

**information for action  
resource guide**



**Oral Rehydration Therapy**



PN-AAP-115/62

**information for action**  
**resource guide**

150-33669

# Oral Rehydration Therapy

**Prepared for UNICEF**

World Federation of Public Health Associations (WFPHA)  
Headquarters: P.O. Box 99, 1211 Geneva 20, Switzerland  
Secretariat: American Public Health Association  
1015 15th Street, N.W.  
Washington, D.C. 20005, U.S.A.

**MAY 1983**

# ACKNOWLEDGEMENTS

This resource guide was prepared by Michael N. Favin and Maria E. McMurtry of the American Public Health Association, under the auspices of the World Federation of Public Health Associations, Susi Kessler, Executive Secretary.

The following persons provided technical advice: Christopher Drasbek, Michael McQuestion, and James Rust (PAHO); Richard Cash (Harvard Institute for International Development); Michael Merson (WHO); David Nalin (Maryland Center for Vaccine Development); and UNICEF staff. These persons bear no responsibility for judgments or errors of fact in this document. The report was edited by Diane B. Bendahmane.

Funding was provided by the United Nations Children's Fund (UNICEF) under Contract 82-C-147.

ISBN 0-87553-113-X

Design: Carol Gerson and James True, Washington, DC  
Printing: Techna Graphics, Washington, DC  
Typesetting: C.W. Type, Washington, DC



# CONTENTS

Introduction	1
<b>1.0</b> Overviews of Oral Rehydration Therapy (ORT)	<b>2</b>
<b>2.0</b> ORT Programs	<b>7</b>
<b>2.1</b> ORT effectiveness	<b>7</b>
<b>2.2</b> ORT delivery	<b>8</b>
<b>2.3</b> Education on ORT	<b>12</b>
<b>3.0</b> Technical Issues	<b>14</b>
<b>3.1</b> Contamination of oral rehydration solution (ORS)	<b>14</b>
<b>3.2</b> Ingredients	<b>15</b>
<b>3.3</b> Nutrition and diarrhea	<b>17</b>
<b>4.0</b> Training Manuals	<b>18</b>
<b>5.0</b> Teaching Aids	<b>20</b>
<b>6.0</b> Resource Institutions	<b>21</b>
<b>7.0</b> Journals and Bibliographies	<b>23</b>



# INTRODUCTION

Dehydration that results from diarrhea and vomiting kills five million children each year but could be simply treated by oral rehydration. *The State of the World's Children 1982-83* and accompanying public statements by UNICEF Executive Director James Grant have dramatized the potential effectiveness of large-scale oral rehydration therapy (ORT) programs. UNICEF and the World Health Organization are actively endeavoring to support field staff and national governments in implementing this priority activity.\*

While the basic elements of ORT are well known, discussion continues on important technical and delivery issues. Health and other program staff have expressed interest in obtaining current information on program innovations, with particular reference to such questions as home preparation, communication techniques, and integration of ORT programs in primary health care. This Resource Guide forms part of an experimental effort to inform such readers about selected projects, studies, periodicals, and resource institutions that deal with such important health interventions.

Unlike several existing bibliographies on ORT and the ones now being prepared by the Pan American Health Organization and the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), this Resource Guide is highly selective and oriented to non-technical field staff. Selection of documents for review was made in consultation with technical and field specialists. The items chosen cover and synthesize important issues and experiences. The documents are all quite current, and with few exceptions, they are available in English.

Because this guide is designed for persons who have limited time for reading technical materials, it describes only a small portion of recent literature on ORT. Some important articles and projects are not mentioned. Readers interested in a more in-depth study of this topic should examine the above-mentioned bibliographies as well as references found in the publications listed in this guide.

Readers are encouraged to write directly to publishers, institutions, or projects for published articles. Please write to UNICEF's Programme Development and Planning Division, however, with your reactions to this guide and suggestions for modifications or for topics on which guides might be prepared in the future.

< Oral rehydration solution can be prepared by using premeasured packets, special spoons, local standard measures, or the "pinch and scoop" method. The above illustrations from Sudan show the last method (from WHO, Diarrhoeal Disease Control: Examples of Health Education Materials.)

\*Readers are referred to the document, "The Management of Diarrhoea and Use of Oral Rehydration Therapy: A Joint WHO/UNICEF Statement," (1983).

## 1.0 Overviews of Oral Rehydration Therapy (ORT)

Hirschhorn, N. "Oral Rehydration Therapy for Diarrhea in Children—A Basic Primer." *Nutrition Reviews*, 40(4), April 1982: 97-104. Published by the Nutrition Foundation, 489 Fifth Avenue, New York, NY 10017, U.S.A.

This article reviews the development of ORT during the last 18 years—from biophysical research, to physiological studies at the bedside, to clinical and field trials, and finally to national campaigns. Since the 1940's, knowledge has been accumulating about the mechanisms of rehydration—how the combination of glucose with sodium, potassium salts, and bicarbonate in certain proportions, added to water and taken orally, is a very satisfactory way of compensating for fluid and salt losses occurring in dehydration.

The WHO formula for oral rehydration solution (ORS) represents a compromise that in numerous experiences has achieved satisfactory results for all age groups and most, though not all, dehydration conditions.

In recent years, the interrelations between dehydration and nutrition have become clearer. Just as diarrhea and denial of food, a distressingly common practice, work synergistically to worsen a person's condition, rehydration and resumption of feeding act synergistically to improve a person's condition.

The author feels that "ORT must . . . be delivered through a community-based program to reach the majority of people in the developing world's three million villages." Although many basic technical questions have been answered, additional challenges must be met before ORT can be implemented on a sufficiently wide scale. These include:

- making ingredients available;
- finding ways to measure ingredients accurately;
- finding containers to measure ORS accurately;
- preventing contamination of ORS;
- devising effective ways of educating health workers and families; and
- monitoring and evaluating ORT programs.

The Johns Hopkins University, Population Information Program. "Oral Rehydration Therapy (ORT) for Childhood Diarrhea." *Population Reports*, Series L, No. 2, November/December 1980: 41-75. Available at no charge from the Johns Hopkins University, Population Information Program, Hampton House, 624 North Broadway, Baltimore, MD 21205, U.S.A.

This report provides perhaps the best overall summary of technical and programmatic issues concerning ORT up to late 1980. Topics covered include the rationale for ORT, composition of the complete formula; production; simple sugar and salt solution; measuring and mixing; early use in the home; feeding during diarrhea; purgatives, antibiotics, and other drugs; program organization; ORT and family planning; external assistance; and ORT program evaluation.

The widely used WHO/UNICEF formula for ORS (sodium chloride, 3.5 gms; sodium bicarbonate, 2.5 gms; potassium chloride, 1.5 gms; glucose, 20 gms; and water, 1 liter) is generally regarded from a physiological viewpoint as the most appropriate for worldwide use. Although some pediatricians have argued that it contains too much sodium for infants, public health specialists point out that continued breastfeeding or drinking other fluids in addition to ORS minimizes this risk. (Rehydra-

## DEHYDRATION IN CHILDREN

### EARLY SIGNS

**Mild - 5%**

- THIRST
- DRY MOUTH
- LESS URINE
- WEIGHT LOSS

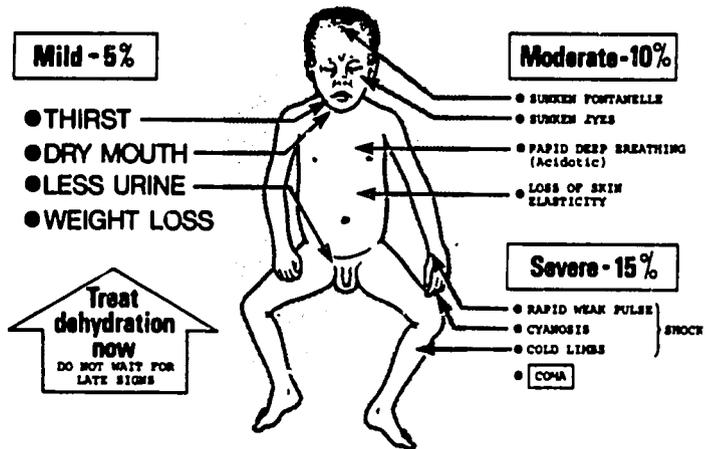
### LATE SIGNS

**Moderate - 10%**

- SUNKEN FONTANELLE
- SUNKEN EYES
- RAPID DEEP BREATHING (Acidotic)
- LOSS OF SKIN ELASTICITY

**Severe - 15%**

- RAPID WEAK PULSE
- CYANOSIS
- COLD LIMBS
- COMA



**Treat dehydration now**  
DO NOT WAIT FOR LATE SIGNS

### THE SIGNS OF SEVERE DEHYDRATION



Two illustrations on how to recognize dehydration. The first is slide 5 from the Foundation for Teaching Aids at Low Cost (TALC) series (see page 20 for citation). The second is from Primary Child Care, page 116 (see page 15).

tion may be divided into two stages. In the initial, replacement stage, water, sodium, and bicarbonate lost up to that time should be rapidly replaced. The second or maintenance stage, which simply calls for replacing new losses as they occur, does not require as high a sodium concentration as the first.)

