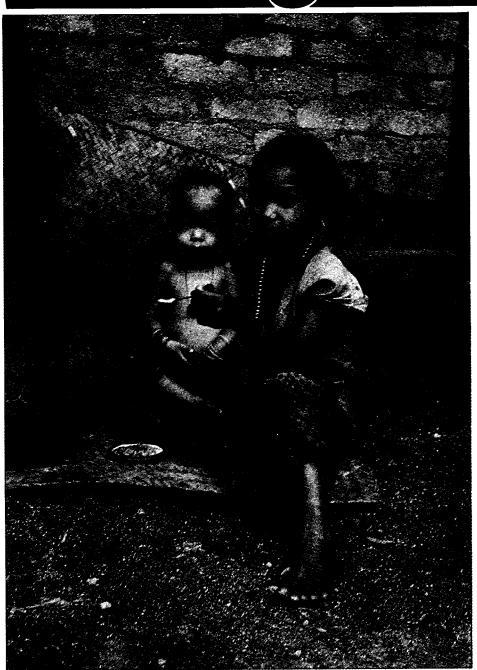
# **Diarrhoea**

ISSUE No. 6

**AUGUST** 1981



Locally produced roasted soya and maize have been mixed with ghee to make the nutritious porridge this girl is feeding to her brother in Nepal. Photograph by Dr David Nabarro

# Diarrhoea and child growth

In healthy children, the nutritional consequences of diarrhoea are not significant. However, diarrhoea can be critical for malnourished children as it causes the appetite to drop and the gut becomes less able to absorb nutrients.

- Rehydration is obviously the priority when a child has diarrhoea. Oral rehydration fluid not only helps to relieve dehydration but also has a positive long-term effect on the nutritional status of the child. Studies in the Philippines and Turkey have shown that children treated with oral rehydration fluid continued to gain more weight for the next six months (in comparison to a control group)(1). However, some children will not accept sugar-salt solution easily and a useful alternative to this in the early stages of diarrhoea is rice water (see page two).
- Children with diarrhoea should be encouraged to feed as soon as possible during an attack. They should not be starved. Even though food passes through the digestive tract much more rapidly during diarrhoea, a certain amount of nutrients are still absorbed. Breastfeeding should always continue.
- High energy foods such as fats, potatoes and yoghurt are well absorbed during diarrhoea (page six). It should be possible to feed the child if you use a cup and spoon and give small amounts frequently.
- If possible, the child should receive an extra meal a day for the first week after the attack.
- (1) Azurin et al 1977 A positive effect on the nutrition of Philippine children of an oral glucose-electrolyte solution given at home for the treatment of diarrhoea. Bulletin of the World Health Organization vol 55.

# In this issue...

- •Mike Rowland reports on infant nutrition and diarrhoea in The Gambia
- Persuading children with diarrhoea to eat
- •News and reviews



Appropriate Health Resources & Technologies Action Group Ltd

# news...news...news...news...

# Rice water and diarrhoea

In South East Asia, rice is prepared in two ways — to produce either dry, cooked rice or, with extra water, rice porridge. This leaves a fluid (rice water) on top of the cooked rice grains.

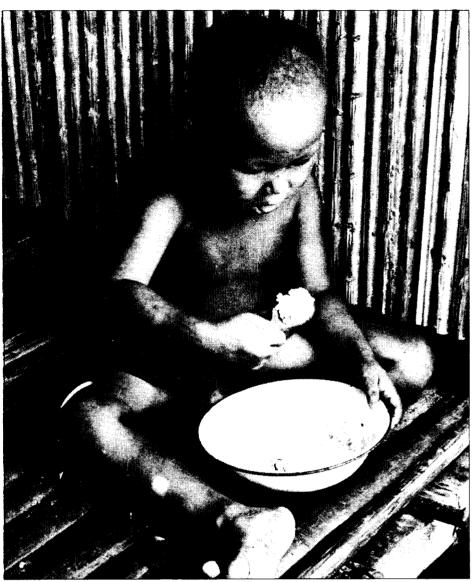
Professor Wong Hock Boon, a paediatrician working in Singapore, has been using rice water to rehydrate babies for several years. If the babies are bottle-fed rice water is given exclusively for the first 24 hours of treatment — breastfeeding can continue as normal<sup>(1)</sup>. Professor Wong and his colleagues have found that many babies who have not responded to other rehydration solutions repond well to rice water. If diarrhoea starts again with the re-introduction of milk, extra rice water is given with additional rice porridge. Older babies are sometimes given rice porridge alone.

