Towards Better Health

The Rural Water Supply and Sanitation Programme in Bangladesh

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Produced by UNICEF
in Collaboration with the DPHE
Reprinted in September, 1995

The rural water supply
and sanitation programme
in Bangladesh is run by the Government
Department of Public Health Engineering (DPHE)
The major supporters of this programme are :

UNICEF, DANIDA, SDC, WHO, UNDP/World Bank.

Introduction

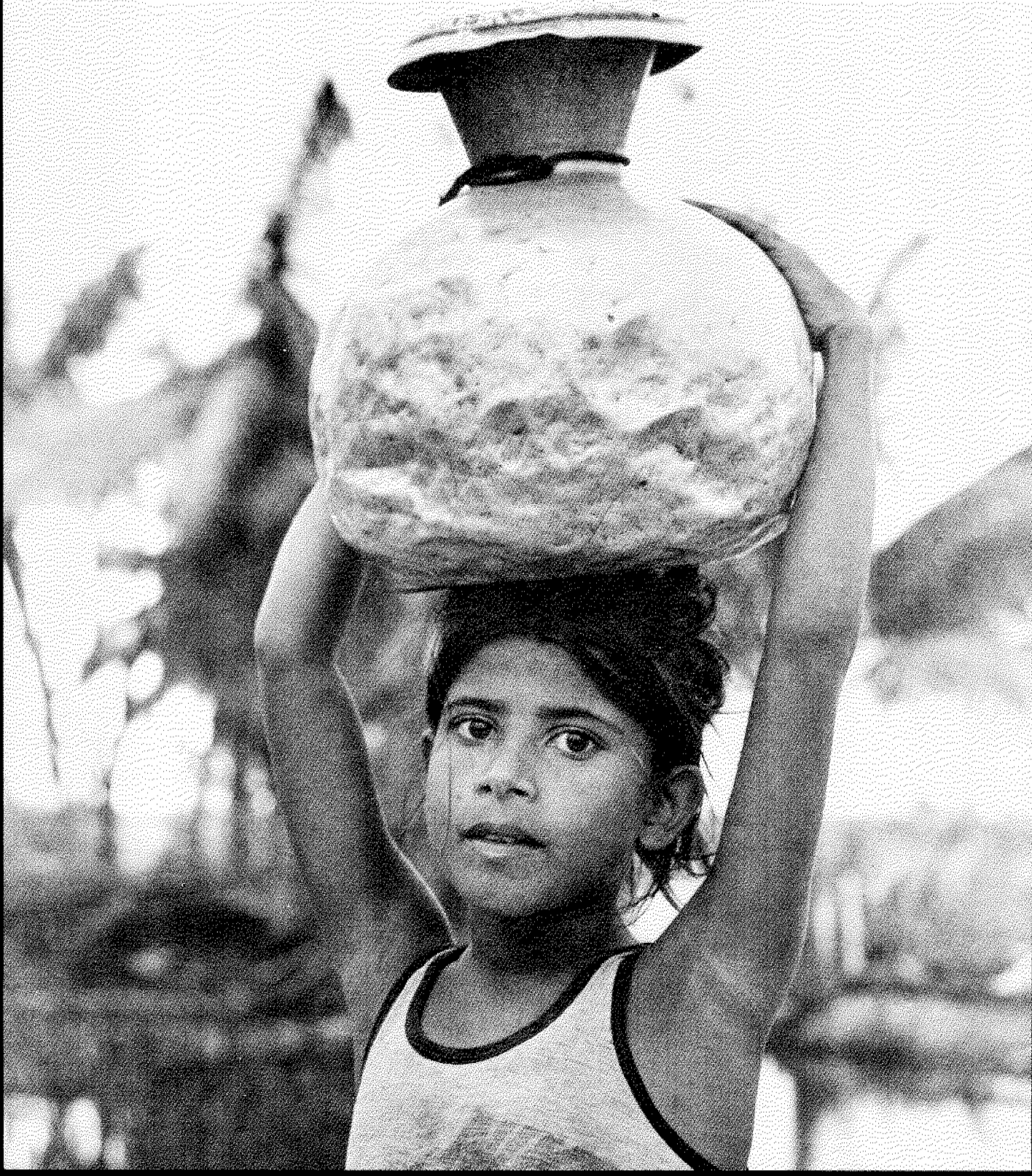
In the last 20 years the Government of Bangladesh, with the support of donors, has created a countrywide demand for tubewell for drinking water. And, more recently, a growing demand for sanitation.

Today 80 million people in rural areas have access to a tubewell within 150 metres of their home. And 96% of the rural population drink tubewell water.

26% of the population now use sanitary latrines, compared to just 10% in 1989.

During the United Nations "International Drinking Water Supply and Sanitation Decade", which ended in 1990, Bangladesh made remarkable progress. This was despite lack of money - which many countries claimed as the barrier to progress.

This booklet sets out how the water and sanitation programme in Bangladesh has developed and achieved its successes to date, and outlines the challenges of the future.



