in animal model [abstract]. In: Abstract; proceedings of the 9th Annual Congress of Indian Association of Medical Microbiologists, Varanasi, 1985:3
- Ahsan CR, Huq MI, Sanyal SC. Studies on immunobiological relationships between Vibrio cholerae and Vibrio fluvialis enterotoxins [abstract]. Bangladesh J Microbiol 1985;2(1-2):44
- Akbar RL. "Home where health begins - mother the health educator" [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:30
- Akhtar SQ. Studies on the pathogenicity of Campylobacter jejuni isolated in Bangladesh (abstract). In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:235
- Akhtar SQ. Studies on two recently established diarrhoea pathogens: Campylobacter jejuni & Clostridium difficile (abstract). Bangladesh J Microbiol 1985;2(1-2):43
- Alam AN, Saha JR, Dobkin JF, Butler VP, Jr., Lindenbaum J. Americans and Bangladeshis differ in the tendency of the normal gut flora to inactivate digoxin (abstract). Clin Res 1985;33(2):599A
- Alam AN, Sarker SA, Molla AM, Rahaman MM, Greenough WB, III. Trial of a wheat-based ORS in the treatment of acute diarrhoea (abstract). In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:240
- Alam AN, Khanum S, Rahman H, Rahaman MM. Wheat syrup as an energy supplement for improving the rate of weight gain in malnourished Bangladeshi children. In: Abstracts of original communications; 13th International Congress of Nutrition, Brighton, 18-23 Aug 1985:37
- Alam N, Henry F, Alam S, Patwari Y, Rahaman MM. Quantification of inaccuracy in one week diarrhoea recall [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:49
- Ashfaq TY, Pulendran B, Ciznar I. Analysis of antigenic patterns of Vibrio cholerae by crossed immunoelectrophoresis (abstract). In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:79
- Aziz KMA. Bengali oral traditions in relations to family size norms: a source of messages for population control (abstract). In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VIII. Social sciences, psychology, anthropology, education and economics. Dhaka: Bangladesh Association for the Advancement of Science, 1985:4
- Aziz KMA. The meaning attributes of Bangladesh kinship system (abstract). In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VIII. Social sciences, psychology, anthropology, education and economics. Dhaka: Bangladesh Association for the Advancement of Science, 1985:7

Aziz KMS. Bangladesh Society of Microbiologists (editorial). Bangladesh J Microbiol 1985;2(1-2):1

Aziz KMS, Rahim Z, Faruque ASG, Huq S, Eusof A. Isolation of Aeromonas hydrophila from cholera-like outbreaks from two districts of Bangladesh (abstract). Bangladesh J Microbiol 1985;2(1-2):42

Bennish M, Eusof A, Kay B, Wierzba T. Multiresistant Shigella infections in Bangladesh [letter]. Lancet 1985 Aug 24;2(8452):441

Bhuiya A, Nahar L, Shaikh K, D'Souza S. Measles mortality among the under five: a multivariate analysis of risk factors in rural area of Bangladesh [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:35

Bhuiya A, Wojtyniak B, Zimicki S, D'Souza S. Socioeconomic determinants of child nutritional status: boys versus girls [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:34

Briend A, Zimicki S. Validation of arm circumference as an indicator of risk of death in one to four year old children [abstract]. In: Abstracts of original communications; 13th International Congress of Nutrition, Brighton, 18-23 Aug 1985:12

Chowdhury A, Begum HA, Rahman M. Recovery of distribution of post-partum amenorrhoea from current status data [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:55

Chowdhury AI, Phillips JF. Scaling contraceptive use motivation in the Matlab Family Planning Health Services Project: a factor analytic approach [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:37

Chowdhury MAR, Aziz KMS, Rahim Z, Kay BA. Abundance of Vibrio mimicus in aquatic environments of Bangladesh [abstract]. In Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:77-8

Chowdhury MAR, Aziz KMS, Rahim Z, Kay BA. Association of Vibrio mimicus with floating macrophytes in aquatic environments of Bangladesh [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:77

Chowdhury MAR, Aziz KMS, Rahim Z, Kay B. Isolation of Vibrio mimicus from aquatic environment of Bangladesh [abstract]. Bangladesh J Microbiol 1985;2(1-2):42-3

Ciznar I, Sack D, Bartkova G. Crossed immunoelectrophoretic analysis of phenotypic variations in carbohydrate and protein antigens of Vibrio cholerae [abstract]. In: Abstract; proceedings of the International Symposium on Bacteria and the Host, Prague, 1985:135

Clemens JD, Stanton BF, Stoll BJ, Shahid NS, Banu H, Chowdhury A. Breastfeeding as a determinant of severity in shigellosis: evidence for protection throughout the first three years of life in Bangladeshi children [abstract]. In: Proceeding of the 25th Interscience Conference on Antimicrobial Agents and Chemotherapy, Minneapolis, Minnesota, 30 Sep 1985:101

Clemens JD. Oral vaccination against cholera. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:139-40

Currey M, Ahmad J, Mahbubuzzaman M, Saha S. ORS packets-do people have access to them [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:55

Eusof A, Faruque ASG, Rahaman MM, Takeda Y, Siddique AK, Ahmed QS. Investigation of a common source food borne outbreak [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:248

Faruque ASG, Eusof A, Akbar SMF, Sarker MAH. Study of diarrhoea management practices in rural Bangladesh [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:256

Glass RI. Protection against cholera: natural antibiotics in breast milk [note]. Int Health Mag 1984 Oct-Dec;(10):50-1*

Haider K, Huq MI, Hossain A, Shahid NS. Electropherotypes of ds-RNA rotavirus in children with acute gastroenteritis in Bangladesh [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:78

Haider K, Huq MI, Hossain A, Shahid NS. Plasmid profile of Shigella dysenteriae type 1: a potentially useful marker to discriminate from other species of Shigella [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:209

Haider K, Huq MI, Hossain A. Trimethoprim-sulfamethoxazole resistance mediated by R-plasmid in the clinical isolates of Shigella in Bangladesh [abstract]. In: Abstracts; proceedings of the 9th Annual Congress of Indian Association of Medical Microbiologists, Varanasi, 28-30 Nov 1985:25

Harris J, Kay B, Ansaruzzaman M, Rahman M, Clemens J, Sack D. Vibrionaceae, important diarrhea-related pathogens in Bangladesh [abstract]. In: Proceedings of the 25th Interscience Conference on Antimicrobial Agents & Chemotherapy, Minneapolis, 30 Sep 1985:138

Hossain A, Haider K, Huq MI, Zaman A. Studies on the factors affecting the haemolysin production of Vibrio mimicus isolated from clinical and environmental sources [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:217

