

# Dialogue on Diarrhoea

Issue no. 49  
June 1992



The international newsletter on the control of diarrhoeal diseases

## The child and its environment

Child health begins at conception. It is influenced by the health of the mother as the foetus grows within the micro-environment of her belly.

After birth, the newborn infant's environment expands to include its immediate family circumstances. Central to these is its mother – breastfeeding by the mother protects and nourishes the newborn with, first, colostrum, and then breastmilk. An infant should consume nothing else during the first four to six months of life. Exclusive breastfeeding (see pages 2-3) plays an important role in providing a safe 'environment' for young babies.

## Hygienic disposal of waste

Health risks increase when the child starts to eat other foods, and to move around inside and outside the home. There is a greater chance that the child will consume contaminated food and water. This happens especially where standards of hygiene are low as a result of insufficient resources or education.

Essential to a safe domestic environment is the hygienic disposal of domestic water and human waste. This is considered in the article on page 6, which looks at the construction of local sewerage systems. Other practical aspects of water supply and sanitation in low income areas have been covered in *DD31*.

As this issue of *DD* goes to press, strategies for protecting the global environment have been discussed at the Earth Summit conference in Rio de Janeiro, Brazil. At the other end of the scale, it is important to



Mary-Ann Maglipon/UNICEF-UK

Alastair Matheson/UNICEF-UK

remember that much can be done to protect the immediate local environment of the child – in the womb, at the breast, in the home and in the community – which largely determines its health now and in the future.

As children grow, they move from the safe 'environment' of exclusive breastfeeding, to face health risks posed by the home and community environment – such as potentially contaminated food.

## In this issue:

- Exclusive breastfeeding
- Diarrhoea and low birthweight
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- Low cost sewerage

# AHRTAG

Appropriate Health Resources & Technologies Action Group Ltd

## Exclusive breastfeeding

The value of *exclusive* breastfeeding in the first four to six months of life is being increasingly recognised.

The importance of breastfeeding in helping to prevent diarrhoea in young children is now widely accepted. There is growing evidence that the risk of death and illness from diarrhoeal infections increases sharply when supplements are given in addition to breastmilk.

Most infants in Africa, Asia and Latin America are breastfed in the first few months of life. But many mothers (as well as doctors and other health workers) wrongly believe that infants under four months old need other liquids in addition to breastmilk, especially in hot climates. In Peru and Brazil, for example, most infants receive herbal teas or water in their first month of life. In Senegal, West Africa, only 5 per cent of infants under five months old are exclusively breastfed, with over two thirds receiving supplementary water<sup>1</sup>.

### Dangers of extra drinks

Giving extra liquids is not only unnecessary, but may also be harmful because:

- The baby may spend less time breastfeeding, which means that the mother's breasts are less stimulated to produce breastmilk. A Brazilian study showed that breastfed infants, who received teas or water in the first days of life, did not breastfeed for as long as those who were exclusively breastfed during their first week<sup>2</sup>.
- The extra fluids may be made with unsafe water and given in feeding bottles which are contaminated. In Peru, babies who received water and teas in addition to breastmilk had twice as many days with diarrhoea in any given month as



**Breast is best – giving extra fluids is unnecessary – a mother in the Philippines breastfeeding her day-old baby.**

those receiving only breastmilk<sup>3</sup>. These findings were confirmed by recent research from the Philippines<sup>4</sup>. Another Brazilian study showed that each additional daily 'feed' with teas or water was associated with a 40 per cent increase in diarrhoea mortality. An infant receiving three feedings of extra fluids a day was almost three times more likely to die than an exclusively breastfed infant<sup>5</sup>.

The message that breast is best, and that giving additional fluids is unnecessary, should be widely promoted among health workers, as well as the wider community.

