

After the inauguration ceremony of ICDDR,B, President Ziaur Rahman going round the Treatment Centre in Dacca on June 26, 1979.

ICDDR,B PAST, PRESENT AND FUTURE

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) was inaugurated in June 1979 by President Ziaur Rahman of Bangladesh. The evolution of International Centre for Diarrhoeal Disease Research, Bangladesh from the former Cholera Research Laboratory was not a mere formality. It has changed the nature and scope of the Centre, and also its relations with other (Bangladeshi and international) organizations.

The First Board of Trustees was constituted with 15 members from 13 countries and was selec-

ted from a list of eminent personalities suggested by governments, international organizations and private foundations. The final list was prepared by a sub-committee chaired by WHO, Geneva.

BACKGROUND

Diarrhoeal disease is a major cause of morbidity and mortality, especially among children under five, in developing countries. It continues to be one of the major health problems in children requiring hospitalization even in developed countries. The factors conducive to diarrhoeal diseases have close biological and socio-econo-

mic links with malnutrition, high fertility and other diseases. Further, these entities share social and economic causes, interact to reinforce each other which should constitute the chief focus of primary health care. To combat the problem, an integrated research and training effort needs to be conducted in a location where the problems can be explored.

The aims and objectives of the Centre are: (1) to develop and improve health care (public health programmes) for the prevention and control of diarrhoeal diseases by undertaking research and studies and disseminating the knowledge gained, (2) to train relevant (Bangladeshi and international) personnel, (3) to collaborate with other (national and international) institutions.

These aims and objectives would be accomplished by:

(i) Developing technologies and their application for disease prevention and health care through clinical, laboratory and field research;

(ii) Conducting research and training for scientists, administrators, technicians and people at all levels of health programmes;

(iii) Developing collaborative research;

(iv) Conducting seminars;

(v) Disseminating new information gained;

(vi) Advising governments and other agencies on health intervention.

THE ORGANIZATION

The Centre's activities can be divided into two broad divisions (a) scientific research and (b) training and extension. The scientific research programme is organized into five working groups, each addressed to a problem area related to diarrhoea i.e.

1. The Community Services Research Working Group (CSRWG)
2. Nutrition Working Group (NWG)
3. Disease Transmission Working Group (DTWG)
4. Pathogenesis and Therapy Working Group (PTWG)
5. Host Defense Working Group (HDWG)

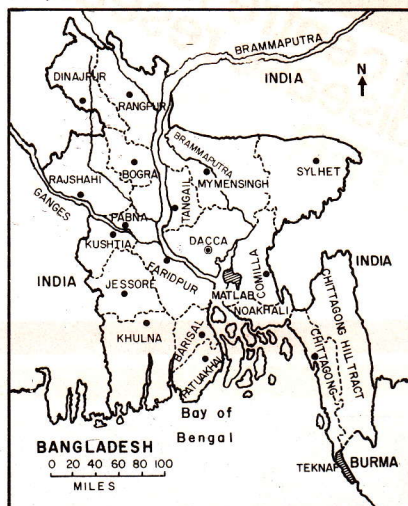
Community Services Research Working Group :

This Group provides the framework for all the field studies of the Centre by carrying out the basic demographic research.

Demographic surveillance systems in Matlab and Teknaf record all births, deaths and migrations as well as detailed information on illnesses. It provides an invaluable and virtually unparalleled resource for basic methodologic studies as well as studies regarding practical policies and programmes to deal with major health problems. Some activities of the CSRWG are listed below :

1. An extensive field trial has been implemented in Matlab comparing a simple sugar-salt (Lobon-Gur) mixture with WHO recommended oral rehydration solution. The findings (after first three months) indicate little difference in outcome variables in the groups under treatment.
2. In Teknaf (Chittagong district) two communities were studied, one close to a rural treatment centre (no oral rehydration therapy supplies or instructions) the other instructed in home preparation and use of oral rehydration. Community instruction was found to be more effective in preventing mortality due to diarrhoea than proximity to treatment centre, which affected mortality only within a 4—mile radius.

3. Information on contraceptives as part of a rural family health programme has proved to be more successful than a campaign directed only at contraceptive acceptance.



Nutrition Working Group :

There is a direct relationship between nutrition and diarrhoeal diseases. The NWG seeks to break the cycle by developing measures to improve nutrition by better food utilization and by reducing nutritional wastage among families. Following are some of the studies conducted by the NWG :

1. The relationship between diarrhoea control and nutrition was studied. The Group applies a nutritional perspective to programmes aimed at immunological or environmental interventions against diarrhoeal diseases, to test what improvements in nutritional well-being are accomplished by these interventions.
2. The distribution of food among individuals within the family (particularly during periods of food scarcity, illness or physiological states such as lactation and pregnancy) are analyzed to see how it may be improved.
3. Metabolic studies were carried out on food wastage in diarrhoea. Acute diarrhoeas may decrease appetite and accelerate the destruction of nutrients in the body; and repeated bouts of diarrhoea may reduce intestinal capacity to absorb food and depress the activity of enzymes necessary for digestion. *Shigella*, *E. coli* and rotavirus diarrhoea are associated with significant

protein loss in the stool. The Working Group aims to understand these mechanisms better.

