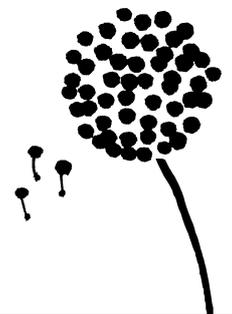


Footsteps

No.51 JUNE 2002

WATER



TEARFUND

Water for the urban poor

by Richard Franceys

Good access to water supplies is a growing problem around the world. Where do people living in the slums and shanties of the world's growing cities get their water? How do they find good sanitation for safe excreta disposal?

Water sources

The poorest people often get their water by queuing for hours, sometimes starting at 3am to collect water from a standpipe, or from a polluted well or illegal connection. Many people obtain water from water carriers – small-scale independent providers who charge ten, maybe twenty times more for a container of water than the price paid by rich people with piped water connections.

Governments often promise low prices for water so everyone can have access to this precious basic need. However, government laws usually prevent suppliers from providing water pipe networks into illegal, unplanned housing areas. So though up to half the city may live in these areas, including the poorest, these people receive no government support for water. The higher income households, living in the planned areas, receive most government help. The poorest remain at the mercy of criminal gangs who often control the illegal water supply.

Many poor households may live close to an existing piped water system. They would be willing to pay for water if they

could pay small amounts on a regular basis. However, they find the water services often charge a very high fee to connect to the water mains and also demand that new customers pay for the pipes to the household. Poor people in urban areas can rarely save up enough to pay these large sums in advance. So they have to buy from richer neighbours who have a piped connection and may charge a high profit.

Sanitation problems

Access to good sanitation is equally difficult. Well-built latrines provide excellent and safe sanitation. However, slum tenants, unsure of their future, cannot afford to invest in a latrine. So

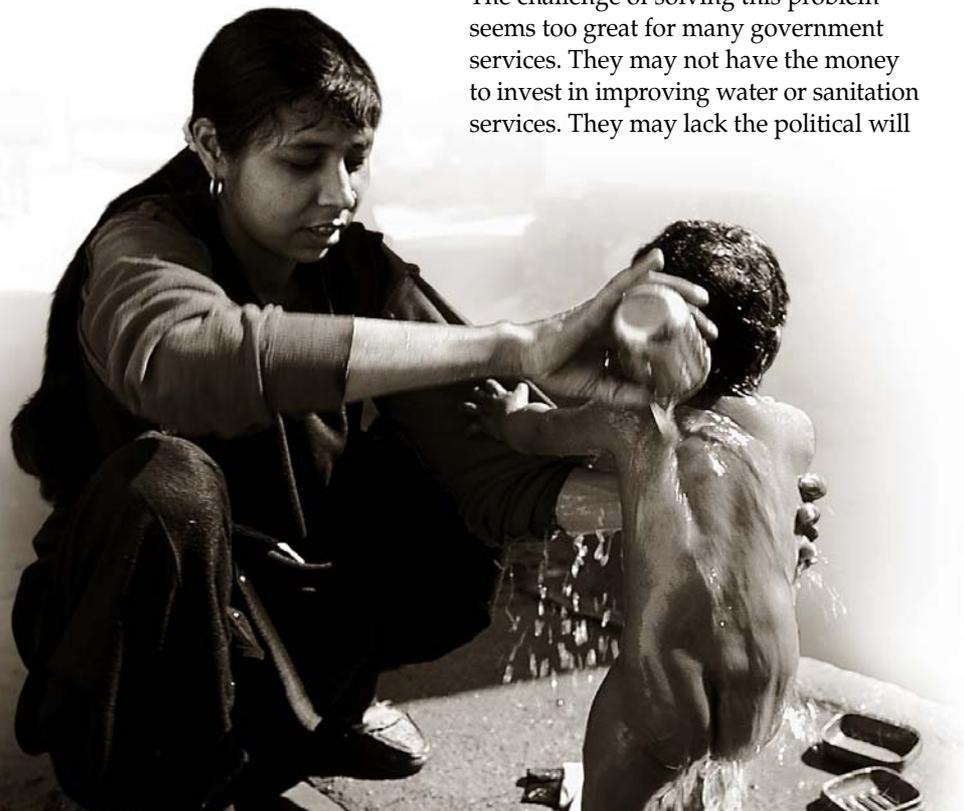
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people have to use either dirty public toilets, the sides of the streets in the early morning or perhaps suffer the indignity of 'wrap and throw' – using a plastic bag or newspaper and throwing excreta into a drainage channel or onto a garbage heap. Meanwhile many rich people have access to water-flushed toilets connected to sewer pipes, the most expensive form of sanitation, which will also have been subsidised by the government.

The challenge of solving this problem seems too great for many government services. They may not have the money to invest in improving water or sanitation services. They may lack the political will

Photo: Jim Loring, Tearfund



Footsteps

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Footsteps is a quarterly paper, linking health and development workers worldwide. Tearfund, publisher of *Footsteps*, hopes that it will provide the stimulus of new ideas and enthusiasm. It is a way of encouraging Christians of all nations as they work together towards creating wholeness in our communities.

Footsteps is free of charge to individuals working to promote health and development. It is available in English, French, Portuguese and Spanish. Donations are welcomed.

Readers are invited to contribute views, articles, letters and photos.

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Tearfund is an evangelical Christian relief and development agency working through local partners to bring help and hope to communities in need around the world. Tearfund, 100 Church Road, Teddington, Middlesex, TW11 8QE, UK.
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or capacity to find ways of serving rapidly growing illegal housing areas. However, the good news is that non-governmental organisations (NGOs) are now making a difference in some cities.

Community organisations

All over the world, NGOs and community-based organisations are trying to help the urban poor. In Dhaka, Bangladesh, the NGO Dusthya Shasthya Kendra (DSK) works with the slum communities and Dhaka Water. After making an agreement with a community water management committee of women, which is supported by an advisory committee of men, a water tank is constructed on nearby land, contributed by Dhaka City Council. The community pays the water bills and, over time, pays back the \$600 capital cost of the water tank and connection.

The water point caretaker, a woman who is a member of the committee with an average salary of \$11 per month, collects water charges from users. With the

support of the NGO, she deposits this into a joint bank account. The community sets the water rates. The average charge is just one third of that previously paid by users. In the beginning, the NGO helps with monitoring their bank account. Later, communities take full responsibility.

In India, the NGO Sulabh International constructs toilet blocks in low-income areas complete with soap, showers and storage. There is a small charge for using the facilities (though the destitute and people with disabilities do not pay). The government helps with the cost of building the toilet blocks. The small charge pays for operating costs that include a caretaker to ensure cleanliness. Sulabh now has 4,000 toilet blocks in India and also promotes a twin pit latrine programme. It is providing sanitation services to perhaps ten million people.

These examples show what can be done. However, it is very difficult for NGOs to meet the needs of so many urban poor. Even with Sulabh's achievements, the majority of poor people in India lack

EDITORIAL

Water is such a basic human need. None of us can survive for more than a few days without it. Despite this, obtaining enough water for household hygiene and clean water for drinking is a continual struggle for millions of people. Two-thirds of the world's population live in areas where water supplies are limited. The World Health Organisation estimates that over one billion people lack access to clean water. Water has become such a political issue that, in some regions, conflicts are likely over access to water supplies.

