



Glimpse

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diarrhoeal disease research, bangladesh
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LONGITUDINAL STUDIES OF INFECTIOUS DISEASES AND PHYSICAL GROWTH OF CHILDREN



The Matlab Treatment Centre treats all patients from the area. Among children the highest number of hospitalization was for diarrhoea followed by pneumonia.

The interaction between infectious diseases and the nutritional status of children was observed in a longitudinal study in two villages in Bangladesh. An intensive village based system of surveillance was used to determine the occurrence and frequency of infectious diseases in a cohort of 197 children aged between 2-60 months. Communicable diseases and malnutrition are both frequent in developing

countries. An estimated 15-20 million persons, mostly children die each year from these conditions and only 50-75% of children survive until their fifth birthday.

A few papers has been written by Dr. Black and others based on the findings of this study. These will be adapted for GLIMPSE, PATTERNS OF MORBIDITY appears this month.

This study was supported by the

International Centre for Diarrhoeal Disease Research, Bangladesh with analysis assisted by an NIH Grant at the Center for Vaccine Development. Dr. Black performed the work in Bangladesh while assigned to the ICDDR,B from the Bureau of Epidemiology, Center for Disease Control, Atlanta, Georgia, in co-operation with other scientists from ICDDR,B.

Infectious diseases have been demonstrated to reduce the growth rate of young children, while malnutrition suppresses host resistance and increases the severity of infectious diseases. In its extreme form, malnutrition is associated with a higher risk of mortality. The reason why of all infectious diseases, diarrhoea affects the growth of children most are unclear. One hypothesis is that food intake is reduced because of anorexia and the practice of withholding food in some cultures. Another hypothesis is that diarrhoea results in a decreased assimilation of nutrients which may be due to decreased bowel transit time, transient decreases in digestive enzymes, damage to the absorptive mucosal surface or metabolic consequences of bacterial overgrowth in the small intestine.

The importance of diarrhoeal diseases in increasing morbidity and mortality, and as major contributors to malnutrition has been well recognized. The etiology of

(Contd. on page 2)

LONGITUDINAL STUDIES

(Contd. from page 1)

most of these diarrhoeal episodes could not be determined in previous studies. However in the past several years techniques have become available to detect bacterial and viral agents that have heretofore been overlooked.

The study was conducted in the Matlab field research area of the ICDDR,B. All births, deaths and migrations have been recorded in the area since 1966. Thus the accurate age of all children are known.

villages were poor. Although there were several handpump wells in each village, only 20% of the study families used this water for drinking. The rest used surface water, which was contaminated by nearby latrines.

The Study Population

The study procedures were explained to the parents of all children aged between 2 to 48 months in the selected study villages. Parents of 177 (94%)



The surface water often gets contaminated from various sources. Indigenous latrines, when constructed, are generally on these sources of surface water. The high-perch latrine seen here in the background has a bamboo bridge as access, and in the foreground women are washing.

Two typical villages, Enayetnagar and Sepaikandi were selected for the study. In 1978 Enayetnagar had 904 residents in 145 households and Sepaikandi had 884 residents in 148 households (6.1 persons per household). The houses were usually made of bamboo or jute sticks and mud with thatched or corrugated steel roof, and clustered around an open courtyard. Persons living in these clusters were usually parental relatives. The educational level was low and consistent with the general level in Bangladesh. Sanitary conditions in the study

children wished to participate in the study and gave informed signed consent. Twenty children born during the year of the study were also included.

All the Female Field Workers (FFWs) were residents of the villages they worked in. Thus, they could readily achieve rapport with the mothers of the study children and have greater intimacy with their families. On alternate days, they recorded morbidity data after questioning the family members of the children and by examining them. Information obtained in this way compared favourably

with that of the physicians, who visited the study children once a week and coded the presence of specific illnesses.