Progress and Challenges : a Summary

In the last twenty years, the rural water supply and sanitation programme in Bangladesh has made huge progress. The reasons for this include :

- reaching the poor majority through low cost technologies
- development of easily maintained and culturally acceptable technologies
- favourable hydrogeological conditions making installation of tubewells easy
- sustainability being built into the programme, through :
  - cost sharing
  - local participation
  - local production
  - quality control
- forging alliances with local agencies and community leaders
- recognition of the vital role of women in promoting health education messages
- well managed government logistical system eg. availability of materials, transportation, storage
- stimulation of the role of the private sector in manufacturing and sales
- adaptability of DPHE to new circumstances and information

Progress has been great but, as the programme evolves, new challenges must also be taken on. Issues for the future include :

- changing people's hygiene habits through public health education
- increasing local community participation
- encouraging more active participation of women in decision making and control
- focussing on the needs of people in underserved water supply areas
- developing low cost technologies and strategies to cope with the declining water table
- providing services in urban slums
- stimulating the growth of the private sector for sanitation

Background

Unlike other countries Bangladesh's water problem is not one of scarcity but rather the opposite. Bangladesh is a country moulded by its rivers. The water breathes life into the country making its land fertile. But, conversely, the country has been described as a massive open drain.

People use ditches and streams as a disposal ground. The surface water has therefore become heavily polluted, carrying all kinds of dirt and germs.

People do not realise that the water they wash in and that their children play in is a potential killer, carrying many different diseases.

80% of disease in Bangladesh is related to unclean water. Diarrhoea is the underlying cause of 250,000 deaths of children under five years old, every year.

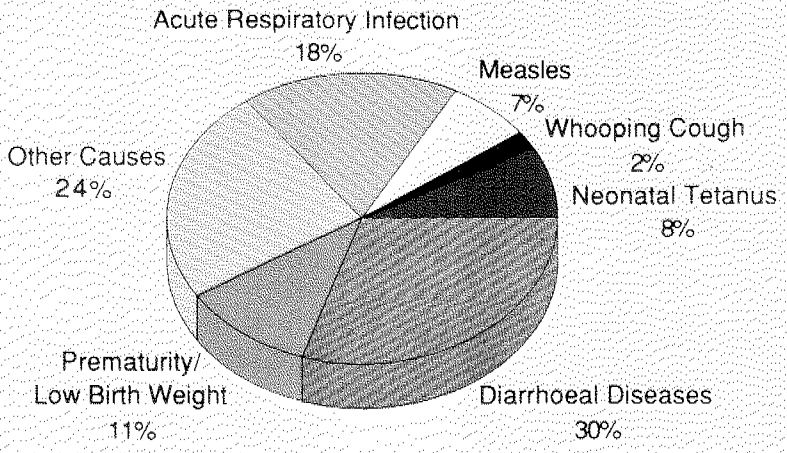
Dirty water is a potential killer

Better health for people in Bangladesh requires :

- use of a clean water supply
- use of sanitary latrines
- good personal hygiene

The rural water supply and sanitation programme in Bangladesh aims to provide universal access to both clean water and sanitation by the end of this century.

Causes of Under-5 Child Mortality



Rural Water Supply Programme

A generation ago the majority of people in rural Bangladesh drew water from ponds and wells. The switch to tubewell water is a revolution in water drinking habits.

Twenty years ago, the installation of a tubewell would elicit complaints about noise and nuisance. People complained that the water didn't taste good and that it smelt strange. But now, nearly everybody in rural areas drinks tubewell water (96%).

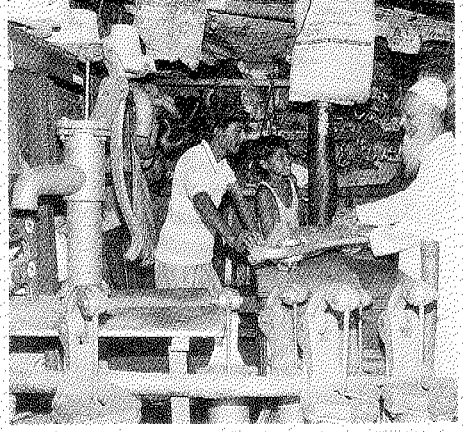
The success of the government programme has stimulated growth in the private sector by providing affordable technology and creating a countrywide demand for tubewells.

In turn, increased demand has generated substantial local employment and industry. Shops in every small town sell handpump spares and in every rural community people are making a living off the handpump business as drillers, fitters, repairers and plumbers.

This has all come about as a direct result of the national rural water supply programme run by the DPHE, which is assisted by UNICEF, WHO and other supporting agencies.

UNICEF's first involvement with water supply in Bangladesh began in 1972, after the liberation war. In the wake of a cyclone in 1970, UNICEF was

A clean water supply close to home improves quality of life



Private sales reflect the programme's long-term sustainability

asked to help in the reconstruction of damaged tubewells.