**Professor Cesar Victora, Centro de Pesquisas Epidemiologicas, Universidade Federal de Pelotas, Pelotas, RS, Brazil.**

1. Dr Jean Claude Lowe, Ministry of Public Health, Cameroon. 1991. *Health worker attitudes towards breastfeeding.*
2. Martines, J C, 1985. *The interrelations between feeding mode, malnutrition and diarrhoea morbidity in early infancy among the*

### What is exclusive breastfeeding?

In order to measure breastfeeding practices, including exclusive breastfeeding, in a standard way, definitions have been agreed. Exclusive breastfeeding is when an infant receives only breastmilk from his or her mother (or a wet-nurse, or expressed breastmilk), and no other liquids or solids.

The following are key to establishing 'exclusive breastfeeding':

- starting to breastfeed within an hour after birth – this ensures that the infant receives colostrum (thicker, yellowish milk produced during the first few days after delivery) as well as breastmilk;
- not giving any prelacteal drinks (any drink given before the first breastfeed), including water, 'holy' or ritually blessed water, sugar or glucose water, herbal teas or other fluids before the first breastfeed;
- breastfeeding frequently, day and night;
- not giving any other food or fluids such as water or infant formula during the first four to six months (until food is introduced between four and six months in addition to breastmilk).

**Note:** An exclusively breastfed child under six months old who develops diarrhoea needs extra fluids to prevent dehydration. WHO recommends that this be oral rehydration solution or clean water, in addition to frequent breastfeeding. Fluids that contain nutrients, such as rice water, gruel, etc, are not recommended. If possible, the infant should be seen by a health worker who is trained to give ORS solution. As soon as the diarrhoea stops, exclusive breastfeeding should be resumed.

*urban poor in Southern Brazil. PhD dissertation, University of London.*

3. Brown, K H, et al., 1989. *Infant feeding practices and their relationship with diarrhoeal and other diseases in Huascar (Lima), Peru. J. Ped. 83:31-40.*

4. Popkin, B M et al., 1990. *Breastfeeding and diarrhoeal mortality. J. Ped. 86:874-82.*

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## Extra drinks are unnecessary

Mothers and health workers often believe that healthy infants need fluid supplements. Stina Almroth explains why extra drinks can do more harm than good.

Families and health workers give extra drinks to breastfed babies for many reasons. Sugar water is often given to prevent or treat constipation. Water is usually given in the belief that it is needed when the weather is hot. Some people believe that too frequent breastfeeding should be avoided and that it is good to give the baby something else, like water, in between breastfeeds. Herbal teas are sometimes given to prevent or treat a variety of ailments.

These beliefs may be understandable, but several studies have shown that extra fluids are not actually needed by healthy infants during the first half year if they are exclusively breastfed. Breastmilk does not make an infant constipated.

Provided that a baby is breastfed frequently to ensure that it gets enough milk, extra drinks are not necessary. People may think that babies, like adults, get thirsty and need extra water when it is hot. Physiologically this is not necessary<sup>1</sup>. Breastmilk is a food and fluid uniquely

balanced for babies, with virtually no excess minerals and protein. Therefore the amount of waste products that need to be excreted in the urine is small, requiring very little water.

Even where the climate is very hot and dry and there is considerable water lost through evaporation from the skin and lungs, a healthy exclusively breastfed baby is not in danger of dehydration. Studies in many hot countries have shown that exclusively breastfed infants do not need extra fluids<sup>2,3</sup>. The concentration of solutes in the urine of these infants was well below levels associated with inadequate fluid intake.

Giving babies glucose water during the first few days after birth has been a common hospital practice. It was thought that this helped to maintain the infant's body weight until the mother started to produce sufficient milk. A study in Australia has shown that babies who received only breastmilk lost less weight during the first few days than infants who received

supplements of glucose water<sup>4</sup>.

Many have assumed that water *supplements* breastmilk, whereas in fact water *replaces* it<sup>5</sup>. Naturally, babies grow better on breastmilk, which contains more than three times as much energy by volume as glucose water.

The message to breastfeed exclusively may seem simple, but promoting it effectively requires carefully designed communication strategies. We must learn what particular extra fluids are commonly given and why. Then our advice to avoid them can be more specific and more effective.