Between March 30, 1978 and March 28, 1979 FFWs recorded the rectal temperature in case of fever, number and consistency of stools, visible blood or mucous in the stool, vomiting, virulent nasal discharge, cough, skin rash, virulent ear drainage, anorexia, and other symptoms. During diarrhoeal episodes the worker also noted signs of dehydration and obtained rectal swabs for detecting enteropathogens.

A physician visited the children every week and reviewed the information recorded by the FFW, examined the child and based on predetermined definitions of illness, coded and categorized illnesses of the preceding week.

To evaluate the validity of the morbidity data for 174 children based on the mother's histories and their own observations, the physician examined each child and noted specific illnesses and compared his findings with those obtained by the FFW. The FFWs record and the physicians' observations tallied in 90% of cases.

Medical Services

The surveillance worker and the physician provided simple treatment for illness when appropriate. Children with serious illnesses or complications received appropriate therapy at the Matlab treatment centre. Because the children had never received immunization, DPT vaccine was given to all study children between July and September, 1978 and measles vaccine was given in September. Piparazine was given to children for treatment of ascariis infection during the first and the sixth month. In addition to illness surveillance and rectal cultures, blood was collected from each child in April, August and December 1978 and March 1979. Breast milk samples were obtained from all lactating mothers of study children each month for one year. A subset of 70 study children who were 3-30 months of age had a series of dietary intake studies. For these children food intakes were measured in the home each month during periods of health and during and after diarrhoea and febrile non-diarrhoeal illnesses. Anthropometric measurements were done at monthly intervals.

PATTERNS OF MORBIDITY



Matlab is intersected by innumerable rivers and canals. Country boats are convenient mode of transportation. In case of any serious illness, the patient is transported on a country-boat to the nearest ambulance point, where speed-boat ambulances carry them to the Matlab treatment centre.

Dr. Kenneth Brown from Johns Hopkins University assigned to ICDDR,B and Dr. Stan Becker and Dr. Md. Yunus from ICDDR,B were the co-authors with Dr. Black for the paper on "patterns of morbidity" and is the first of the series of papers written on the "LONGITUDINAL STUDIES OF INFECTIOUS DISEASES AND PHYSICAL GROWTH OF CHILDREN IN RURAL BANGLADESH" and is summarized and adapted for GLIMPSE, based on the original papers by the authors.

Most frequent of the illness reported by the study children were upper respiratory infections. Next in frequency were diarrhoeal illnesses, followed by impetigo, scabies, and other skin infections.

Of the other illnesses noted chronic otitis, stomatitis and conjunctivitis occurred on more than one percent of the days of study.

Fever was reported in 8.7% of all days of observation and was more often associated with infectious diseases like typhoid, measles and pneumonia. The rate of confirmation (temperature, above or equal 37.8°C) of reported fever was highest in children 2-5 months of age (47%) and ranged from 32-37% in other age groups. Diarrhoeal diseases were the most frequent causes of admission to the treatment centre (Table 1).

The prevalence of upper respiratory infections did not vary substantially with the age of the child.

TABLE 1

NUMBER AND RATES OF HOSPITALIZATION OF STUDY CHILDREN BY REASON FOR HOSPITALIZATION

Illness	Number of Hospitalizations	Rate of Hospitalization Per 100 Child-Years
Diarrhoea	33	19.5
Pneumonia	11	6.5
Abscess	6	3.5
Tonsillitis	4	2.4
Fever	4	2.4
Marasmus	2	1.2
Typhoid fever	1	0.6
Bullous impetigo	1	0.6
Ampicillin allergic reaction	1	0.6
All illnesses	63	37.2

Diarrhoeal prevalence was highest in children aged between 2-11 months, and decreased in older children. The prevalence of impetigo was highest in 6-23 months old children, which was also the age of peak prevalence for scabies and other skin infections. The prevalence of otitis did not vary consistently with age; however, the prevalence of stomatitis increased progressively with age. Conjunctivitis was most prevalent among children aged 6-35 months. Respiratory infections were more common during the cool dry months while diarrhoea was more frequent in the hot rainy period.