The major issue today is not the composition of ORS but the provision of necessary services and essential supplies to those who require them. While the per packet production cost for the salts seems very low (as little as U.S. 5c), many governments cannot afford to produce and distribute the many packets that are needed. The alternative is teaching mothers to make and use simple, homemade sugar/salt solutions. It is felt, however, that the lack of potassium and bicarbonate may be detrimental in cases of severe dehydration. It is also felt that without adequate education, mothers may use incorrect proportions and give their children an ORS that is ineffective or dangerous.

Until long-term environmental and behavioral changes lessen the incidence of diarrhea, ORT is clearly the public health measure to be emphasized. The authors point out, however, that even such a relatively simple technology is difficult to deliver. The scope of the task requires careful planning, with specific objectives, reliable logistics, community-wide training, well-designed information programs, and close monitoring and supervision of a multi-

**National Research Council.**  
*Management of the Diarrheal Diseases at the Community Level.* National Academy Press, 1981: 22 pp. Available for purchase on paper or microfiche from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, U.S.A.

*Teaching a mother how to mix ORS.*  
 Academy for Educational Development photo.

tiered treatment system. Because they have a number of features in common with community-based family planning programs, ORT programs may take advantage of some of the infrastructure of the latter.

This report ends with a bibliography that contains 258 citations and tables that describe community-based distribution of ORT and educational components of selected projects and programs.

This small book covers two essential tactics in the management of diarrheal diseases, ORT and continued feeding. It does not discuss in detail health education and other measures to prevent diarrhea or community organization and educational strategies used in conjunction with ORT. Although quite clearly written, the book uses some medical terminology.

Recent experiences have shown ORT to be "the single most important step in the development of a program to manage diarrheal disease at the community level." The authors proceed to discuss several ORT issues, without giving dogmatic answers that disregard the variety of local circumstances in which they must be answered. Table 1 summarizes many of these discussions.

Additional important points are the following. To lessen the risk of too much sodium, water or human milk should be given to patients in addition to ORS. If potassium is not given in ORS, it should be replaced through food (bananas, citrus fruit, or green coconut water, for example). Economic comparisons of different ORT strategies should be made on the basis of cost effectiveness.

Based on current knowledge, continued breastfeeding and/or early reintroduction of feeding during rehydration are desirable. Feeding can begin as soon as the child will accept food, often within a few hours of initiating rehydration treatment. It may be necessary to limit the quantity of milk being offered to avoid milk intolerance, but it



seems likely that the vast majority of patients will exhibit no symptoms and will benefit nutritionally.

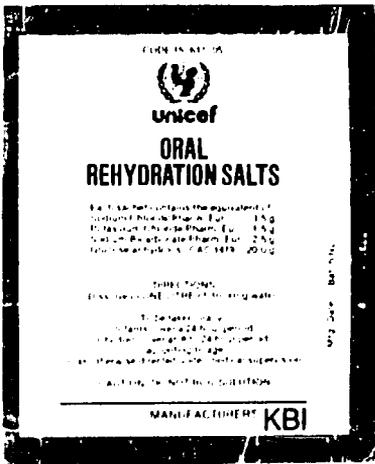
Long-term control of diarrheal diseases involves a community system for surveillance and education on a continuing basis. This requires an investment in infrastructure but means that the program will ultimately include other components of health care, such as education on weaning foods, population control, and environmental sanitation, as well as on immunization and prenatal care. Each of these has a direct effect on the incidence and severity of diarrheal disease and an indirect effect through improved nutritional status.

**TABLE 1: COMPARISON OF DIFFERENT ORT STRATEGIES**

<i>Plan</i>	<i>Advantages</i>	<i>Disadvantages</i>	<i>Situation</i>
Pre-packaged WHO formula.	Effective even for severe cholera. Standardized. Highly visible and identifiable. Effective for cholera and mild diarrhea.	More expensive. Ingredients may not be locally available. Can lead to hyponatremia* if incorrectly used.	Effective for a health system reaching the bulk of the population.
Pre-packaged WHO formula with sucrose.	May cost less. Sucrose may be more readily available.	Less effective for severe diarrhea. May increase vomiting. Ineffective if sucrose deficiency develops.	Effective for a health system reaching the bulk of the population.
Local mixing using WHO formula (spoon set).	No dependence on central facilities. No packaging costs.	Increased risk of error. Storage of ingredients may be a problem.	Effective for a system of urban and rural clinics with outreach to patients.
Home mixing using salt/sugar formula (double spoon).	Reduced costs. Direct participation of community and family. No dependence on health system. Permits early institution of treatment at home.	Not as effective as WHO formula. Requires individual instruction of users. Requires a properly sized container in the home.	Effective where majority has no access to a centralized health service but where there is strong community involvement in health.
Local mixing using salt/sugar (no spoons).	Requires no packets, spoons or devices. Minimum investment. Encourages self-reliance.	Measurement of ingredients is more variable. Efficacy of solution cannot be assumed. Requires instruction, standardization and frequent follow-up.	Effective where provision of measuring spoons is not practical.
Any distribution scheme using formula with lower sodium content (e.g., 60 meq/L).	Decreased risk of hyponatremia.	Risk of hyponatremia.** Less effective in severe diarrhea caused by <i>V. cholerae</i> or <i>E. coli</i> .	Effective where surveillance and surveillance is impossible.

\* condition caused by too much sodium in the blood

\*\* condition caused by too little sodium in the blood



#### ADDITIONAL READINGS

- Booth, I. and J. T. Harries. "Oral Rehydration Therapy: An Issue of Growing Controversy." *Journal of Tropical Pediatrics*, 28(3), June 1982: 116-123.
- Carpenter, C. C. "Oral Rehydration. Is It As Good As Parenteral Therapy?" *New England Journal of Medicine*, 306(18), May 1982: 1103-1104.
- Cash, R. A. "Oral Therapy for Diarrhoea." *Tropical Doctor*, 9, January 1979: 25-30.
- Cash, R. A. "Oral Rehydration for the Treatment of Diarrhea: Its Value As a Health Component in Community Based Family Planning Distribution Programs." Unpublished, 1982: 16 pp. Author's address: Harvard Institute of International Development, 1737 Cambridge Street, Cambridge, MA 02138, U.S.A.
- Center for Development and Population Activities. "Integrating Oral Rehydration Therapy into Community Action Programs: What Role for Private Voluntary Organizations?" Workshop on Oral Rehydration Therapy, March 19-21, 1980. 42 pp. CEDPA, 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036, U.S.A.
- "The Control of Acute Diarrhoeal Diseases: WHO and UNICEF Collaborate in Country Programmes." *WHO Chronicle*, 33(4), April 1979: 131-134.
- Finberg, L. "The Role of Oral Electrolyte-Glucose Solutions in Hydration for Children: International and Domestic Aspects." *Journal of Pediatrics*, 96(1), January 1980: 51-54.
- Finberg L. et al. "Oral Rehydration for Diarrhoea." *Journal of Pediatrics*, 101, 1982: 497-499.
- Goodall, R. "Oral Rehydration Therapy (ORT) for the Treatment of Childhood Diarrhoea." November 1982: 12 pp. Available from UNICEF, 866 United Nations Plaza, New York, NY 10017, U.S.A.
- Hirschhorn, N. "The Treatment of Acute Diarrhea in Children: An Historical and Physiological Perspective." *American Journal of Clinical Nutrition*, 33(3), March 1980: 637-663.
- Jain, A. et al. "Oral Rehydration Therapy." *Journal of the Indian Medical Association*, 75(6), September 16, 1980: 120-123.
- Mahalanabis, D. et al. "Oral Rehydration Therapy—Recent Advances." *World Health Forum*, 2(2), 1981: 245-249.
- Mkandawire, A. C. "Simple and Effective Treatment of Acute Dehydrating Diarrhoeas Including Cholera." *Moyo*, 12(1), April 1980: 3-7.
- Nalin, D. R. et al. "Oral Rehydration and Maintenance of Children with Rotavirus and Bacterial Diarrhoeas." *Bulletin of the World Health Organization*, 57(3), 1979: 453-459.
- Pierce, N. F. and N. Hirschhorn, "Oral Fluid—a Simple Weapon against Dehydration in Diarrhoea: How It Works and How to Use It." *WHO Chronicle*, 31(3), March 1977: 87-93.
- Rohde, J. E. and L. Hendrata. "Oral Rehydration: Technology and Implementation." In eds. D. B. Jelliffe and E.F.P. Jelliffe, *Advances in International Maternal and Child Health*, vol. 1, pp. 82-97. Oxford University Press, 1981.
- Rust, J. and M. McQuestion. "Oral Rehydration Therapy: Perspectives on a Powerful Appropriate Technology Innovation." Pan American Health Organization, 1980: 10 pp.
- Snyder, J. D. and M. H. Merson. "The Magnitude of the Global Problem of Acute Diarrhoeal Disease: A Review of Active Surveillance Data." *Bulletin of the World Health Organization*, 60, 1982: 605-613.