**Stina Almroth, Selmedalsringen 8, 126 70 Hagersten, Sweden.**

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### Health workers: beliefs versus advice

Most health workers believe in the benefits of breastfeeding. But few actually recommend breastfeeding within an hour of birth, and few actually help mothers to establish and practise breastfeeding. This means that infants risk infections from other possibly contaminated fluids, and do not have the immediate post-partum protection provided by breastfeeding and colostrum.

Advice about giving prelacteal feeds, separation of mother and newborn, and delaying breastfeeding until 24 hours after delivery, are still very common.

- In **Senegal's** capital city, Dakar, although more than 80 per cent of health workers questioned believed that colostrum should be given to infants, only a quarter recommended that breastfeeding begin within two hours of birth. One third recommended that the mother wait as long as 24 hours. Sugar water, and 'holy water' were often given to infants before their first breastfeed.

- In Kumasi, **Ghana**, although all of 100 medically qualified midwives asked about infant feeding and giving water supplements<sup>1</sup> believed breastfeeding to be the best method of infant feeding, 75 per cent of them advised giving sugar and water or water alone before the first breastfeed.

Reasons given included: 'to prevent hypoglycaemia' (low blood sugar levels), 'to check the swallowing reflex', or 'to maintain a correct fluid balance'. Only a few said that infants did not need water at any time during the first few months. Most thought that water should be given to all infants on the first day of life, usually within six hours of birth.

A common belief is that the tongue must be cleansed with water after breastfeeding, to prevent oral thrush and that although breastmilk provides an infant with energy, water is essential for life.



**Health workers play a crucial role in helping mothers to establish and practise breastfeeding.**

1. Mackie, E, 1991. *Water supplementation of breastfed infants in Ghana. Letter in The Lancet, vol 338: 251.*

# Low birth weight babies

Children born with low birth weight are at high risk of malnutrition and frequent diarrhoea infections. *DD* explains why, and how to care for them.

Some 22 million low birth weight (LBW) babies are born in the world each year, most of them in less developed countries. These babies weigh under 2,500g at birth, rarely catch up in growth, and are likely to remain malnourished at least during their first four years of life<sup>1</sup>. Low birth weight babies are more vulnerable to a range of infections, including acute respiratory infections and diarrhoeal diseases.

A study in Brazil<sup>2</sup> found that LBW infants are twice as likely to die from diarrhoea as babies weighing 2,500g or more at birth. Malnourished and well nourished children can have equal numbers of diarrhoeal episodes, but in less well nourished children these are more severe or prolonged.

Children of low weight, due to LBW or malnutrition, are also at higher risk of becoming dehydrated during a diarrhoea episode than children who weigh more. One possible explanation for this increased severity has been identified<sup>3</sup>. Infections in the proportionally greater intestinal surface area of small infants and children result in larger stool losses per kilogram of body weight.

- LBW babies should be exclusively breastfed during the first four to six months of life. Breastfeeding should also be continued well into the child's second year, as it protects from diarrhoea and other infections. This requires special efforts from health workers, as

## Home treatment for infants with diarrhoea

### Specific guidelines according to the infant's age and feeding status are:

1. If the infant is less than four to six months old and normally takes breastmilk alone, or with supplements of water or tea, advise the mother to:

- continue to breastfeed as frequently and for as long as the infant wants;
- give ORS solution, or if this is not possible, give plain water, 50-100ml after each loose stool; tea is not recommended.

2. If the infant is less than four to six months of age and normally takes animal milk or formula, with or without breastmilk, advise the mother to:

- continue to breastfeed as frequently and for as long as the infant wants;
- give the usual animal milk or formula, undiluted;
- give ORS solution or plain water.