Since all deviations from a state of health were intended to be identified, the definitions of illnesses used included relatively mild illnesses also. This resulted in a higher prevalence of illness than studies based on episodes treated. Ethical consideration requires that serious illnesses be treated, so the provision of rehydration fluids for diarrhoea or antimicrobial drugs for shigellosis, scabies, pneumonia, and other serious illnesses may have affected the transmission and prevalence of certain infections. As the study children were provided with basic immunization, the occurrence of diphtheria, pertussis, tetanus and measles may have been less than otherwise expected. But it is not possible to determine how prophylactic immunization and treatment affected the mortality of the study children. Only 3 children died during the year of study, resulting in a mortality rate of 18 per 1000 children, which is substantially less than the annual mortality rate of children under-five in the Matlab field area, which is 56 per 1000 children.* Infectious diseases had a very high prevalence in the study children. About 75% of the days under observation, the children had at least one illness and often several concurrent illnesses. Most common were the diseases in the upper respiratory tract, predominantly purulent rhinitis and pharyngitis. The incidences of these diseases did not vary with age during the first five years of life.

*Chen LC, Rahman M, Sarder AM: Epidemiology and causes of death among children in a rural area of Bangladesh. *Int J Epidemiol* 9: 25-33, 1980.

PATTERNS OF MORBIDITY¹

Upper respiratory illnesses were more common in the cool dry seasons, but respiratory illnesses remain also relatively frequent throughout the study period. Lower respiratory infections, diagnosed clinically as pneumonia, were the second most common reasons for hospitalization; these infections were presumed to be bacterial and the illnesses showed no seasonal pattern.

Diarrhoeal diseases were the second most common illnesses with a peak prevalence rate in children 6–11 months old and a declining prevalence with increasing age. The high rate of diarrhoea may be explained by the frequent exposure of infants to an unsanitary environment, including heavily contaminated food and water given to supplement breastfeeding. The declining rate of illness with age is probably due to the acquisition of immunity from repeated exposure to the common pathogens. Diarrhoeal syndromes accounted for 52% of all hospitalization; however no deaths occurred because the care included correction of dehydration and antibiotic therapy for severe dysentery.

During the hot dry months skin infections with gram positive bacteria had a very high prevalence. During the cool dry months scabies

was more common. The pyogenic skin infections were severe, which was indicated by their association with fever, the need for hospitaliza-

whereas others resembled herpangina and, sometimes, thrush. Other cases with angular stomatitis and glossitis were probably second-



Surface waters, often contaminated, are traditionally used for all purposes, drinking, washing, etc.

tion of three children with cutaneous abscesses and one with bullous impetigo and the death of one child in spite of treatment for a large axillary abscess. Stomatitis probably had many diverse etiologies. Many cases had extensive vesicular lesions in the oropharynx suggestive of herpes simplex infection,

dary to vitamin B deficiencies (Table 2).

Children in many developing countries, like the children in this study in Bangladesh, suffered frequent infectious diseases and growth retardation. The morbidity information reported here and other information on dietary intake and growth has been used in subsequent analyses of the relationship between infectious diseases and nutritional status.

TABLE 2
PREVALENCE OF ILLNESSES IN STUDY CHILDREN

Illness	Days	Prevalence per 100 Child-Days
Upper respiratory	37,111	60.3
Diarrhoea	7,904	12.8
Impetigo	5,119	8.3
Scabies	4,206	6.8
Other skin infection	2,969	4.8
Chronic otitis	2,457	4.0
Stomatitis	2,449	4.0
Conjunctivitis	1,363	2.2
Asthma	269	0.4
Pneumonia	175	0.3
Measles	138	0.2
Hepatitis	69	0.1
Eczema	55	0.1
Varicella	41	0.1
Tonsillitis	35	0.1
Typhoid fever	20	0.03
Other illnesses	15	0.02
Mumps	14	0.02
Pertussis	7	0.01

¹ Published in American Journal of Epidemiology, March 1982, Vol. 115, No. 3.