- Hossain A, Rahaman MM, Aziz KMS, Morshed G, Munshi MH. Emergence of multi-resistant epidemic strain of Shigella dysenteriae type 1 in 1984 at Teknaf: a coastal area of Bangladesh [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:206-7
- Huq A, Huq SA, Grimes JD, Colwell RR. Colonization of Vibrio cholerae to the hind gut of blue crab Callinectes sapidus and its effect on ion transport system [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:81
- Huq A, Huq MI, Aziz KMS, Ansaruzzaman M, Rahman R, Colwell RR. Isolation of various pathogenic species of the genus Vibrio from the environmental waters in Bangladesh [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:287
- Huq MI, Al Sadiq A, Rahman ASMM, Munshi MMH. Common source attack of S. mansoni in a Saudi family [letter]. J Diarrhoeal Dis Res 1985 Mar;3(1):33
- Huq MI, Al-Sadiq A, Rahman ASMM, Alim ARMA. Rotavirus as cause of diarrhoea in a children hospital in Saudi Arabia [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:196
- Islam MR. Citrate in oral rehydration therapy [reply]. Gut 1985 Apr;26(4):429
- Kabir S, Ali S, Akhtar Q. Ionic, hydrophobic, and hemagglutinating properties of Shigella species [letter]. J Infect Dis 1985 Jan;151(1):194
- Khan MU. Nutritional blindness and diarrhoea in Bangladesh [reply]. Br J Nutr 1985 Nov;54(3):778
- Khan MU. Prevention of cholera by using alum [fitkiri] in water [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:31
- Khan MU, Roy NC, Huq MI, Stoll B, Islam MR. Shigellosis, an increasing paediatric problem in Dhaka: a fourteen years' epidemiological analysis [abstract]. Bangladesh J Microbiol 1985;2(1-2):44-5
- Khanum S, Alam AN, Ali MA, Anwar MI, Rahaman MM. Effect of zinc supplementation on the dietary intake and rate of weight-gain in Bangladeshi children recovering from severe malnutrition [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:272
- Koblinsky MA, Huque Z, Bagee L, Islam T, Rahman A, Ali S. The role of operational research in carrying out the national diarrhoea management program at village level in Bangladesh. Diarrhoea Dialogue 1985 Mar;(20):4-5
- Kusano N, Matsuse M, Kaku M, Mochida C, Yamaguchi K, Saito A, Hara K, Zeaur RZ, Akhtar SQ, Huq I, Aziz KM. Drug susceptibility of clinical isolates in ICDDR,B hospital [abstract]. Jpn J Trop Med Hyg 1985 Jun;13(2):180-1

- Majumder MSI, Ali A, Islam KMN, Chowdhury AK. Changes in some pathophysiological factors in rabbits in protein energy malnutrition [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:2
- Majumder MSI, Ali A, Rahman MM, Islam KMN, Chowdhury AK. Growth retardation and changes in some pathophysiological factors in zinc deficient rabbits [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:3
- Mitra AK, Clemens J. Risk factors of dysenteric deaths in rural areas of Matlab, Bangladesh [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:283
- Molla A, Molla AM, Sarker SA, Khatun M, Jahan F. Estimation of lactose malabsorption by breath hydrogen test in children with acute diarrhoea due to different aetiologies [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:270
- Molla A, Molla AM, Sarker SA, Khatun M. Food intake and nutrient absorption in children with acute diarrhoea due to non-specific aetiology [abstract]. In: Abstracts of original communications; 13th International Congress of Nutrition, Brighton, 18-23 Aug 1985:44
- Molla AM, Molla A. Dietary management of acute diarrhea in children: state of the art. In: International Nutrition Planners Forum: Nutrition and Diarrheal Disease Control; report of an international conference, Brighton, 12-16 Aug 1985:30-1
- Molla AM, Molla A, Khatun M, Rahaman MM. Does nutritional status affect absorption of macronutrients in children with acute diarrhoea? [abstract]. In: Abstracts of original communications; 13th International Congress of Nutrition, Brighton, 18-23 Aug 1985:46
- Molla AM, Molla A, Sarker SA, Khatun M. Feeding during and following acute diarrhoea due to different aetiology in children [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:151
- Molla AM, Greenough WB, III, Bari A, Nath SK, Molla A. New development in oral rehydration therapy. In: Rafique M, ed. Souvenir of the Second National Paediatric Conference and Symposium on Child Health, Quetta, 24-25 Apr 1985.
- Monsur KA. Epidemiology of *Escherichia coli* - an important but neglected field [editorial]. J Diarrhoeal Dis Res 1985 Sep;3(3):128-30
- Morshed MG, Aziz KMS, Rahaman MM, Hossain A, Munshi MMH. A comparative study of coliform bacteria in fresh, brackish and marine water at Teknaf [abstract]. Bangladesh J Microbiol 1985;2(1-2):46

Morshed MG, Hossain MA, Aziz KMS, Rahaman MM, Munshi MH. Prevalence of intestinal parasitic infection at rural Teknaf [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:92

Novak NR. Diarrhoea in Africa. Future 1984-85 Winter;(13):5-6

Novak NR. Mutant strain: new cholera toxin isolated in Bangladesh. Int Health Mag 1984 Oct-Dec;10:47-8

Rabbani GH, Butler T. Berberine sulfate inhibits fluid-loss in non-cholera diarrhoea [abstract]. In: Proceedings of the 25th Interscience Conference on Antimicrobial Agents & Chemotherapy, Minneapolis, 30 Sep 1985:138

Rahaman MM, Aziz KMS, Munshi MH, Hossain A, Shahid N. Changing pattern of resistance to anti-microbials among Shigella dysenteriae type 1 and S. flexneri isolated in rural and urban Bangladesh between 1975 to 1984. In: Abstracts of the 14th International Congress of Chemotherapy, Kyoto, 23-28 Jun 1985:29

Rahim Z, Aziz KMS. Isolation of enterotoxigenic Aeromonas spp. from fresh water prawn, Macrobrachium malcolmsonii available in local fish market of Dhaka, Bangladesh [abstract]. In: Abstracts; proceedings of the 9th Annual Congress of Indian Association of Medical Microbiologists, Varanasi, 28-30 Nov 1985:4

Rahim Z, Aziz KMS, Sanyal SC, Huq MI, Khan MR. Isolation of enterotoxigenic drug resistant Aeromonas hydrophila from Bangladesh environment [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:288

Rahim Z, Aziz KMS. Isolation of enterotoxigenic and drug resistant Aeromonas hydrophila from skin ulcers of fish [abstract]. Bangladesh J Microbiol 1985;2(1-2):43

Rahim Z, Aziz KMS. Isolation of Aeromonas from fresh water prawn Macrobrachium malcolmsonii [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:75

Rahim Z, Aziz KMS, Chowdhury AR. Isolation of Aeromonas hydrophila from the surface water of Dhaka, Bangladesh [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:75

Rahim Z, Aziz KMS, Islam MS, Huq MI. A limnological study of a pond of Dhaka, Bangladesh [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:81

Rahman ASMH, Al-Mahmud KA, Islam KMN. Ear canker mite producing body mange in New Zealand white rabbits [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:34-5

- Rahman ASMH, Al-Mahmud KA, Sanyal SC. Excretion pattern of Cryptosporidium oocysts in suckling Holstein-Friesian dairy calves [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:35-6
- Rahman ASMH, Al-Mahmud KA. Vesicular urolithiasis in New Zealand white rabbit: (Oryctolagus cuniculus) [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:35
- Rahman ASMM, Bari A, Molla AM, Greenough WB, III. Feasibility of rice based ORS under field conditions, including the training to mothers and family members on its preparation and use [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:237
- Rahman H, Amin M, Huq MI, Aziz KMS, Selim SA. Diarrhoea in calves within one year age limit due to bacterial infection [abstract]. Bangladesh J Microbiol 1985;2(1-2):41-2
- Rahman M, Wojtyniak B, Mustafa G. An evaluation of different methods of calculating infant mortality rate availing data from longitudinal vital registration systems [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:67
- Razzaque A. Effects of 1974-75 famine on differential mortality in rural Bangladesh [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:66
- Roy SK, Tomkins AM. Effects of acute repletion of experimental zinc deficiency on intestinal absorption [abstract]. In: Abstracts of original communications; 13th International Congress of Nutrition, Brighton, 18-23 Aug 1985:139
- Saha SK, Aziz KMS, Khan WA. Escherichia coli: a possible source of skin infections in Bangladesh [abstract]. Bangladesh J Microbiol 1985;2(1-2):41
- Sarker MR, Huq MI, Qadri F. Adhesion of some enteropathogenic bacteria to chromatographic matrices and to rabbit intestinal brush borders [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section II. Biology, botany, zoology, entomology, fisheries, and microbiology. Dhaka: Bangladesh Association for the Advancement of Science, 1985:80-1
- Sarker SA, Rahaman MM, Ali A, Hussain S, Alam AN. Prolonged depression of serum zinc in children following post-measles diarrhoea [abstract]. In: Abstracts of original communications; 13th International Congress on Nutrition, Brighton, 18-23 Aug 1985:45
- Sarker SA, Wahed MA, Alam AN, Khanam A, Rahaman MM. Protein losing enteropathy syndrome in post-measles diarrhoea [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:271