3. If the infant is taking soft weaning foods, in addition to animal or formula milk and/or breastmilk, advise the mother to:

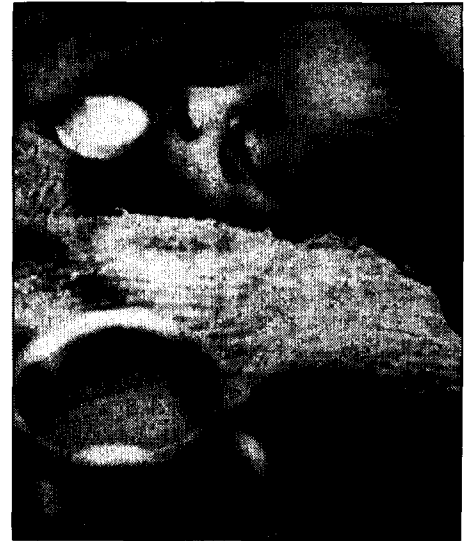
- continue to breastfeed as frequently and for as long as the infant wants;
- give the usual animal milk or formula, undiluted;

- give additional fluids such as ORS solution, rice water, yogurt drink, or plain water; 50-100ml after each loose stool;
- give the normal diet of soft nutritious weaning foods; if the child is over six months of age and not yet taking soft foods, these should start to be given.

### Guidelines that apply to all infants, regardless of their age and feeding status:

- If it is not possible to give measured amounts of recommended fluids after each stool, advise the mother to give the child more fluid than usual, as much as the child will take.
- Special lactose-free or hydrolysed protein formulas should not be used routinely in place of the usual animal milk or formula; they are rarely required.
- Use a clean cup or spoon to give fluids to infants – not feeding bottles which are a source of infection.

All mothers should be taught to bring an infant with diarrhoea for treatment by a health worker, if it does not get better in three days or develops any of the following: many watery stools; repeated vomiting; marked thirst; eating or drinking poorly; fever; blood in the stool.



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If the baby cannot suck, it should be given expressed breastmilk.

these babies are often weaned early<sup>4</sup>.

- Not all LBW babies can breastfeed. For very LBW babies (less than 1,500g) who are unable to suck, expressed breastmilk should be provided with a nasogastric tube or a cup and spoon.
- LBW babies with diarrhoea must be given oral rehydration therapy as soon as possible, as they can easily become dehydrated.
- Parents should seek medical care quickly if a LBW baby with diarrhoea shows any of the following signs: starts to pass many loose or watery stools; has repeated vomiting; becomes very thirsty; is sucking/nursing, eating or drinking poorly; develops a fever; has blood in the stool; or does not get better within three days.

**Drs Fernando C Barros and Cesar Victora, Department of Social Medicine, Universidade Federal de Pelotas, Brazil, and Dr José C Martines, Diarrhoeal Diseases Control Programme, WHO, Geneva, Switzerland.**

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## Facing up to the threat

DD provides guidelines for prevention and treatment.

In 1991, for the first time this century, cholera broke out in Latin America. It has been endemic in Africa since 1970. Now nearly half of the continent's 52 countries have reported cases. Cholera is also endemic in Asia and parts of the Middle East. Isolated cases have been identified in the USA and eastern Europe.

Cholera is treatable and preventable. In some countries only 1 per cent of all people with the disease have died, while in others the death rate has been much higher. Efforts to train health workers in early detection of cases and effective treatment, and to educate the public, are essential in every country at risk.

### How to recognise cholera

Most cholera infections cause only mild symptoms, and the illness resembles other types of watery diarrhoea. The severe form of the disease occurs in only about 5 per cent of infected persons.

The signs of cholera are: frequent vomiting; large amounts of very watery diarrhoea which is straw-coloured and contains little faecal matter (known as 'rice-water' diarrhoea); and rapidly developing signs of severe dehydration due to the loss of large amounts of liquid stool fluid (up to 25 per cent of body weight in a day).

These signs are usually all that is needed to diagnose cholera, especially in children older than five years and adults. Precise laboratory diagnosis is not necessary to determine the best treatment.