The means by which rice water helps to stop diarrhoea are still being researched. One explanation could be that starch-like sugars tend to draw less fluid out of the body and into the gut compared with a similar amount of simple sugar such as glucose. Some babies with diarrhoea can digest starch more easily than simple sugars. The International Centre for Diarrhoeal Disease Research, Bangladesh (ICD-DR,B) is carrying out studies on the inclusion of locally available starches (such as rice starch) as the carbohydrate in oral rehydration solution.

As Professor Wong stresses, the advantage of using rice water is that rice is cooked daily in South East Asia. The rice water is boiled and does not have to be made up and kept in large quantities as is frequently the case with sugar-salt rehydration solutions.

If you would like more information about the use of rice water for rehydration, write to: Professor Wong Hock Boon, National University of Singapore, University Department of Paediatrics, Singapore General Hospital, Outram Road, Singapore.

For information on ICDDR, B's work on locally available starches, write to: Library and Publication Unit, International Centre for Diarrhoeal Disease Research, Bangladesh, G.P.O. Box 128, Dacca-2, Bangladesh.



The advantage of using rice water is that rice is cooked daily in South East Asia. WHO photograph by Dr Gramiccia

(1) Wong H B 1981 Rice water in treatment of infantile gastroenteritis. The Lancet vol 2: 102–103.

# Bangkok seminar

A seminar on diarrhoeal diseases of children in South East Asia in the context of primary health care will take place in Bangkok from 9–12 November 1981. The meeting will be held at the Faculty of Tropical Medicine, Mahidol University, Bangkok. It is being jointly organized by the SEAMEO Regional Tropical Medicine and Public Health Project, the Faculty of Tropical Medicine, Mahidol University, and the Gastro-enterology section of the Paediatric Society of Thailand. For

further details, write to: Dr Tan Chongsuphajaisiddhi, Faculty of Tropical Medicine, Mahidol University, 420/6 Rajvithi Road, Bangkok 4, Thailand. Cable TROPMED. Tel. 2819224, 2819234.

# **IRC** newsletter

The International Reference Centre for Community Water Supply and Sanitation has asked us to mention their monthly newsletter which looks at all aspects of water supply and sanitation. The publication is free and available in either English or French from: International Reference Centre for Community Water Supply and Sanitation, P.O. Box 5500, 2280 HM Rijswijk, The Netherlands.

# news....news...news...news...

# Diarrhée Dialogue

Diarrhoea Dialogue is now available in French. It is being produced and distributed with the help of the Organisme de Recherches sur l'Alimentation et la Nutrition Africaine (ORANA) and the Association Africaine d'Education pour le Développement (ASAFED) in Dakar, Senegal. We have sent copies of



Oral rehydration in Dakar, Senegal Photograph by Dr B. Maire

the first edition to readers currently on our mailing list in French-speaking countries. However, if you have not yet received a copy and would like to be on the French mailing list please contact

# **UNESCO** prize

Readers may be interested to know that our Costa Rican editorial adviser. Dr Leonardo Mata, and his team have been awarded the UNESCO Science Prize for 1980 for their outstanding contribution to scientific and technological development in developing countries.

# **Erratum**

In the article on pit latrines in Mozambique (Diarrhoea Dialogue 5, page 3) there was a mistake in the sentence beginning "The slightly conical shape makes it possible to eliminate the steel reinforcement on a slab 1.1 metres in diameter and less than 4 cm thick." The concrete slab should in fact be 1.5 metres in diameter. The large diameter allows the load to be carried far from the edge of the pit in unstable sandy soils, as well as permitting a wider lined pit in areas with high water tables.