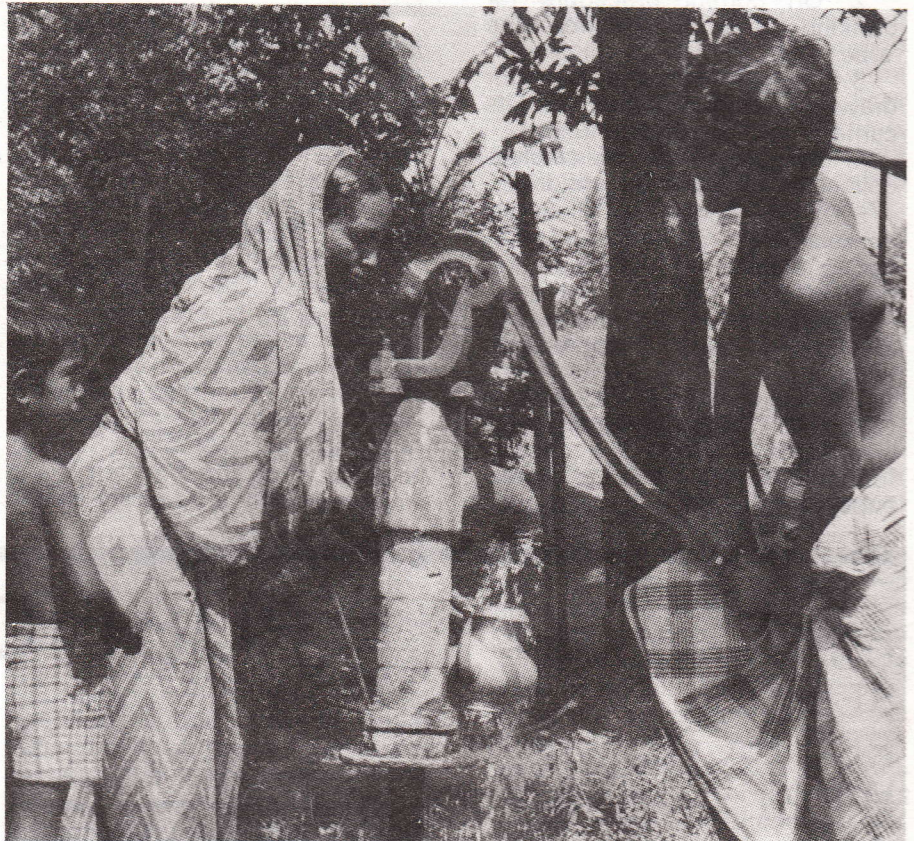
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BANGLADESH

HEALTH EDUCATION MESSAGES FOR PROPER USE OF TUBE-WELL WATER IN RURAL BANGLADESH

A set of health education messages were developed to motivate people for exclusive use of tube-well water for all personal and domestic purposes in a rural area of Teknaf, Bangladesh. This was developed as a part of a programme to study the impact of water and sanitation intervention covering two communities with a population of 2,000 each in Teknaf in July 1980. One of these communities acting as the study population has been provided with adequate number of tube-wells (ratio of 1 tube-well to seven households). The comparison community has not been given additional tube-wells other than the existing ones (ratio of 1:32). The traditional sources of water for personal and domestic use were ditches and ring-wells; people, however, depended on tube-well water mainly for drinking.

In the study community in addition to the tube-wells, female health educators were giving health education messages related to water use and each family will be provided with a water-seal latrine.

The health education messages on tube-well water use were designed to promote the acceptability of tube-well water for all



Only providing tubewells in the community generally does not bring down incidences of waterborne diseases. Health education to create awareness of the causes of diseases and to motivate the people to use tube-well water is being tried out in Teknaf.

personal and domestic purposes. Through health education people are being motivated to:

a) depend exclusively on tube-well water;

b) follow hygienic practices in collecting, carrying and storing tube-well water;

c) increase the consumption of tube-well water for all personal and domestic purposes;

d) wash hands with plenty of water after defaecation and before eating or handling food.

