

Glimpse

international centre for
diarrhoeal disease research, bangladesh
NEWSLETTER

ISSN 0253-7508
Volume 5
Number 2
MARCH-APRIL 1983

ICDDR,B's Contribution Recognized



DR. W.B. GREENOUGH receiving UNICEF's Gold Medal Award from Mr. Uffe Konig, (left) UNICEF's representative in Bangladesh.

"For distinguished contributions to improving the situation of poor rural and urban children and mothers" in many countries, UNICEF recently presented a Gold Medal Award to ICDDR,B Director William B. Greenough III.

Dr. Greenough received one of five such awards given in Bangladesh Feb. 24. He was honoured because, under his leadership, the ICDDR,B has made "an outstanding contribution in research, training and community services efforts to help improve child health and reduce child deaths through the prevention and

management of diarrhoeal diseases."

Specifically Dr. Greenough and the Centre were lauded for:

*Developing oral rehydration salts and promoting oral rehydration therapy (ORT) "a major breakthrough in the treatment of diarrhoeal diseases and the reduction of child death due to dehydration and related factors." The Centre was cited for its leadership in promoting the preparation and use at home by families of ORT's simple salt/sugar/water solution—that can

save thousands of children's lives each year.

*Outstanding research work and training activities that have led to hundreds of health professionals—from Bangladesh, the Philippines, Vietnam, China, Indonesia and other developing countries—setting up their own ORT services at home in order to save the lives of children, the primary death victims of diarrhoeal diseases.

The UNICEF Regional Director's Gold Medal Award was presented to Dr. Greenough by Uffe Konig, UNICEF's Representative in Bangladesh. ■

Teachers of Rural Health Workers Trained

Trainers of Medical Assistants, from 16 Bangladeshi institutions, learned modern teaching techniques, during one of two week-long sessions at the ICDDR,B. The trainers studied primary health care, including the difficulties of its implementation and the best strategies for success.

They also learned about management and control of diarrhoeal diseases, and how best to transfer these skills to Medical Assistants—who, in turn, teach village health workers, community volunteers and other rural health personnel.

The courses were jointly sponsored by the ICDDR,B and the Governments of Bangladesh and the Netherlands. ■

The Role of Diet;

MALNUTRITION IN WEANING AGE CHILDREN

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

The study was conducted at the ICDDR,B's Matlab field research area. All births, deaths and migrations in the area have been recorded since 1966. Hence, the accurate ages of children are known. Two typical villages, Enayetnagar and Sepaikandi, were selected for study. In 1978, Enayetnagar had 904 residents in 145 households, and Sepaikandi had 884 residents in 184 households (6.1 persons per household). Between March 30, 1978 and March 28, 1979, female field workers (FFWs) recorded all useful information: 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 diarrhoea the FFWs also noted signs of dehydration and obtained rectal swabs for detecting enteropathogens.

A physician visited the children every week, reviewed the information recorded by the FFWs, examined the children and, based on predetermined definitions of illness, coded and categorized the previous week's illnesses.

This study was supported by the ICDDR,B, with a grant from the National Institute of Health, USA, and funds from the Centre for Vaccine Development, the University of Maryland School of Medicine. Dr. Black performed the work in Bangladesh while assigned to the ICDDR,B from the Bureau of Epidemiology, the Centers for Disease Control.

Dr. Robert E Black, Dr. Stan Becker, Ms. Samsun Nahar, Dr. John Sawyer and Dr. Kenneth H Brown, were co-authors of the ICDDR,B paper "Consumption of foods and nutrients by weanlings in rural Bangladesh," published in *The American Journal of Clinical Nutrition* 36: November 1982, pp878-889. The GLIMPSE version appearing in this issue has been adapted from the paper.

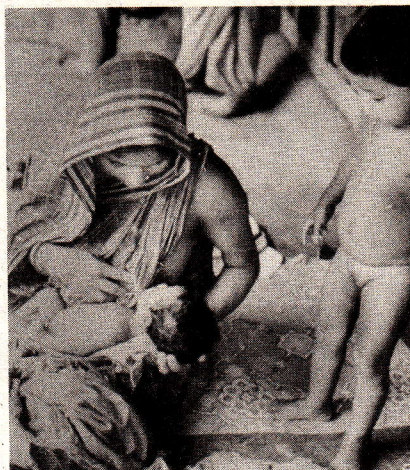
To design any successful programme for the prevention of malnutrition in children, it is important to know the factors responsible. In one of the few such developing country "quantitative" weaning studies of its kind, ICDDR,B researchers have come up with significant data relating to preventing malnutrition in children.

During 632 days of observation of 70, 5-to-30-month-old rural Bangladeshi children, the researchers concluded that the most striking finding was the role played by breast milk in the diet—which was severely limited in both quantity and quality.

The only saving grace, the scientists said, was the fact that, for most of the children, mothers continued to breast-feed well into the third year. Nevertheless, the amount of milk produced was insufficient to meet the nutrient requirement of even the youngest child studied.