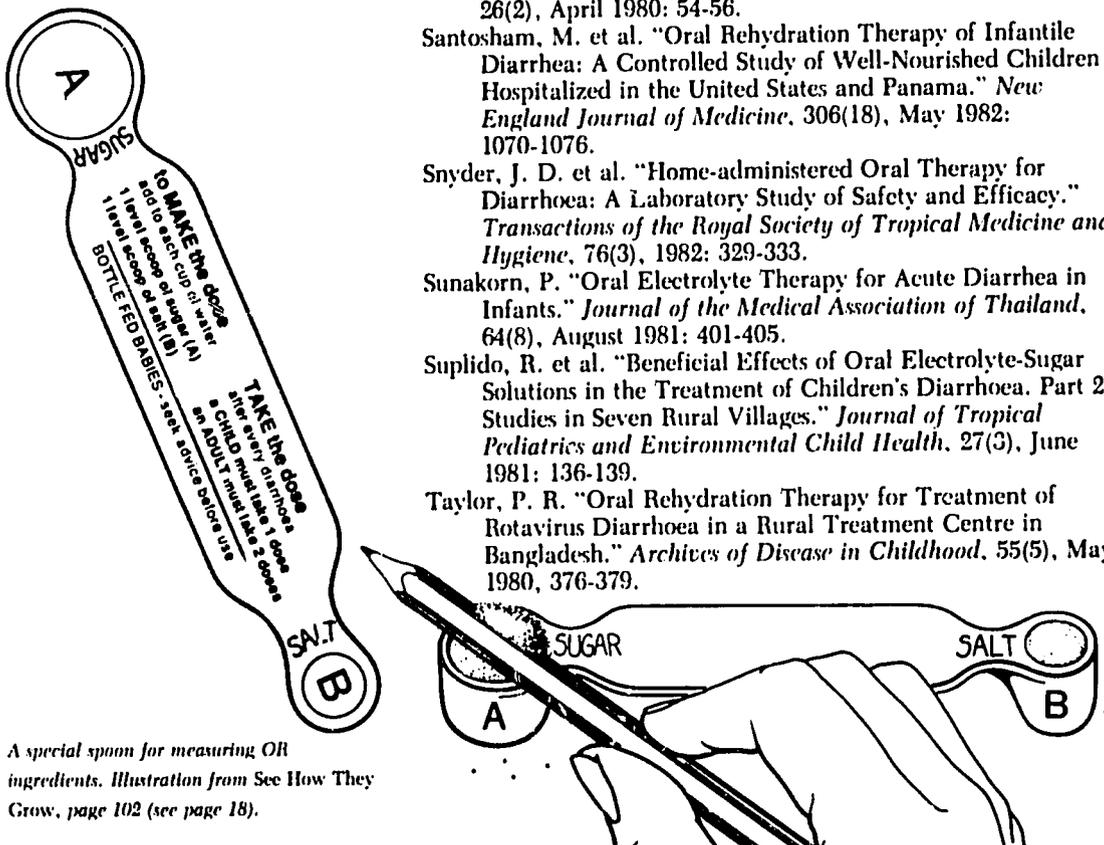
## 2.0 ORT Programs

### 2.1 ORT EFFECTIVENESS

Many studies and programs have shown ORT to be effective in preventing dehydration and in rehydrating persons with diarrhea. Except for a small percentage of cases, ORT is just as effective as intravenous therapy and normally is much more practical. The following articles describe some of these experiences.

#### READINGS

- Barzgar, M. A. et al. "The Evaluation of the Effectiveness of Oral Rehydration in Acute Diarrhea of Children under Three Years of Age in West Azerbaijan, Iran." *Journal of Tropical Pediatrics*, 26(6), December 1980: 217-222.
- Bhutta, T. I. "Oral Rehydration for Diarrhea." *New England Journal of Medicine*, 307(15), October 1982: 952.
- International Study Group. "Beneficial Effects of Oral Electrolyte-Sugar Solutions in the Treatment of Children's Diarrhoea. Part 1. Studies in Two Ambulatory Care Clinics." *Journal of Tropical Pediatrics and Environmental Child Health*, 27(2), April 1981: 62-67.
- McLean, M. et al. "Etiology of Childhood Diarrhoea and Oral Rehydration Therapy in Northeastern Brazil." *Bulletin of the Pan American Health Organization*, 15(4), 1981: 318-326.
- Pizarro, D. et al. "Oral Rehydration of Infants with Acute Diarrhoeal Dehydration: A Practical Method." *Journal of Tropical Medicine and Hygiene*, 83(6), 1980: 241-245.
- Rowland, M. G. and T. J. Cole. "The Effect of Early Glucose-Electrolyte Therapy on Diarrhoea and Growth in Rural Gambian Village Children." *Journal of Tropical Pediatrics*, 26(2), April 1980: 54-56.
- Santosham, M. et al. "Oral Rehydration Therapy of Infantile Diarrhea: A Controlled Study of Well-Nourished Children Hospitalized in the United States and Panama." *New England Journal of Medicine*, 306(18), May 1982: 1070-1076.
- Snyder, J. D. et al. "Home-administered Oral Therapy for Diarrhoea: A Laboratory Study of Safety and Efficacy." *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 76(3), 1982: 329-333.
- Sunakorn, P. "Oral Electrolyte Therapy for Acute Diarrhea in Infants." *Journal of the Medical Association of Thailand*, 64(8), August 1981: 401-405.
- Suplido, R. et al. "Beneficial Effects of Oral Electrolyte-Sugar Solutions in the Treatment of Children's Diarrhoea. Part 2. Studies in Seven Rural Villages." *Journal of Tropical Pediatrics and Environmental Child Health*, 27(3), June 1981: 136-139.
- Taylor, P. R. "Oral Rehydration Therapy for Treatment of Rotavirus Diarrhoea in a Rural Treatment Centre in Bangladesh." *Archives of Disease in Childhood*, 55(5), May 1980, 376-379.



A special spoon for measuring ORT ingredients. Illustration from See How They Grow, page 102 (see page 18).

## 2.2 ORT DELIVERY

**"Diarrheal Diseases Control Programme—Strategies, Effectiveness and Constraints." Session 5 (Chairmen: D. Barua and Aung Than Batu). In eds. E. Holme et al. pp. 361-408. *Acute Enteric Infections in Children. Prospects for Treatment and Prevention*, Elsevier/North-Holland Biomedical Press, 1981. Individual articles:**  
**"Summary of Open Discussion, C.C.J. Carpenter. "National Oral Rehydration Programme in Egypt," L. M. Pal. "Diarrheal Diseases Control Programme in Pakistan. Strategies, Effectiveness and Constraints," S. R. Khan. "Oral Rehydration in the Management of Acute Gastroenteritis in Children in Jamaica," D.E.C. Ashley, A. Akierman, and H. Elliott. "Diarrheal Diseases Control Programme in Indonesia: Its Constraints and Alternatives," Brotowasisto.**

Ellerbrock, T. V. "Oral Replacement Therapy in Rural Bangladesh with Home Ingredients." *Tropical Doctor*, 11, 1981: 179-183.