Selim SA, Aziz KMS, Sarker AJ. Detection of rotavirus in calf faeces by ELISA: a comparison of results with latex agglutination test [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:40

Selim SA, Aziz KMS, Sarker AJ, Rahman H. Rotavirus infection in calves [abstract]. Bangladesh J Microbiol 1985;2(1-2):41

Shahabuddin M, Ahmed A. Comparison of V. cholerae, enterotoxigenic E. coli (ETEC) and Shigellae by protein banding pattern of their sonicates on sodium dodecyl sulphate-polyacrylamide GEL electrophoresis (SDS-PAGE) [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:49

Shahid NS, Sack DA, Rahman N, Huq MI. Infantile diarrhoea, cause, oral rehydration therapy and antibiotic misuse in Bangladesh [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:24

Shahid NS, Rahaman MM, Haider K, Banu H, Rahman N. Re-emergence of epidemic due to resistant Shiga bacillus (Shigella dysenteriae type 1) and Shigella flexneri in Bangladesh [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:208

Shaikh K, Khan MU, Wojtyniak B. Pattern of diarrhoeal deaths in a rural area of Bangladesh: 1966-1982 [abstract]. In: Abstracts; proceedings of the Third Annual Conference of the Indian Society for Medical Statistics, Calcutta, 3-5 Dec 1985:64

Speelman P, Van Loon FP, Bennish ML, Butler TC. A double blind trial of loperamide for the treatment of watery diarrhoea in expatriates in Bangladesh [abstract]. In: Proceedings of the 25th Interscience Conference on Antimicrobial Agents & Chemotherapy, Minneapolis, Minnesota, 30 Sep 1985:99

Stanton B, Clemens J, Shahid NS, Khair T. Follow-up children discharged from urban hospital after treatment for diarrhea [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:33. Also published in: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:273-4

Stanton B, Clemens J, Ahmed S. Guidelines for safe drinking in Dhaka city [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:34

Stanton B, Clemens J. Practices differing between families with high rates of diarrhea versus those with low rates of diarrhea [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:31-2

Stanton B, Clemens C. Practices differing between families with high and low rates of diarrhea [abstract]. In: Proceedings of the 25th Interscience Conference of Antimicrobial Agents & Chemotherapy, Minneapolis, Minnesota, 30 Sep 1985:137

Stanton B, Khair T. The Urban Volunteer Program: a model for primary health care and research program in urban areas of developing countries [abstract]. In: Proceedings of the 10th Annual Bangladesh Science Conference, Dhaka, 22-27 Mar 1985. Section VI. Biochemistry, pharmacy, medicine, and veterinary science. Dhaka: Bangladesh Association for the Advancement of Science, 1985:32-3

Struelens MJ, Bennish ML, Patte D, Mondal G, Rahman M, Coignau H. Importance of bacteremia as a complication of diarrheal illness in Bangladesh [abstract]. In: Proceedings of the 25th Interscience Conference on Antimicrobial Agents & Chemotherapy, Minneapolis, Minnesota, 30 Sep 1985:100

Wanke CA, Butler T. Intestinal amoebiasis in a hospital population in Bangladesh [abstract]. In: Proceedings of the 25th Interscience Conference of Antimicrobial Agents & Chemotherapy, Minneapolis, Minnesota, 30 Sep 1985:101

Yunus M, Chakraborty J, Zimicki S. The impact of a home-based distribution of oral rehydration solution on the nutritional status of children [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:239

Zaman K, Islam MR, Baqui AH, Yunus M. Nutritional status and electrolyte anomalies in children with diarrhoea in rural Bangladesh [abstract]. In: Programme, papers and abstracts of the Third Asian Conference on Diarrhoeal Diseases, Bangkok, 10-14 Jun 1985:269

14. STAFF LIST

DIRECTORS

* R E Feckels MD DTM	Belgium	Director (from July 1st 1985)
** W B Greenough III BA MD FACP	USA	Director (until June 30th 1985)

ASSOCIATE DIRECTORS

K M S Aziz MSc PhD	Bangladesh	Training, Extension and Communication
M R Bashir BA	Bangladesh	Resources Development
** T C Butler MD	USA	Pathogenesis and Therapy
I Ciznar PhD Dr.Sc	Czechoslovakia	Host Defence
** M F L Goon MBA	Malaysia	Administration and Finance (until June 30th 1985)
M M Rahaman MBBS MSc PhD	Bangladesh	Nutrition
M G M Rowland MBBS DCH FACP DTM&H	U.K	Community Services Research
D A Sack MD	USA	Disease Transmission

COMMUNITY SERVICES RESEARCH WORKING GROUP

S J Abedin MCom	Bangladesh	Programmer
** J Ahmed MSc	Bangladesh	Senior Field Research Officer
M Ahmed	Bangladesh	Secretary
Shahnaz Ahmed MSc	Bangladesh	Field Research Officer
* Z Ahmed MSc	Bangladesh	Statistical Officer
J Akbar M Stat	Bangladesh	Demographer
* D S Alam MBBS	Bangladesh	Medical Officer
M N Alam MA	Bangladesh	Senior Statistical Officer
M S Alam MSc	Bangladesh	Data Management Officer
* S Anwar MCom	Bangladesh	Programmer
A Ashraf MA MPH	Bangladesh	Senior Operations Researcher
K M A Aziz MA MPhil PhD	Bangladesh	Anthropologist
Laila Bagee MSc MUPR	Bangladesh	Operations Researcher
M A H Baqui MBBS	Bangladesh	Senior Medical Officer
R Banerjee MS	Canada	Computer Analyst
A Bari MBBS	Bangladesh	Medical Officer
U S Barua MA	Bangladesh	Analyst Programmer
Hosne Ara Begum MA	Bangladesh	Data Management Officer
Saleha Begum MA	Bangladesh	Programmer
Suraiya Begum MA	Bangladesh	Field Research Officer
** Shushum Bhatia MBBS MPH	India	Scientist
M A U Bhuiya MA	Bangladesh	Demographer-Statistician
J Chakraborty	Bangladesh	Manager, Health Services
M Chibba	Canada	Health Economist
A K M A Chowdhury ScD	Bangladesh	Demographer
M K Chowdhury MSc MPhil	Bangladesh	Statistician
A I Chowdhury	Bangladesh	Statistical Officer
S H Chowdhury BA	Bangladesh	Secretary
* S Clark, Jr. DrPH	USA	Consultant
** Maureen Corbett	USA	Consultant