# Reviews

Sanitation without Water Uno Winblad and Wen Kilama 133 pp

Swedish International Development Authority (SIDA)

This is a useful manual first published in 1978 and recently re-issued in a revised form. It describes composting latrines and improved pit latrines of various kinds. The information is of particular interest to health officers, sanitarians and medical auxiliaries working in rural areas. The illustrations in the manual are particularly good.

Requests for copies to: Swedish International Development Authority (SIDA), S-105 25 Stockholm, Sweden.

Rural Water Supply in Developing Countries

Proceedings of a workshop on training held in Zomba, Malawi, 5-12 August

144 pp

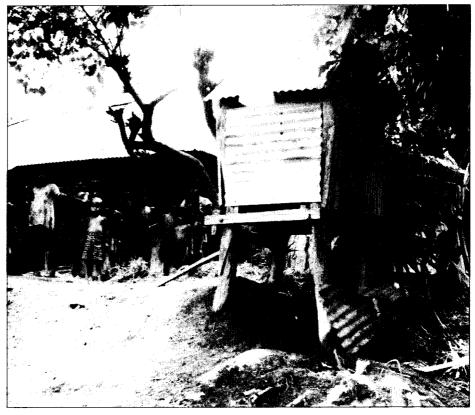
Sanitation in Developing Countries Proceedings of a workshop on training held in Lobatse, Botswana, 14-20 August 1980

172 pp

In August 1980, two regional workshops were organized by the International Development Research Centre (IDRC) — one, in Malawi, on water supply and another, in Botswana, on sanitation. The aim of the workshops was to help spread information on low-cost technologies and to discuss curricula changes and training. These well-presented proceedings include papers given at the workshops, descriptions of field visits and action plans. The books are free and IDRC hopes that, through wide dissemination, the influence of the workshops can spread beyond the countries of the attending delegates.

Requests for copies to: International Development Research Centre (IDRC), Box 8500, Ottawa, Canada K1G 3H9.

Villagers in Bangladesh have built this latrine away from their homes but it is still unhygienic and floods during the monsoon. Photograph by Denise Ayres



# Diarrhoeal disease and nutrition in child

# The diarrhoeamalnutrition complex

The main mechanism by which diarrhoea leads to malnutrition is uncertain and few data exist to clarify the situation. Mike Rowland reports from a long-term study in The Gambia looking into this problem.

Diarrhoea and malnutrition are major causes of childhood morbidity and mortality in less-developed countries. The interaction between the two was highlighted during the early 1960's and an excellent account later published<sup>(1)</sup>. The complex relationship is still not fully understood but two generalizations appear valid.

### Failure to thrive

Malnourished children (i.e. children who are failing to thrive) appear to suffer more severe episodes of diarrhoea than their better nourished counterparts<sup>(2)</sup> and to excrete infective organisms for longer. This situation is complicated by the fact that impaired growth in many of these children may be largely due to the heavy burden of diarrhoea already experienced.

Diarrhoea more than any other infection causes serious growth-faltering in children in many areas of the world.

It is significant that in the three continents where this has been well described all mothers in the study communities breastfed their children for long periods. The children would almost certainly have been worse off if fed otherwise but protection is not complete in most subjects<sup>(3)</sup> nor does breastfeeding preclude serious morbidity in under-privileged communities.

## Food shortage

Some workers feel that food shortage in the community plays a relatively minor role in early childhood growth-faltering and that if diarrhoea could be prevented near-normal growth could occur. The main mechanism by which diarrhoea leads to malnutrition is uncertain and few data exist to clarify the situation. Some suggest that anorexia is the main cause, others that malabsorption due to abnormalities of gut flora and function is a more likely explanation.

### **Seasonal variation**

In The Gambia there is marked seasonal variation in growth and disease in young children and studies there<sup>(4)</sup> have thrown some light on these problems.