### How to treat cholera

- If there is severe dehydration, give Ringer's Lactate Solution intravenously: 30ml/kg in the first 30 minutes, and then 70ml/kg in the next 2½ hours (total IV fluid 100ml/kg).
- Replace ongoing losses of liquid stool with equal amounts of ORS solution by mouth; this may require 5-10ml of ORS solution per kg body weight each hour. If signs of dehydration recur, more ORS solution should be given. In patients with very high rates of stool loss, Ringer's Lactate Solution should be given intravenously until the rate of stool output diminishes.
- Treat severe cases with an appropriate oral antibiotic, such as tetracycline, when vomiting has stopped. **Adult dosage:** 500mg tetracycline four times per day for

three days *or* 300mg doxycycline in a single dose *or* 100mg furazolidone four times per day for three days, *or* 160mg trimethoprim and 800mg sulfamethoxazole twice a day for three days. **Child dosage:** tetracycline 12.5mg/kg four times a day for three days (tetracycline should not be given to children under 12 years of age) *or* (if local resistance) furazolidone 1.25mg/kg four times a day for three days *or* trimethoprim 5mg/kg and sulfamethoxazole 25mg/kg twice a day for three days.

- For patients with some dehydration, give ORS solution by mouth. During the first four hours give approximately:

under 4 months – 200ml to 400ml

4-11 months – 400ml to 600ml

1-4 years – 600ml to 1200ml

5-14 years – 1200ml to 2200ml

over 14 years – 2200ml to 4000ml

- When rehydration is complete and vomiting has stopped (usually 4-6 hours after treatment is started) encourage the patient to eat and drink – infants should continue to breastfeed.

### Prevention in the home

Cholera is spread via the stools of people who are infected with the cholera organism; faecally contaminated water and food are especially important. The majority who are symptomless or have only mild diarrhoea can still spread the disease to others through faecal-oral transmission. Health workers and families can do much to reduce the risk of infection.

**Safe food:** food is contaminated during preparation or storage after cooking, by hands or water contaminated with cholera germs. Cholera vibrio can survive in food for up to five days.

- Wash hands before preparing food and after using the toilet.
- Cook food thoroughly.
- Eat cooked foods immediately.
- Store cooked foods carefully.
- Reheat cooked foods thoroughly.
- Wash fruits and vegetables with clean water, if they are to be eaten raw.
- Use clean, uncontaminated or boiled or chlorinated water to prepare and cook foods.

**Water:** use only clean potable water for drinking or washing food, or water that has been:

- disinfected with alum potash or chlorine;
- boiled (for up to five minutes); or
- collected as rainwater.

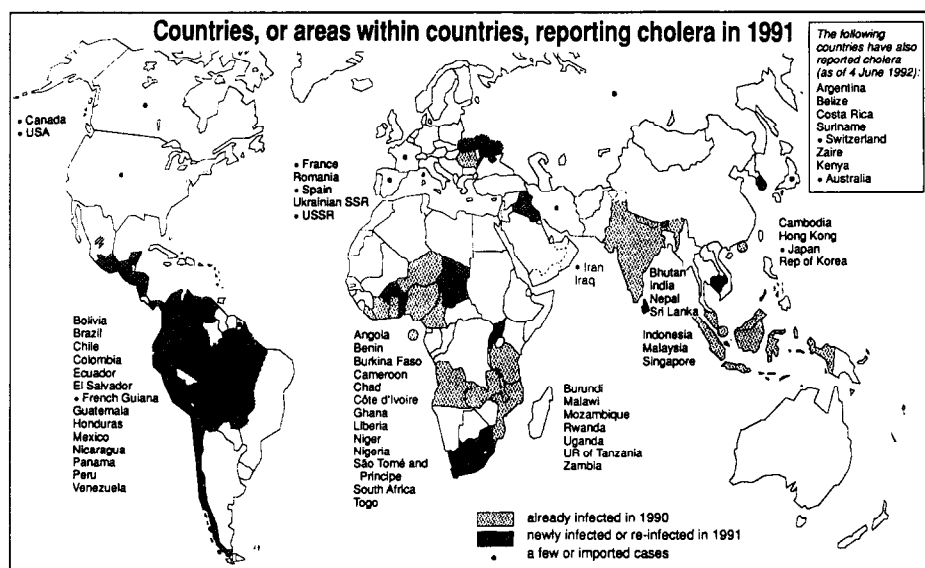
Store drinking water in a clean, covered container. To take water out, use a long-handled dipper that is not used for any other purpose.