The study revealed that the quantity of complementary weaning food introduced failed to compensate for both the shortfall and the reduction in breast milk consumption with age. This resulted in a dietary deficiency of all nutrients for most of the children—who were found to be mildly to moderately stunted and wasted, compared to the National Center for Health Statistics reference population.

The researchers maintain that one of two solutions must be



THE MOST STRIKING finding of the researchers was the role played by breast milk in the diet of the study children.

found: either breast milk production must be enhanced safely, or complementary food—dense in energy, balanced in amino acids, and rich in absorbable vitamin A—must be introduced early and in enough quantity.

While the data are not necessarily representative of the weaning pattern for all Bangladesh, much less for other countries, the study, nevertheless, is of interest as a basic description of the nutritional transitions that occur during the weaning period in a traditional society. For, there are few such quantitative studies available from similar settings.

In this study, once a month, over 14 months, when they were

free of diarrhoea and fever, each child was observed from sunrise to sunset by a dietician and field-worker, who measured all food-intake. Breast feeding was measured by test-weighing: measuring the diapered child before and after feeding, and then assuming the change in the body weight to be equal to the amount of milk consumed. The total amount for 12 hours was extrapolated to get the amount consumed in 24 hours (53% of the total amount was consumed during the day). In evaluating this method, the researchers found it tended to underestimate total consumption by 5%. All other foods were weighed before consumption, as were all leftovers.

The researchers found that all children under 18 months were breast feeding, and 85% continued until between 24 to 30 months of age, but the amount taken, 632g, gradually reduced to 368g per day for all children aged 24-30 months. Breast milk was the major source of all nutrients (except iron and vegetable protein) in all children. It supplied more than 70% of animal protein, fat and vitamin A. In younger children, breast milk alone supplied more than 50% of the carbohydrates and iron consumed.

Considering the fact that the quantity of breast milk available was not enough for even the youngest child studied, early introduction of complementary food, rich in nutrients and of sufficient quantity, could correct the situation, the scientists said.

After breast milk the second most important source of all nutrients (except fat and vitamin A) was cereals. However, the amount taken was hardly enough to provide the energy required for resting metabolism for some of the children during some periods of study. Cereals became more important as children grew older. Thus, for under-one-year-olds only 54% ate cereals, but by age 24 months, all children ate cereals, the amount consumed increasing from 35g to 94g. The first foods generally introduced were sugar and cereals.

By age 30 months about 54% of the study children were eating

dairy products, 65% roots and tubers, 69% fruits, 54% vegetables (other than green leafy ones), 23% fish—but only 19% green leafy vegetables and 12% meat and eggs.

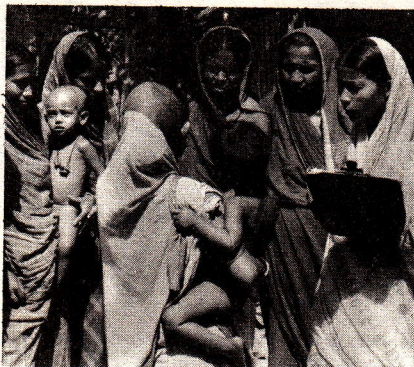
The energy intake ranged from 63 to 71 Kcal/kg/day, which was about 50% of the amount recommended by WHO for children in the same age-length. Below age 18 months, the energy intake was the same for boys and girls, but thereafter energy intake in relation to body weight increased in boys but decreased in girls—reflecting the cultural preference for boys over girls.

The amount of protein consumed averaged 1.2 to 1.5g/kg/day, but girls received less than boys in all age groups. Among 5-to-17-month-old children about two-thirds of the safe level of intake was met. However, the situation improved with age. In the 18-to-30-month-olds, 88% of the requirement was met in boys and 75% in girls. Although with age protein intake increased, the amount of protein from animal sources decreased.

Rice supplied 60-70% of both protein and iron that the children

derived from cereals. The rest of cereal-derived energy and protein, as well as some fat and vitamin A, came from wheat. Carbohydrate consumption increased with age, but this increase was more marked in boys than girls.

Most vitamin A was consumed as retinol. The source, other than human and animal milk, was fruits for children of all ages. In older children, 4.6% of vitamin A consumed was supplied by fish and vegetables. Among 5-to-17-month-old children, 92% of the minimum daily requirement of



FIELD WORKERS observed the 70 study children for 632 days from sunrise to bedtime to collect the information for the study.

vitamin A was met in boys and 67% in girls. However, this amount decreased with age so that 18-to-30-month-old boys received only 82% of the minimum iron requirement, while girls received only 61%. Moreover for iron, an increase in intake with age was seen. This increase was more pronounced in boys than in girls.

The researchers observed the preference for boys over girls in all food items in the 18-to-30-month age group. Therefore, the major source of nutrients for girls even in this age group remained breast milk, for their diets were less supplemented than were the boys' diets.