This series of short articles on national ORT programs describes several interesting similarities and contrasts among country experiences. All countries seem to agree on the severity of the diarrheal diseases problem and on the utility of ORT as the best tool for handling it in the short term. Nonetheless, the programs described differ greatly in that they are at various stages of evolution—from covering all health facilities as in Indonesia and Egypt, to one major hospital in Jamaica, to preliminary programming and research in Pakistan. Two challenges that all countries must meet are the mounting of nationwide orientation/education campaigns for health personnel and the establishment of mechanisms for providing OR salts. In Egypt, Indonesia, and other countries, the establishment of national diarrheal disease or ORT coordinating committees has facilitated the programs' growth. There is still disagreement between those who think that prepackaged ingredients are necessary (Egypt) and those who think that mothers can mix a substantially correct ORS in the home with the aid of a measuring spoon (Indonesia).

Although this is a useful compilation of national ORT experiences, the information is slightly dated and not extremely detailed. Readers desiring more up-to-date and detailed knowledge of national program development should contact national ministries of health or WHO's Programme for Control of Diarrhoeal Diseases.

The author states that packets of OR salts added to the proper amount of water provide the ideal treatment for the vast majority of diarrhea cases. However, it is currently impractical to supply these to every household in poor, rural areas such as most of Bangladesh. In Bangladesh, tens of millions of packets would have to be distributed annually in a country where 92 percent of the population live in rural areas and transportation is poor. Cost considerations are another great deterrent to using packets, and understanding packet instructions would probably be very difficult for rural mothers, 80 percent of whom are illiterate. The author also argues that special spoons and containers are less than satisfactory because they are new and foreign to rural mothers. The best solution, if satisfactory results can be achieved, is use of ingredients and containers already found in rural homes.

An experiment of the Bangladesh Rural Advancement Committee (BRAC) tested such a method—often called "pinch and scoop"—and demonstrated that it can be safe, cheap, simple, acceptable, and available to all. Although the pinch and scoop method has not proven satisfactory in other experiences, the BRAC experiment indicates that it can work very well, given careful planning and sufficient health worker supervision.

Twenty oral replacement workers—village women, 20-50 years old, with an average of six years of education—taught mothers to prepare ORS. The health workers received five days of training, worked in teams, and were carefully monitored. During 20-30 minute home visits, they taught women to make ORS using the pinch and scoop method for salt and sugar (in this case sucrose in



*A health worker administers oral rehydration salts to a young boy at a weighing post in Bogor, Indonesia. UNICEF Photo by Bob Mangunwidjojo. ICF 9300.*

Mobarak, A. B. et al. "Diarrhoeal Disease Control Study. May through October, 1980." Egypt, Ministry of Health, Rural Health Department, Strengthening of Rural Health Delivery Project, 1980: 41 pp.

the form of molasses or *gur*, which also contains substantial potassium and a little bicarbonate). They used a local measure for the total volume equal to 467 ml. Also during the visits, the workers taught mothers ten simple educational messages about diarrhea and rehydration.

The program was carefully evaluated through interviews and laboratory analyses of ORS made in a random sample of households. Moreover, the health workers were paid according to the "scores" of the mothers they had taught. (This is a rare example of health workers being given a financial incentive for preventive rather than for curative work.) The evaluation results were extremely satisfactory. In total, 98 percent of the mothers interviewed remembered seven or more of the ten messages, and all knew how to make the solution correctly. Laboratory analysis of the solutions showed that only 1.5 percent had sodium concentrations that were dangerously high and 11.5 percent had concentrations less than desired but nonetheless safe.\*

From May to October 1980, the government of Egypt conducted a controlled study on the use of ORT to reduce child mortality from diarrhea. Six study cells (two control and four "treatment" cells) included 11 villages with a total population of 200,000. The four treatment cells were set up as follows: (1) Oralyte\*\* distributed in homes, (2) Oralyte sold at low price in stores, (3) mothers taught in home visits to prepare a sugar/salt solution supplemented by juice, and (4) mothers given prepackaged sugar/salt in home visits. Data were collected from household surveys, ingredient and utensil surveys, concentration analyses of home-prepared ORS electrolytes, mortality surveys, verbal autopsy reports, and treatment and referral records.

Results indicate that accurate measuring of salt, sugar, and water improved during the study and that the sodium content in all treatment cells closely approximated expected concentrations. Mortality rates of children one month to less than five years in the two control cells and where Oralyte was available mainly from commercial sources did not change significantly from a 1976-79 study to 1980. Where Oralyte was distributed to homes, mortality fell from 18.9 to 11.2. Where sugar and salt was prepared at home, mortality fell from 17.7 to 10.3, and where prepackaged sugar/salt was distributed to homes, mortality declined from 23.4 to 9.3. These three declines of 40-60 percent were statistically significant. Diarrheal deaths were 50 percent lower in the Oralyte home distribution and the two sugar/salt cells than in the two control cells. In 83 percent of a sample of the deaths (50) a physician had been consulted, but only 42 percent (45) of patients had been given fluids; 76 percent received too small a quantity of ORS. The cost per death averted ranged from \$52 in the home-prepared sugar/salt cell to \$691 in the control cell; in the home-distributed Oralyte cell, it was \$104.

\*Dr. Richard Cash, who visited this project, has provided some additional information. "It is important to emphasize that each mother is taught individually and that there is also instruction to men by male members of the team. The teachings of the men usually takes place in market places, at the Mosque, and at the work place. As of March 1983, 2½ years into the project, over 1.7 million households have been visited."

\*\*Prepackaged OR salts (WHO/UNICEF formula)

Results of this important study should be useful to Egypt as well as other countries in designing national ORT programs. Among the key findings of the study are the following: (1) Oralyte and sugar/salt solutions were equally effective when used early in the disease by mothers; (2) mothers can be taught—if the health education effort is repeated and continuous—to become proficient in early management of diarrheal diseases using ORT; and (3) rehydration with sugar/salt appears to be as safe as rehydration using Oralyte. In addition to these significant findings, the authors list several additional lessons useful in planning a national ORT program: (1) the existing health care delivery system needs to be modified so that home visiting becomes a routine part of health services; (2) unfamiliarity with ORT by health workers necessitates training of workers in the use of ORT; (3) supervision of health workers must be upgraded in both quality and quantity; and (4) because staff must do a significant amount of extra work, incentives must be paid to make the program a success.

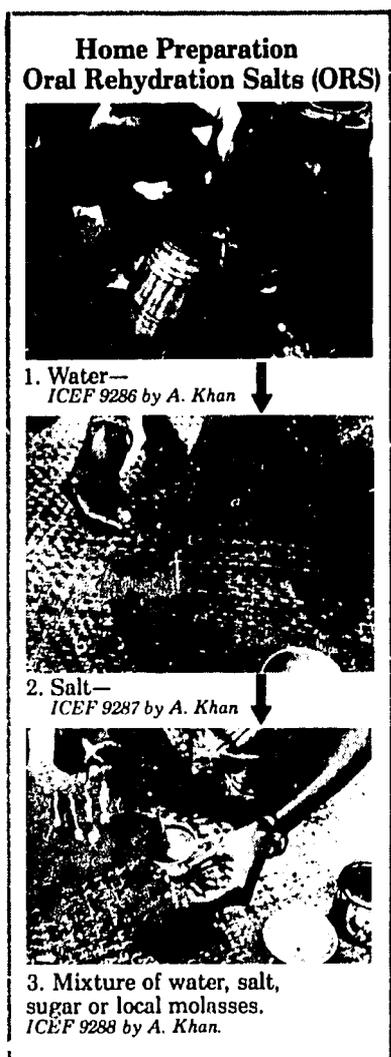
**Tekçe, B.** "Oral Rehydration Therapy: An Assessment of Mortality Effects in Rural Egypt." *Studies in Family Planning*, 13(11), November 1982: 315-327.

This article describes an important ORT study in Menoufia governorate, Egypt. In treatment villages, young local women, selected and trained by the project, taught mothers about ORS during home visits. The results of the experiment were disappointing: villages in which mothers had been taught and given OR salts had essentially the same child mortality rates as control villages. The author argues that since ORT's efficacy has been proven in numerous studies, the cause of the intervention's failure lies in faulty implementation.

Several valuable lessons may be extracted from the experience. The role of dehydration in producing death does not appear to have been appreciated by either mothers or medical practitioners. Investigation revealed that only one-third of the children who died of diarrhea received ORT during their terminal episode, although over 90 percent received medical care. Only one mother administered ORS *before* consulting a health professional. The ORS that was administered was too little and too late. Thus, a crucial lesson is that a good training program for both mothers and health professionals is essential. It is particularly important that mothers and health personnel understand the necessity of maintaining a proper diet during diarrheal episodes. It was found that acceptance and proper use of ORT using household distribution required reinforcement over time. Moreover, the author believes that local health professionals would have been more credible purveyors of new medical knowledge than the young local women who made the home visits. Finally, the author emphasizes the desirability of a comprehensive diarrheal disease strategy that aims to change behavior regarding water use, waste disposal, food preparation and storage, child-feeding and (particularly) weaning methods, as well as proper home treatment.