### Hygiene and waste disposal:

- If possible, wash kitchen dishes with soap, rinse with clean water and only use clean cloths to wipe dishes dry (if not, leave dishes to dry in the sun).
- Dispose of all excreta and faecally contaminated materials in a latrine or bury them if latrines are not available.

Sources: WHO, PAHO and ADDR materials.

The WHO cholera information pack is available from CDD/WHO, Geneva 27, 1211 Switzerland.



Source: WHO

## Low cost sewerage

Peter Kolsky describes circumstances where sewerage systems may be appropriate, and outlines the key issues to consider.

Safe disposal of domestic water and human waste plays an important role in the control of diarrhoeal diseases. Recent issues of *DD* have highlighted some practical aspects of water supply and sanitation for low-income and refugee communities. These have focused in particular on low-cost alternatives to conventional engineering methods for the disposal of human waste in rural and peri-urban areas. These low-cost alternatives (e.g. VIP latrines and pour-flush toilets with soakaways) cost much less than conventional sewerage, are much easier to build, and are easier to manage by individual families.

There are, however, some situations where sewers (pipes for removing used domestic water and human waste) are the most appropriate technology. For example, where water has been piped into houses in areas of high population density, some

form of piped sewerage is the only way to avoid flooding the area with sewage (the mix of used water and human wastes).

If domestic water use is high, people need a safe way to dispose of sewage. If a sewerage system does not exist, sewage flooding will spread faecal contamination.

In these circumstances, some form of sewer or septic tank will be more appropriate than latrines or pour-flush toilets. The choice between sewers and septic tanks is usually based on consideration of population density, soil conditions and cost.

### Septic tanks

Septic tanks are simple systems that let the solids settle out of the waste water and sewage, before the liquid filters into the soil. Where population density is low, and where soils can absorb water easily (e.g.

sandy soils with a low groundwater level), some form of septic tank can provide a safe and economic means of sewage disposal. The tank itself does not treat the sewage, and the water flowing out of it is highly contaminated; it is the soil into which the contaminated water flows that does the real 'filtering' of the sewage. If the water coming out of a septic tank system cannot be absorbed by the soil (and therefore runs along the ground), it becomes a significant environmental health hazard and a septic tank is not an appropriate sewerage system. **Note:** septic tanks should not be sited too close to drinking water supplies and pipes, in case the pipes have breaks in them and drinking water becomes contaminated by sewage being absorbed by the soil in the surrounding area.

### Sewers

Sewers are pipe systems that remove sewage from the home and neighbourhood. They should be considered where water use is high, and septic tanks cannot be used. Even where septic tanks are technically feasible, sewers may still be a cheaper or better option, depending upon the housing density, the local experience with sewers and septic tanks, and the wishes of the community.

**Conventional sewers**, as first developed in Europe and North America, are expensive; in 1978<sup>1</sup>, they cost about US\$400/household/year. One of the main reasons they cost so much is because they are often quite deep, thus requiring a lot of excavation. They are deep for two reasons:

- the slope of the pipes must be relatively steep, so that the sediment from human waste moves and does not settle out and block the pipe; and
- pipes must be sufficiently deep (about a meter) to avoid being broken by car and lorry traffic on the ground above them.

Two different systems have been developed that save money by allowing sewers to be shallower.

**Small bore sewers** use a settling compartment, like a septic tank, outside each house to catch solids before they flow into the sewer. This means that the sewer pipe itself can be smaller and laid with a flatter slope, because it carries only the liquid, since solids have already been deposited in the tank. Such systems are most appropriate where septic tanks have already been installed.

**Shallow sewers** are like ordinary sewers in that they carry both the liquid and solid parts of the sewage. The sewers are shallow

### Self-managed sanitation

The Orangi Pilot Project (OPP) is a non-government organisation working in Pakistan. Orangi is a large unplanned slum on the edge of the city of Karachi, with a population of 800,000. The OPP has undertaken a number of development projects, but is best known for its model of low-cost sanitation.