The researchers felt that the most striking finding in the socio-cultural setting studied, was the almost universal continuation of breast-feeding up to age 24 months, and often beyond; and the late introduction of scanty amounts of complementary foods. The failure to provide adequate amounts of complementary foods, as well as a reduction in consumption of breast milk with increasing age, resulted in a dietary deficiency of all nutrients for most of the study children. ■

ICDDR,B Hospital Moves To New Building

Global efforts to combat debilitating, often deadly diarrhoeal diseases gained an important advance March 9th, with the opening of a new, modern, comprehensive hospital-cum-research facility by the ICDDR,B.

The new Clinical Research Unit and Treatment Centre relieves severe overcrowding of hospitalized patients, out-patients, laboratories, equipment and other research facilities.

Funded by a \$1.5 million grant from OPEC, the one-storey, 37,000 square-foot building is the first and most important phase of a projected much larger facility.

Lauding OPEC for its "fore-sight and commitment to waging war against some of the most devastating diseases worldwide," ICDDR,B Director Dr. William B. Greenough III, said at the opening ceremonies that the new facility greatly enhances the Centre's research and treatment efforts, and vastly improves conditions for patients.

Special gratitude, he added, must go to three "honoured guests whose intensive interest and efforts" have made construction of the new

facility possible: Dr. Ibrahim F.I. Shihata, Director General of the OPEC Fund for International Development, who provided the needed funds promptly; William Mashler, head of Global Programs for the United Nations Development Program (UNDP) who "enthusiastically supported the proposed facility from the beginning;" and Bernard Zagorin, the former UNDP representative in Bangladesh, who, with the Interim Committee, forged the basis of the excellent ordinance governing Centre operations.

Mr. Shihata and Mr. Zagorin attended the dedication. Also there was Maj. Gen. M. Shamsul Haq, Bangladesh's Minister for Health and Population Control.

Completed over two years on a four-acre plot donated by the Bangladesh Government, the new building houses a hospital, including an intensive care ward; a large treatment centre, which can care for 1,00,000 patients a year; an X-ray facility; diagnostic and other research laboratories and related facilities.

As Dr. Greenough pointed out, ICDDR,B efforts long have been seriously hampered by severe

overcrowding. Until now, the above facilities have been housed in an old, three-storey wing of the Bangladesh Institute of Public Health, and in an attached tin shed.

"Beginning with a 20-bed research unit in 1962, the treatment facilities expanded rapidly, reaching a peak of 120,000 diarrhoea patients in 1978—with no increase in physical space," Dr. Greenough recalled.

"It's a gross understatement to say we have been overcrowded. Until now, our clinical research and laboratory space has been so cramped that, in normal times, patients and equipment alike have been kept in corridors. During the annual or semi-annual cholera epidemics, we have had to care for patients in tents and a large tin shed."

The new facilities, Dr. Greenough said, not only improve conditions for diarrhoea victims needing hospitalization or out-patient treatment, but immensely enhance the ICDDR,B's principal research efforts. For, in the last analysis, it is such efforts that are having and will continue to have the greatest impact on the worldwide war against diarrhoeal diseases. ■

Urban Volunteers:

Helping Communities Combat Diarrhoea Themselves

Clutching a pencil firmly and glancing from blackboard to paper on their small wooden desks, 10 women with thick black hair pulled into severe buns and wearing multi-coloured saris and plastic thongs, concentrated on copying a chalk sketch of a pitcher, glass and small packet.

Moving among them, "Sister Eva," blond and blue-eyed, in long skirt and sneakers, smiled and nodded approvingly, and occasionally leaned over to guide an unsteady hand.

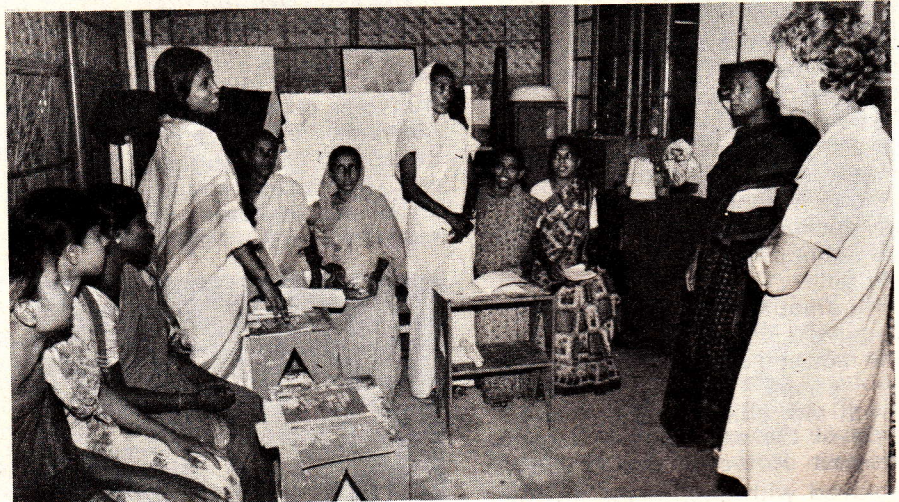
Then, pointing to a large, coloured chart showing comic strip-like characters measuring and pouring ingredients into a pitcher, Sister Eva recited, in Australian-accented Bangla, the precise amounts of components that make up an "oral rehydration solution" for diarrhoea victims.