#### ADDITIONAL READINGS

Chakraborty, J. et al. "Reports on Bangladesh Oral Rehydration Program." ICDDR,B, 1980: 7 pp.



- Chen, L. C. Village-Based Distribution of Oral Rehydration Packets in Bangladesh. *American Journal of Tropical Medicine and Hygiene*, 29(2), March 1980: 285-290.
- Clements, M. L. "Sudan Community-Based Family Health Project: Trip Report, August 21-September 2, 1980." Unpublished, 1980: 19 pp. Author's address: Clinical Studies Section, Centre for Vaccine Development, Division of Infectious Diseases, School of Medicine, University of Maryland, Baltimore, MD 21201, U.S.A.
- Cutting, M. A. and T. V. Ellerbrock. "Homemade Oral Solutions for Diarrhoea." *The Lancet*, 1(8227). May 2, 1981: 998.
- Egeman, A. and M. Bertan. "A Study of Oral Rehydration Therapy by Midwives in a Rural Area near Ankara." *Bulletin of the World Health Organization*, 58(2), 1980: 333-338.
- Halperin, D. C. and R. Garfield. "Developments in Health Care in Nicaragua." *New England Journal of Medicine*, 307(6), August 1982: 388-392.
- Harland, P. S. et al. "Composition of Oral Solutions Prepared by Jamaican Mothers for Treatment of Diarrhoea." *The Lancet*, 1(8220), March 14, 1981: 600-601.
- "Home-made Oral Rehydration Solution: Feasibility Study in Nepal." *WHO Chronicle*, 34(12), December 1980: 496-497.
- Huber, D. H. and S. Banu. "A Practical Assessment of Instructions for Oral Rehydration Therapy." Presented at the National Workshop on Oral Rehydration, ICDDR,B, September 26-28, 1979. Unpublished, 1979: 4 pp.
- Isaza, P. et al. "A Diarrhoeal Diseases Control Program among Nicaraguan Refugee Children in Campo Luna, Honduras." *Bulletin of the Pan American Health Organization*, 14(4), 1980: 337-342.
- Kumar, V. et al. "The Introduction of Oral Rehydration in a Rural Community in India." *World Health Forum*, 2(3), 1981: 364-366.
- Levine, M. D. et al. "A Practical, Reliable Method for Preparing Simple Sugar/Salt Oral Rehydration Solutions." *Journal of Tropical Medicine and Hygiene*, 84, 1981: 73-76.
- "Practice of Oral Therapy: Role of Village Practitioners." *Glimpse*, 2(3), March 1980: 2-5.
- Rahaman, M. M. et al. "A Diarrhea Clinic in Rural Bangladesh: Influence of Distance, Age, and Sex on Attendance and Diarrheal Mortality." *American Journal of Public Health*, 72(10), October 1982: 1124-1128.
- Rahaman, M. M. et al. "Diarrhoeal Mortality in Two Bangladeshi Villages with and without Community-Based Oral Rehydration Therapy." *The Lancet*, October 20, 1979: 809-812.
- Rahman, A. S. "Village Practitioners of Bangladesh: Their Characteristics and Role in an Oral Rehydration Programme." Dacca, ICDDR,B, February 1981: 59 pp. Thesis and Dissertation No. 2.
- Ransome-Kuti, O. "Dependence on Commercial Oral Rehydration Preparations." *The Lancet*, 2(8203), November 15, 1980: 1080.
- Reinke, W. A. "Sudan: Community-Based Family Health Project." Unpublished, February 12, 1980: 15 pp. Author's address: Johns Hopkins University, School of Hygiene and Public Health, 615 N. Wolfe Street, Baltimore, MD 21205, U.S.A.
- Sullesta, E. O. and D. R. Nalin. "An Evaluation of the Oral Rehydration Therapy Program of the Ministry of Health of the Government of Jordan." Unpublished, 1981: 71 pp. American Public Health Association, International Health Programs, 1015 15th Street, N.W., Washington, D.C. 20005, U.S.A.

### 2.3 EDUCATION ON ORT

Hendratta, L. and J. E. Rohde. "Oral Rehydration: Where Do We Go from Here?" In, eds. D. B. Jelliffe and E.F.P Jelliffe, vol. 1, pp. 98-104. *Advances in International Maternal and Child Health*, Oxford University Press, 1981.

The authors of this article believe that whereas twenty years ago the major obstacle to preventing dehydration from diarrhea was lack of a practical technology, today the major impediments are organizational and socio-cultural—how to make available a known and proven technology when and where it is needed and how to modify mothers' behavior so they will use it. The authors examine the socio-cultural barriers to wider acceptance and use of ORT. Rather than advocating a traditional health education strategy for effecting behavioral change, they recommend a social marketing strategy that utilizes the techniques of commercial advertisers.

The authors claim that a major reason that the simple, cheap, and proven technology of ORT is not saving more lives is the failure of health programs to convince mothers to use or demand it. Many mothers throughout the world do not understand that diarrhea is an illness, that it causes many deaths, and that ORT can prevent these deaths. Also, many mothers withhold food from their children who have diarrhea. Before mothers will be motivated to use ORT, they must change their thinking on these questions.

The authors suggest that each country develop an appropriate delivery strategy that maximizes coverage, even at the slight sacrifice of effectiveness and quality control. This usually means educating and motivating mothers to prepare and dispense ORS in their homes. The use of plastic spoons to measure ingredients can facilitate both motivation and education of the mothers.

The aim of a social marketing strategy is to use messages based on present values, beliefs, and practices in order to make the product (ORS) a culturally accepted practice and norm. Messages, based on popular beliefs, should show consumers how using ORT will help them achieve social goals (healthy, happy children). For example, in Indonesia, where traditional herbal medicines are highly esteemed, the educational messages should talk about ORS as if it were one of those medicines.

Educational messages should be consistent. They should explain to the listener when a child should be seen by a health professional; and it is very important that the latter be prepared to play his or her role effectively. In a comprehensive strategy, each target audience—mothers, village health workers, and health facilities' staff—should receive appropriate but varied messages. Messages for mothers should come by way of as many routes as possible—mass media, women's groups, village meetings, and schools.

Academy for Educational Development (AED), Mass Media & Health Practices Project. *Semiannual Report No. 8* (covering the period April 1, 1982—September 30, 1982). Washington, DC: 1982. Over 20 publications on this project are available from AED, 1414 22nd Street, NW, Washington, DC 20037, U.S.A.

This report summarizes activities of the Mass Media and Health Practices Project in Honduras and the Gambia. With support from AID, the project assists national health personnel to develop public education campaigns to deliver information on home treatment of infant diarrhea, including the proper preparation and administration of ORT. Other related messages cover rural water use, sanitation practices, infant feeding, food preparation, and personal hygiene. The campaigns combine radio, specialized print materials, and health worker training.

In Honduras, project activities include the training and

orientation of health personnel at all levels and the testing and development of educational radio spots and programs, cloth flip charts for community health workers, and a variety of print media such as posters and a photo-novel. Among the many innovative educational ideas used are a radio game show in which listeners win a variety of prizes by correctly answering questions on diarrhea and ORT. The project also held a one-day seminar for radio announcers and has instituted competition among radio stations for the best support of the educational project.

In the Gambia, the project supports similar training and educational activities. One particularly interesting aspect of this program is the training of 840 "Red Flag Volunteers" who fly red flags over their compounds to indicate that they have been trained to mix ORS correctly for children in need.

#### ADDITIONAL READINGS

Academy for Educational Development, Inc. "Principal Health Considerations for a Public Education Campaign on Prevention and Treatment of Infant Diarrhea." May 15, 1980: 19 pp. Write to AED, 1414 21st Street, N.W., Washington, D.C. 20037, U.S.A.

"Carrying out a Survey on Attitudes to Diarrhoea." *Diarrhoea Dialogue*, 9, May 1982: 6-7.

Costa Rica. Caja Costarricense de Seguro Social. *Rehidratación oral. Diseño de comunicación para el componente educativo*. San José: Departamento de Relaciones Públicas, 1979: 24 pp.

Hilton, D. "Health Education by Story Telling." *Tropical Doctor*, 12, October 1982: 236-237.

McCord, C. "Evaluation of Menoufia, Egypt, Oral Rehydration Project." Unpublished, 1980: 29 pp. American Public Health Association, International Health Programs, 1015 15th Street, N.W., Washington, D.C. 20005, U.S.A.