The project recognises development on two levels. *Internal development* consists of constructing sanitary latrines in the houses, sewerage lines in the lanes, and small sewerage collectors downstream of the lanes. The project's experience shows that local people, organised by lanes, can finance, manage, and maintain this internal development. *External development* consists of constructing large drains and collectors along main roads, main trunk sewers downstream of collectors, and treatment works, which the project believes is the responsibility of the government, and which local people cannot undertake. Integration of internal and external development is critical – the OPP and the Karachi Municipal Corporation have signed a contract to work together in the future.



The sewer built by local people.

At present, 70 per cent of the lanes in Orangi have underground sewerage lines built under this programme, and 345 'secondary' drains, downstream of the lane drains, have been constructed. This represents sanitation improvements for nearly 70,000 homes since 1980; and a dramatic impact on the immediate environment of slum dwellers in Orangi, at a fraction of the cost of government programmes.

## Women take action

Amman Nagar (B) is a low-income community located in an abandoned water reservoir in Hyderabad, India. Because of the area's inherent drainage problems, recent slum-upgrading work in this community has included the construction of some large open drains, although it did not include sewers for each street. Nevertheless, a number of streets have sewers, funded by the residents themselves, which lead to the open drains.

In one of the lanes, the prime mover for this was a woman named Youssef Bi. Several years ago, her family built a twin-pit sanitation system, which she claims the municipality was supposed to clean out periodically. The municipality did not do so, but Youssef Bi did not complain; her family had no title to the land on which they were living and had no wish to attract attention to themselves. As a result, the toilet failed, and the system overflowed into the lane. Other houses had similar problems, with the result that the area was soon flooded with sewage. Youssef Bi went to the local slum improvement com-



**Youssef Bi and her friends, and the sewer that they arranged to have constructed.**



mittee (composed entirely of men) and asked them to consider building a sewer to connect to the open drain. They were more concerned, however, with other problems.

Undeterred, Youssef Bi talked to the women in the other twelve houses of her lane, and succeeded in obtaining a contribution of 500Rs (US\$25) from each to build a sewer. She contributed a little bit

more, and then hired a contractor to build the sewer; the job was done in two days. After their success, the lane on the opposite side of the open drain followed suit, and now four lanes have built their own sewers. They have had no blockages in eight months, but anticipate collecting 5Rs per household to cover the cost of unblocking the sewer, should that problem arise.

Photos: Peter Kolsky

because they are built where there is no vehicle traffic. Shallow sewers are often located in the back yards of houses to avoid traffic, or they may be placed under streets in communities where traffic is unlikely ever to be very heavy.

## Community participation

At least as important as the development of lower cost technical solutions has been the evolution of community participation in low-cost sewerage. Traditionally, central authorities have taken responsibility for entire sewerage networks, on the basis that all drains up to the individual property boundaries are public property and that maintenance is best done by a single organisation.

In some areas, however, municipal authorities are beginning to think about devolving responsibility for small local sewers to community groups or non-government organisations. This can be done because the small branches are technically simple, and because they can be managed more closely by the community than by municipal authorities. The Orangi Pilot Project, and the stories of individuals such as Youssef Bi in slums without organised projects, show the potential for such efforts.

## Sewerage checklist

- 1. Where does the waste go?** A sewer for one street can create a problem for the neighbours if it is not planned properly.
- 2. Is the system technically feasible?** Some help from the local sewerage board, if they are willing to break with traditional engineering standards, can save problems. Low-cost sewerage requires significant technical input from an engineer or technician. It also depends on availability of adequate water supply, the slope of the ground and the soil not being too rocky.
- 3. Is the plan socially feasible?** A lot depends on how much the community wants sewerage, and whether it makes sense for them to manage the construction, as in Orangi, or whether they expect the municipality to do it. If people choose the community based option, it makes sense to start small and learn as you go.

**4. Does the system fit together?** A little work with levels at the beginning (with the help of trained engineers or technicians), and some knowledge of the plans of the sewerage board, can help assure that low-cost sewers from many streets fit together properly. Otherwise, upstream sewers may be unable to empty into downstream sewers that are too small or at a higher elevation.