Like an old-fashioned primary school class, the 10 "pupils" repeated the lesson. "Palo, Palo" (good, good) said Sister Eva, inclining her head slightly as she spoke in the Bangladeshi manner. "Now," she continued in Bangla, "let's review the 16 signs and symptoms of diarrhoeal dehydration, so you're sure to recognize the danger signs.... Diarrhoea, with or without vomiting; sunken eyes; dry tongue; washerwoman's fingers; scanty urine...."

The students responded dutifully, if a bit shyly, as they turned now and then to gauge a visitor's reactions.

"It's only their second day and they're still a bit hesitant," explained Sister Eva. "After all, for most of them it's a long journey in more ways than one from their community to this classroom."

The classroom is a small, sunny concrete-walled room tucked into a corner of the free Treatment Centre that's part of the old Cholera Research Laboratory, which three years ago became the ICDDR,B (International Centre for Diarrhoeal Disease Research, Bangladesh)—the world's only institution devoted solely to finding the causes, preventives, treatments and cures for a host of diarrhoeal diseases, of which cholera is the best-known and most feared.



SISTER EVA DOHERTY and Ms. C. Dutta (from right) conducting one of the many training courses for the urban volunteers, conducted at the ICDDR,B.

The teacher, Eva Doherty, is a 35-year-old Australian nurse-volunteer. In January 1981 she began what has become an incredibly successful program to teach "Urban Volunteers" to diagnose and treat diarrhoeal disease victims in their own communities.

The students, mostly women, are poorly educated or illiterate slum dwellers who, for a variety of reasons, volunteer to help their friends and neighbours reduce the suffering and death continuously inflicted by widespread, endemic diarrhoeal diseases.

For as these women know only too well diarrhoeal diseases are one of the most devastating scourges in developing countries. Worldwide, they account for an estimated five million deaths annually, especially of young children.

Caused by diverse bacteria, viruses and parasites, the diarrhoeas themselves are debilitating but not deadly. Deaths are caused mainly by dehydration leading to shock, as the body is drained of essential fluids and minerals. Most such deaths are preventable, if a patient is swiftly rehydrated. That's where the Urban Volunteers, their "Sister Eva" and the ICDDR,B come into the picture.

"Until a few years ago, due to the lack of a cheap, easily disseminated 'home remedy,' it was not feasible

for any developing country to treat diarrhoeal dehydration on a large scale," explains Ms. Doherty.

"For in poorly nourished, disease-ridden populations the time between diarrhoeal disease on-set and death often is swift—a matter of hours or, at most, a few days. By the time severely dehydrated patients reach a hospital, if their families can afford the time and expense of bringing them, it's often too late to revive the patient even by intravenous solution."

In the mid-1960's an alternative rehydration therapy was discovered, almost simultaneously by scientists in Calcutta, India and at the Cholera Research Laboratory in Dhaka. The new technique consisted of a salt/sugar/water mix a patient could drink.

Additional research led, in the late 1970s, to an Oral Rehydration Solution (ORS) formula cited by the World Health Organization as one of the most significant advances in Third World health therapy. Today that ORS, perfected at the ICDDR,B, is used worldwide to treat diarrhoeal dehydration—not just in hospitals, but in rural villages and urban slums.

In Bangladesh and many other countries, ORS is made available in ready-made packets distributed free. All a user need do is to mix it in a litre of water and use the solution within 24 hours, before it deteriorates and grows bacteria.

Alternately, user communities are being taught how to prepare their own ORS, mixing set amounts of sugar, salt and water.

At the same time, in Bangladesh ICDDR,B researchers are further perfecting ORS, by experimenting with a rice, rather than sugar-based solution, which appears to increase ORS's nutritional, as well as re-hydration value.

In the past three years, ORS has been widely used in Bangladesh, among target populations, where concerted efforts are being made to promote its use at home. The result: ORS appears to have been responsible for a dramatic drop in diarrhoeal dehydration deaths. Much of the success has occurred in Dhaka—and appears to be attributable to Sister Eva and her Urban Volunteers.

When Eva Doherty was assigned to the ICDDR,B as an "Australian Volunteer Abroad" (AVA), by the private, non-profit Overseas Service Bureau in Melbourne, she had little inkling of the impact she would have. For she was about to start an unprecedented program and to virtually run her own show.

"All I was basically told," she recalls, "is that I would be assigned a driver and a couple of nurses; and that the goal was to transfer ORS out of the ICDDR,B hospital, into homes in as many Dhaka slums as possible. How I was to do this was up to me."

Though she would vigorously demur, "how" she did what she did took enormous patience, perseverance and plain hard work. Hers is the story of a lonely, frequently frustrating and often overwhelmingly depressing struggle against rampant poverty, disease, ignorance, superstition and alien customs.