World Health Organization. *Diarrhoeal Disease Control: Examples of Health Education Materials*. 1982: 56 pp. Available from the Programme for Control of Diarrhoeal Diseases, World Health Organization, Ch-1211 Geneva 27, Switzerland, or WHO Regional Offices.



Teaching health workers how to mix ORS in the Gambia. Academy for Educational Development photo.

## 3.0 Technical Issues

### 3.1 CONTAMINATION OF ORAL REHYDRATION SOLUTION (ORS)

World Health Organization, Programme for Control of Diarrhoeal Diseases. "Use of Locally Available Drinking Water for Preparation of Oral Rehydration Salt (ORS) Solution." WHO, Geneva, no date: 6 pp.

This paper summarizes current knowledge regarding contamination of ORS. (1) Growth of enteric bacteria in ORS: ORS prepared with untreated water containing organic matter can support the growth of enteric bacteria at the normal temperature in countries where ORS is most likely to be extensively used. Even ORS made from water that is distilled, boiled, or autoclaved may support the growth of enteric bacteria. (2) Risk associated with ORS that is not bacteria-free: Although this needs further investigation, in one study in Gambia, the use of contaminated water had no measurable adverse effect on children. (3) Possible methods of decontamination of water and/or ORS: No chemical method has yet proven satisfactory. Boiling water is an effective method of decontamination but it has many disadvantages (cost, time, later contamination, etc.). Preliminary results for decontamination by sunlight are promising.

After mentioning areas needing further investigation, the paper concludes with several recommendations: (1) ORS should be prepared with water made potable by recognized methods (e.g., boiling, chlorination) in containers washed with such water. (2) ORS should be protected against subsequent contamination and kept in a cool, dark place. (3) Generally, the *best* available water should be used. (4) ORS should ideally be used within 12 hours and never kept for more than 24 hours. Mixing ORS in relatively small volumes may facilitate this.

#### ADDITIONAL READINGS

- Acra, A. et al. "Disinfection of Oral Rehydration Solutions by Sunlight." In Camp, Dresser and McKee. *Report of the Water and Sanitation for Health (WASH) Project*. May 1980: 4 pp. Available from: WASH, 1611 N. Kent Street, Room 1002, Arlington, VA 22209, U.S.A.
- Acra, A. et al. "Disinfection of Oral Rehydration Solutions by Sunlight." *The Lancet*, 2(8206), December 6, 1980: 1257-1258.
- Black, R. E. et al. "Proliferation of Enteropathogens in Oral Rehydration Solutions Prepared with River Water from Honduras and Surinam." *Journal of Tropical Medicine and Hygiene*, 84(5), October 1981: 195-197.
- Cash, R. and L. Chen. "Possible Disinfection of Oral Rehydration Solutions: Notes from November 13, 1980 Meeting." In Camp, Dresser and McKee. *Report of the Water and Sanitation for Health (WASH) Project*. May 1980: 9 pp.
- Isely, R. B. "Oral Rehydration Fluids: To Disinfect or Not To Disinfect. A Preliminary Report of a Limited Literature Review." In Camp, Dresser and McKee. *Report of the Water and Sanitation for Health (WASH) Project*. May 1980: 5 pp.
- Santosham, M. et al. "Storing Oral Rehydration Solution." *The Lancet*, 1(8275), April 3, 1982: 797.
- Shields, D. S. et al. "Electrolyte-Glucose Concentration and Bacterial Contamination in Home-Prepared Oral Rehydration Solution: Field Experience in Northeastern Brazil." *Journal of Pediatrics*, 98(5), May 1981: 839-841.

Watkinson, M. et al. "The Use of Oral Glucose Electrolyte Solution Prepared with Untreated Well Water in Acute Nonspecific Childhood Diarrhoea." *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 74(5), 1980: 657-661.



Workers wear masks as they prepare packets of ORS in this factory in Dhaka, Bangladesh. UNICEF Photo by Akil Khan, ICLE 9273

### 3.2 INGREDIENTS

Many exciting experiments, most seeking an effective substitute for ORS ingredients that must be manufactured or imported, have been conducted in the past two years. One of the most promising areas of inquiry is the substitution of rice powder or rice water for glucose in ORS. Such a substitution, if resulting in no loss of effectiveness, is extremely attractive for several reasons:

- Rice is a staple of 60 percent of the world's population and hence is both available and acceptable to vast numbers of people;
- Where rice is a staple, it is already eaten at least twice a day, so it costs no additional money;
- Since it is already boiled, no extra fuel is needed;
- Where it is boiled for some time, it is less likely to be contaminated.

Initial experiments with a rice powder solution have been encouraging. In Bangladesh, a rice-based electrolyte solution proved to be as effective as the standard WHO-recommended ORS in correcting dehydration and maintaining hydration. Rice-powder ORS had the additional attribute of not increasing the rate of diarrhea, as glucose does. Work in Calcutta (described in F. C. Patra et al.) has produced similar results.

Despite some reported success in the field, WHO maintains that rice water, the water left over from cooking rice—in contrast to rice-powder ORS—can be helpful only in the very early stages of diarrhea, before significant dehydration has set in. More experiments with these two

ORS variations are needed to refine our understanding of their efficiency and safety.

#### ADDITIONAL READINGS

- Black, R. E. et al. "Glucose vs. Sucrose in Oral Rehydration Solutions for Infants and Young Children with Rotavirus-Associated Diarrhea." *Pediatrics*, 67(1), January 1981: 79-83.
- Clements, M. L. et al. "Comparison of Simple Sugar/Salt versus Glucose/Electrolyte Oral Rehydration Solutions in Infant Diarrhea." *Journal of Tropical Medicine and Hygiene*, 84, 1981: 189-194.
- Clements, M. L. et al. "Oral Therapy with Glucose Electrolyte Solution." *The Lancet*, 2(8184), June 5, 1980: 34.
- Clements, M. L. et al. "Potassium Supplements for Oral Diarrhoea Regimens." *The Lancet*, 2(1899), October 18, 1980: 854.
- Greenough, W. B. III et al. "Lobon-gur (Common Salt and Brown Sugar) Oral Rehydration Solution in the Diarrhoea of Adults." Scientific Report No. 36, ICDDR,B, 1980: 17 pp.
- Kjellman, B. et al. "Oral Solutions for Gastroenteritis—Optimal Glucose Concentration." *Archives of Disease in Childhood*, 57(4), April 1982: 313-315.
- Ludan, A. C. et al. "The Use of Modified Coconut Water for Rehydration." *Journal of the Philippines Medical Association*, 57(3), March 1981: 55-61.
- Molla, A. M. et al. "Rice Powder Electrolyte Solutions As Oral Therapy in Diarrhoea Due to *Virbrio Cholerae* and *Escherichia Coli*." *The Lancet*, (1) 8285, June 12, 1982: 1317-1319.
- Nalin, D. R. et al. "Effect of Glycine and Glucose on Sodium and Water Absorption in Patients with Cholera." *Gut*, 11, 1980: 768-772.
- Nalin, D. R. et al. "Comparison of Low and High Sodium and Potassium Content in Oral Rehydration Solutions." *Journal of Pediatrics*, 97(5), November 1980: 848-853.
- Nalin, D. R. and R. A. Cash. "Rice Powder and Electrolyte Solutions." *The Lancet*, 2(8290), July 17, 1982: 155-156.
- Patra, F. C. et al. "Is Oral Rice Electrolyte Solution Superior to Glucose Electrolyte Solution for Infantile Diarrhoea?" *Archives of Disease in Childhood*, 57, 1982: 910-912.
- "Rice Powder As an Alternative of Sucrose in Oral Rehydration Solution." *Glimpse*, 3(11), November 1981: 2-4.
- "Rice Water for Diarrhoea." *Health for the Millions*, 8(5), October 1982: 18-19.
- "Rice Water Rediscovered for Treating Diarrhoea." *Future*, 5, 1982 fourth quarter: 53-55.
- Sack, D. A. et al. "Oral Rehydration for Diarrhea." *New England Journal of Medicine*, 307(15), October 7, 1980: 953.
- Sack, D. A. et al. "Oral Therapy in Children with Cholera: A Comparison of Sucrose and Glucose Electrolyte Solutions." *Journal of Pediatrics*, 96(1), January 1980: 20-25.
- Sandhu, B. K. et al. "Oral Rehydration in Acute Infantile Diarrhoea with a Glucose-Polymer Electrolyte Solution." *Archives of Disease in Childhood*, 57(2), February 1982: 152-154.
- Santosham, M. et al. "Oral Electrolyte Solutions for Infantile Diarrhea." *The Lancet*, 2(8243), September 3, 1981: 581.
- Yip, W. C. et al. "Oral Rehydration for Diarrhea." *New England Journal of Medicine*, 307(15), October 7, 1982: 952.