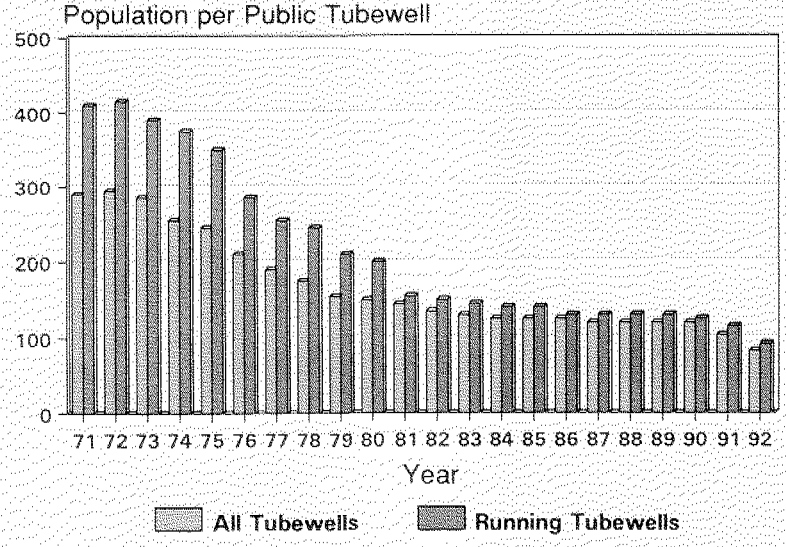
When work began after independence was gained, the programme was extended. UNICEF assisted the DPHE in sinking new shallow tubewells, re-sinking choked up wells and rehabilitating deep tubewells damaged by the cyclone.

Since 1972 860,000 tubewells have been installed by the government, and it is estimated that over one million have been installed privately (1992 survey). Nationally, the average number of people served by government tubewells has dropped from 400 per pump in 1972, to 92 per pump in 1992.

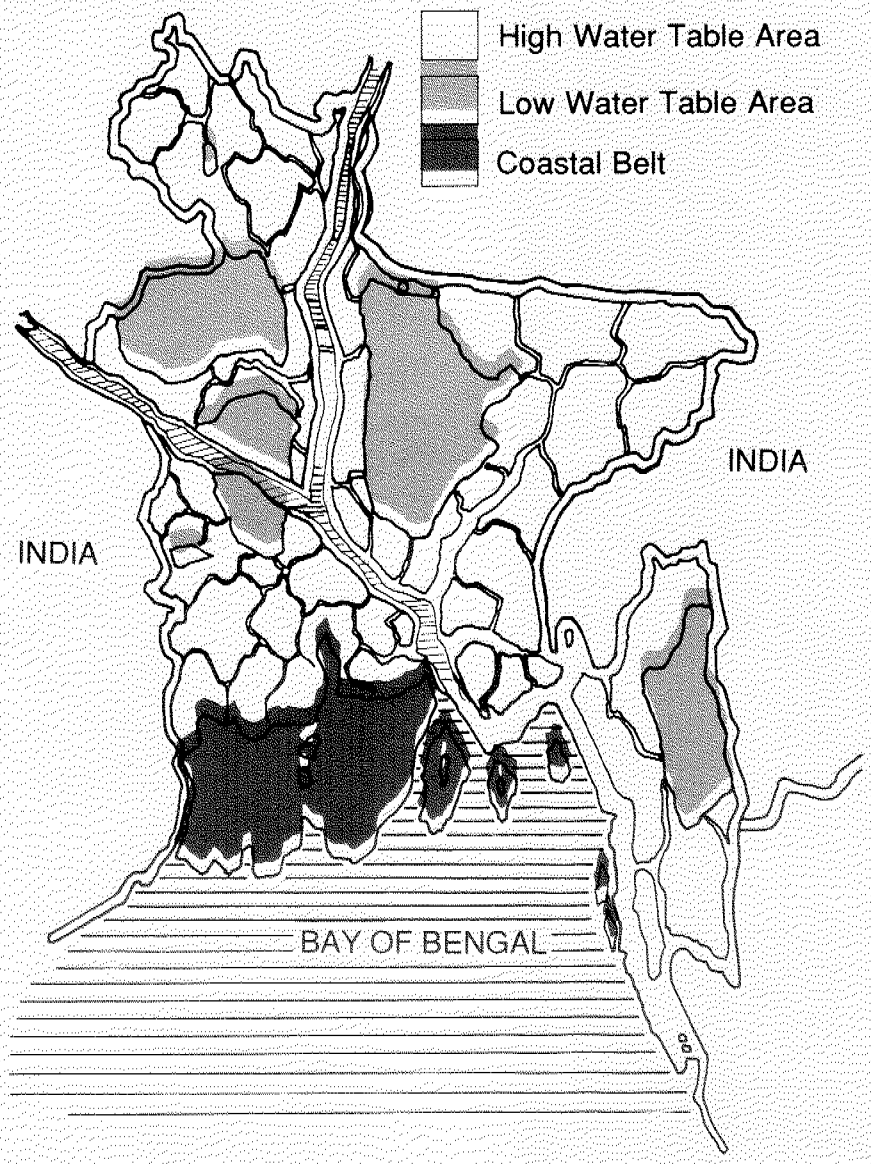
This progress can be attributed to :