Improving access to water supplies is the subject of this issue. We look at practical methods of digging or drilling wells, maintaining water pumps, good hygiene practices in collecting and storing water, as well as a simple idea for obtaining safe drinking water. Poor people living in urban areas probably face the greatest challenge. Richard Franceys discusses one possible way of improving urban water supplies by looking at the idea of privatising water supplies. However, this raises many fears and the idea needs careful monitoring and control by governments and NGOs to ensure that poor people benefit. Tearfund is involved in a research project studying the impact of different approaches to water supply for the poor. At present, private operators supply the water needs of only about 5% of the world's population.

Water is used in the Bible as a symbol of blessing, new life and cleansing. Gladys Mwitwa shared the Bible study on the River of Life many years ago and it has continued to inspire me ever since. I hope it will do the same for many readers.

Future issues will look at nutrition for young children and holistic development.

Isabel Carter





Photo: Mike Webb, Tearfund

Access to unpolluted water should be available to even the poorest people.

access to improved sanitation. Most of the 400 million people worldwide who live in urban areas do not have access to improved sanitation and 170 million of them lack access to improved water supplies.

Public private partnerships

Recent research in over ten Asian countries has shown that one unexpected answer to solving the problems of the urban poor is 'privatisation'. Involving private enterprise in what are called *public private partnerships* (PPP) is making a difference for poor people in several cities in the world.

Private operators can bring better management and new investment. The results may be clean water flowing for 24 hours a day at reasonable pressure. Before, users might receive just two hours of water supply every one or two days at low pressure. By working in partnership with governments and community organisations, some of these private operators are serving poor people through participatory approaches. For example, they may reduce connection costs if the community helps to lay pipes in the slum, or they may allow people to pay their connection fees over two years with a small addition to their monthly water bill.

As a result of one PPP, a resident in Manila who says she used to spend up to P40 (pesos) each day for water bought from a water carrier, now only pays P25 to P50 per month! Another resident who

used to pay a flat rate of P300 per month to a neighbour with water, now spends only about P60 per month.

During focus group discussions, participants said that they could now enjoy the luxury of a daily shower because of the higher water pressure. As well as much reduced water charges, people mentioned other benefits such as:

- more time for other household chores
- more time for leisure
- lack of stress from queuing (fights often occur when people jump the queue)
- readily available water supplies.

In one slum in F Carlos, Manila, after individual water connections were installed, many houses were improved. Previously they were mostly made of temporary materials, while now most are made of more permanent materials such as hollow blocks and cement. Mothers now have more time to care for their children. Some residents use their extra free time for income-earning activities.

Why have these examples of private operators proved so successful? There are several reasons:

- It is in their commercial interest to serve all potential customers.
- They can make a profit even with low charges.

- They often have government contracts demanding they achieve high levels of service for poor people.

What can we do?

What can readers of *Footsteps* do with these ideas? We can share these research findings about PPPs and lobby our governments to consider them as one way forward. We can lobby politicians to improve water services for poor people. We can ask them to raise their targets for water service provision to 100%, so that the urban poor are always included.

Through churches and NGOs we could establish credit unions, which among other ideas, could finance piped water connections. We can talk with householders who sell water to their neighbours about what should be a reasonable profit. Perhaps we could even consider building a Sulabh-style public toilet block, complete with soap and showers, making sure it remains clean and safe. An interesting extension perhaps of Jesus's example of foot-washing in John 13:1-17?

Richard Franceys is based at the Institute of Water and Environment, Cranfield University, Silsoe, Bedford, MK45 4DT, UK. He was team leader of the Asian Development Bank study 'Beyond Boundaries: Extending Services to the Urban Poor' used as case studies in this article.

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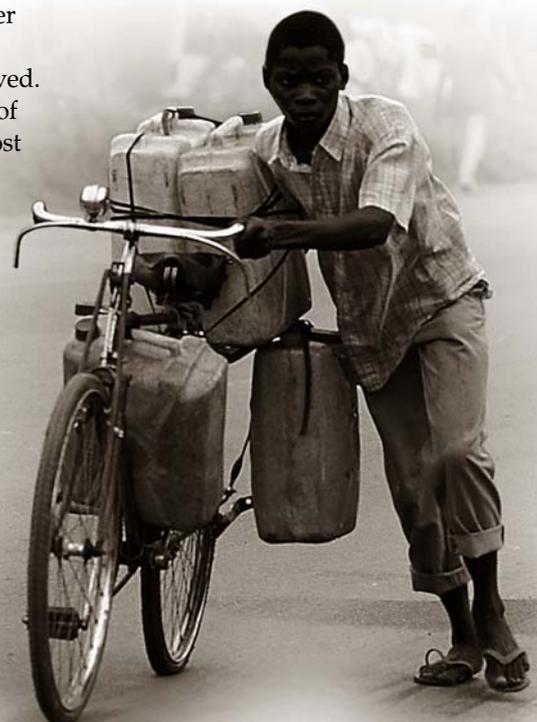


Photo: Jim Loring, Tearfund

Handpumps: A losing battle?

By Daniel Schotanus

Why do we hear so few success stories of handpumps? During the early stages of planning, building and initial use, there are many claims of success. However, there are few reports on the state of handpump projects after three, five or even ten years of use. Is it because little monitoring and evaluation is carried out? Has interest moved to other projects or regions? Or is it because the handpump projects themselves have proved only a short-term success?

Most of us working to improve water supplies know the sorry sight of lonely, broken-down pumps. One can only guess how long ago the pump was proudly presented to the community. A local official probably made the first few forceful swings and declared a decisive blow in the war on famine, disease and poverty. But the clear water pouring out is now only a memory for local people and a photograph in the final project report.

Last December, I visited a water programme managed by an Ethiopian NGO, eight years after working with them. I sat with my previous counterparts and reflected on the good times we had. Talk turned to work issues. It soon became clear that the dream we had ten years earlier, about the NGO encouraging local multiplication of handpumps sustained by community financing, had not really developed. The idea of sustainable water development had not lived up to our expectations.

We visited one of the first handpumps installed by the programme 12 years earlier and found it nicely fenced and still in use. However, many of the other handpumps were no longer successful. Sometimes the pump had broken down; sometimes the water committee had failed to manage and maintain the pump; sometimes the community had failed to provide financial contributions. These concerns raise a number of important issues that we need to consider before

deciding whether handpumps are a wise choice for community water supply.

Appropriate service level

Researchers into water supplies suggest a useful scale to describe the level of water supply. Traditional water sources with no improvements – for example river water, a pond, water hole, shallow unlined well or unprotected spring – are regarded as zero level. The first level of improvements upgrade these with simple measures to protect the source from contamination. These could include lining a well, using a bucket and rope or protecting a spring. This can result in a very significant improvement in water quality. Handpumps are listed as the second out of six levels.



Photo: Jim Loring, Tearfund

Handpumps offer a healthier way of obtaining water.

Handpumps offer improved protection, more water and an easier way of obtaining water by pumping. The closed well cover protects the water source from any contamination from the surface. The amount of water varies depending on the type of pump, the depth of the water table below the surface and the strength of the user. Handpumps can usually supply 0.5–1 cubic metre of water per hour, and 10–12 year old children should be strong enough to work the pump.