For an outsider, seeking to have an impact on a traditional society such as that of Bangladesh, first must immerse herself in the culture—even when what is involved is the seemingly straightforward treatment of diarrhoeal diseases. The reason: the very prevalence of diarrhoea is intimately bound up with people's lifestyles; beliefs and taboos exist about how to treat diarrhoea: and "Sister Eva" was asking very conservative Muslim communities to permit some of their women to temporarily venture outside, and then to perform non-traditional duties.

Luckily, Ms. Doherty began with at least three things in her favour: knowledge of the local

language and customs, which she had learned in 1977 during a prior AVA assignment in Dhaka; a strong, stubborn personality; and an ICDDR,B driver, Mr. Jahir Islam, who was to become an unofficial social worker and Sister Eva's community contact man, as well as, ultimately, with his wife and children, Sister Eva's family in Bangladesh.

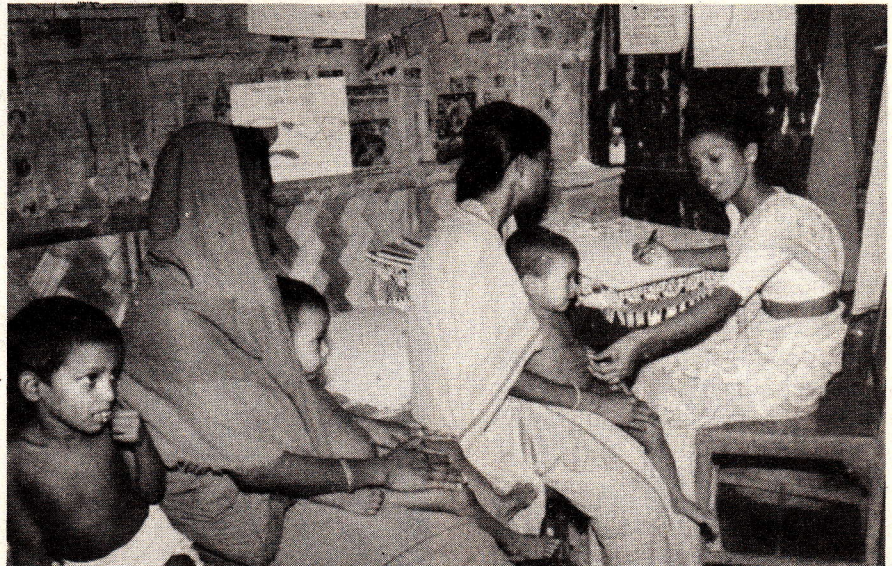
"We started very slowly, one community at a time," recalls Ms. Doherty. "Since as a woman I couldn't effectively approach community leaders, Jahir would get them interested, and I would then explain the details.

"In most cases we found a receptive audience, because diarrhoeal

we'd train for five mornings over one week. After that, we would constantly monitor their efforts, and occasionally retrain them."

In its 28 months Ms. Doherty's Urban Volunteers Program has trained about 600 women from more than 30 Dhaka Slums. Almost all the volunteers selected for training "graduate" and receive a certificate. Most remain in the program at least six months, though about half drop out after a year or so.

What factors determine whether a woman will stick? Ms. Doherty would like to know. Thus far, the only thing that seems to make a difference is age: women under 30 last longer. What motivates



SOME OF THE more resourceful volunteers set apart a small room or a corner of their house to be used as the consulting room, when people, mostly women, come to them for ORS/packets and advice in case of diarrhoea in the family.

diseases take such a toll in these communities; and because we represented the ICDDR,B Treatment Centre, where Dhaka residents are most likely to go if they're seeking help for diarrhoea-related illness."

"We'd point out that it's very difficult and expensive for people to reach a hospital. (Dhaka is a sprawling city; and transportation, in the form of three-wheeled scooters, is too expensive for most people, while bicycle rickshaws are too slow, especially for critical cases).

"Then we'd say that, with a little cooperation, at no cost, the community could help itself at home. How? By finding a group of women, aged 18 to 40, willing to work as diarrhoea treatment volunteers. Out of say 15 or 20 candidates we would choose 10, whom

women to volunteer, since they're not paid? Complex motives probably are involved, including boredom, prestige and altruism. Another reason may be a simple desire for a brief "adventure." For, during the first week, the trainee-volunteers are picked up and taken across the city to the ICDDR,B Treatment Centre, located in a part of Dhaka they probably haven't seen.

For five consecutive mornings a trainee group is met about 7 a.m. by Jahir or another driver, and Ms. Doherty or one of two local ICDDR,B nurses. Lessons begin at 7:30 a.m. and finish at 12:30, when the women are escorted home. During training they're given a total of 50 taka (about U.S. \$ 2.50) for miscellaneous expenses. ▶

"On the first day," Ms. Doherty explains, "the women are taught about diarrhoea in general: what causes it, how to prevent it, how to treat it, and what to feed a victim.

"We emphasize the importance of prevention—including personal hygiene and disposal of human wastes; boiling all river or pond water before drinking or cooking with it; covering left-over food and boiling it before eating it again; and giving new-borns the breast immediately after birth, since mother's milk has been shown to contain antibodies that offer some protection against certain diarrhoeal diseases.