At certain times of the year it appears that normal and even catch-up growth is possible on a traditional diet of locally grown food, provided the individual child suffers little diarrhoea. At other times of the year, however, growth is uniformly depressed whether or not diarrhoea occurs and this tends to be the case in the traditional "hungry season". Thus diarrhoea at different times appears to have an effect on growth of widely differing magnitude<sup>(5)</sup>. Just as the aetiology may vary from season to season and also from one age-group to another, so may the nature and severity of the pathological processes which follow infection.

### Malabsorption

In the Gambian community studied diarrhoea is certainly responsible for some reduction in complementary food intake in the weanling child (i.e. the child receiving both breast milk and additional foods), but so are a number of other infections which have little or no detectable effect on growth. Furthermore there are indirect indica-

Sampling food for bacterial examination in The Gambia. Photograph by Dr R. G. Whitehead





An inadequate early weaning food: cereal gruel being given in The Gambia. Photograph by Dr R. G. Whitehead

tions that some degree of intestinal malabsorption may be common in the young village children. On balance it appears that in this community at any rate malabsorption is more important than anorexia in explaining diarrhoea-induced growth-faltering<sup>(6)</sup>.

# Weanlings at risk

Whatever the mechanism it seems clear that the initiation of the weaning process, even when breastfeeding is continued for long periods afterwards, puts children seriously at risk. This is supported by examination of the weaning foods used. In The Gambia the earliest weaning foods are cereal gruels or paps. These are grossly inadequate nutritionally with approximately half the energy-density of breast milk and many of the other nutrients are inadequate or totally lacking.

Furthermore it is these earliest foods which show the highest levels of bacterial contamination, both with

faecal "marker" organisms and known gut pathogens<sup>(7)</sup>. Local fuel shortages make it impossible for mothers to cook frequent meals for small children. Instead larger quantities are prepared and kept for long periods, when they may easily become contaminated.

### A total approach

In this situation we cannot afford to neglect any health strategy including promotion and active support of the breastfeeding mother, the appropriately timed introduction of hygenically prepared, nutritious weaning foods, the general use of complete oral rehydration mixtures, and various aspects of environmental sanitation. In the course of treating children with diarrhoea breastfeeding should be maintained and other foods withheld only if there appears to be clinically important intolerance (and not just malabsorption) to these foods.

We may hope for vaccines against a

number of diarrhoeal agents in the near future but as little is known of the impact of the various individual agents on growth in different communities it would be unwise to try to predict the efficacy of these measures. What it would be helpful to know at this stage is which, if any, organisms are particularly important in the diarrhoea-malnutrition complex; useful work is already being undertaken along these lines in Bangladesh<sup>(8)</sup>.

Mike Rowland, Medical Research Council, Fajara, The Gambia, West Africa.

(1) Scrimshaw N S et al Weanling diarrhoea — a synergism of infection and nutrition. Interactions of nutrition and infection. WHO Monogram Ser. No 57: 216-261

(2) Tomkins A M 1981 Nutritional status and severity of diarrhoea among preschool children in rural Nigeria. The Lancet, April 18: 860–862

(3) Rowland M G M et al 1980 Bacteriostasis of Escherichia coli by milk. Vl. The in-vitro bacteriostatic property of Gambian mothers' breast milk in relation to the in-vivo protection of their infants against diarrhoeal disease. Journal of Hygiene Cambridge 1980 85: 405–413

(4) Rowland M G M, Whitehead R G 1978 The epidemiology of proteinenergy malnutrition in children in a West African village community. Medical Research Council. Available from Nutrition Planning.

(5) Rowland M G M et al 1977 A quantitative study into the role of infection in determining nutritional status in Gambian village children. British Journal of Nutrition 1977 37: 441–450

(6) Rowland M G M 1980 (in press) Interaction between diarrhoea and malnutrition: aetiological considerations. In: Acute enteric infections in children. New prospects for treatment and prevention. Proceedings of Nobel Conference 3.

(7) Rowland M G M et al 1978 Bacterial contamination in traditional Gambian weaning foods. The Lancet January 21: 136–138

(8) Black R E 1980 (in press) Epidemiological importance of diarrhoeal agents in Bangladesh. In: Acute enteric infections in children. New prospects for treatment and prevention. Proceedings of Nobel Conference 3.