- good hydrogeological conditions
- use of appropriate and affordable technologies
- community involvement

Rural Water Supply Coverage



Hydrogeological Areas



Hydrogeological Conditions

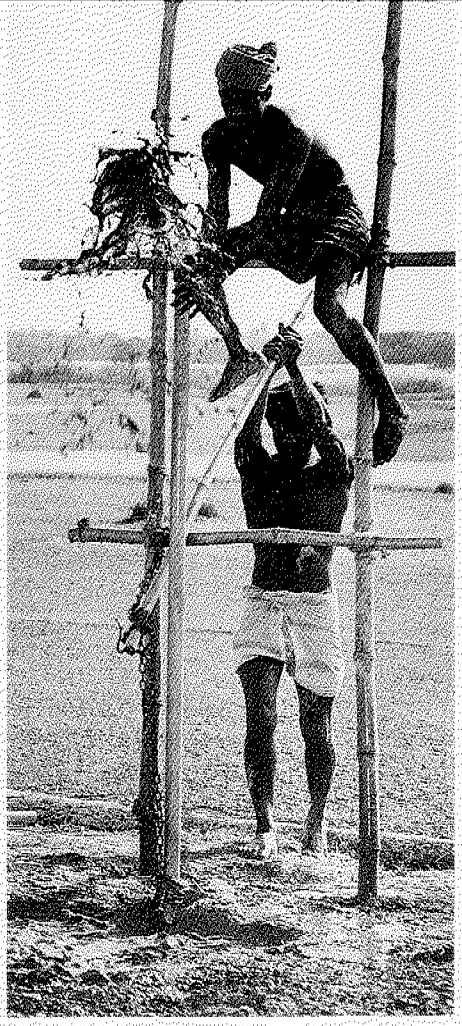
Hydrogeological conditions for groundwater extraction in Bangladesh are highly favourable for low cost, simple technological approaches.

The country sits on a vast spongy aquifer which is replenished by rains and floods every year. As the floods recede the water table falls, but rarely drops below 15 metres. In fact, in 75-80% of the country the water table is less than 8 metres below the surface. And at a depth of 30 to 40 metres there is usually clean water.

Below the clay surface, the groundwater percolates down through different layers of sand which act like a filter, so that the water gradually gets cleaner and cleaner.

The soft soils and lack of rocks means that tubewells can generally be sunk without any mechanical device. Tubewells can be sunk to 100 metres using the "sludger" technique, a traditional hand drilling method which is well within the capacity of a local driller. It is cheap and requires no sophisticated equipment; just a lot of human energy.

In the coastal belt of the country the deepest tubewells must be sunk to a depth of 300 metres, to reach non saline water. Here a water jetting device is used to dislodge the soil. It is also a simple but labour intensive method.



The sludger technique in action

Throughout Bangladesh information on the depth of the water table is annually updated by the DPHE. Other hydrogeological data, such as iron content and salinity, is periodically updated. This information provides a basic aid to good planning within the programme.

Evolution of Appropriate Technology

The water supply programme is characterised by its continuous research for good but simple technology. With 50% of the population living below the poverty line it is essential that low cost technology is developed.

The depth of the water table dictates the type of handpump technology which is used in different areas of the country.

Where the water table is less than 8 metres below the surface, water can be pumped up by suction. This accounts for over 95% of Bangladesh's tubewells, which use simple suction pumps. The majority of these are shallow tubewells, sunk to a depth of 40 to 50 metres. The remainder are deep tubewells in the coastal belt, where the water table is high but the water is saline.

Both shallow tubewells and deep tubewells, however, use the same suction handpump technology - as the water rises to less than 8 metres below ground level : it is just the depth of the tubewell that differs.

The suction pump, called the New No. 6, is based upon a simple earlier technology. With some modifications in the 1970's it remains the country's standard handpump. This pump has also been adopted by Nepal and Vietnam in their water supply programmes.

The main modification made to the tubewell was to replace the metal with PVC. The metallic parts, imported into Bangladesh, were costly, heavy and rusted easily. The switch to PVC

The Tara pump is easy to use

reduced the cost, increased its lifespan, and the tubewell and handpump are now entirely locally produced.

Where the water table is below the suction limit of 8 metres, a different kind of handpump technology is needed. A deepset pump is used which lifts water by mechanical means instead of working by suction. Until the mid 1980's a pump similar to the India Mark II was used. However, this was costly and difficult to maintain.

Research and design came up with a new simpler deepset pump, called the "Tara" pump. The Tara pump can lift water where the water table is as far as 15 metres below the ground surface. It is produced locally which keeps the cost down and is designed to be easily maintained. Compared to the India Mark II, it is lighter, simpler to maintain and cheaper.

By 1992 about 45,000 Tara pumps had been installed in low water table areas. In addition to underserved low water table areas, the Tara pump was hailed as the solution to the declining water table.