"In Bangladesh this last point often is a stumbling block. For there's a widespread belief that, for the first three days, babies should be fed only honey or sugar and water—because the baby will get diarrhoea from mother's milk. Overcoming this belief is one of our major battles."

Also on day one the women learn the importance of rehydration and the ease of doing it. They learn what's in ORS, how much to give, and what diarrhoea victims can and should eat—almost anything.

Those who can write take notes in a small booklet provided. All the women are expected to draw, though some, unused to it, hold their pencils awkwardly.

Day two is devoted to the signs of dehydration, and to the fact that there are three levels of severity. All but the most severely dehydrated, the women are told, can be treated at home with ORS.

"We teach them," Ms. Doherty says, "that severely dehydrated patients must be seen by a doctor and must not be given ORS. Such patients may be unconscious, vomiting excessively, breathing with difficulty, convulsive, pulseless, or may have a distended abdomen, no urine or excessive stool."

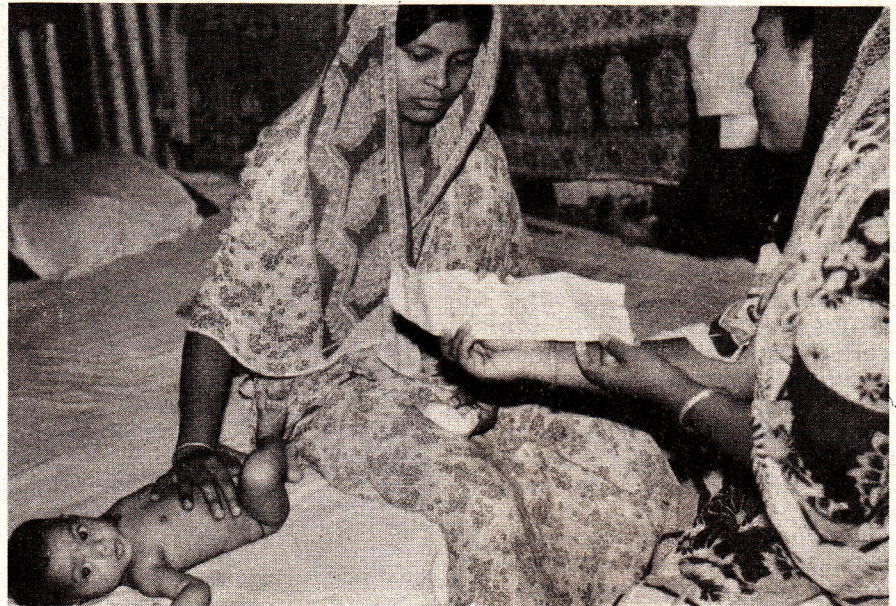
Finally on day two, the students learn to make ORS, using the packet, or measuring the components: 8 teaspoons sugar and one teaspoon salt to a litre of water. Or, where no spoon is available, four, 4-finger scoops of sugar and two 3-finger pinches of salt.

On the third day there's a review. Next, the students visit the treatment ward, where first a nurse and then the students question diarrhoea victims while looking at a

series of coloured charts, which tell a story about diarrhoeal disease transmission, hygiene, nutrition, etc. Different stages of dehydration also are pointed out, and the students get a chance to feed patients ORS, and to give them advice about preventing and treating diarrhoeal disease.

Back in the classroom, the students role play, rehearsing what they will say and do as Urban Volunteers.

"On the fourth day," Ms. Doherty explains, "we accompany them to their community, and go house-to-house seeking diarrhoea victims, and watching our students in action. This is their practical exam."



THE URBAN volunteers not only treat the diarrhoea patients in their community, but also inform and educate the mothers to identify the first signs of danger and what to do next.

The last day is taken up by oral and written exams at the Centre, and a final review of points that still cause confusion. A Centre doctor then distributes certificates, the women are given 50 taka and a notebook, in which they're to record their patients names and pertinent symptoms. They're told that weekly follow-up visits will be made to monitor their progress.

There are 10 such weekly sessions in succession; followed by five, week-long review courses for volunteers trained 3-to-12 months earlier. During these review courses the volunteers also learn the importance of immunization against measles, tetanus, diphtheria, whooping cough and polio—so they will motivate people in their communities to be vaccinated.

Occasionally, Ms. Doherty says, especially well-motivated, relatively educated volunteers stand out. Viewed as future trainers and field supervisors, they are either given additional training at the ICDDR,B's Treatment Centre or at the "New Life Centre," run by the Swedish Mission. Moreover, a few are hired by the ICDDR,B to help with field trials or to work with malnourished hospitalized patients.

"Overall," says Ms. Doherty, "we're extremely proud of our Urban Volunteers, who have made and continue to make an enormous contribution to the health and survival of their communities.

"At the same time, we're grateful to the communities involved,

for having had the foresight to wholeheartedly cooperate with our effort. Moreover, some communities' involvement has exceeded our expectations. Four communities have been so pleased with the results that they have donated a room free, where the volunteers can see patients on a set basis, for several hours on a given day.