# Practical advice series

# Persuading children with diarrhoea to eat

Encouraging a child with diarrhoea to eat is a difficult and exhausting task for the mother. However, children should be encouraged to eat as early as possible during an attack.



This mother in Nepal has provided the best food she can — dried whole grains and milk — as well as oral rehydration solution, but her child refuses to eat.

Although rehydration is the most immediate and vital aspect of the management of diarrhoea, the giving of energy in some form of food is essential. In many parts of the world, people think it is necessary to starve children with diarrhoea. This is dangerous. Starving can start off malnutrition, or worsen it, making the child too weak to fight infection.

### Extra meal

Food should be given to the child as soon as dehydration is corrected, any vomiting stops, and the appetite returns. Breast milk and other liquids (but not cows milk and infant formula foods) should continue during oral rehydration. Once the diarrhoea has stopped, at least one extra meal should

Photographs by Dr David Nabarro

be given each day for a week if possible.

### Small portions

Feed the child with small portions throughout the day. Do not force him to take too much food at a time. The composition of the food can be changed gradually until the child goes back to his normal solid diet. The mother will know which food the child likes best and can further encourage his appetite by adding additional flavouring.

Every effort should be made to feed the child as there is evidence that even during diarrhoea as much as 60 per cent of nutrients are absorbed. In many developing countries, low-energy gruels form the basis of children's diets, and therefore the sick child has to eat much more to obtain sufficient calorie intakes. Try to give a child with diarrhoea a higher intake of energy foods (see Chart A). Mothers need to be shown how to use locally available foods to the best advantage for their children.

# Other important points

- Try to prepare all food in a clean place, using clean pots and utensils.
- Food should be eaten soon after it is cooked. If not, it should be thoroughly heated again before eating.



Patience in trying to persuade a sick child to eat can often be rewarded . . .

- Wash uncooked food in clean water before eating.
- To be sure a young child is getting enough food, try to give him a separate plate or dish. The dish should have a cover.

Α

# Which foods to give:-

During diarrhoea foods which contain a lot of fibre (e.g. coarse fruits and vegetables, vegetable and fruit peel and whole-grain cereals) and spicy foods should be avoided. Energy-rich foods are important (such as bananas, potatoes, yoghurt and cereals cooked with milk, sugar and a little oil) and foods containing potassium (e.g. pineapple and citrus fruits and their juices, bananas and coconut milk) can also be given.

# **Questions and answers**

# From: Sigrid Woelke, Santa Cruz, Bolivia

I am a nutritionist working in a poor rural area in Bolivia where there is a lot of childhood diarrhoea. It seems an excellent idea to me to publish a newsletter about this widespread and dangerous disease.

1. In issue three, page two, you mention the dangers of giving the wrong quantities of oral rehydration solution. What are these dangers? Do they also apply to homemade solutions or just for the packages of sugar and salt?

2. Some literature includes sodium bicarbonate when suggesting recipes for homemade oral rehydration solution, and from articles in Diarrhoea Dialogue I gathered that the packaged oral rehydration salts include sodium bicarbonate as well. However, in issue three all the homemade versions seem to leave it out and use only sugar and salt. Isn't the sodium bicarbonate important for treating acidosis in diarrhoea?

3. I would like to get some recipes for oral rehydration solution that would be useful in areas where there is no possibility of taking children to the doctor. We have no sachets of oral rehydration salts because the idea of oral rehydration is still very new here.

Table A indicates how much fluid should be given according to the weight of the child. As far as composition is concerned, there are fewer problems with adding too much sugar to the quantity of liquid used — although this can happen in some cases.

It is far more likely that when making up homemade oral rehydration solution, too much salt will be added causing hypernatraemia. Again, you can avoid this by measuring out the salt carefully and by tasting the solution. It should not taste saltier than tears. If you are using water from a salty spring source, you should add slightly less salt to the solution. If you are using sachets of oral rehydration salts, as long as the contents are mixed with the correct amount of liquid specified, there should not be a problem of over or under concentration.