Higher levels of service such as public standpipes, outside taps and in-house connections provide more water at greater convenience but at much higher costs.

Service levels for community water supply

Level	Type of service	Litres of water used each day for each user	Cost
5	house connection	100–150	high
4	yard tap	50–100	high
3	standpipe	10–40	moderate
2	handpump	10–40	low
1	improved traditional	10–40	very low
0	traditional	10–40	very low

Arlosoroff (1987)

These systems require considerable technical and economic resources and are usually beyond the means of users and authorities to establish and maintain.

Village level operation and maintenance

Over the last 15 years, village level operation and maintenance of hand-pumps (VLOM) has become a key consideration for handpump design. Many different manufacturers now claim this for their own design of pump. The World Bank originally promoted this concept and it includes these criteria:

- Easily maintained by a village caretaker, requiring minimal skills and few tools
- Manufactured in-country so that spare parts are easily available
- Strong and reliable under field conditions
- Cost-effective.

Village level operation and maintenance also applies to the management of the handpumps. This means the community needs to take ownership of the use and maintenance of the pump. The ownership and management of maintaining pumps should mean that the community:

- chooses when to service the pumps
- chooses who will service the pumps
- pays for the service.

Handpump failures

Our project in Ethiopia worked with a local maintenance team. After a number of pumps were established, the project continued to employ this team because:

- Village caretakers often did not practise preventative maintenance but waited for problems to develop.
- Spares were often not available.
- Breakdowns occurred which were beyond the capacity of the village community to repair.
- It was against the financial interest of the project maintenance team to give responsibility to local communities.

In both remote and urban areas, many caretakers are very careful with money. People think there is no need to replace a part that is still working. This may mean that parts are not replaced until they show



Rivers and ponds offer a low cost but high risk water supply.

definite problems or have actually broken down. It may also prove very difficult to obtain spare parts locally and without them no preventative maintenance can take place.

However, depending on how often the pump is used, all parts will eventually need replacing once their intended lifetime is past. The pump may still be usable after a small part has worn out or broken, but this can lead to considerable and permanent damage. Expensive new parts and outside help may then be necessary to repair extensive damage.

If funds are available for a central maintenance team, then emergency repairs can be done and communities continue to benefit from working pumps (assuming the maintenance teams live up to expectations!). But generally, funding for such teams is unlikely to last.

In Ethiopia, both government and NGOs have expected too much from the communities' initial willingness to contribute to providing water supplies. Outside funding and the need for rapid results, often mean too little attention is given to building up local capacity and participation.

'Ownership' of the water scheme often just means the completed pump is 'given' to the community once built. Too little time is taken to allow the community to manage the planning and implementation process and to take ownership of the water supply scheme from the start. Local contributions are often measured

in terms of labour and contributions of building materials or food. Who can blame local people for being hesitant about contributing to something that seems to be owned by outsiders?

Research carried out by Ethiopian students of the IHE-UNESCO Institute for Water Education suggests that communities are usually able to pay for their own water supply schemes. The required contribution to maintenance of water supply schemes is usually much less than 1% of annual income, which should be acceptable even at subsistence level. Only during crisis situations were people unable to contribute.

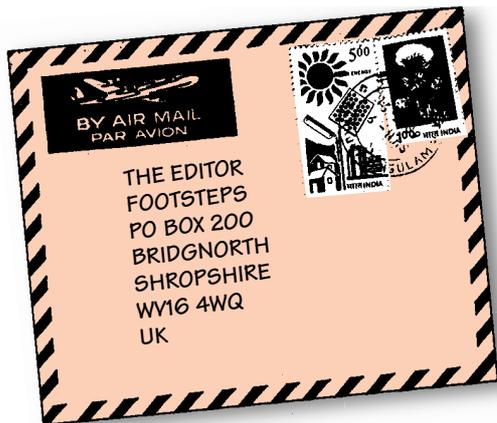
There is a clear need to rethink our approaches. Good handpumps exist, and technical solutions are available. Management of handpumps is the real issue. For village level operation and management to work, the capacity building of those responsible for operation and maintenance is essential. They need training in proper management of supplies, spares and finances. Our planning and support need to match local people's willingness to contribute.

Daniel Schotanus works in the Department of Management and Institutions at IHE-UNESCO Institute for Water Education, PO Box 3015, 2601 Delft, the Netherlands. He has many years experience as a water engineer in Ethiopia.

*E-mail: tds@ihe.nl
IHE website: www.ihe.nl*



Photo: Mike Webb, Tearfund



Dental news

I live in the Democratic Republic of the Congo, working in five health zones in Ituri and Uele districts in the eastern province. As part of our work with oral health, we carried out a survey and found these results:

- 80% of people have one or more dental cavity.
- 75% are unable to attend a dental clinic, either for financial reasons or because of the distance involved.
- 25% have lost teeth because of an untreated cavity.
- 95% have poor oral hygiene – which is the primary cause of dental cavities and is due to lack of knowledge.

This serious situation has been overlooked by all health authorities. We took the



initiative to train Mr Basali Achalina as an oral health agent to help us create a mobile dental service. He is working to improve the situation by using an ordinary torch to light up the mouth, performing dental extractions and making dentures without a cutting or polishing machine, just using a file and sandpaper to polish them.

We are unable to carry out fillings as we lack the materials and the means to do them. We would appreciate any suggestions, advice or help so that we may work together to promote good oral healthcare in our area.

*Beakaka Mangbaiso
Medical Service for Oral health
Dieu voit tous Dentistry
PO Box 8D4
Arua
Uganda*

Potato skins

We appreciated *Footsteps* 48 promoting traditional medicines. For serious burns, we recommend a dressing made from muslin cloth with boiled potato skins attached with a paste of wheat flour. The potato skin layer is placed on the burn with the inner layer of the potato next to the skin. It does not stick to the burn and so prevents the scarring that often happens when skin rips as dressings are changed. The idea comes from India. The dressing must of course be sterilised before use. You could steam it over a pan of water.

Readers may also be interested to know that we export, free of charge, supplies of second-hand spectacles for distribution to the poor. People try on many pairs and often find a pair that is suitable. However, we do ask that people pay for the postage and any customs duty.

*Jimmy Richardson
78 Hutton Road
North Entrance
NSW 2261
Australia*

Sharing information

I have been receiving *Footsteps* since 1996. To begin with, I found it simply enough to read it and learn about work in other areas of the world. I learned to understand different ways of life and different ways in which communities resolved

their needs. But soon I came to the conclusion that it was not fair to acquire this knowledge and not share it. This led me to ask for more magazines to share with the leaders of our evangelical fellowship which covers four provinces here in Ecuador.

Now I distribute the magazine to these leaders and also pastors in several districts. Together we reflect on the topics appropriate to each place, whether urban or rural, and endeavour to apply those that are most suitable. We do not have many written resources here and lack access to radio, TV and newspapers. We have been particularly interested in the information about fish farming, urban gardens, mosquito nets, solar driers and the role of the church in development and advocacy. We hope to set up our own library.

Whenever I visit the pastors I remind them about recent topics and ask what they have done with the information.