Each year, due to more and more intensive irrigation, the water table is falling. In 1975, in 8% of the country the water table was below the 8 metre suction limit. But by 1992, this had risen to over 20%. And by the year 2000 it is feared that the figure may be as much as 50%.

During the dry season, before the monsoon rains, more and more shallow tubewells are becoming inoperable as the water table drops. It is estimated that 150,000 shallow tubewells in the public sector alone are presently (1992) affected by the declining water table.

At first it was intended that the new Tara tubewells would replace the affected shallow suction tubewells, to give a reliable all year round water supply. However, the long term cost implications are enormous.

Then, in 1991 further research began, to see if the Tara pump could be modified to fit inside the existing suction tubewell. The result was the "mini Tara" pump, which is being tested with encouraging results.

The mini Tara has been designed to fit inside the casing of an existing shallow tubewell. If development continues to be successful this means old tubewells will be given a new lease of life, saving on the cost of resinking new wells.

The aim of the initial phase of this rejuvenation programme is to install 2000 mini Tara pumps by 1995. Once thoroughly tried and tested this programme will be accelerated.

In parts of the country where the water table is below 15 metres, the Tara pump has been modified, to produce the Tara II pump. This pump uses the same technology as the Tara pump, but is able to lift water as far as 30 metres below the ground surface. Small scale implementation of the Tara II with close monitoring will begin in 1993.

Other simple technologies

In addition to handpumps, other simple technologies have been developed to solve different technical problems.

In the coastal belt of Bangladesh where the water remains saline beyond 300 metres tubewells have not been sunk because of the prohibitive cost. Here, people rely on the traditional system of pond water. But, in order to give a safer drinking water supply two simple technological innovations have been developed.

One is the very shallow shrouded tubewell (VSST) and the other is the pond sand filter.

Under the clay surface layer, if a thin layer of sand exists near to the bottom of the pond, a very shallow shrouded tubewell can be constructed (VSST) near to the pond. As the pond water percolates through the sandy layer it is filtered and cleaned. The tubewell is sunk to only about 6 to 8 metres, and taps this clean filtered water.

Where no sandy layer exists, a pond sand filter is constructed at the edge of the pond. Water is simply pumped from the pond and runs through a filter to clean it.

In some areas of the country there is a high iron content in the water making it unpleasant to drink. Here, iron removal plants have been installed to take the excess iron out of the tubewell water.

Another problem is the choking up of tubewells. Around 24,000 shallow tubewells become clogged up with sand every year rendering them inoperable. To overcome this a de-sanding technique was developed in the early 1980s that can revive pumps at very low cost.

Sustainability

The water supply programme has been successful to date because it has been developed on the grounds of increasing sustainability. In addition to the use of appropriate technology, sustainability has been enhanced through :

- cost sharing
- local participation & training
- local production & quality control

Cost sharing

At the beginning of the programme, in the 1970's, everything was provided free to people. The materials were provided by UNICEF and the tubewells were sunk by the DPHE. But during this time research was carried out to test the feasibility of involving the community in the programme.

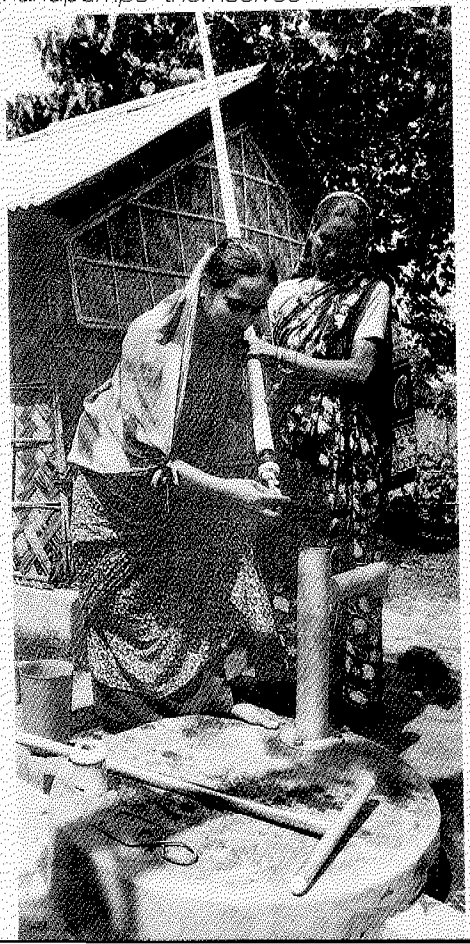
The results established that people were willing to contribute to the costs of having a tubewell. In fact, having

to pay for a tubewell makes them a more valued resource than if they were given away free.

Contribution costs have increased over the years. In 1992 the contribution rate for installation of a shallow tubewell was set at 1000 Taka, which is 8% of the total cost. For a deep tubewell the contribution rate is up to 2000 Taka.

Since 1992, the maintenance of handpumps has been transferred to users themselves. Spare parts can be bought either from the government or from private suppliers. Villagers either manage the repairs themselves or will employ a local mechanic to do the work.