"And two other communities have asked us to help them establish a diarrhoea treatment centre. Both have donated the land, and one already has provided a building. In each case they want to have ORS, as well as intravenous facilities for severe dehydration cases.

"Such communities epitomize the goal of the Urban Volunteers program: to help people help themselves." ■

DISC. DISC. DISC. DISC. DISC..... ABSTRACTS

Huq A, Small EB, West PA, Huq MI, Rahman R, Colwell RR. Ecological relationships between *Vibrio cholerae* and planktonic crustacean copepods. *Appl Environ Microbiol* 1983 Jan; 45(1): 275-83

The study was designed to examine any association between *Vibrio cholerae* and zooplankton and to determine whether the presence of copepods influences the survival of *V. cholerae* in the aquatic environment. The strains of bacteria used in the study were *V. cholerae* 01 (classical Inaba and El Tor Ogawa), *V. cholerae* non-01, *V. parahaemolyticus*, *Escherichia coli* and *Pseudomonas* sp. Strains of *V. cholerae*, both 01 and non-01 serovars, were found to attach to the surfaces of live copepods maintained in natural water samples collected from the Chesapeake Bay and Bangladesh environments. Scanning electron microscopy (SEM) confirmed the specificity of attachment of *V. cholerae* to live copepods. Attachment to live copepods appeared to be selective, since the heaviest concentrations of bacterial cells were observed in the oral region and on the egg sac of the copepods. In addition, survival of *V. cholerae* in water was extended in the presence of live copepods. SEM revealed that there was no attachment when cold-killed (by exposure to -60°C) copepods were employed. *V. cholerae* did not survive as long in the presence of dead copepods as in the live copepod system. *V. parahaemolyticus* was also observed to adhere to live copepods, but without selectivity: i.e., the cells covered the whole copepod. The attachment had no effect on survival of the organism in water. Strains of *Pseudomonas* sp and *E. coli* did not attach to live or dead copepods. The attachment of vibrios to copepods was concluded to be significant since strains of other bacteria used in the study did not show any adherence. The attachment phenomenon observed to occur between *V. cholerae* and live copepods was suggested to have ecological as well as epidemiological significance. Since *V. cholerae* serovar 01 is the causative organism for cholera, epidemiological implica-

tions of the results of the study were indicated.

Samadi AR, Wahed MA, Islam MR, Ahmed SM. Consequences of hyponatraemia and hypernatraemia in children with acute diarrhoea in Bangladesh. *Br Med J* 1983 Feb 26; 286 (6366) : 671-3

Abstract:

During 1979, the 1330 children aged below three years and admitted to the ICDDR,B treatment Center with diarrhoea and complications were retrospectively studied for relation between types of dehydration, age, and nutritional state. Stool microscopy and stool culture were done along with other routine laboratory examinations. Serum electrolyte was measured on an I-L flame photometer. Of the 1330 children, 276 (20.8%) were hyponatraemic (serum sodium concentration <130 mmol/L); 969 (72.8%) isonatremic (serum sodium concentration 130-150 mmol/L); and 85 (6.4%) hypernatraemic (serum sodium concentration >150 mmol/L). The incidence of hyponatraemia increased with age, while the incidence of hypernatraemia decreased with age. A significant relation was observed between serum sodium concentration and nutritional state. While incidence of hyponatraemia was directly related to the degree of malnutrition, hypernatraemia was inversely related to it. There was a strong association between case fatality and serum sodium value, and these two followed a linear trend. The case fatality rate was 10.1% in hyponatraemia, 3.8% in isonatremia, and 1.2% in hypernatraemia. The high mortality in hyponatraemic dehydration was probably caused by a decrease in vascular volume. The high rate of incidence and case fatality identifies hyponatraemia as a serious complication of diarrhoea in Bangladesh.

Samadi AR, Huq MI, Ahmed QS. Detection of rotavirus in handwashings of attendants of children with diarrhoea. *Br Med J* 1983 Jan 15; 286 (6360) : 188

Abstract:

Handwashings of rotavirus diarrhoea patients' attendants yielded rotavirus more often than the

FORTHCOMING MEETINGS AND CONFERENCES

Michigan, USA.
THIRD INTERNATIONAL SYMPOSIUM ON MICROBIAL ECOLOGY 7th-12th August 1983.
Information from: Dr. John Breznak, Kellogg Center for Continuing Education Michigan State University, East Lansing, Michigan 4882401022. USA.