* New in 1985

** Left in 1985

	Mehtabunnisa Currey PhD	India	Intl Research Associate
**	M D'Silva	Bangladesh	Secretary
**	Deborah DeGraaf	USA	Consultant
**	E Elder	USA	Consultant
**	M Giashuddin MBBS	Bangladesh	Medical Officer
	S B Gomes B Com	Bangladesh	Senior Secretary
**	Graca M Gosk	Denmark	Consultant
	M E Haque MA	Bangladesh	Senior Field Research Officer
	M Y Hasan MA	Bangladesh	Senior Operations Researcher
	M M Hossain	Bangladesh	Field Research Officer
	M B Hossain MSc	Bangladesh	Demographer
	A A Z Huq MBBS MPH	Bangladesh	Senior Medical Officer
	Marilyn Hurrell RN BS	Canada	Health Educator
	S Islam MA	Bangladesh	Sociologist
	A K M N Islam	Bangladesh	Field Research Officer
*	M Islam MA	Bangladesh	Senior Field Research Officer
	M M Islam	Bangladesh	Field Research Officer
	Razia Islam MA	Bangladesh	Data Processing Assistant
	K Jahangir BA	Bangladesh	Senior Coordination Officer
*	S C Karmaker MBBS	Bangladesh	Medical Officer
**	M R Karim MSc	Bangladesh	Research Associate
	T Khair MSc MA	Bangladesh	Coordinator UVP
	M Khalequzzaman MBBS	Bangladesh	Senior Medical Officer
	M A Khan MSc	Bangladesh	Senior Statistical Officer
	A M Khan MBBS	Bangladesh	Medical Officer
	A K M A I Khan BA LLB	Bangladesh	Field Research Officer
*	E H Khan MBBS	Bangladesh	Medical Officer
	M M R Khan	Bangladesh	Manager, Special Studies
*	Shamim Akhter Khan MBBS	Bangladesh	Medical Officer
	Shahida Khanam MSc	Bangladesh	Field Research Officer
	Khodeza Khatun MA MPH	Bangladesh	Senior Field Research Officer
	Jahanara Khatun MSc	Bangladesh	Field Research Officer
	Marjorie Koblinsky PhD	USA	Scientist
**	D Lecn MA	USA	Consultant
**	A K M Mahbubuzzaman MSc	Bangladesh	Senior Field Research Officer
	A B M K A Mazumder MA	Bangladesh	Demographer
	A K Mitra MBBS DIH	Bangladesh	Training Physician
	M Mohsin	Bangladesh	Computer Operator
	M I Molla MSc DIH	Bangladesh	Analyst-Programmer
*	A J Molla MSc	Bangladesh	Statistical Officer
	L A Mondal	Bangladesh	Field Research Officer
	A H Mostafa BSc DIP EDP	Bangladesh	Mgr Computer Operations (Actg)
	M G Mostafa MSc	Bangladesh	Statistical Officer
	L Nahar MA	Bangladesh	Statistical Officer
	Hazera Nazrul MA	Bangladesh	Field Research Officer
*	Fazilatun Nessa MSS	Bangladesh	Operations Researcher
**	D J Palmer	Bangladesh	Secretary
**	J F Phillips PhD	USA	Demographer
**	Naomi Phillips MPH	Canada	Consultant
*	M Quiah	Bangladesh	Senior Secretary
	A Rahman MSc	Bangladesh	Senior Field Research Officer
	A S M M Rahman MBBS MSc	Bangladesh	Clinician-Epidemiologist
	M Rahman	Bangladesh	Field Research Officer
	M Rahman MSc	Bangladesh	Demographer-Statistician
	M F Rahman MBBS	Bangladesh	Medical Officer
	M Rahman	Canada	Computer Statistician
	M M Rahman MA	Bangladesh	Senior Field Research Officer
	S Rahman	Bangladesh	Senior Computer Operator

* Tasmina Rahman MSc	Bangladesh	Research Officer
M A Razzaque MSc	Bangladesh	Senior Statistical Officer
N C Roy MSc	Bangladesh	Data Management Officer
** Sabita Saha MSc	Bangladesh	Senior Field Research Officer
Loretta Saldanha	India	Executive Secretary
* A H Sarker MSc	Bangladesh	Statistical Officer
A M Sarder	Bangladesh	Manager, DSS
T M Sarker MSc	Bangladesh	Computer Operator
J N Sarker BA	Bangladesh	Senior Secretary
S M A Sattar BA	Bangladesh	Senior Administrative Officer
M A K Shaikh MA	Bangladesh	Head, Data Management Branch
M Shahidullah MSc	Bangladesh	Senior Statistical Officer
D K Shil	Bangladesh	Secretary
** M Shuaib MSc	Bangladesh	Statistical Officer
Bonita Stanton MD	USA	Intl Research Associate
A H N Uddin	Bangladesh	Field Research Officer
** F Uddin MSc	Bangladesh	Statistica Officer
Judith N Wasserheit MD	USA	Consultant
A Wazed	Bangladesh	Field Research Officer
B Wojtyniak ScD	Poland	Demographer
M Yunus MBBS MSc	Bangladesh	Matlab & MCH-FP Coordinator

DISEASE TRANSMISSION WORKING GROUP

W U Ahmed	Bangladesh	Senior Research Officer
Q S Ahmed MSc	Bangladesh	Supervisor, Research Microb.
F Ahmed MBBS	Bangladesh	Epidemiologist
Z Ahmed MSc	Bangladesh	Data Management Officer
S Q Akhter MSc PhD	Bangladesh	Microbiologist
K Alam BSc	Bangladesh	Supervisor, Diagnostic Microb.
M Ali MA	Bangladesh	Data Management Officer
ARM Abdul Alim BSc	Bangladesh	Senior Research Officer
M Ansaruzzaman MSc	Bangladesh	Supervisor, Matlab Microbiol.
A K Banik MSc	Bangladesh	Senior Field Research Officer
Hasina Banu MA MS	Bangladesh	Senior Field Research Officer
B Banerjee BA	Bangladesh	Senior Secretary
N N Banu MSc	Bangladesh	Research Officer
Yasmin A Begum MSc	Bangladesh	Research Officer
Saleha Chowdhury BA	Bangladesh	Senior Secretary
S Chowdhury MSc	Bangladesh	Senior Data Management Officer
J Clemens MD	USA	Intl Research Associate
Khaleda Haider MSc MPhil	Bangladesh	Senior Research Officer
J R Harris MD	USA	Epidemiologist
** A Hossain MSc	Bangladesh	Research Officer
* K M B Hossain MSc	Bangladesh	Research Officer
* E Hossain	Bangladesh	Senior Data Management Officer
* M A Hoque	Bangladesh	Research Officer
M I Huq DBact PhD	Bangladesh	Microbiologist
A Huq MSc PhD	Bangladesh	Manager, Microbiology Branch
* A K M N Islam	Bangladesh	Supervisor, Technical Support
B A Kay AS BS MS MPH DrPH	USA	Head, Microbiology Branch
M U Khan MBBS DPH PhD	Bangladesh	Epidemiologist
A K M G Kibriya	Bangladesh	Senior Research Officer
Prabashi Mahmud	Bangladesh	Secretary
M A H Miah MSc Dip Metal	Bangladesh	Manager, Vaccine Trial
** I Miah BA	Bangladesh	Secretary
A L Mian BSc MBBS DPH PhD	Bangladesh	Consultant
M A S Mian	Bangladesh	Senior Research Officer