As far as sodium bicarbonate is concerned, add this to homemade oral rehydration solution if it is locally available. If not, don't worry, the most important elements of the solution are the sugar, salt and water.

# **Homemade solutions**

There are various ways of making up homemade solutions.

• You can measure out one heaped 5ml teaspoonful of sugar and a finger pinch of salt. Add this to about 250cc of water. It is a good idea to make up the solution in quantities as small as this so that you can use it quickly and avoid storing it for long periods. The UNICEF sachets provide enough salts for one litre of solution, but many sachets being locally produced are designed for smaller quantities. For example, in Costa Rica the Instituto de Investigaciones en Salud has developed a pack of oral rehydration salts — Sueroral — which is being widely distributed together with instructional materials for health workers and mothers. The pack contains the correct amount of salts to be mixed with 8 oz of water (Diarrhoea Dialogue 3, page 3).

● You can obtain two-ended plastic spoons from TALC (Teaching Aids at Low Cost, 30 Guilford Street, London WC1N 1EH, United Kingdom) to measure out enough salt and sugar for 200cc of water. The TALC spoons are available with instructions printed on in different languages and all carry the advice that the oral rehydration solution should be tasted before it is given to the child and not used if it tastes

saltier than tears.

Homemade formulae do not include any form of potassium replacement. There are, however, many locally available sources of potassium that can be added to the solution (such as bananas, oranges and lemons. See *Diarrhoea Dialogue* 3, page seven and *Diarrhoea Dialogue* 5, page seven).

# **Clear instructions**

With all methods of making up oral rehydration solution, mothers and health workers must be given clear instructions on how to prepare the solution correctly. This was well illustrated in an interesting study carried out in Honduras. The authors looked for a simple method of preparing sugar-salt solution using measuring utensils most often available in developing countries(1). Village mothers were asked to bring a teaspoon and a one litre container to the health centre. Sugar and salt were bought in a town market. The method of preparation (one level 5ml teaspoon of salt and four heaped teaspoons of sugar in a litre of water) was described to a 15-year-old girl who was training as an assistant health auxiliary.

Sixteen of the mothers brought the correct size of teaspoon, three brought smaller teaspoons and one a 20ml tablespoon. The solutions made up by the mothers ranged in sodium level from 60–145mmol/l and in sucrose from 1.3–3.7g per cent, all within a safe and effective range.

The authors of the study stress the importance of one person in a village being taught to discern the correct size of utensils so that she can teach and supervise preparation of oral rehydration solutions by mothers. Often, the village midwife can serve this function.

(1) Levine M M el al 1981 A practical, reliable method for preparing simple sugar/salt oral rehydration solution. The Journal of Tropical Medicine and Hygiene, 84: 73–76.

Table A How much oral rehydration solution to give										The Journal of Tropical Medicine and Hygiene, 84: 73–76.								
Child's weight in kilograms		3	4	5	6	7	8	9 1	0 11	12	13	14	15	20	30	40	50	
For the first 4-6 hours of dehydration give: All measurements in ml.		200- 400			400–600			600–800		800–1000			1200 2500 4500 1500 3500					
For continuing diarrhoea and to prevent dehydra- tion from coming back use Method 1 or 2	Method 1: After every diarrhoea stool give:	5	0		100					150			200 300 350 400					
	Method 2: Over 24 hours give:	40	0		600			800		1000		2500						

Reproduced from Diarrhoea Dialogue 3, November 1980

# letters...letters...letters...

# Urban water supplies

UNICEF in Lagos has been kind enough to send me a copy of *Diarrhoea Dialogue* 4. Such a newsletter is long overdue. Although many developing countries, including Nigeria, are trying to have clean pipe-borne water within the next decade the concentration is more in the urban centres.

Eighty per cent of African people are rural dwellers. They depend upon the shallow wells, suspicious water flowing from one village to the other and dirty stagnant pools near the farm tents. They die in thousands of water-borne diseases.

Most of the pipes imported from the advanced nations are not durable. Africa has big rivers, good falls and heavy rainfall. Yet we suffer from inadequate water supplies in big cities.