Boston, Massachusetts.
THIRD INTERNATIONAL SYMPOSIUM ON AEROBIC DIGESTION 14th-20th. August 1983. Organized by the International Association Research and Control. Information from: R L Wentworth, Dynatech R/D Co. 99 Erie Street, Cambridge, Mass. 02139. USA. ▶

(Contd. on Page 8)

handwashings of non-rotavirus patients' attendants. Stools were collected on admission for the 147 under-five children over of selected for the study. A 20% random sample of tap water, stool specimens and handwashing concentrates were tested for rotavirus antigen using a confirmatory ELISA test. All laboratory assays were performed blind. Handwashings of 78.6% of the attendants of rotavirus positive patients (n=70) and 19.5% of the attendants of rotavirus negative patients (n=77) were positive for rotavirus antigen (P<0.001). The rate of detection of rotavirus in handwashings of attendants of patients with rotavirus diarrhoea was significantly higher in young children (0-23 months) than in older children (24-59 months) (P<0.02). This might be due to the closer contact of attendants with younger children. None of the samples of tap water contained rotavirus. The high rate of detection in attendants of patients with rotavirus suggested that the method of detection is a sensitive indicator of faecal contamination of hands, and might be useful in future studies to trace rotavirus transmission. Rotavirus in the handwashings of attendants of patients with non-rotavirus diarrhoea might have been caused by contact with other attendants and patients in adjacent beds. This implicated a possible role for hands in the spread of rotavirus infection, which might cause hospital outbreaks of rotavirus infections. ■



CONTINUING its three-year-long support of the ICDDR,B, the Kingdom of Saudi Arabia donated another US \$100,000 to the Centre in February. Shown are ICDDR,B Director Dr. William B. Greenough III and Janiel Al-Ghamdi, Saudi Arabia's Charge d'Affairs in Bangladesh. The Centre also began collaborating with Saudi Arabia recently, by setting up a facility to detect and control diarrhoeal diseases in the Kingdom's Eastern Province.

SAUDI EFFORT TO COMBAT DIARRHOEA

Seeking to diagnose, treat and control diarrhoeal diseases, Saudi Arabia signed an agreement with the ICDDR,B. In the first such cooperative effort of its kind, the ICDDR,B began on March 1 to help Saudi Arabia establish a diarrhoea diagnosis and treatment centre in the Kingdom's Eastern Province.

The ICDDR,B experts will train Saudi doctors, specialists and technicians in the management of diarrhoea; and will provide technical expertise aimed at improving and updating the Eastern Province's clinical, microbiological and biochemical laboratories.

Moreover, as little is known about the specific bacterial causes, prevalence and severity of diarrhoeal diseases in the Province, ICDDR,B researchers will do an initial survey.

The cooperative agreement was signed in Dhaka by Dr. Ghazi Abdul Rahman-Gosaibi, Saudi Arabia's Acting Health Minister, and by Dr. W.B. Greenough III, Director, ICDDR,B. Similar ventures are planned for the future in other Middle Eastern and Third World Countries. ■

124 Veterinary Road, Saskatoon, Saskatchewan, Canada S7N 0W0.

Singapore.
INTERNATIONAL EPIDEMIOLOGICAL ASSOCIATION REGIONAL MEETING 3rd-6th. October 1983.

Organized by the Chapter of Community and Occupational Medicine, Academy of Medicine. Information from: IEA Regional Meeting Secretariat, Academy of Medicine, 4-A College Road, Singapore 0316. Tel- 2238968/2245166 ■

DISC. DISC. DISC.....

FORTHCOMING MEETINGS AND CONFERENCES

Kyoto, Japan.
FIFTH INTERNATIONAL CONGRESS OF IMMUNOLOGY 21st-27th. August 1983.

Organized by the Japanese Society for Immunology, under the auspices of the International Union of Immunological Societies. Information from:

Prof. Masao Hanaoka, General Secretary, 5th International Congress of Immunology. C/O Japan Convention Services Inc. Toranomon No: 22, Mori Building. 3-22, 4-Chome, Toranomon, Minatoku, Tokyo, Japan.

Vienna, Austria.
FIRST INTERNATIONAL CONGRESS FOR INFECTIOUS DISEASES 24th-27th. August 1983. Organized by the International Congress for Infectious

Diseases in collaboration with the International Federation for Infectious Diseases. Information from: Congress Secretariat, Interconvention, P.O. Box 80, A 1107, Vienna, Austria.

Singapore.
THIRD CONFERENCE ON EPIDEMIOLOGY IN OCCUPATIONAL HEALTH 28th-30th. September 1983. Organized by the Chapter of Community and Occupational Medicine, Academy of Medicine, 44 College Road, Singapore 0316.

Saskatchewan, Canada.
FOURTH INTERNATIONAL SYMPOSIUM ON NEONATAL DIARRHOEA 3rd-5th. October 1983. Organized by the University of Saskatchewan. Information from: Program Chairman, 4th. International Symposium, VIDO,

EDITORIAL BOARD

Members : Dr. Thomas C Butler, Dr. Ayesha Molla, Dr. S C Sanyal, M. Shafiqul Islam, A K Azad, Md. S I Khan
Editor-in-Chief : Dr K M S Aziz Associate Editor : Shereen Rahman Design & Photography : Asem Ansari

Published by Dr. KMS Aziz, for and on behalf of the International Centre for Diarrhoeal Disease Research, Bangladesh, G P O Box 128, Dhaka 2, Bangladesh. Telex no 65612 ICDD BJ. Photocomposed and Printed by Eastern Commercial Service Limited, Dhaka, Bangladesh.