4. Relationship between diarrhoea and vitamin A absorption were observed, the population coming to the Dacca Treatment Centre indicate high degree of vitamin A deficiency. Studies have been initiated to approach this problem as there seems to be a close link between vitamin A deficiency and diarrhoea.

Disease Transmission Working Group :

The DTWG is one of the three groups whose interests center directly on diarrhoeal diseases. It has three long-range goals :

- a. to identify agents responsible for the various kinds of diarrhoeas and to define and identify their cycles of occurrence and modes of transmission ;
- b. to delineate ways in which these agents interact with human beings and are spread in different communities ; and
- c. to develop effective and applicable means for interrupting the transmission of diarrhoeal diseases.

Some activities of the DTWG are listed below :

1. To analyze the spread of diarrhoea caused by several common agents—*E. coli*, rotavirus, *Vibrios* and *campylobacter* among children. Studies are conducted to determine what factors in environmental or social behaviour may be altered to interrupt the transmission of these diseases.
2. Except for *E. histolytica* and *Giardia lamblia* the role of parasites and worms in diarrhoeal diseases is yet to be established. This requires an in-depth field study backed by clinical, pathological and microbiological expertise.
3. Environmental factors e.g. water availability, sanitary practices, cultural behaviour and population density, influence spread and characteristics of diarrhoeal diseases. Microbiological studies are planned to investigate their roles.
4. Microbiological investigations of the various strains of the species *Vibrio* including *Vibrio cholerae*, some of which cause

disease and some do not, will probe, among other things, the possibility of developing an effective vaccine from a nonpathogenic strain.

Studies are also in progress to examine the transmission of genetic factors from one bacterial species to another, or within single species. All of these investigations require highly sophisticated equipment, and are being pursued in cooperation with laboratories in developed countries.

Pathogenesis and Therapy Working Group :

The PTWG has two broad goals: (a) to understand the causes and physiological mechanisms of various diarrhoeal diseases; and (b) to develop simple and cheap therapies for treating and preventing these diseases. Among topics of interest to the Group are:

1. Chlorpromazine (Largactil) controls diarrhoea induced by cholera toxin. It reduces stool output in cholera patients under study.

2. An effective rehydration solution from materials easily available in the villages were developed. A simple solution of salt and molasses seems to be effective in combating dehydration although it failed to correct the acidosis, which follows heavy loss of body fluid from the gut.

3. An oral rehydration formula with cooked-rice starch solution provides the glucose needed. Use of rice starch solution with appropriate correction of electrolytes has been successful, and a study of its use is progressing. This solution also provides nutrition along with hydration. A direct comparison between the rehydration solution recommended by WHO and the rice-based solution is underway.

4. Rotavirus, recently has emerged as the single most common cause of diarrhoea in children under two years. The action of rotavirus is significantly different from the pathogenesis of cholera and toxigenic *E. coli* diarrhoea. Better understanding of its pathological process is necessary for the formulation of

effective courses of rehydration therapy and to determine the extent and duration of damage in the small intestine responsible for absorption and utilization of food for the affected individuals.

5. GM1 Ganglioside, a toxin binding charcoal was demonstrated to reduce stool output in cholera especially during the first 8 hours of the disease.

6. Complications following diarrhoea and dysentery, especially among children, are pneumonia, high fever with shock, and altered states of consciousness, often with convulsions.

Studies on complications in diarrhoea have demonstrated the importance of blood glucose levels. For example, hypoglycemia in diarrhoeal patients, markedly increases the risk of death, and rapid correction of low blood sugar results in marked clinical improvement in many cases.

Host Defense Working Group :

The HDWG is concerned with the defense mechanisms of the human body against disease. The Group is investigating new vaccines, already tested elsewhere to be safe and effective in enhancing the body's defenses against cholera, particularly in children. The testing of other vaccines, including an oral vaccine for cholera, are foreseen for 1981 and thereafter.

The small intestine appears to be capable of generating an immune response to diarrhoeal illness, but little is known about how this response is triggered or exactly how it affords protection to the host. The Centre has initiated a programme to study the subject to identify those immunological factors actually responsible for prevention of diarrhoea.

The Working Group's study of general resistance to enteric infections is following two lines of investigations: (i) to elucidate the role of stomach acid as a barrier to infection, and (ii) to study the significance of alterations in the microbial population of the intestinal tract as a possible influence on the incidence of diarrhoea.

TRAINING AND EXTENSION

The primary objective of the programme is to use the resources of the Centre to help developing countries (including Bangladesh) to improve the planning and execution of diarrhoeal and related health services and to help develop national research capacity in these countries. The following are the goals of the Training and Extension Working Group:

- a. Trainers and extension workers would be trained on the management of diarrhoea.