*Pastor Isidro Alcivar
Iglesia Evangélica Chipe Minuape
Casilla 151, Quevedo
Ecuador*

Time management



My church programmes cover every day of the week. There was often a poor attendance at our meetings, which I considered to be through lack of interest and commitment. So I started a campaign of 'Time Management' with the following illustration. We all have 24 hours each day to be used and managed by us. We only need to sleep and rest for 8 hours. If we live for 60 years, this means that we will sleep and rest for 20 years! The official working period is 8 hours, which represents another 20 years. The question we now need to ask ourselves is what do we do with the remaining 8 hours; the other 20 years of our life?

We should use it to serve our God if we don't want to serve our enemy, the Devil! This campaign changed the lukewarm attitudes of our members for the better.

*Mr Isaac Olanipekua
Box 35961
Agodi PO, Ibadan
Oyo State
Nigeria*

Nutritious flour

We produce flour using various different ingredients, the main one being Soya flour. It is 100% natural and we encourage people to use it with malnourished children between six months and five years old. After testing children over an eight-month period with this flour, the result is that the children are putting on 1kg of weight for every 2kg of this flour used in cooking.

The flour is a nutritious mixture of 24 ingredients. These include maize flour, powdered oats, wheat, oat and rice bran, roasted and ground pumpkin seeds, dried, roasted and ground cassava, okra and sweet potato leaves, linseed, sesame seed, gelatine, wheat germ, wheat flour, powdered cow's milk, powdered soya milk and brewer's yeast. It contains a balanced mix of carbohydrates, proteins, fats, fibre, essential minerals and vitamins.

The flour only costs on average \$2 per month per child. I would encourage anyone interested in finding out more to contact me (in Portuguese!).

Revd Alexandre Ferreira Pevidor
Cx Postal 358
Pato Branco
Parana
Cep 85 501 100
Brazil

E-mail: afp@qualinet.com.br

Problems wanted!

Have you got a technical problem that needs solving? I am a lecturer in Mechanical Engineering at the University of Nottingham, and as part of our course I am looking for engineering problems to set my students. Possible ideas include:

- the design of a seed planter that doesn't require the user to bend
- an 'alternative' fuel stove
- a device to seal plastic bags cheaply and safely.

If you have any other suggestions, I would be pleased to hear from you.

Dr Mike Clifford
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University of Nottingham
Nottingham
NG7 2RD
UK

E-mail: mike.clifford@nottingham.ac.uk

Child-to-Child activities

My lay reader class were eager to learn about health issues, so I set them the task of preparing Child-to-Child classes and then teaching children at our local Dispensary. It was a great success! Both the students and the children learned about health and the babies were better looked after. Other classes have

followed. Child-to-Child materials are very easy to use and stimulate good discussions. They are available from TALC. The photo shows our successful Child-to-Child Programme Certificate day.

Mr Martin Carr
Archbishop Janani Luvum Theological College
Gulu
Northern Uganda



Photo: Martin Carr

Child-to-Child produce a number of useful resources for using with children. Their address is Child-to-Child, Institute of Education, University of London, 20 Bedford Way, London, WC1 HOA, UK.

Children – a new secret force!

Children are proving to be a new force in the move to protect babies from diseases and to stamp out polio.

'New babies should receive protection from four types of vaccine before their first birthday. They also need these vaccines at special times. For example, they need measles vaccine when they are nine months old and they need three doses of polio vaccine before they are four months.'

Is this a medical expert speaking? No – it's a ten year old girl, Omba, from Mandeleo Primary School, in Kolwezi, Democratic Republic of Congo. Omba and her classmates are the new force for raising immunisation rates and looking out for cases of paralysis which can indicate polio. Children in five schools in Kolwezi have been learning all about immunisations and why they are so important. Then they check in their own communities to make sure new babies are getting the protection they should.

'We adopt up to five babies – but actually I have six,' says Omba. 'We help the mothers remember when vaccinations should be done, and tell them why it is important. We write all the details down in our exercise books and often visit the babies.'

Vaccine coverage in this area increased from 50% to 70% between 1999 and 2000 – mostly due to this child-to-child programme. BCG immunisation rates for TB were 99% compared with a national average of 30–50%.

'Children are a good channel of communication' says School Director, Madame Eugenie. 'They can reach their own parents and other children and make them enthusiastic, sometimes much better than adults. They are very observant about details.'

This is also a way of changing behaviour for the future.

Adapted from WHO Press Release No 201.

For further information please contact
Mr Valery Abramov, WHO, Avenue Appia, CH-1211
Geneva 27, Switzerland.
E-mail: abramovv@who.int



Design of hand-dug wells

by Daniel Schotanus

There are several ways to design and build hand-dug wells. In many societies there are local experts with knowledge and expertise developed through years of experience. In the Borana area of Ethiopia, for example, traditional hand-dug wells have been reported with depths of over 100 metres.

Designs vary according to local preferences and conditions. This design has been used by a Tearfund partner in Ethiopia and is suitable for areas with firm soils. Generally, hand-dug wells are 10–15 metres deep. For deeper wells, drilling is more appropriate.

Wells should only be dug in suitable places where good supplies of clean ground water are likely to be available.

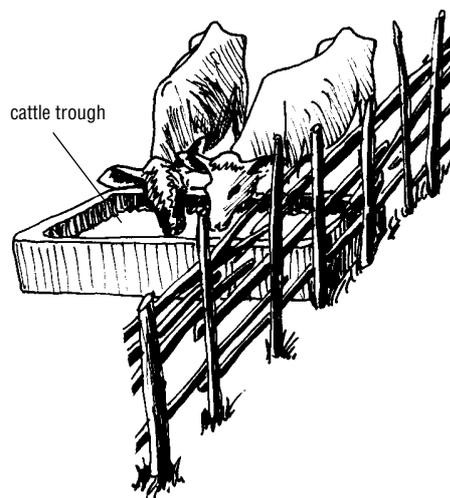
There are dangers in building hand-dug wells. Skill, knowledge and expertise are essential to ensure the safety of workers during the construction process.

A communal hand-dug well can give long-lasting service if it is well designed and constructed.

Hygiene

Ground water is generally safe to drink, because of natural filtering through the soil. However, chemical contamination is possible.

- Make sure that the well is located upstream of potential pollution sources such as pit latrines, petrol stations, rubbish pits or burial grounds.
- Prevent surface pollution at the well site. Ensure any spaces between concrete rings, the slab and well cover are filled in with concrete. Fit a pump on a raised pedestal.
- Spilled water from the pump should drain into a soak-away pit filled with rocks and gravel some distance away from the well.
- After the handpump is installed, disinfect the well with chlorine before use.



cattle trough

sloped slab with side wall for better drainage

Safety first

Digging deep wells can be dangerous, both for the diggers and for observers.

The dangers include:

- collapse of the sides (dig inside precast concrete rings if soil is unstable)
- objects or buckets falling from the surface
- people or animals falling in the well (use fences or covers)
- lack of oxygen in the well
- poison exhaust gases from a generator used to pump out water
- unsafe entering and climbing out of the well (use a safety harness and tripod and at least two helpers at the surface)
- electric shock due to poor isolation of the electric pump or cutting of power cable
- worker collapse due to exhaustion
- unhygienic conditions in the well (do not allow the well to be used as a toilet during digging).

If the completed well will not have a cover and handpump, build a protection wall at least 70cm high to prevent children and animals falling in.