Users can repair handpumps themselves



Local participation and training

A request must come from the community for a tubewell to be installed, which ensures that right from the start there is interest and responsibility, rather than something new and unwanted being foisted upon people.

For each tubewell at least 10 families must apply, and there are certain application criteria which attempt to target the poorer people in the community. For example, to qualify for a tubewell no applicant must have more than 5 acres of land.

Also, local people participate in the selection of a site. Site selection criteria have been developed to prevent the concentration of tubewells in one area, and to benefit poorer people.

These criteria ensure that a tubewell is located at a convenient distance from all the prospective user families, and no family should be further than 100 metres away.

More recently women are being particularly encouraged to take part in this process, as it is recognised that they are the key people responsible for fetching and using water. To

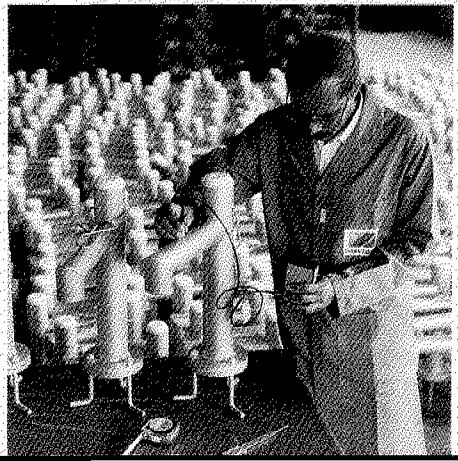
Caretaker families attending a training session

encourage their participation, when an application for a tubewell is made a woman as well as a man must apply from each family.

A caretaker family is designated for every handpump. Both a man and woman from the caretaker family are given training on maintenance and repair by local DPHE staff.

When an application for a tubewell is submitted the most active applicant is designated as the caretaker. This means that, although these are public wells, they are sometimes under the influence of the wealthier members of the community. However, this can be beneficial for poorer users when it comes to organising and paying for repairs.

Quality control is essential



Local production and quality control

Developing and producing handpumps locally keeps costs down by using local knowledge and materials. Maintenance is easier because there is always access to spare parts.

Local production and maintenance also provides employment for many people.

The DPHE is responsible for quality control in the programme. Materials are checked by independent inspection agencies and the installation is checked by the DPHE with support from UNICEF.

Quality control in the government programme is also having an effect on quality in the private sector, resulting in higher standards of manufacturing.

Sanitation and Hygiene

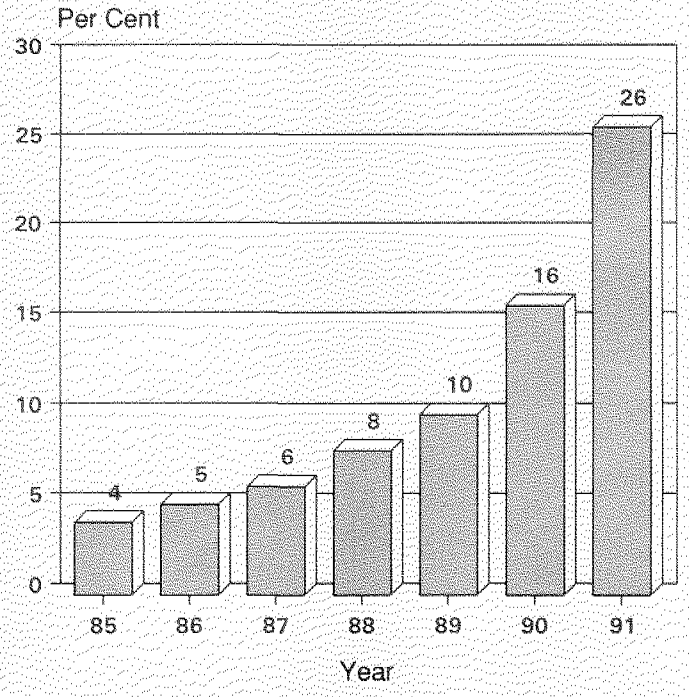
The sanitation component of the programme has lagged far behind water supply. Rapid progress, however, has been made in the last two year. It is estimated that 26% of the total population now uses sanitary latrines, compared to just 10% in 1989.

But this still means that 74% of the population is either using an unhygienic latrine or defecating out in the open. It is estimated that over 20,000 metric tons of faecal matter is deposited in the public domain every day.

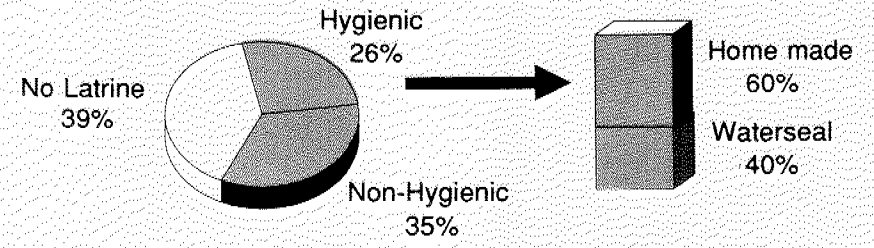
The incidence of water and sanitation-related diseases, particularly diarrhoea, has remained the major killer of children under 5 years. With the increased coverage of a clean water supply it was anticipated that there would be a related drop in disease. But it is now appreciated that this drop is not going to happen until there is a vast improvement in sanitation.