Health education messages were developed taking into consideration the existing behavioural pattern and the required behavioural modifications identified through participant observation and informal discussion. Field observations and informal discussions revealed that people were not acquainted with the "germ-theory". Rather they appeared to be familiar with the concepts of "purity and impurity" and "cleanliness". Most of them, however, failed to link their knowledge of cleanliness with the daily routine practices of water use. Keeping in view such a folk perception of water use, health education messages were developed under the following ten topics:

(Contd. on page 6)

TABLE 1

SOURCES OF WASHING WATER WITH DISTANCE IN YARDS BEFORE AND AFTER
INSTALLATION OF TUBE-WELLS IN THE STUDY AREA

Distance in yards	before install.			after install.		
	Washing All	source Ditch	Tubewell	Washing All	source Ditch	Tubewell
0-30	147 (84.0)*	137 (89.5)	10 (45.4)	133 (78.7)	53 (88.3)	80 (73.4)
30+	28 (16.0)	16 (10.5)	12 (54.6)	36 (21.3)	7 (11.7)	29 (26.6)
Total	175 (100.0)	153 (100.0)	22 (100.0)	169 (100.0)	60 (100.0)	109 (100.0)

*Figures within brackets indicate percentage value

HEALTH EDUCATION

(Contd. from page 5)

1. On increasing people's awareness of the need to use tube-well water in their routine activities.
2. On correct procedure for drinking water directly from the tube well.
3. On correct procedure for drawing tube-well water and its carriage and storage at home.
4. On prevention of careless collection of water by children.
5. On promotion of use of narrow necked water pitchers and discontinue the use of wide-mouthed containers.
6. Emphasizing the importance of washing hands at appropriate times.
7. On benefits of regular bathing.
8. On the benefits of maintaining cleanliness of items like cooked food and vegetables, fruits, plates, cups, utensils, etc.

9. On method of spreading the messages to the neighbours.

10. On methods of transmission of diarrhoeal diseases and intestinal worms.

These messages are being delivered by female health educators through inter-personal informal discussion with the mothers of under-five children at the household level and through informal group discussion with the women and older children of the neighbouring households. Following the delivery of the health education messages at the personal and group levels, demonstrations were provided at the tube-well site and inside the house on correct procedure for collection and carriage of water. Through *Maktab* (Elementary Islamic Arabic School) teachers, the students are being imparted with elementary health

education on the use of tube-well water. Another approach has been to address small groups of men in the tea stalls, mosque compounds, during prayer time and other small male gatherings. The male audiences are being organized and addressed by male field workers.

It has been evident that the major task of the health educators has been linking of knowledge related to healthy practices of water use with actual water use practice. The measurement of the impact of health education in changing the water use behaviour is being carried out on the basis of certain predetermined indicators by an outside and independent group of investigators. These are being carried out through in depth observations and interviewing of 20% of the randomly selected study and comparison households at six monthly intervals (Table 1).

CONTRACEPTIVE SERVICE PROJECTS: WHAT WORKS?

Two studies have been conducted in a rural area from 1975 to 1981 to test the hypothesis that contraceptive services can reduce fertility. Drs. James F. Phillips, Wayne Stinson, Shushum Bhatia, Mr. Makhlisur Rahman, Mr. Chakraborty reviewed the designs of the two studies and analysed their demographic effects.

In the first study Contraceptive Distribution Project (CDP), oral contraceptive pills and condoms were distributed in 150 villages with a population of 135,000. Though the base-line survey of eligible women showed that 33% were either users or interested in adopting family planning measures, at the end of three months 17.8% were only practising family planning which declined further to 12.8% at the end of 18 months.