Improvements

- Build a concrete washing slab for washing clothes away from the well, with its own soak-away pit.
- Build a cattle trough some distance away and use buckets or a hose to fill this. Fence the well area so animals cannot damage it.
- Encourage the caretaker to make a vegetable plot at the end of the drainage ditch to provide additional income.
- Take care to avoid using too much water for irrigation. This may lower water levels and also affect other nearby wells.

Recommended handpumps

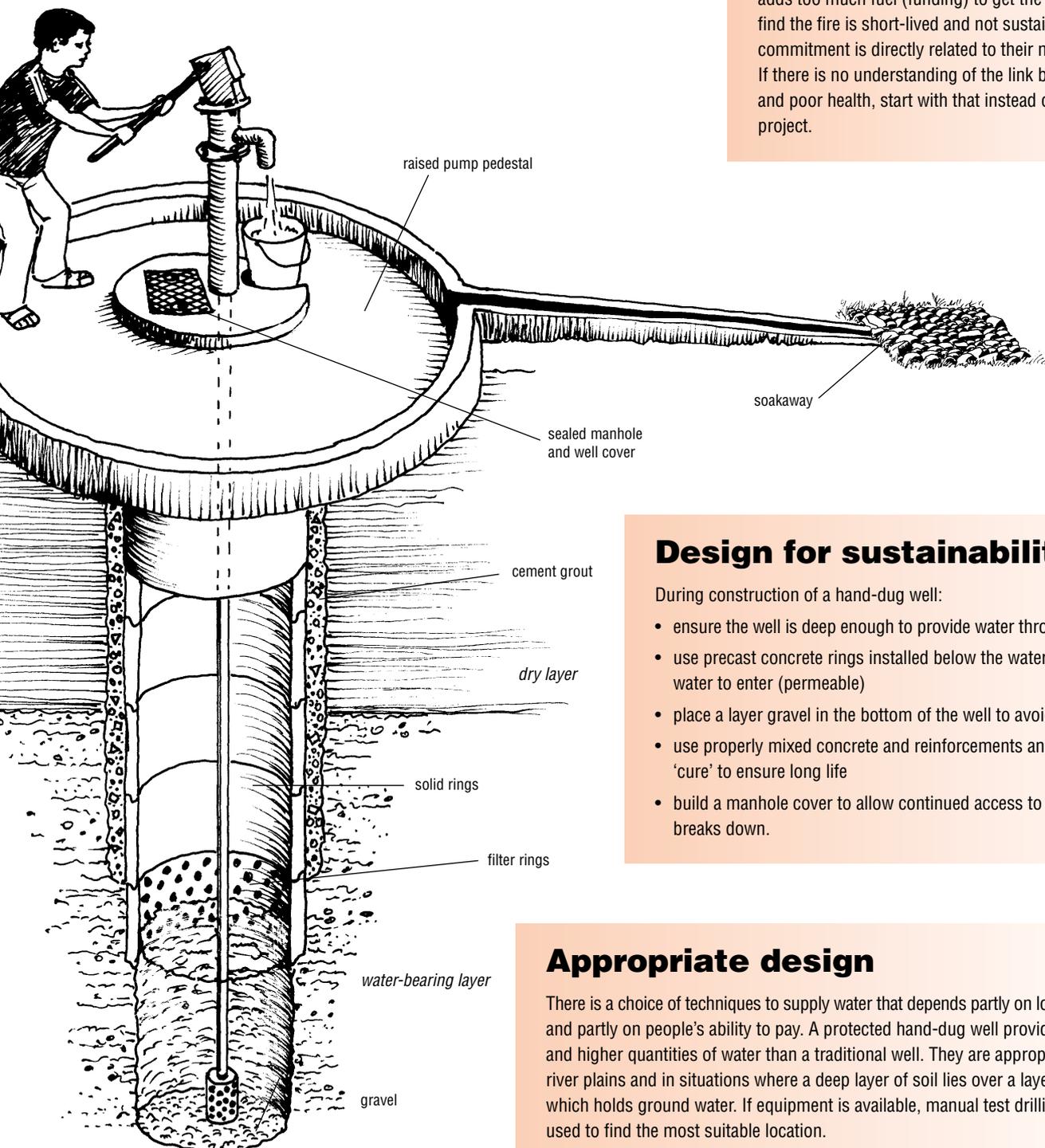
Three handpumps recommended by Unicef are the TARA, the AFRIDEV and the India Mark II.

The TARA is very suitable for shallow hand-dug wells of approximately ten metres deep. It is a double-action handpump, lifting water on the up-stroke as well as the down-stroke with a bicycle pump type movement.

For deeper wells, the AFRIDEV and the India Mark II are lever-action, single-action handpumps suitable for wells up to 30 metres deep (up to 50 metres for the India Mark II).

Community ownership

Trying to light a fire with wet wood is very difficult. Instead of allowing the wood to dry, you may add paper, petrol or kerosene. This is rather like starting a project without the wholehearted support of local people. It is essential that the community 'owns' a water project. Outside agencies such as NGOs or churches can help in 'gathering the (dry) wood' and providing a match. However, too often the outside agency adds too much fuel (funding) to get the fire going, only to find the fire is short-lived and not sustainable. People's commitment is directly related to their need for clean water. If there is no understanding of the link between dirty water and poor health, start with that instead of setting up a water project.



Design for sustainability

During construction of a hand-dug well:

- ensure the well is deep enough to provide water through the dry season
- use precast concrete rings installed below the water level which allow water to enter (permeable)
- place a layer of gravel in the bottom of the well to avoid silting up
- use properly mixed concrete and reinforcements and allow them to 'cure' to ensure long life
- build a manhole cover to allow continued access to water if the pump breaks down.

Appropriate design

There is a choice of techniques to supply water that depends partly on local conditions and partly on people's ability to pay. A protected hand-dug well provides cleaner and higher quantities of water than a traditional well. They are appropriate in broad river plains and in situations where a deep layer of soil lies over a layer of rock, which holds ground water. If equipment is available, manual test drilling can be used to find the most suitable location.

Hand-drilled water wells

by Dr Richard Carter

Many people walk long distances to obtain water that is often contaminated. However, there may be clean underground water within 30–40 metres, below their communities. This ground water has great potential to save time, reduce inconvenience and improve health.



Photo: Richard Carter

The low cost shallow well drilling project.

Hand-dug wells and boreholes

Hand-dug wells are one obvious means of gaining access to ground water. The alternative is usually a deep borehole built by an expensive drilling rig. Most communities are unable either to have access or to afford a rig, unless they receive help from governments or NGOs. However, there is a new third alternative – hand-drilled wells.

Small diameter shallow wells

These are usually just 15cm in diameter (compared with 1.2 metres or more for a hand-dug well), and up to 30 metres deep, similar to most hand-dug wells. Hand-drilled wells can be cheaper and are usually quicker to build than hand-dug wells. One advantage of a hand-dug well is that if the pump breaks down, people can still obtain water using a bucket and rope.

Any well, whether hand-dug, hand-drilled, or machine-drilled – involves three processes:

- loosening the ground
- removing the soil and rock
- supporting the walls of the hole.

Hand-drilled wells use a large drill called an *auger* to drill into the ground, supported by a metal frame. One great advantage of small diameter wells is that far less soil and rock has to be broken through and removed.