- b. Research capacity in developing countries would be improved by providing research training.

- c. Extension projects for diarrhoeal disease services would be encouraged.

- d. Knowledge and experience gained at the Centre would be disseminated among the interested countries by publishing reports, monographs, newsletter, manuals and demonstration materials.

The Centre endeavours to share its findings and expertise with Bangladesh and other developing countries. The Training and Extension programme has made rapid progress in developing courses, identifying and serving individuals and groups likely to have an impact on diarrhoeal disease services and research. The target groups are extensive, it varies from instructors of village workers, to medical students, physicians and post-doctoral fellows in medicine, demography or biological science.

Technical and applied training was carried out both at international and Bangladesh levels. Training of physicians responsible for thana health centres (the thana being the smallest administrative unit of Bangladesh), began in 1978; and 301 doctors have been trained. Short courses were given on treatment of diarrhoeal disease to nearly 450 individuals involved in paramedical services in villages; and similar short courses were given to nearly 300 medical students from Bangladeshi universities. Courses varying in length from two or three days to six months were given to more than 80 technical and paramedical person-

nel from both governmental and private institutions. Seven pre-doctoral and eleven postdoctoral fellows were received from abroad for study periods of up to three years.

Practical courses : The Centre offers (a) short courses (one week or less) in diarrhoeal disease management and therapy for doctors in rural health centres in Bangladesh and medical students and interns, (b) two-week courses in management and therapy for trainers from the Asian region, (c) two-week courses in diagnostic procedures, also for trainers from the Asian region, and (d) courses on evaluation of health service interventions with special reference to diarrhoea control programmes, tetanus immunisation and family planning for physicians, statisticians and social scientists.

Three courses will be offered in the region and internationally to individuals and groups who will be responsible for developing programmes to control diarrhoeal diseases in their own countries.

A national workshop on oral rehydration was held in Dacca. Other workshops are also planned in other countries. Seminars and workshops are used as a training method for helping the extension activities of the Centre.

Extension activities will be aimed at developing countries where there are demand and need for technical assistance.

PROGRAMME SUPPORT

The scientific research and the training working groups are assisted by the departments of Animal Resources, Biochemistry, Biometrics and Data Management, Immunology, Microbiology, Library and Publications, and the station complements at Dacca, Matlab and Teknaf.

The largest support items are station operations at Dacca and

Matlab, which account for about three-fifths of the expenditure in this category. There are treatment centres in Dacca, Matlab and Teknaf; the Matlab operation also includes a large field staff of village workers.

SCIENTIFIC ACCOMPLISHMENTS

The scientists of ICDDR,B during 78-79 attended several scientific conferences, seminars and meetings mainly within the region. A total of 46 papers were presented by the scientists at these meetings. During the same period 44 papers were published in various scientific journals. During 1979, 115 visitors from outside of Bangladesh visited the Centre's laboratories and field-facilities.

FUNDING

Many countries and organizations have taken interest in the scientific work of the Centre. A dozen governmental organizations are now contributing to the support of the Centre. The United States of America (the principal donor during the Cholera Research Laboratory period) is maintaining its previous level of financing. The donor governments and agencies are:

Australia, Bangladesh, Ford Foundation, International Development Research Centre (Ottawa), Saudi Arabia, Sweden, Switzerland, United Kingdom, USA: Agency for International Development, Center for Disease Control, United Nations Development Programme and United Nations Fund for Population Activities.

The UNDP contribution, derived from funds originating with the Organization of Petroleum Exporting Countries, contributed to cover the cost of constructing and equipping new physical facilities for the Centre. The UNDP contribution is channelled through WHO,

and WHO participates in the administration of the funds.

Apart from the contribution to the Capital budget, there are core contributions—available for general support of the Centre's overall programme; and project funds—for specific projects only. The Centre prefers core contributions, since project funds are difficult to administer and sometimes fail to cover the full costs of the intended projects.

RELATIONS WITH OTHER ORGANIZATIONS

In the field of research the Centre is collaborating with the University of Göteborg, Sweden; the Johns Hopkins University, the National Institutes of Health, United States of America; Mahidol University, Thailand; the United Nations University, Tokyo, and several other institutions. Such relationships with developing countries in Asia would be further developed.

The Centre has direct relationship with the Government of Bangladesh, (the host Government which provides cash support, important facilities and privileges to the Centre) and two agencies of the United Nations: The United Nations Development Programme and the World Health Organization.

The UNDP as a sponsor of the Centre was the Chairman of the international group which helped to develop the charter and chose the Board of Trustees. At present it is the Chairman of the Consultative Group of governments and organizations. WHO will have a nominee on the Centre's Board of Directors and is also expected to be a principal source of fund, advice and technical collaborations. The Centre has been proposed to be designated as WHO collaborating Centre for Research, Training and Control in Diarrhoeal Diseases.

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