The second study—the Family Planning Health Services Project (FPHSP) was restructured to in-

clude maternal and child health services, although only tetanus immunization and oral therapy for diarrhoeal cases were implemented. Workers were trained to advise women on delivery practices, to provide information on proper nutrition, hygiene and sanitation resulting in a comprehensive family planning service delivery.

The overall goal of the FPHSP service system was to shift the emphasis of the CDP on contraceptive technology to an emphasis on comprehensive contraceptive care, to include frequent and regular visits to all women, a wide choice of methods conveniently available, and ancillary health services. The principle link between health and family planning services has been a three-tiered referral system for the detection and treatment of side effects. In the first two years—the FPHSP reduced fertility by 21 and 25 percent.

The data generated from the study indicate that contraceptive services have effect because a latent demand exists for efficient

birth planning methods. An unmet demand for contraception exists in rural Bangladesh which can be served by an extensive field programme. Effective services can produce substantial fertility declines. The failure of national programme to produce demographic effects may be more because of incomplete programme implementation rather than the absence of motivation to limit or space births among rural Bangladesh couples.

This is a summary of the paper:

The Demographic Impact of Two Contraceptive Service Projects in Matlab Thana of Bangladesh: A Compendium of Findings for the 1975-1980 Period/ James F. Phillips, Wayne Stinson, Shushum Bhatia, Makhlisur Rahman, J. Chakraborty. October 1981. (Working paper No. 23)

PUBLICATIONS

A Design and Field Methods for Monitoring Impact on Mortality of An Oral Therapy Programme/ A. M. Raza Chowdhury, Stan D'Souza. July 1982. (Working paper no. 27)

This paper provides a design and field methods for monitoring the impact on mortality of an Oral Therapy Programme undertaken by the Bangladesh Rural Advancement Committee in five districts of Bangladesh. The aim is to set up a low cost surveillance system that can detect changes in mortality due to diarrhoea in the 1-4 age group. The design envisages a double stratification of thanas (one geographic and one on the basis of "famine liability"), a sliding selection of two unions from each of four strata. A baseline survey in each union followed by retrospective multi-round surveys in the selected unions have been planned.

Calorie Intake in Childhood Diarrhoea/Shafiqul Alam Sarker, Abdul Majid Molla, A.K.M.M. Karim, M. Mujibur Rahman. July 1982. (Scientific report no. 57)

Intake of calories during acute diarrhoea and after recovery was studied longitudinally. Thirty-six children aged between 1 and 4 years and hospitalized with diarrhoea were selected for the study, 12 had cholera, 12 had enterotoxigenic *E. coli* and 12 had rotavirus. In the acute stage, the mean calorie intake was 71 Kcal/kg/day for the cholera patients, 80 Kcal/kg/day for *E. coli* and 63 Kcal/kg/day for the rotavirus patients. After stoppage of diarrhoea (early convalescent stage) the intake improved to 128 Kcal/kg/day for cholera patients, to 126 Kcal/kg/day for those with *E. coli* and the intake in late convalescent stage (2 weeks after discharge from the hospital) was 115 and 114 Kcal/kg/day respectively. Rotavirus patients showed a slower rate of improvement in comparison to the patients

with cholera and *E. coli*. The calorie intake in rotavirus was 84 Kcal/kg/day and 100 Kcal/kg/day in early and late convalescent stages respectively. These results suggest that anorexia may be an important factor in reducing food intake during the acute stage of diarrhoea. Low intake of calorie during the acute stage could be compensated by providing higher intake during the convalescent period both in cholera and *E. coli* patients. Rotavirus patients seem to have a prolonged period of low intake of food following diarrhoea.

ICDDR,B Model for Treatment of Diarrhoeal Diseases/A. R. Samadi, M. R. Islam, K.M.S. Aziz. July 1982. (Special publication no. 19)

Diarrhoeal diseases form a major health problem in developing countries because of its high morbidity and mortality rate. The main cause of death in acute diarrhoeal diseases is dehydration, which can be prevented by replacement of water and electrolytes. Over the past three decades the study of acute diarrhoea in children and adults has led to important knowledge of the physiology of body fluids and intestine as well as efficacy of oral rehydration solution in treatment of dehydration due to diarrhoea.