Energy

Three or four men building a hand-drilled well have less than 2% of the energy of a medium-sized drilling rig. If the drill has to break through rock, this may prove impossible with hand-drilling. Soft materials such as sand and silt require less energy, but may cause problems if the holes collapse.

Other issues

There are also wider issues for communities to consider when thinking about hand-drilling:

- Are there alternative water sources which could be protected?
- Can existing sources be improved?
- Is the geology suitable for hand-drilling?
- How will sites be chosen?
- How will communities be mobilised and involved?
- Who will pay for the wells?
- Who will construct the wells?
- Where will hand-drilling rigs be made?
- Will it be easy to get spare parts?
- Who will supply the linings and other construction materials for the wells?
- How much will the wells cost?

Recent work

These issues were explored during a recent three-year project in Uganda. This work looked into possible partnerships between government agencies, outside donors, commercial contractors and local communities.

The project developed new technology suitable for local conditions. They encouraged small contractors to adopt the technologies and begin the local manufacture of equipment. They found that with support from donors, government and communities it is possible to build partnerships between public sector, private sector and communities to improve rural water supplies. Whether this can really result in progress toward more affordable access to clean water still remains to be seen.

Dr Richard C Carter, Institute of Water and Environment, Cranfield University, Silsoe, Bedford, MK45 4DT, UK.

E-mail: r.c.carter@cranfield.ac.uk

For more details

This is a new and exciting technology. At present there is little manufactured equipment. An exception is the Vonder Rig, available from V&W Engineering, PO Box 131, Harare, Zimbabwe.

In some countries, individuals have produced their own versions of hand drills. Readers with experience in this area are asked to contact Richard so he can share their details with others.

This website has many of the project reports and a resource pack with all available information: www.silsoe.cranfield.ac.uk/lcdrilling

Photo: Richard Hanson, Tearfund



Water collection and storage

by Rachel Blackman

It is important to use good methods for collecting, transporting and storing drinking water. There is a high risk of water becoming contaminated between the water source and the home. This is because it may become exposed to harmful bacteria or germs, either when it is transferred between different containers or when different people come into contact with it.

Drinking water can be collected from different types of sources: from surface sources (rivers or springs) or from ground water (wells with a rope and bucket, or handpumps). Usually ground water provides the best quality water because it is protected from contamination.

A number of easy methods can be used to maintain the quality of the water during collection, transportation and storage.

Collection

Water is often contaminated during collection through people dipping a dirty

bucket into the water source. Once a water source is contaminated, it is likely that other people who share the water source will become ill.

There are two important ways of reducing this risk of contamination:

- **Use more than one container to collect water.** Use a clean scoop or bucket to transfer water into the container. Ensure water is poured from the scoop or bucket into the transportation container, so that the two containers do not come into contact. Handpumps are the best way of collecting water because the water is, in effect, poured directly from the source into the container.

- **Use the scoop or bucket only for that purpose.** Many villages have a communal scoop or bucket that everyone uses to collect water from the water source. This reduces the chances of contamination because there is only one scoop or bucket coming into contact with the water, rather than many. A community committee can help ensure the scoop is not stolen and is stored in a clean place.

Transportation

Transport water from the source to the home as quickly as possible. Cover the container with a lid or a piece of clean cloth to stop dirt falling into it.

Storage

Store water in the home in a cool place, well away from gasoline, kerosene and agricultural chemicals. If different containers are used for transporting and storing the water, make sure that the water is poured from one container to the other. Follow the same rules; pour water from the storage container into an appropriate drinking vessel. If the storage container is too heavy to lift, use a clean scoop to transfer the water.

If these steps are followed, the chance of contaminating water between the source and the home is small.

Remember

- All containers should be clean
- Where possible, pour rather than dip!

Ideas for purifying water



By Paul Dean

Many water and sanitation projects focus on making more water available to people and encouraging good personal hygiene practices. The quantity of water used for bathing, cleaning and other household tasks may prove more important for good health than its quality. However, the quality of drinking water is very important.

Drinking water that is not clean often leads to diarrhoea and other water-borne diseases. Each household should therefore try to purify enough water for drinking and cooking. This water should be kept separate from other household water. It should never be stored in containers that have been used to store fuel or pesticides.

Purification methods

One way of making sure that water is pure is to boil it. Many healthcare and hygiene programmes recommend this. Boiling water rapidly for at least five minutes will kill any disease-causing organisms. However, boiling water is not easy. It uses a lot of fuel, which is often expensive or difficult to find. It changes the taste of the water and most people do not like this. The water needs cooling before it can be drunk. While cooling, it needs careful storage to keep it free of contamination and to prevent anyone being scalded. So boiling water is neither easy nor popular.



Sand filters can also purify water (*Footsteps 35*). However, filtering does not always remove all the organisms. A layer of charcoal can help solve this problem, but many experts still advise boiling filtered water or sterilising it by adding chlorine. Chlorine requires very careful measurement. If too much is added, the water will taste bad, while adding too little risks not killing all the organisms. The amount of chlorine in different powders or solutions can change over time, and also varies from product to product.

Solar disinfection

In countries where there is a lot of sunshine, the heat and light of the sun can be used to kill disease-causing organisms. This method is becoming very popular because it is cheap, simple, and requires little work. Research has shown that if used correctly, the treated water is as clean as boiled water. The process is called solar disinfection (SODIS).

This method requires:

- clear plastic bottles of approximately 1.5 litres (those used for bottled water are ideal)
- water that is not too cloudy.

It is important not to use glass bottles, as they do not allow enough sunlight into the water. Plastic bottles have very thin walls which allow the sunlight to reach the water. Cloudy water should be left to settle before use and filtered through a cloth or sand filter if still cloudy.

Fill a clean bottle about three quarters full, put the top on and shake it vigorously for about 20 seconds. This ensures there



Comments from SODIS users

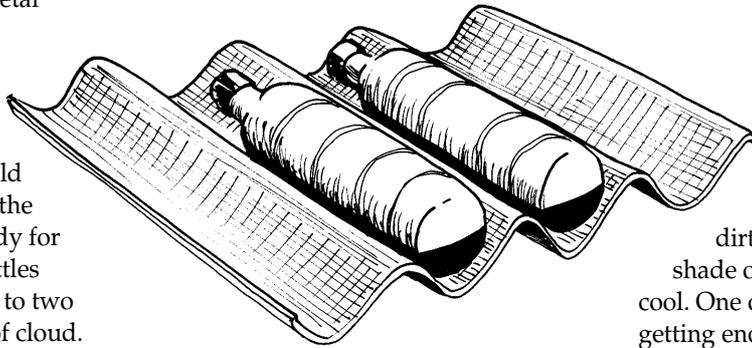
- SODIS is easy to use. I just put the bottles out in the morning and 'forget' about them. In the evening when I finish my other work I just bring them inside.
- SODIS is cheap and we can get the bottles ourselves.
- SODIS does make water safe. We no longer get headaches (associated with typhoid), dysentery and diarrhoea.

is plenty of air in the water, which reacts with the sunlight to help the purification process. Then fill the bottle to the top and place on its side where it will receive direct sunshine for several hours and where wind will not cool the bottle. A roof is ideal if it is made from metal sheets, tiles or concrete, rather than thatch (which could possibly catch fire).