### 3.3 NUTRITION AND DIARRHEA

Malnutrition and diarrhea are intimately connected. Each worsens the other and together they cause an estimated six million deaths in children under five each year. A second connection between them is the fact that simple nutrition interventions, such as growth monitoring and nutrition education, have been shown to be excellent complements to ORT in improving infant and child health. Finally, during diarrhea and ORT, it is extremely important that the child resume normal eating as soon as possible. Although folk beliefs work against this resumption of food, a child's desire for food appears to be increased by ORT.

How this can happen was shown in a Philippines experiment. ORS administered to children with diarrhea was associated with greater average weight gain compared with a control group both during an attack of diarrhea and over a seven-month period. The longer-term effect on weight, relative to a national standard weight for age, was more pronounced in children who had more than one attack of diarrhea. The size of the longer-term weight gain was three to five percent toward the standard weight. It thus appears that the vigorous compensation of salt and fluid losses improved children's appetites following diarrhea.

#### ADDITIONAL READINGS

- Chen, L.C. and N. S. Schrimshaw, eds. *Diarrhea and Malnutrition. Interactions, Mechanisms, and Interventions.* Plenum Press, 1983. 318 pp.
- Hoyle, B. et al. "Breast-Feeding and Food Intake among Children with Acute Diarrheal Disease." *American Journal of Clinical Nutrition*, 33(11), November 1980: 2365-2371.
- Khan, M. A. and J. Baker. "Nutrition in Primary Health Care." Pakistan National Nutrition Foundation, Medical Centre, Islamabad, Pakistan, June 1978: 78 pp.
- MacLean, W. C. et al. "Nutritional Management of Chronic Diarrhea and Malnutrition: Primary Reliance on Oral Feedings." *Journal of Pediatrics*, 97(2), August 1980: 316-323.
- "A Positive Effect on the Nutrition of Philippines Children of an Oral Glucose-Electrolyte Solution Given at Home for the Treatment of Diarrhoea. Report of a Field Trial by an International Study Group." *Bulletin of the World Health Organization*, 55(1), 1977: 87-93.
- "The Role of Oral Rehydration as a Nutrition Intervention." *Glimpse*, 2(8), August 1980: 1-3.



Mother in Honduras using OR salts packet to mix ORS. Academy for Educational Development photo.

## 4.0 Training Manuals

World Health Organization, Programme for Control of Diarrhoeal Diseases. *Manual for the Planning and Evaluation of National Diarrhoeal Diseases Control Programmes*. 1981: 110 pp. (WHO/CDD/SER/81.5). Available from World Health Organization Distribution and Sales Service, 1211 Geneva 27, Switzerland. Also available in French and Spanish.

This manual has been designed to assist health management staff in planning and evaluating national programs to control diarrheal diseases. It is the basic reference source for the WHO Training Course for National CDD Programme Managers. The manual is divided into four chapters. Chapter one describes the current problem of diarrhoeal diseases and past efforts at control. In addition, the chapter includes a method to measure morbidity and mortality due to diarrhoea. Chapter two develops a plan of operation. It identifies the environment in which the program will function and discusses the resources which will be needed and the objectives and activities which must be included. Chapter three is concerned with the evaluation of the program by those who are participating in it. Chapter four details the elements of a periodic and comprehensive review of the program.

### ADDITIONAL READINGS

- Aarons, A. and H. Hawes. *Child-to-Child*. 1979: 54-61. For more information write to: Child-to-Child Programme, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, U.K. (The book is available for about U.S. \$2 from TALC, Institute of Child Health, at the same address.)
- Hertang, I. R. de and J. Courtejoie. *L'enfant et la santé*. 1980: 244-269. Available from Bureau d'Etudes et de Recherches pour la Promotion de la Santé, B.P. 1977, Kangu-Mayumbe, Zaire, Cost: U.S. \$10.
- International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). *Manual on Treatment and Prevention of Diarrhoea*. 1980. 16 pp. (Special Publication, No. 12) Available from: ICDDR,B, G.P.O. Box 128, Dacca-2, Bangladesh. Cost: U.S. \$4.
- King, M., F. King, and S. Martodipoero. *Primary Child Care. A Manual for Health Workers*. 1978: 110-132. Available from: TALC, Institute of Child Health, 30 Guilford St., London WC1N 1EH, U.K. Cost: U.S. \$5.20
- Morley, D. and M. Woodland. *See How They Grow—Monitoring Child Growth for Appropriate Health Care in Developing Countries*. 1980: 97-111. (MacMillan Tropical Community Health Manuals). Available from: TALC, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, U.K. Cost: U.S. \$2.60.
- Werner, D. *Where There is No Doctor: A Village Health Care Handbook*. 1977: 151-161. Available from: The Hesperian Foundation, P.O. Box 1692, Palo Alto, CA 94302. Cost varies depending on origin of purchase request and number of copies. Available in many other languages.

Additional WHO manuals (available from World Health Organization, Distribution and Sales Service, 1211 Geneva 27, Switzerland). Most are also available in French and Spanish.

World Health Organization, Programme for Control of Diarrhoeal Diseases. *Guidelines for Cholera Control*. 1980. 14 pp. (WHO/CDD/SER/80.4).

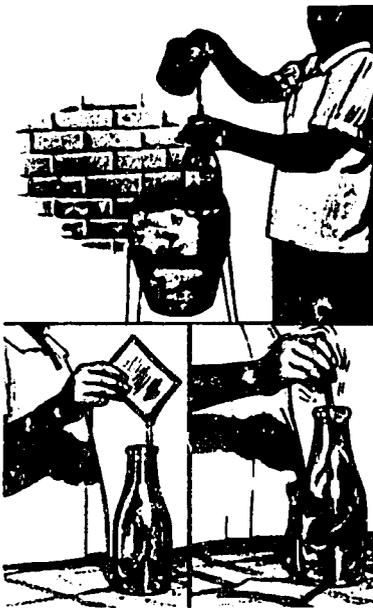
World Health Organization, Programme for Control of Diarrhoeal Diseases. *Guidelines for the Trainers of Community Health Workers and the Treatment and Prevention of Acute Diarrhoea*. 1980. 29 pp. (WHO/CDD/SER/80.1).

- World Health Organization, Programme for Control of Diarrhoeal Diseases. *Guidelines for the Production of Oral Rehydration Salts*. 1980. 58 pp. (WHO/CDD/SER/80.3).
- World Health Organization, Programme for Control of Diarrhoeal Diseases. *Logistics (Training Module)*. WHO, 1980. 45 pp.
- World Health Organization, Programme for Control of Diarrhoeal Diseases. *A Manual for the Treatment of Acute Diarrhoea*. 1980. 25 pp. (WHO/CDD/SER/80.2).



*In the Gambia, red flags fly over the compounds of persons trained to mix ORS correctly for children in need.  
Academy for Educational Development photo.*

## 5.0 Teaching Aids (see also sections 6.0 and 7.0)



Practicing mixing and giving ORS is the best way to learn how to use it. Many useful teaching aids are available to prepare mothers and health workers for this practice. A few are listed below.

Appropriate Health Resources and Technologies Action Group (AHRTAG). *The Prevention of Dehydration with Oral Electrolyte Fluids and How to Recognize Diarrhoea*. 1980: 6 pp. and 2 pp. (Diarrhoeal Disease Information Series nos. 1 and 2). Available from AHRTAG, 85 Marylebone High Street, London W1M 3DE, U.K. (For mid- to senior-level health personnel and for any literate health worker, respectively).

Foundation for Teaching Aids at Low Cost (TALC). "Diarrhea Management" (24 color slides). 1982. Available from TALC, Institute on Child Health, 30 Guilford Street, London WC1N 1EH, U.K. Cost varies from £1.10 to £4.25, depending on mounting and origin of request. (For all levels of health workers.)

Hesperian Foundation. "Teaching About Diarrhea and Nutrition" (72 color slides). 1981. Available from: the Hesperian Foundation, P.O. Box 1692, Palo Alto, CA 94302, U.S.A. Cost: U.S. \$18.00 (For health educators, community health workers, and the public.)

PIACT de Mexico. "Las sales rehidratantes." 2½" by 4" pamphlet of illustrations. 1981. 16 pp. Available from PIACT de Mexico, Shakespeare #27, Mexico 5, D.F., Mexico. (For persons who are illiterate.)