K A Monsur MB DCP DBact FRCPATH	Bangladesh	Consultant
P K B Neogi BSc	Bangladesh	Senior Research Officer
M D. Noorullah MA (1st)	Bangladesh	Consultant
G Poddar MBBS	Bangladesh	Senior Research Officer
A Rahman MSc	Bangladesh	Analyst Programmer
N Rahman Med MPH	Bangladesh	Field Research Officer
* M R Rahman	Bangladesh	Research Officer
S Rahman MSc	Bangladesh	Senior Field Research Officer
M A Salek	Bangladesh	Senior Research Officer
* M S Sarder	Bangladesh	Supervisor, I.V. fluids
M R Sarker MSc	Bangladesh	Research Officer
S K Sarker BCom AIPM	Bangladesh	Secretary
M Shahidullah	Bangladesh	Field Research Officer
Nigar S Shahid MBBS MSc DPH MPH	Bangladesh	Epidemiologist
* M K A Talukder MSc	Bangladesh	Research Officer

HOST DEFENSE WORKING GROUP

A Ahmed MBBS	Bangladesh	Associate Scientist
K A Al-Mahmud MSc (Vet)	Bangladesh	Associate Scientist
** A B Ashraf MBBS	Bangladesh	Research Trainee
M Haque	Bangladesh	Secretary
M S Huda BA	Bangladesh	Research Officer
K M N Islam MSc (AH)	Bangladesh	Animal Husbandry Officer
G Mondal	Bangladesh	Research Officer
* A Rahman	Bangladesh	Research Officer
A S M H Rahman MSc (Vet)	Bangladesh	Veterinary Officer
K M Shafiullah HSC	Bangladesh	Technical Officer
M Shahabuddin MSc	Bangladesh	Research Officer
** Taharat Yasmin MSc	Bangladesh	Research Officer

NUTRITION WORKING GROUP

** N M Abdal MBBS Dip Nutr	Bangladesh	Research Trainee
R Ahmed	Bangladesh	Senior Field Research Officer
** S Ahmed MSc	Bangladesh	Field Research Officer
A N Alam MBBS PhD	Bangladesh	Clinician-Nutritionist
M A Ali MSc	Bangladesh	Head, Biochemistry Branch
Shahanara Begum MSc	Bangladesh	Research Officer
A Briend MD	France	Nutritionist
D B Chakma	Bangladesh	Field Research Officer
G B Chakma	Bangladesh	Senior Staff Nurse
A K Chowdhury MSc	Bangladesh	Supervisor
S Das BA	Bangladesh	Field Research Officer
K Z Hasan MBBS MPH	Bangladesh	Epidemiologist
F Henry PhD	Guyana	Intl Research Associate
* Bilqis Amin Hoque PhD	Bangladesh	Consultant
** M Hossain PhD	Bangladesh	Visiting Professor
M A Hossain MBBS	Bangladesh	Medical Officer
K M N Islam MSc (AH)	Bangladesh	Animal Husbandry Officer
* M A Islam	Bangladesh	Administrative Officer
M N Islam BA	Bangladesh	Field Research Officer
Ferdous Jahan MSc	Bangladesh	Research Officer
Obaida Kabir BA	Bangladesh	Senior Secretary
A D Khan MA	Bangladesh	Senior Field Research Officer
K M F Khan MSc	Bangladesh	Research Trainee

A H Khan	Dip Engg (Civil)	Bangladesh	Engineering Supervisor
S I Khan	MSc	Bangladesh	Research Officer
M K A Mia	BA	Bangladesh	Secretary
Ayesha Molla	PhD	Bangladesh	Biochemist-Nutritionist
A Q Mondal	BA	Bangladesh	Field Research Officer
M M H Munshi	MBBS MPH	Bangladesh	Head, Teknaf Station
M Y Patwary	MA	Bangladesh	Senior Field Research Officer
M A Rahim	BSc	Bangladesh	Research Officer
A Rahman	MSc	Bangladesh	Research Officer
A S M H Rahman	MSc (Vet)	Bangladesh	Veterinary Officer
M M Rahman	MSc	Bangladesh	Senior Research Officer
** M T Rahman	BSc Engg (Civil)	Bangladesh	Project Environmental Engineer
** Bhashini Rao	PhD	India	Consultant
N Rizvi	MA MA PhD	USA	Nutritionist-Anthropologist
Farida Sultana		Bangladesh	Secretary
M Umra		Bangladesh	Field Research Officer
M A Wahed	BSc	Bangladesh	Manager, Biochemistry Branch

PATHOGENESIS AND THERAPY WORKING GROUP

M M R Ali		Bangladesh	Secretary
M L Bennish	MD	USA	Int Research Associate
R Islam	MBBS DTM&H	Bangladesh	Clin Res and Chief Physician
Asma Khanam	MBBS MPH	Bangladesh	Commun Med Research Physician
F P L Van Loon	MD	Netherlands	Gastroenterologist
A M Molla	MBBS PhD DCH	Bangladesh	Paediatr & Gastroenterologist
F C Patra	MD	India	Intl Research Associate
** D Patte	MD	France	Internist
A R Patwary		Bangladesh	Secretary
G H Rabbani	MBBS MPH	Bangladesh	Clinical Research Physician
Mahbooba B Shamsuddin		Bangladesh	Senior Secretary

DHAKA STATION HOSPITAL

T Ahmed	MBBS	Bangladesh	Medical Officer
A N Alam	MBBS PhD	Bangladesh	Acting Head, Dhaka Hospital
N H Alam	MBBS	Bangladesh	Medical Officer
M S Ali		Bangladesh	Hospital Services Supervisor
K Anam	MBBS	Bangladesh	Medical Officer
H Ashraf	MBBS	Bangladesh	Medical Officer
A K Azad	MBBS	Bangladesh	Senior Medical Officer
A Aziz		Bangladesh	Assistant Matron
Anita Baidya		Bangladesh	Senior Staff Nurse
P K Bardhan	MBBS	Bangladesh	Senior Medical Officer
Annie A Baroi		Bangladesh	Senior Staff Nurse
Pankajini Biswas		Bangladesh	Matron
I Costa		Bangladesh	Senior X-Ray Technician
Florence Daring		Bangladesh	Senior Staff Nurse
Santona D'Cruze		Bangladesh	Senior Staff Nurse
B Gomes		Bangladesh	Senior Staff Nurse
Irene S Gomes		Bangladesh	Senior Staff Nurse
Maloti A Gomes		Bangladesh	Senior Staff Nurse
U Elizabeth Gomes		Bangladesh	Senior Staff Nurse
R C Goswami		Bangladesh	Senior Staff Nurse
Rukhsana Haider	MBBS	Bangladesh	Medical Officer
M G Halder		Bangladesh	Senior Staff Nurse
S E Halder		Bangladesh	Senior Staff Nurse
S K Halder		Bangladesh	Senior Staff Nurse