Leave bottles in the sun for at least six hours, where they should become hot to touch. Then take the bottles inside to cool and be ready for use. If the weather is cloudy, bottles should be left on the roof for up to two days, according to the amount of cloud.

SODIS is cheap and we can get the bottles ourselves

SODIS is simple to use and does not change the taste of the water. Nothing needs to be measured, and the water can be kept in the same bottle before drinking, reducing the risk of contamination during storage.



To increase the water temperature (which can be very useful during the rainy season or in cooler climates) one side of the bottle can be painted black. The painted side is placed underneath and helps the water temperature to rise more quickly.

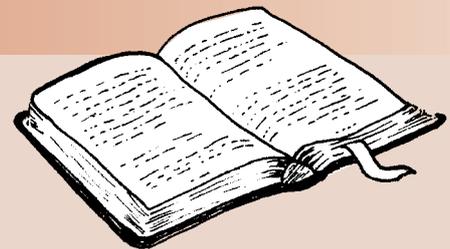
SODIS is easy to use. I just put the bottles out in the morning and 'forget' about them

There are likely to be few problems unless people use really dirty water, use dirty bottles, leave bottles in the shade or where the wind keeps them cool. One of the main problems may be getting enough bottles. This can lead to the use of old, badly scratched bottles which keep out the sunlight.

Paul Dean worked for seven years in Uganda with Tearfund and is now a consultant in Rural Infrastructure and Civil Engineering. More information can be found at the SODIS website: www.sodis.ch

BIBLE STUDY

The river of life by Gladys Mwiti



Water is used to symbolise many things in the Bible; cleansing, new life or healing.

Read Ezekiel Chapter 47:1-12

Here is a wonderful picture of the river of life, symbolising the spirit, life and power of God.

- *Where is the source of the river of life? What do you think this represents?*

Like all rivers, the river of life begins as a small trickle that grows into a mighty river too deep to stand in.

- *If the water represents the spirit, life and power of God, where are we standing? With our feet in the shallows? Or have we launched out into the deep water to be carried along by the power of God's love?*

The deeper we move into our relationship with God, the more the river of life will surround us and flow through us. The river of life brings blessing wherever it passes.

Read verses 7-10

The sea that is mentioned here is the Dead Sea – which has a very high salt content.

- *What happens as the river of life enters the Dead Sea?*
- *Do we have the same effect on our sinful communities and the world in which we live?*

Read verse 12

The river brings great blessing to all those, who like these trees, have their roots deep into the water.

- *What are the five points to note about these trees?*
- *Reflect on how Christ's life could be likened to this description.*

This picture is also repeated again at the end of the Bible:

Read Revelation Chapter 22:1-2

At the end of his ministry Christ reminded us that he is always with us, still pouring out his love and spirit upon us (Matthew 28: 20b). Let us hold on to this beautiful image and let the river of life flow through us and our communities.

Gladys Mwiti established the Oasis Counselling Centre in Nairobi, Kenya.

Books Newsletters Training materials

New *Footsteps* CD-ROM

Do you lend out issues of *Footsteps* to friends and then never see them again? Have you lost issues of *Footsteps*? Are you a new reader and wish you had earlier back copies? We now have a new CD-ROM available with issues 18–50 of *Footsteps* in English, French, Spanish and Portuguese. You can search for issues or topics and print out the information you need. We also have copies of the earlier CD-ROM (Issues 1–40) still available. Both CD-ROMs cost £10 each (US \$15) to organisations able to pay. Please make cheques payable to Tearfund. One copy is available free of charge to *Footsteps* readers unable to pay who could make good use of them. Please write with details:

Footsteps CD-ROM
PO Box 200
Bridgnorth
Shropshire
WV16 4WQ
UK



Hands On – Food, Water and Finance



Hands On – Energy, Infrastructure and Recycling



Practical innovations for a sustainable world

Lots of short articles on interesting projects around the world that have been featured on the BBC World TV series, featuring their experiences, problems and successes. The Energy book covers subjects ranging from solar lanterns to recycling inner tubes, hydrogen powered cars to disaster proof buildings. The Food book includes subjects from ecological sanitation to mercury detection, harvesting seaweed to credit unions.

Both are available from ITDG for £12.95 each plus £4.90 postage and packing.

ITDG Bookshop
103–105 Southampton Row, London
WC1B 4HL, UK

E-mail: orders@itpubs.org.uk

Medical Supplies and Equipment for Primary Health Care



by Manjit Kaur and Sarah Hall

This book is an excellent resource for obtaining medical equipment and supplies. It will prove invaluable to health personnel responsible for maintaining a clinic. It contains detailed information on essential drugs and their usage. There are helpful details on every aspect of selection, ordering, storage, record keeping and use of medicines and equipment. The subject of safe disposal of medical waste is also considered. A free copy is available for health personnel in the South, with additional copies available at £7.50. Please contact:

ECHO
Ullswater Crescent, Coulsdon, Surrey,
CR5 2HR, UK

E-mail: cs@echohealth.org.uk

An on-line version is also available from:
www.echohealth.org.uk



Books for young people

Being young in the world today is quite a challenge. Advertising provides young people with suggestions and lifestyles which may often prove destructive. The economic crisis makes them feel uncertain about their future. Family breakdowns and the present day social structure make it more difficult to form healthy relationships. How can young people make the right decisions?

The Certeza Argentina editorial group is specially interested in this group of readers. They recently published four titles in Spanish for this age group. The books are written in a lively style designed to appeal to youth. They are CD-ROM size with lots of illustrations and humour. The authors are young people themselves or youth leaders. These books may help our young people to find God's answer to their concerns.

- **Sexo realmente seguro: El verdadero plan de Dios**
- **Cómo cumplir tus sueños**
- **Amistad**
- **¿Bailamos? Ayudánete a decidir**

These books cost \$6.90 each including postage. All four are available for \$17 including postage.

Send orders and payment to Certeza Argentina, Bernardo de Irigoyen 654, C1072AAN, Buenos Aires, Argentina, Tel/Fax: +54 11 4331 5630.

For further information, contact: certeza@logos.com.ar or connect at the following websites:
www.libriercerteza.com.ar www.certezajoven.com.ar

How to Build the Archloo

This book shows how to build a permanent shelter over a VIP (Ventilated Improved Pit) type latrine, in much the same way as a ferro-cement water tank is built. The main items required are four planks of wood, each cut into the shape of half an arch, sacking and cement mortar. There are many pictures, and suggestions on how to make the end walls, a vent pipe, and alternatives to a door. Although knowledge of building VIP latrines is recommended, any person with basic building skills will be able to use it.

The book costs £8 including postage and packing and is available from:

Dr Peter Glover
The Write Stuff, 133 Penzance Road,
Durban 4001, South Africa
E-mail: writes@iafrica.com

CLAVES – A Juventud Para Cristo (Uruguay) programme

Youth for Christ Uruguay has been running a very successful programme aimed at preventing child and adolescent sexual abuse. Very valuable resources in Spanish, English and French have been developed in order to equip those interested in working in this area. Their experience has now been recorded and it was shared at an international conference in Japan in December 2001. If you would like to learn from their experience please request a copy of their publication, *Into the Fields of Hope*, which can be e-mailed to you free of charge. Unfortunately they are not able to post copies.