The government target for the use of sanitary latrines is 35% of the rural population by 1995 and 80% by the

Access to Sanitary Latrines in Rural Bangladesh



Use of Latrines in Rural Areas 1991



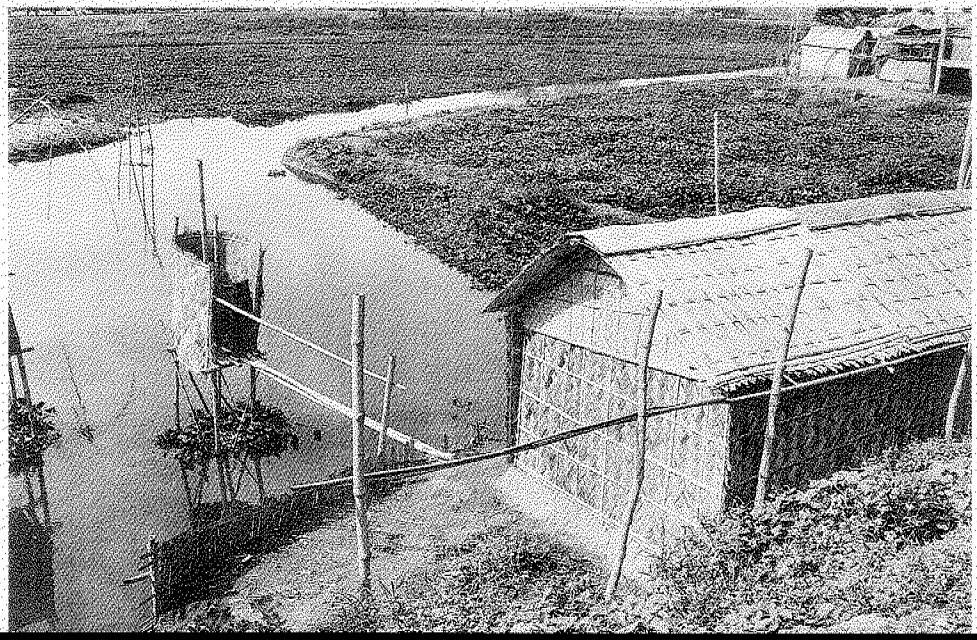
year 2000. This is ambitious, but achievable.

A large sector of the community is already "latrine-conscious". 61% of the population are already using latrines, but the problem is that 35% use unhygienic latrines.

These are mostly open latrines and hanging latrines. Hanging latrines are often positioned directly over a river or pond so faecal matter drops straight into the water which may also be used for bathing and washing.

People use open or hanging latrines primarily for privacy and convenience, without being aware of the health risks. What is needed is to educate people to discontinue using unhygienic hanging and open latrines and turn to the use of sanitary latrines.

Hanging latrines ... a major health threat



Development of the Programme

Village sanitation activities in the public sector began in 1954 as a WHO assisted pilot project to introduce latrines and identify low cost technology options.

Latrine slabs were distributed free, but a high proportion were not used. And nearly all the latrines being used were damaged by people breaking the water seal.

The first phase of a UNICEF assisted Village Sanitation Programme began in 1975. An experimental programme was set up to see if people would pay for latrines. And the results showed that 60% of the latrines sold (at a heavily subsidised rate) were in use, whereas only 30% of those given away were in use.

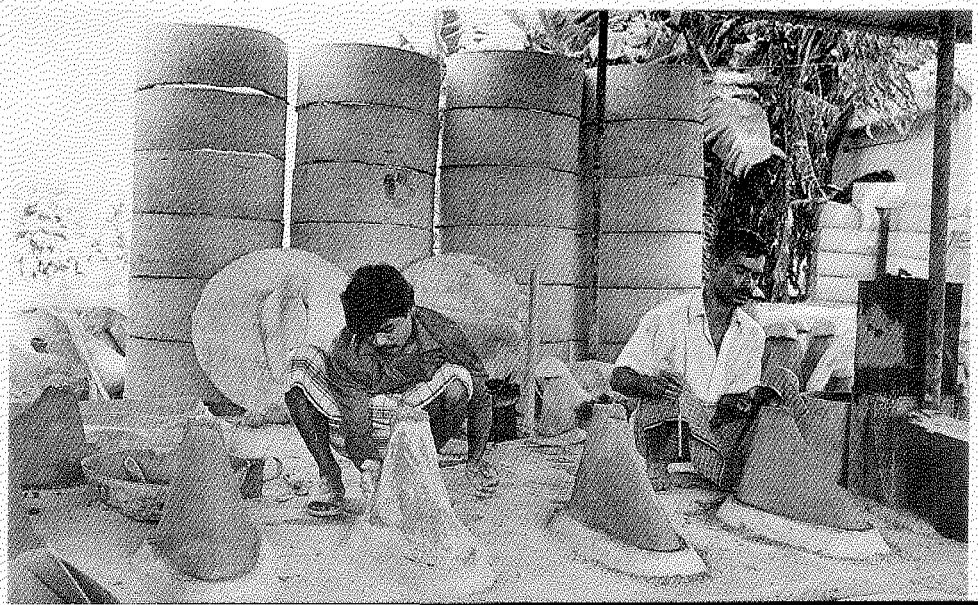
By 1978 a new programme was launched to construct a production centre in each Thana and to sell latrines. By mid 1985, 460 production centres had been built, one in each Thana , and 360,000 latrine sets had been produced.