Jena D Hamadani MBBS	Bangladesh	Medical Officer
A Hossain MBBS	Bangladesh	Medical Officer
S Hossain MBBS	Bangladesh	Senior Medical Officer
Wendy Hossain SRN RSCN	UK	Nurse-Trainer/Matron
Lily Islam	Bangladesh	Senior Staff Nurse
Hosneara Kabir	Bangladesh	Assistant Matron
I Kabir MBBS	Bangladesh	Senior Medical Officer
A M Khan MBBS	Bangladesh	Medical Officer
M Khatun	Bangladesh	Research Officer
Naseha Khatun MSc	Bangladesh	Dietician
Premlata Kunder	Bangladesh	Senior Staff Nurse
A Majid	Bangladesh	Pharmacy In-charge
R N Mazumder MBBS	Bangladesh	Medical Officer
Manakhushi Mondal	Bangladesh	Senior Staff Nurse
S K Nath MBBS	Bangladesh	Senior Medical Officer
Suratun Nessa	Bangladesh	Assistant Matron
B C Nokrek	Bangladesh	Senior Staff Nurse
Momota H Purification	Bangladesh	Senior Staff Nurse
K L Rahman	Bangladesh	Senior Staff Nurse
Hosne Ara Rahman	Bangladesh	Senior Staff Nurse
S K Roy MBBS	Bangladesh	Senior Medical Officer
Mavel V Rozario	Bangladesh	Senior Staff Nurse
M A Salam MBBS	Bangladesh	Senior Medical Officer
Jacinta Sarkar	Bangladesh	Senior Staff Nurse
S A Sarker MBBS	Bangladesh	Medical Officer
M S Sattar	Bangladesh	Senior Staff Nurse
A Stephen	Bangladesh	Assistant Matron
Isabella Vesters SRN	Belgium	Nurse-Physician's Assistant

TRAINING, EXTENSION AND COMMUNICATION DIVISION

H S Ahmed MCom LLB	Bangladesh	Publication Officer
* M Ahmed MBBS	Bangladesh	Medical Officer
R L Akbar MBBS MPH MHPEd	Bangladesh	Training Coordinator
K A H M Akram MBBS	Bangladesh	Medical Officer
M M Ali MA	Bangladesh	Serials Librarian
D Anand MBBS DPH MPH FAMS	India	Consultant
A Ansari BFA	Bangladesh	Head, Med Illustration Cell
* F A Ara MBBS	Bangladesh	Training Physician
Z B M Bakht MA	Bangladesh	Senior Coordination Officer
* Fatima Chowdhury	Bangladesh	Secretary
** Teresa Derozhinsky	Italy	Consultant
Najma Dey BFA	Bangladesh	Assistant Medical Illustrator
A Eusof MBBS	Bangladesh	Team Leader, TEC
A S G Faruque MBBS	Bangladesh	Training Physician
C Gomes	Bangladesh	Senior Secretary
M M Hassan	Bangladesh	Senior Secretary
M Hogue BA	Bangladesh	Secretary
F Hossain MA	Bangladesh	Librarian
M N Huda MA DPH	Bangladesh	Senior Publication Officer
** A M M Huq MBBS DPH DIM&H DBact	Bangladesh	Consultant
A B M Q Islam MBBS	Bangladesh	Training Physician
** I Islam M Pham	Bangladesh	Scientific Doc Officer
R Islam MSc PhD	Bangladesh	Programme Officer
M S Islam MSc	Bangladesh	Senior Research Officer
A Khan MA	Bangladesh	Scientific Editor
M S I Khan MA Dip in FM	Bangladesh	Head, Lib, Pub & Commun Branch

M A Mazid BA	Bangladesh	Senior Secretary
M A A Meah BA	Bangladesh	Senior Secretary
** M A Molla MSc	Bangladesh	Senior Research Officer
A K Mitra MBBS DIH	Bangladesh	Training Physician
Yameen Mazumder MBBS DIM&H	Bangladesh	Medical Officer
P P Mutsuddy MBBS	Bangladesh	Medical Officer
M Z Rihim MSc	Bangladesh	Research Officer
B R Saha MBA Dip in PM	Bangladesh	Manager, Training & Extension
Sharon Sargeant	Bangladesh	Editorial Secretary
A K M Siddique MBBS MPH	Bangladesh	Epidemic Control Coordinator
S Sukla BFA	Bangladesh	Assistant Medical Illustrator
Brenda Wroot BSc N	Canada	Consultant
R Wroot BEd MEd (Admin)	Canada	Consultant
M K Zaman MBBS	Bangladesh	Medical Officer

RESOURCES DEVELOPMENT

Eleonora F C Ahmad	Romania	Secretary
M I Ali MBA	Bangladesh	Programme Officer
A K Azad MA LLB	Bangladesh	Public Relns & Info Officer
Charlene B Dale	USA	Consultant
S Khan MBA	Bangladesh	Senior Secretary
* Ellen Panni	USA	Programme Officer
M H Rahman BA	Bangladesh	Senior Secretary
** N Shadani	Bangladesh	Secretary
** Suzanne L Smith AB	USA	Development Officer

FINANCE & ADMINISTRATION

A Ahmed MSc Engg (Mech)	Bangladesh	Manager, Admin. Services
C S Alam	Bangladesh	Secretary
M M Alam BSc	Bangladesh	Head, Maintenance Branch
Anjali Baidya	Bangladesh	Senior Staff Nurse
Nayna Begum BA	Bangladesh	Senior Secretary
L C Chang BA BCom	Australia	Rudget and Finance Officer
* M Choudhury MBBS	Bangladesh	Manager, Staff Clinic
Judith Chowdhury	Australia	Executive Asstt to Director
** Sonja Waara-Conway BSc	Sweden	Chief Personnel Officer
R Das Dip Engg (Civil)	Bangladesh	Constructions Supervisor
** N K Datta MCom ACMA	Bangladesh	Accounts Officer
R H Dery MBA	USA	Acting Chief Personnel Officer
M A Hashem	Bangladesh	Senior Accounts Officer
M S Hoque BCom CA (Int)	Bangladesh	Senior Accounts Officer
K S Hossain	Bangladesh	Senior Travel Officer
A R M S Huq BA	Bangladesh	Senior Materials Officer
M A Huque MSc Dip in PM	Bangladesh	Manager, Intl Personnel
S M Iqbal BSc Engg (Elec)	Bangladesh	Maintenance Engg Officer
M A Jabbar	Bangladesh	Manager, Local Personnel
* H A N Janssen MBA BS	Canada	Chief Finance Officer
M R Khalili ACA	Bangladesh	Head, Financial Accounting
S A A A Matin BCom	Bangladesh	Senior Accounts Officer
A K M A Matin BA	Bangladesh	Head, Logistics & Field Suprt
** N M Meemalat	Bangladesh	Technical Officer
M Mohiuddin	Bangladesh	Senior Coordination Officer
Shamima Moin MCom MBA	Bangladesh	Head, Budget Accounting
M A A Molla MA	Bangladesh	Senior Procurement Officer
M G Morshed MA LLB	Bangladesh	Head, Supply Branch
** Beverley Morris	UK	Asstt to Assoc Director, A&F
** Naami R Novak MS	USA	Consultant, Editor

A S Patwary	Dip Electron	Bangladesh	Electronic Technician
Tazia Qamar	MA	Bangladesh	Senior Personnel Officer
* Aurelia Rahman		Romania	Senior Secretary
M Rahman	Dip Engg	Bangladesh	Instrument Engineer
M Rahman	MBBS	Bangladesh	Physician, Staff Clinic
M B Rahman	MCom	Bangladesh	Senior Budget Officer
M M Rahman		Bangladesh	Senior Estate Officer
M M Rahman	BSc Dip in PM	Bangladesh	Personnel Officer
M M Rahman	MCom	Bangladesh	Senior Accounts Officer
* Shereen Rahman	MA	Bangladesh	Acting Protocol Officer
A Razzaque		Bangladesh	Senior Technical Officer
S Salekin	MCom	Bangladesh	Programmer
A K M A Samad	BCom	Bangladesh	Senior Accounts Officer
M J Sarker		Bangladesh	Senior Secretary
M Shahabuddin		Bangladesh	Special Asstt to Director
R H Sircar		Bangladesh	Secretary
M Sobhani	Dip Engg	Bangladesh	Head, Bio-Medical Engg Cell
M A H Talukder	Dip Engg	Bangladesh	Site Supervisor