There is poor planning by most African governments and poor equipment supplied from Europe. Both the suppliers and the users are guilty. Unless there is a change of heart on both sides we may not achieve so much in many African countries by the year 1990.

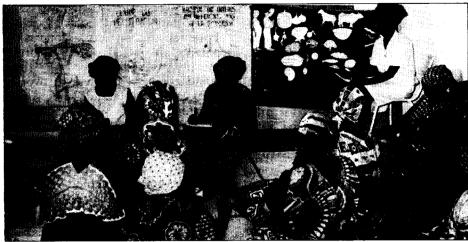
Ade Adetona, P.O. Box 6924, Marina St., Lagos, Nigeria.

## Naso-gastric drip

We are a doctor and nurse working in a very poor and neglected area in Bihar, north-east India. Our main work is the training of village health workers. We make up our own rehydration mixture in plastic bags and the cost of each works out at about 35 paise whereas electrolyte packets available in the shops cost at least 15 times as much.

We have found that in cases of babies with diarrhoea and vomiting and severe dehydration where even small spoonfuls of fluid lead to vomiting, a nasogastric drip is very effective. We have not heard of this method being used before and would like to hear about any similar experiences.

Ms Janet E. Aitken, c/o Bimalendu Das, P.O. Jagdishpur, via Madhupur (S.P.) 815353, Bihar, India.



Midwives in Niger receiving instruction on nutrition during pregnancy. WHO photograph by R. da Silva

### Editors' note: Aspirin and diarrhoea

Diarrhoea Dialogue 5 (page seven) reviewed an article about aspirin and diarrhoea (The Lancet, 1980, Vol 1: 1329–1330). It advised against the use of this household remedy because of possible toxic effects, and since it may distract from the essential treatment—oral rehydration. Dr Steinhoff from India emphasizes other reasons for not using aspirin in the treatment of diarrhoea.

With regard to your review in Diarrhoea Dialogue 5 of the aspirin and diarrhoea study I wish to point out that the mean difference in daily stool volume between the aspirin and nonaspirin groups was approximately 100ml. While this may be a statistically significant difference, I wonder how many paediatricians would consider this a clinically important difference. This volume of "excess" stool loss could easily be made up with an extra cup or two of oral rehydration solution. Although no aspirin toxicity was seen, I doubt if the effect on stool losses is large enough to trouble both the patient and over-worked ward staff with a six-hourly medication.

Mark C Steinhoff, Department of Child Health, Christian Medical College Hospital, Vellore-632004, India.

### Rice water

Many of the people where I am posted use rice water for babies and children with diarrhoea. What benefit, if any, does rice water contain? Also, could you suggest some simple and inexpensive ways that water can be purified in the home? Fuel is very difficult for our people to obtain. We have the extended family situation so it takes a lot of water for the needs of each home.

Patricia Robertson, B.P. 16, Po, Upper Volta.

## Editors' note:

On page two of this issue we have a report from Singapore on a study using rice water for rehydrating babies. You can obtain further information from Professor Wong Hock Boon. For ideas on simple water purification we suggest you contact Samia Al Azharia Jahn, Water Purification Project, P.O. Box 2681, Khartoum, Sudan (see her letter on page eight of Diarrhoea Dialogue 5).

# In the next issue...

Diarrhoea Dialogue 7 will focus on the aetiology of diarrhoea. It will be available at the end of November 1981.

Editors: Dr William Cutting (U.K.) and Dr Katherine Elliott (U.K.)

**Editorial advisers:** Dr David Candy (U.K.), Dr I. Dogramaci (Turkey), Dr Richard Feachem (U.K.), Dr Michael Gracey (Australia), Dr N. Hirschhorn (U.S.A.), Dr D. Mahalanabis (India), Dr Leonardo Mata (Costa Rica), Dr Mujibur Rahaman (Bangladesh), Dr Jon Rohde (Rockefeller Foundation), Dr E. O. Sullesta (Philippines), Dr Paul Vesin (France), Dr M. K. Were (Kenya).

Executive editor: Denise Ayres

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