**5. Is it necessary?** Other technologies (latrines, pour-flush toilets and soakaways) are cheaper, simpler and easier to implement. Sewers should only be considered where water consumption is high, and should be weighed carefully against septic tanks or similar soakaway systems, which may be simpler to organise, and can solve the problem locally.

**Peter Kolsky, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK.**

*1. Small-bore sewers: Kalbermatten, J M, et al., 1980. Appropriate technology for water supply and sanitation. Vol 2, a planner's guide, Washington, D.C: World Bank.*

### Further reading

*Septic tanks: Cairncross, S, 1988. Small scale sanitation. Ross Institute Bulletin No. 8, LSHTM.*

*Shallow sewers: UNCHS (Habitat), 1986. The design of shallow sewer systems. UNCHS (Habitat), PO Box 30030, Nairobi, Kenya.*

## Refrigerated SSS?

In teaching mothers about how to prepare home made salt and sugar solution, I advise them to throw it away after 24 hours to avoid contamination during storage. Some of them ask whether keeping the solution in the fridge would enable them to use it over a period of a few days. Is there any harm in doing this, and how long can SSS be stored in a fridge?

**Saliso Sando, Environmental Health Officer, Ministry of Health, Katsina State, Nigeria.**

**Dr Nate Pierce, CDD/WHO, replies:**

When SSS is kept at room temperature in warm climates it tends to spoil after 24 hours because of bacterial growth in the solution. Normally, any solution not used within 24 hours should be discarded and a fresh solution made. If the solution is kept in a fridge it will last longer, at least two days. It should not be necessary to keep the fluid longer than two days as the amount

prepared, usually one litre or less, would be used up within this time.

## Treating cholera

There was a cholera epidemic in part of Nigeria last year. At the hospital where I work, most of the patients were prescribed tetracycline and phthalylsulphathiazole, together with (mist) kaolin. Do you think this combination of antibiotics is necessary, as in most cases the cholera vibrio is sensitive to tetracycline? There was also little or no reduction in stool quantity in the patients treated with kaolin.

**Oleyede Oyegbade, PO Box 367, Osogbo, Osun State, Nigeria.**

**Dr William Cutting replies:**

Phthalylsulphathiazole is a poorly absorbed sulphonamide, and can have toxic side effects. Studies have shown that the drug has no effect on cholera vibrio excretion. Tetracycline is one of the recommended drugs of choice for treating

cholera, and should be given without other antibiotics.

Clinical trials have shown that giving kaolin does not result in fewer stools or less fluid loss. The stools may look less watery, because the kaolin itself absorbs fluids in the gut, but it does not stop fluid loss from the body. As Mr Oyegbade points out, giving kaolin to cholera patients is of no benefit. Rehydration therapy is the most important part of treatment for cholera. An appropriate antibiotic, such as tetracycline, is helpful because it shortens the illness and reduces stool losses.

## Future issues ...

*DD50* will focus on training issues. *DD51* will review evaluation of CDD activities. We would like to include readers' experiences and examples of what has worked and why, as well as what has not worked so well! Please send contributions for issue 51 by 13 September.

The following are references for the studies cited in the Persistent Diarrhoea insert in *DD48*.

**Table 1:** Indonesia<sup>1</sup>, Guatemala<sup>2</sup>, Peru<sup>3,4</sup>, Peru<sup>5</sup>, Bangladesh<sup>6,7</sup>, Bangladesh<sup>8</sup>, Bangladesh<sup>9</sup>, India<sup>10</sup>.

**Table 2:** India<sup>10</sup>, Nepal<sup>11</sup>, Peru<sup>5</sup>, Bangladesh<sup>8</sup>, Bangladesh<sup>9</sup>, Bangladesh<sup>12</sup>, Brazil<sup>13</sup>.

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With support from **AID (USA), ODA (UK), UNICEF, WHO**

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## Dialogue on Diarrhoea



*Dialogue on Diarrhoea* is published by AHRTAG, 1 London Bridge St, London SE1 9SG, UK. Tel: 44-71-378 1403 Fax: 44-71-403 6003 E-mail: GEO2 AHRTAG Reg. charity no. 274260

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