15. ACRONYMS AND ABBREVIATIONS

AFIP&T	Armed Forces Institute of Pathology & Transfusion
BADC	Belgian Administration for Development Cooperation
BIRDEM	Bangladesh Institute of Research & Rehabilitation in Diabetes, Endocrine & Metabolic Disorders
BOSTID	Board on Science and Technology for International Development
BRAC	Bangladesh Rural Advancement Committee
CIDA	Canadian International Development Agency
CIS	Computer Information Services
CNU	Children's Nutrition Unit (of the SCF, UK)
CSRWG	Community Services Research Working group
DISC	International Diarrhoeal Disease Information Service and Documentation Centre
DMB	Data Management Branch
DSH	Dhaka Shishu Hospital
DSS	Demographic Surveillance System
DTWG	Disease Transmission Working Group
DTC	Diarrhoea treatment centre; Dhaka treatment centre
IU	Dhaka University
ETEC	Enterotoxigenic Escherichia coli
ELISA	Enzyme-linked immunosorbent assay
EPI	Expanded Programme on Immunization
HDWG	Host Defence Working Group
IBRD	International Bank for Reconstruction and Development
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
IDRC	International Development Research Centre
IPGM&R	Institute of Postgraduate Medicine and Research
IPH	Institute of Public Health
i.v.	intravenous
JDDR	Journal of Diarrhoeal Diseases Research.
KAP	Knowledge, attitudes and practice
MCH-FP	Maternal and Child Health - Family Planning
MOHPC	Ministry of Health and Population Control
NGO	Non-Governmental Organization
NIPSCM	National Institute of Preventive and Social Medicine
NORAD	Norwegian Agency for Development
NWG	Nutrition Working Group
OMP	Outer Membrane Protein
ORS	Oral rehydration salts; oral rehydration solution
ORSTOM	Office de la Recherche Scientifique et Techniques d'Outre-Mer
ORT	Oral rehydration therapy
PEM	Protein-energy malnutrition
PHC	Primary health care
PRITECH	Primary Health Care Technology (USA)
PTWG	Pathogenesis and Therapy Working Group
SCF	Save the Children Fund
SES	Socio-economic status
TEC	Training, Extension and Communication
UCVP	Urban Community Volunteers Programme (see UVP)
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNFPA	United Nations Family Planning Agency
UNICEF	United Nations Children's Fund
UNROB	United Nations Relief Organisation in Bangladesh
USAID	United States Agency for International Development
UVP	Urban Volunteers Programme
WHO	World Health Organization
WUSC	World University Service of Canada

16. SUBJECT INDEX

Abhoynagar, MCH-FP programme	...	...	...	10,11
<u>Aeromonas</u>	...	...	...	16
Alpha-1-antitrypsin	...	...	...	28
Alum Potash	...	...	...	16
Ampicillin	...	...	...	19,30
Anaemia	...	...	...	24,25
Animal Resources Branch	...	...	...	21
Annotated bibliographies	...	...	...	37,41
Anthropological studies and ORS	...	...	...	27
Anthropometry	...	...	...	23
- arm circumference	...	...	...	8,22
Asian Conference on Diarrhoeal Diseases	...	...	...	1,37
Berberine sulphate, for watery diarrhoea	...	...	...	32
Biochemistry Branch	...	...	...	29
Biostatistics Cell	...	...	...	12
Board of Trustees	...	...	...	56
Breast feeding	...	...	...	28
<u>Campylobacter</u>	...	...	...	16
- jejuni	...	...	...	16
- -like organisms (CLO's)	...	...	...	16,17
Ceftriaxone, in typhoid fever	...	...	...	30
Cereal based ORT (see ORT)				
Children's Nutrition Unit (SCF, UK)	...	...	...	23,24
Chloramphenicol, in typhoid fever	...	...	...	19,30
Cholera				
- berberine sulphate	...	...	...	32
- epidemiology	...	...	...	19
- drug resistance	...	...	...	19
- furoxone	...	...	...	32
- prostaglandins	...	...	...	32
- toxin	...	...	...	15,20
- transmission	...	...	...	16
- vaccine antigens	...	...	...	16,20
- vaccine trial	...	...	...	15,16
Ciprofloxacin, in shigellosis	...	...	...	30
<u>Clostridium difficile</u>	...	...	...	16
<u>Colitis, and C.difficile</u>	...	...	...	17
<u>Colostrum</u>	...	...	...	28
Computer Information Services	...	...	...	12
Contraceptives	...	...	...	6,10
Cost-effectiveness, MCH-FP services in Matlab	...	...	...	6
Cotrimoxazole	...	...	...	19,30
<u>Cryptosporidium, in DIC</u>	...	...	...	35
Data Management Branch	...	...	...	12
Demographic Surveillance System	...	...	...	3-5,7
Dhaka Treatment Centre, diarrhoea surveillance system	...	...	...	34
Diagnostic tests	...	...	...	16,17,31
Diarrhoea, dysenteric	...	...	...	23
Diphtheria, immunization	...	...	...	5,9
DISC	...	...	...	1,40
DONORS	...	...	...	43
ELISAs	...	...	...	16,17,18
<u>Escherichia coli, enterotoxigenic</u>	...	...	...	15,16
- berberine sulphate	...	...	...	32
- heat labile toxin	...	...	...	17
- heat stable toxin	...	...	...	17,21
- phage typing	...	...	...	18,
- prostaglandins	...	...	...	32

Epidemic Control Preparedness Programme	...	...	38
ETEC (see <i>Escherichia coli</i> , enterotoxigenic)			
Ethical Review Committee	...	...	60
Expanded Programme on Immunization (EPI)	...	...	5
Family planning	...	...	6
- Matlab	...	...	5,6
- related infections	...	...	7
<i>Fasciolopsis buski</i> , treatment of	...	...	33
Feeding patterns of infants	...	...	28
Fertility	...	...	4,6,7
Furoxone	...	...	19
<i>Giardia</i> , ELISA for diagnosing	...	...	18
Giardiasis, absorption of nutrients in	...	...	24
Glimpse	...	...	41
Haemolytic-uraemic syndrome	...	...	30
Handpumps	...	...	11,22,25,26
Handwashing and diarrhoea	...	...	16
Health education	...	...	9,11,26,34
- Teknaf	...	...	26
Hypoglycaemia and i.v. rehydration	...	...	33
Immunization programmes	...	...	5,11,34
Institut Merieux	...	...	1
Institut Pasteur	...	...	20
International Training Courses	...	...	36
Intravenous rehydration, and hypoglycaemia	...	...	33
Iron, bioavailability from food	...	...	25
Jinjira (see Zinzira)			
Journal of Diarrhoeal Diseases Research	...	...	1,12,40,42
Karolinska Institute	...	...	20
Knowledge, attitudes and practice surveys	...	...	11
Latrines	...	...	4,11,23,26
Loperamide, and traveller's diarrhoea	...	...	32
Malnutrition	...	...	8
- and diarrhoea	...	...	22,23
- and weight gain	...	...	23
- and zinc	...	...	23
Mass media, in control of diarrhoea	...	...	37
Maternal and Child Health - Family Planning (MCH-FP)			
- Extension Programme	...	...	10,11,13
- Matlab	...	...	5
- cost-effectiveness	...	...	6
- slide-tape presentation	...	...	38
Matlab	...	...	3-8
- DSS	...	...	3,24
- Field Station	...	...	13
- MCH-FP	...	...	5,24
- slide-tape presentation	...	...	38
- non-cholera Vibrionaceae	...	...	16
- nutritional anaemia in	...	...	24
- nutritional rehabilitation	...	...	8,13
Measles	...	...	4,5
- diarrhoea associated with	...	...	31
- protein-losing enteropathy	...	...	28
- immunization	...	...	9
- and diarrhoea	...	...	8
Meghna-Dhono-goda embankment scheme, effect on DSS	...	...	7
Microbiology Branch	...	...	19
Mirzapur Handpump Project	...	...	11