Another major problem in developing countries is lack of resources and trained personnel to cope with health problems. In this paper we are presenting the ICDDR,B model for treatment of diarrhoeal diseases with particular reference to its organization, administration, staffing pattern, procedures for screening patients and methods for treatment. This model is an example that the trained paramedics and auxiliaries, under supervision of a physician can run a large treatment centre for diarrhoeal diseases efficiently. The other aspect of this model is the successful use of oral rehydration solution in treatment of majority of dehydrated patients. This model can be adapted to suit local situations in any developing country where resources and trained personnel are limited.

ARTICLES FOR JDDR SOLICITED

The Journal of Diarrhoeal Disease Research (JDDR) will be published by the International Diarrhoeal Disease Information Service and Documentation Centre (DISC) of the ICDDR,B. Four quarterly issues (March, June, September and December) with an annual index will be published from 1983. Original research articles, short communications and letters dealing with all aspects of diarrhoeal diseases, especially those focusing on the problems in the Asian region are solicited for publication.

Every issue of the JDDR will also print annotated bibliography of current Asian literature on diarrhoeal diseases. Reprints or copies of publications are welcome for inclusion in this section.

Manuscripts should conform with the Vancouver Style and submitted in duplicate (i.e. the original with one copy) with two sets of illustrations, of which one must be original. Photographs and transparencies should be placed in a separate heavy paper envelope, to prevent bending during mailing. All manuscripts will be subject to peer review and editorial revision.

In principle, an **Original research article** should not exceed five printed pages (about 4,500 words), including the abstract, tables, figures, photographs, illustrations, references, and other appendices. A **short communication** should not exceed two printed pages (about 1,800 words), including the abstract, tables, figures and references. **Letter** should be brief and to the point; tables can be included but graphs and illustrations will not be normally included and references must be kept to a minimum.

Brochure or Instruction to authors will be available on request.

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The opening of the Treatment Centre in Kalirbazar means that most of the patients in the area will be treated here and can save the trip to Matlab Bazar. However only serious patients needing special attention will be referred to Matlab Treatment Centre.

NEW DIARRHOEA TREATMENT CENTRE OPENED

A community based Diarrhoeal Disease Treatment Centre was opened on 22 June at Kalirbazar under the Matlab thana, Comilla. The Treatment Centre was constructed with aid from the Australian Government on a piece of land donated by Mr. Ahmed Ali Sarkar, a social worker at Kalirbazar. The Treatment Centre will be run by the local community with the technical assistance from ICDDR,B.

Kalirbazar is situated at the junction of 3 thanas i.e. Gazaria, Daudkandi and Matlab. From now on, uncomplicated diarrhoea cases

from the area will be managed at the Kalirbazar Centre by the volunteers and local community leaders, trained by the ICDDR,B. All diarrhoea patients from these areas used to go to Matlab for treatment before.

Representative from Australian High Commission, Senior ICDDR,B Officials, Government Officials, Local Chairman and Community Leaders were present at the opening ceremony. Similar community based treatment centres have been established at Kumudini Hospital, Mirzapur, Tangail District and at Nayergaon, Comilla District.

ICDDR,B BOARD OF TRUSTEES ELECTS NEW MEMBERS

Professor David E. Bell, Clarence Gamble Professor for Population and International Health at the Harvard School of Public Health, Boston, Massachusetts, U.S.A. was elected to the Board of Trustees at its sixth meeting held in June this year for a three-year term beginning July 1, 1982. In the same meeting Dr. Yoshifumi Takeda of Osaka University, Japan was also elected member and Professor Bradley of Ross Institute of Tropical Hygiene and Medicine was elected Chairman of the Board (See Glimpse, Vol. 4, No. 6).

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