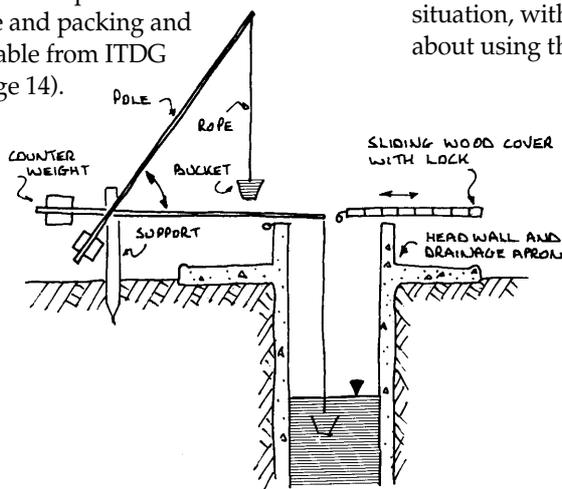
CLAVES Programme
Youth for Christ Uruguay
E-mail: claves@adinet.com.uy

Hand-dug Wells and their Construction

by SB Watt and WE Wells

This technical book provides practical guidance in constructing a well. It includes numerous illustrations (example below), details of recommended materials, construction tips and sources of further information.

It costs £13.95 plus £4.90 postage and packing and is available from ITDG (see page 14).



Waterlines

This practical magazine provides detailed information on all aspects concerning low-cost water and sanitation. It is written for project managers, engineers, policy makers and field workers. Annual subscriptions cost £35 for organisations and £22 for individuals.

ITDG Publishing Journals
c/o Portland Press
Commerce Way
Whitehall Industrial Estate
Colchester, Essex
CO2 8HP
UK
E-mail: sales@portlandpress.com

Hand-dug Shallow Wells

by Seamus Collins
ISBN 3 908001 97 8

This manual is Volume 5 in a series of books on various aspects of water supply and sanitation published by SKAT. It deals with the planning, construction, management, operation and maintenance of hand-dug wells with communities in low income countries. It is aimed at planners, engineers and technicians in the water sector, with the aim of aiding decision-making about the appropriate type of technology to use in a given situation, with practical information about using the various technologies.



Water & sanitation websites

- www.skat.ch
Publications and links to useful sites
- www.sodis.ch
Detailed information on solar disinfection at household level
- www.lboro.ac.uk/well
Provides information for NGOs on water, sanitation and environmental health
- www.lifewater.org
A Christian site with technical information on rural water supplies and sanitation
- www.wateraid.org.uk
Up to date information on Tearfund's research project – *Water Matters*

The book costs £14.00 plus £4.90 postage and packing and is available from ITDG.

Other books in the series include:

- **Water programme management**
- **Building construction**
- **Drilling wells**
- **Handpumps.**

All the books are simply written and are well illustrated, so they are excellent to use for training and in the field. More information is available from:

SKAT
Vadianstrasse 42
CH-9000 St Gallen
Switzerland
E-mail: info@skat.ch
Website: www.skat.ch

Apology

We apologise that the fascinating account of the use and translation of *Footsteps* in Mozambique in Issue 50 was wrongly credited to CORD.

The work is actually being carried out by the organisation AMM who are linked with CORD.

Data protection

Tearfund is legally required to ask *Footsteps* readers for their agreement to use the information held on our mailing list. From time to time we may pass reader information on to other organisations for purposes related to *Footsteps* (for example, the present *Footsteps* evaluation). If you are happy for your address details to be used in this way, there is no need to take any action. However, if you would prefer us **not** to pass on any information that we hold about you, please fill in your name and address and send this form back to us, or send an e-mail to roots@tearfund.org

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Please send this form to: *Footsteps* Mailing List,
PO Box 200, Bridgnorth, Shropshire, WV16 4WQ, UK

Treatment for HIV?

HIV/AIDS is a serious problem in Thailand. It is estimated that approximately 1.3 million people – around 2% of the population – are infected with HIV.

Reducing HIV infection

Five years ago the Thai government began giving free treatment for pregnant women infected with HIV. The anti-retroviral drug, AZT (zidovudine) reduces the risk of pregnant women passing on the virus to their unborn babies. In Thailand AZT is given to mothers who test positive for HIV in the last weeks of pregnancy. This has reduced the rate of HIV infection in their babies by 50%. The drugs used in Thailand cost about \$50 per mother. AZT is a powerful drug that can cause a number of side effects. However, the short-term course given to mothers seems to have no negative effects on them or their babies. Another less expensive drug is Nevirapine, which is almost as effective if used as part of a well-managed health education programme.

Though the procedure is expensive, the Thai government is setting an example and will bring the country considerable benefits by reducing the spread of HIV/AIDS. If other governments followed this policy, hundreds of thousands of childhood HIV infections could be prevented around the world.

Siam-Care, a Tearfund partner in Thailand, works with pregnant women

with HIV or AIDS who are rejected by their families. They provide support, encouragement and training to help them find practical ways of providing for their babies after birth. They also educate young people about the dangers of HIV/AIDS. With the help of young people, they wrote a booklet based on Christian principles for teenagers and printed 5,000 to use in their training sessions. However, a government official saw a copy and circulated it within the Ministry of Public Health. Officials thought it so useful they requested permission to print 100,000 copies to give out to all secondary school students. Siam-Care is now finalising a booklet for primary school children called *A Little Dragon Lives in Brenda's Blood*.



Counting the costs

The cost of anti-retroviral drugs is too expensive for the Thai government to treat other patients with HIV/AIDS – they must pay for their own treatment. These drugs are manufactured in Thailand and cost less than in other countries where they have to be imported. A new mixture of three anti-retroviral drugs still costs just over 5,000 Baht (\$115) each month – treatment only the very rich can afford. The cost of these drugs could be substantially reduced if the patent

Suggested action

Does your government provide anti-retroviral drugs at the end of pregnancy to prevent HIV infection in newborn babies? If not, work with other groups to request this life-saving treatment.

Imaginative education on HIV/AIDS is essential to protect young people. Could you learn from Siam-Care's example?

Raise awareness with religious organisations and NGOs about the WTO's present policy on patents for anti-retrovirals.

charge on the drug was removed. This would greatly extend their use among poor people. Though patents provide funding to allow companies to develop new drugs, many argue that they should not be charged for essential drugs. At the recent World Trade Organisation (WTO) talks, representatives from 50 poor countries (including Siam-Care) worked together to lobby the WTO to release poor countries from patent charges.

HIV/AIDS is causing a worldwide crisis. The WTO and major US pharmaceutical companies should release poor countries from the burden of patents on essential drugs to make anti-retrovirals widely available to the poor. The 'accelerating access' process to improve HIV care supported by the United Nations and five major drug companies is a positive step forward.

Siam-Care, PO Box 86, Sutthisan PO, Bangkok 10321, Thailand.

*E-mail: siamcare@samart.co.th
Website: www.siamcare.org*

Published by: Tearfund, 100 Church Road, Teddington, TW11 8QE, UK

Editor: Dr Isabel Carter, PO Box 200, Bridgnorth, Shropshire, WV16 4WQ, UK

Tearfund staff spend considerable time dealing with many thousands of funding requests that we are unable to support. This is taking them away from their work of bringing good news to the poor through current partnerships. **Please note** that all funding proposals will be rejected unless they are from current Tearfund partners.

Photo: PhotoDisc