Morbidity				
- due to diarrhoea	...	...	...	11
- due to measles	...	...	...	8
Mortality	...	...	...
- child	...	...	...	3-8, 22
- differential, by sex	...	...	...	3, 4, 22
- infant	...	...	...	3, 4
- maternal	...	...	...	22
- Matlab	...	...	...	6
- measles	...	...	...	3, 6, 7
- neonatal	...	...	...	4
- post-neonatal	...	...	...	4, 6, 7, 8
Nalidixic acid, in shigellosis	...	...	...	4, 8
Nandipara	...	...	...	30
National Oral Rehydration Programme, evaluation of	...	...	...	16, 23, 31
National training courses	...	...	...	11
Non-cholera Vibrionaceae	...	...	...	36
Nutrient absorption	...	...	...	13, 16
- in PEM	...	...	...	23
- in giardiasis	...	...	...	24
Nutrient utilization, in PEM and zinc	...	...	...	24
Nutritional				
- anaemia in Matlab	...	...	...	24
- education	...	...	...	9, 28
- rehabilitation	...	...	...	8, 9, 13, 34
- status	...	...	...	4, 15
- supplement based on wheat syrup	...	...	...	25
Oral rehydration salts	...	...	...	11
- citrate in	...	...	...	33
Oral rehydration solution	...	...	...	5, 9
- cereal based	...	...	...	25, 27
- glucose based (WHO)	...	...	...	8, 24, 25, 31, 32
- maize based	...	...	...	31
- millet based	...	...	...	31
- plantain based	...	...	...	31
- potato based	...	...	...	31
- rice based	...	...	...	31
- slide-tape presentation	...	...	...	8, 25, 27, 31, 24
- sorghum based	...	...	...	37
- wheat based	...	...	...	31
Oral rehydration therapy	...	...	...	24, 27, 31
- slide-tape presentation	...	...	...	5, 27, 31
Outer membrane proteins	...	...	...	37
PEM (see Protein-energy malnutrition)	...	...	...	16, 21
Phage typing, ETEC	...	...	...	18
<u>Plesiomonas</u>	...	...	...	16
Primary health care				
- family level evaluation	...	...	...	27
- UVP	...	...	...	9, 10
Programme Coordination Committee	...	...	...	58
Prostacyclins, in haemolytic-uraemic syndrome	...	...	...	30
Prostaglandins, in diarrhoea	...	...	...	32
Protein-losing enteropathy, in post-measles diarrhoea	...	...	...	28
Publications	...	...	...	42, 62-79
Research Review Committee	...	...	...	61
Reserve Fund	...	...	...	44, 46
Safe-birth practices and kits	...	...	...	6
<u>Salmonella typhi</u>	...	...	...	31
Sanitation score	...	...	...	26
Seminars	...	...	...	37

Shiga toxin, ELISA for	...	...	...	17
<u>Shigella dysenteriae</u>	...	...	...	18,19,20
<u>Shigella flexneri</u>	...	...	...	19
<u>Shigella spp</u>	...	...	...	18,31
- in buffered glycerol saline	...	...	...	26
- in Matlab	...	...	...	13
- in post-measles diarrhoea	...	...	...	29
- in Teknaf	...	...	...	29
Shigellosis				
- diagnosis by coagglutination	...	...	...	18
- drug resistance	...	...	...	19,30
- epidemiology	...	...	...	19
- haemolytic-uraemic syndrome	...	...	...	30
- treatment	...	...	...	30
Sirajganj, MCH-FP programme	...	...	...	10
Slide-tape presentations	...	...	...	37
Staff development	...	...	...	14,19,29,35, 39,42
Teknaf				
- diarrhoea and malnutrition	...	...	...	23
- DSS	...	...	...	3,4
- health education	...	...	...	26
- slide-tape presentation	...	...	...	37
- Station	...	...	...	29
- water and sanitation study	...	...	...	25
- video programme	...	...	...	26
Training	...	...	...	21
- manuals	...	...	...	37
Traveller's diarrhoea, and loperamide	...	...	...	32
Typhoid fever, treatment with ceftriaxone	...	...	...	30
U N University	...	...	...	27
University of Adelaide	...	...	...	20
Urban Volunteer Programme	...	...	...	9,10,13
Vaccine trial (see Cholera vaccine trial)				
<u>Vibrio cholerae</u>	...	...	...	13,15,16, 19,20
Vibrionaceae	...	...	...	16
Video programme, Teknaf	...	...	...	26
Vital events	...	...	...	3,4
Vitamin A deficiency	...	...	...	9,27
Water and sanitation study, Teknaf	...	...	...	25
Wheat syrup, as an energy supplement	...	...	...	25
Xerophthalmia	...	...	...	9
Zinc	...	...	...	23,24
Zinzira	...	...	...	23

ICDDR,B PUBLICATIONS FOR SALE

JOURNAL OF DIARRHOEAL DISEASES RESEARCH (Quarterly)

Editor-in-Chief: Roger Eeckels

Annual Developed US\$ 35.00 (Inst.) Developing US\$ 25.00 (Inst.)
Subscription: countries US\$ 25.00 (Indvl.) countries US\$ 15.00 (Indvl.)

ANNOTATED BIBLIOGRAPHY ON NUTRIENT ABSORPTION AND DIARRHOEA-MALNUTRITION CYCLE

Editor-in-Chief: Ayesha Molla

December 1984. iv, 53 pages. Specialized bibliography series no. 1
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON ORAL REHYDRATION THERAPY

Editor-in-Chief: Abdul Majid Molla

March 1985. ii, 83 pages. Specialized bibliography series no. 2
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON COMPOSITION OF ORAL REHYDRATION SOLUTIONS

Editor-in-Chief: Abdul Majid Molla

March 1985. iii, 38 pages. Specialized bibliography series no. 3
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON ANTHROPOLOGICAL STUDIES IN DIARRHOEAL DISEASES

Editor-in-Chief: K M A Aziz

June 1985. iv, 47 pages. Specialized bibliography series no. 4
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON CLASSICAL VIBRIO CHOLERAЕ

Editor-in-Chief: K M S Aziz

June 1985. iii, 72 pages. Specialized bibliography series no. 5
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON DRUG RESISTANCE OF SHIGELLA

Editor-in-Chief: Khaleda Haider

July 1985. iii, 49 pages. Specialized bibliography series no. 6
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

ANNOTATED BIBLIOGRAPHY ON PATHOGENESIS OF SHIGELLOSIS

Editor-in-Chief: Ashfaque Hossain

July 1985. iii, 47 pages. Specialized bibliography series no. 7
Price: US\$ 17.00 (developed countries)/US\$ 13.00 (developing countries)

9/3