Werner, D. and B. Bower. *Helping Health Workers Learn: A Book of Methods, Aids, and Ideas for Instructors at the Village Level*. 1982: 632 pp. Available from the Hesperian Foundation, P.O. Box 1692, Palo Alto, CA 94302, U.S.A. Cost varies depending on origin of purchase request and number of copies. (For instructors of community health workers.)

*Samples of educational materials on ORT. The first is from a pamphlet developed by PIACT de México to teach non-literates about ORT. The second is from a photo-novel developed by the Honduran Ministry of Health and the Academy for Educational Development.*



## 6.0 Resource Institutions

*Academy for Educational Development, Inc. International Division, 1414 22nd Street, N.W., Washington, D.C. 20037, U.S.A.*

The Academy for Educational Development actively seeks ways to apply communications technology to educational activities in health and nutrition as well as in other development sectors. For the past several years, the Academy has assisted the governments of Honduras and the Gambia with the educational components of national ORT—developing public education campaigns that combine radio, specialized print materials, and health worker training to deliver information on home treatment of infant diarrhea, including the proper preparation and administration of ORS. Over two dozen reports on these projects are available upon request.

*Child-to-Child Programme. Institute of Child Health, 30 Guilford Street, London WC1N 1EH, U.K.*

This international program is designed to teach and encourage school children to concern themselves with the health of their younger brothers and sisters. It includes activities, games, and role-playing which can be taught to the children in school, and which they in turn can share with their families and communities. All of the activities and games can be easily adapted to local situations. The program publishes a manual, a newsletter, and activity sheets. ORT is one of the key topics discussed in these.

*Foundation for Teaching Aids at Low Cost (TALC). Institute of Child Health, 30 Guilford Street, London WC1N 1EH, U.K.*

TALC is a non-profit organization which sells teaching aids for health workers at or below cost. Its major activity is producing and distributing sets of color slides on various topics. In addition, it sells low-cost and not easily obtainable books on health care as well as weight charts, flannel-graphs, and measuring spoons.

*International Centre for Diarrhoeal Disease Research, Bangladesh ICDDR,B. G.P.O. Box 128, Dacca-2, Bangladesh.*

ICDDR,B provides a variety of formal and informal training activities for Bangladeshi scientists, students, and health workers, as well as for participants from other countries. Its fellowship program gives pre- and post-doctoral students the opportunity to spend a few days to several months with ICDDR,B scientists. Inter-regional training courses, in collaboration with WHO, are also offered. These include three two-week courses in laboratory, clinical, and epidemiological aspects of diarrheal diseases. Besides the manual on treatment and prevention and the two periodicals reviewed elsewhere in this bibliography, ICDDR,B has an extensive range of publications on ORT based on field studies in Bangladesh. ICDDR,B is preparing an annotated bibliography on ORT.

*Manoff International. 1789 Columbia Road, N.W., Washington, DC 20009, U.S.A.*

This organization specializes in using advertising techniques to transmit simple health messages. Manoff has worked with nutrition messages in many countries and has promoted ORT through radio messages in Nicaragua.

**PATH/PIACT.** 130 Nickerson Street, Seattle, WA 98109, U.S.A.; **PIACT de Mexico,** A.C., Shakespeare No. 27, Mexico 5, D.F., México.

**Programme for Control of Diarrhoeal Diseases (CDD).** World Health Organization, Diarrhoeal Diseases Control Programme, 1211 Geneva 27, Switzerland.

**UNICEF.** 866 United Nations Plaza, New York, NY 10017, U.S.A.

PIACT is engaged in the supply and distribution of OR salts packets, development of support materials to promote their correct use (including materials for non-literates), implementation of quality assurance procedures, and formulation of new ORS presentations and packaging. PIACT has worked in ORS promotion and distribution in Mexico, Indonesia, the Philippines, Thailand, and Bangladesh.

The CDD Programme was launched by WHO, with the support of UNICEF, in 1978. This program seeks to reduce diarrhea-related mortality and malnutrition in children through the use of ORT and improved feeding practices. The program has two components—implementation and research. The implementation component seeks to incorporate existing knowledge of diarrheal diseases into national primary health care programs. The research component supports the development of new methods and approaches for treating and preventing diarrheal diseases. To date, over 70 countries have shown an interest in developing national programs and 13 countries are producing OR salts on a large scale. Early in 1983, the program will publish a catalog of health education materials on the causes and prevention of diarrhea, including slide sets and other educational materials of its own. Among the program's publications is a series of semiannual bibliographies (*Bibliography of Acute Diarrhoeal Diseases*).

A joint partner with WHO in the CDD Programme, UNICEF has helped fund ORT projects in numerous countries. UNICEF was instrumental in developing ORS and today distributes over 20 million OR salts packets annually as well as aids and supervises local production of salts in various countries. UNICEF's Project Support Communications Service offers assistance in the educational aspects of ORT programs.



*After instruction at a health centre in Rajburi Province, Thailand, a local mother gives her child a dose of OR salts. UNICEF photo by Annat Nikomrat. ICEF 9308.*

## 7.0 Journals and Bibliographies

*Baumslag, N., et al. Oral Rehydration Therapy: An Annotated Bibliography. 1980: 116 pp.*



This bibliography contains annotated references on ORT in the treatment of diarrhea. It is an invaluable resource to individuals interested in an in-depth review of the ORT literature. The 133 entries are arranged in chronological order under five categories: history, clinical trials, composition, impact, and implementation. All the publications in the bibliography are in English, and they cover the period 1949-1979. Author and country indexes are included, and although there is no subject index, there is an adequate cross-referencing system. The Pan American Health Organization is preparing a new, expanded edition that will be available in the spring of 1983. It will be published in English, Spanish, French, and possibly Arabic.

Available without charge in English or Spanish from the Pan American Health Organization, Distribution and Sales Office, 525 23rd Street, N.W., Washington, DC 20037, U.S.A.

*Diarrhoea Dialogue. May 1980 to present (quarterly).*



This newsletter is a forum for the exchange of information on the prevention and treatment of diarrhea. It is directed to primary health workers, planners, and administrators and includes articles and news about ORT and letters and comments from readers.

Available without charge for persons in developing countries from AIIRTAG (Appropriate Health Resources and Technologies Action Group), 85 Marylebone High Street, London W1M 3DE, U.K. Also published in French and Spanish.

*Glimpse. January 1979 to present (eight times per year).*

This newsletter reports on major activities, publications, training, and seminars of the ICDDR,B. It is a monthly publication which looks closely at ICDDR,B and other field projects.

Available without charge from the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), G.P.O. Box 128, Dacca-2 Bangladesh.

*The Journal of Diarrhoeal Diseases Research. First issue, March 1983 (quarterly).*



The Journal of Diarrhoeal Diseases Research will be published by the International Diarrhoeal Disease Information Service and Documentation Centre of the ICDDR,B. Issues will include original research articles, short communications, and letters dealing with all aspects of diarrheal diseases, especially in Asia. Each issue of the journal will include an annotated bibliography of current Asian literature on diarrheal diseases.

Available from ICDDR,B. Cost for four issues: U.S. \$15.00 or \$25.00 depending on origin of subscription (developing or developed country); for institutions, U.S. \$25.00 or \$35.00

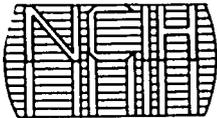
***Mothers and Children.***  
**September 1980 to present**  
 (quarterly).



This is a newsletter about infant feeding and maternal nutrition. It is published three times a year and is directed at health practitioners, nutritionists, planners, and policy makers. Each issue includes technical articles, profiles of innovative programs, summaries of research, discussions of legislation and policy, and reviews of new publications. ORT is a subject which receives frequent attention.

Available without charge from Clearinghouse on Infant Feeding and Maternal Nutrition, American Public Health Association, 1015 15th Street, N.W., Washington, DC 20005, U.S.A. Also published in French and Spanish.

**National Council for International Health.** *Oral Rehydration Therapy Supplement.* 1981: 74 pp.



This is a technical supplement to the *Directory of U.S.-Based Agencies Involved in International Health Assistance* (also published by NCIH). It lists approximately 60 U.S.-based organizations which promote ORT activities overseas. Two appendices are included. Appendix I lists financial and technical resource organizations. Appendix II is a bibliography on ORT. The organizations are listed alphabetically, and there is an index which lists the organizations by country of involvement.

Available from the National Council for International Health (NCIH), 2100 Pennsylvania Avenue, N.W., Suite 740, Washington, DC 20037, U.S.A. Cost: U.S. \$4.00.