Now there are around 1000 DPHE Village Sanitation Centres selling low cost sanitary latrines.

In addition there is a growing number of private producers selling latrine parts. It is anticipated that, like the water supply programme before it, the private sector will also have a significant impact in the growth of sanitation.

The programme has stimulated a demand for sanitation where little existed before.

Every Thana has a sanitation centre



Affordable & Socially Acceptable Technologies

Untill recently Village Sanitation Centres have promoted the water-seal latrine as the only hygienic latrine. But, it has been estimated that only 25% of rural households can afford to install a water-seal latrine, even at the subsidised cost of 300 Taka. A survey found that of the rural families who have no latrine, 80% said that the main reason was poverty.

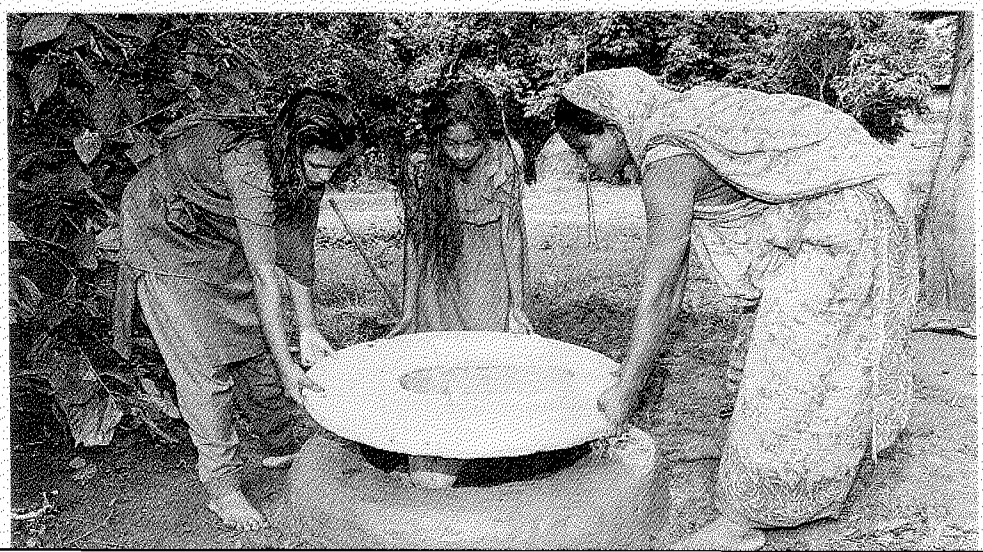
UNICEF and the DPHE therefore revised their policy on what kind of technology they should be producing, and since 1985 a low cost option of one slab and one ring has been promoted, for use in stable soil conditions. The government subsidised cost of one slab and one ring is 125 Taka. Additional concrete rings, if wanted, can be bought from private producers.

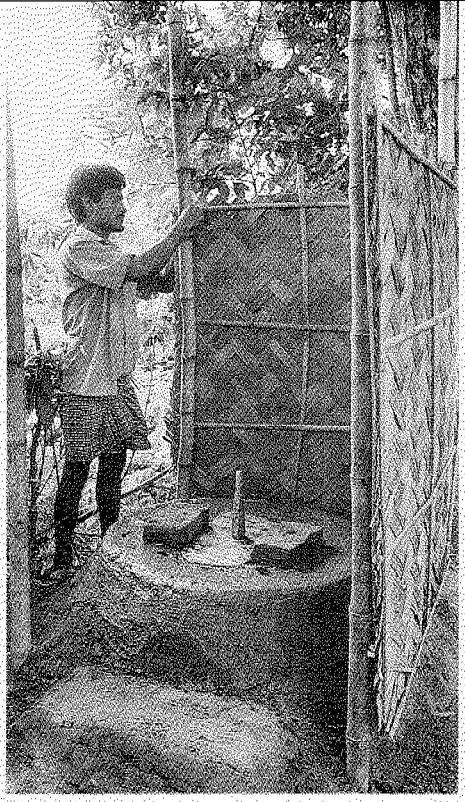
The success story of water supply rests largely on the application of low-cost, appropriate and acceptable technologies. Doing the same for sanitation is possible. Using "do-it-yourself" technologies is an obvious choice for sanitation, and for the majority of people, who simply cannot afford anything else, a simple homemade pit latrine is being promoted.

Homemade pit latrines account for about 60% of sanitary latrines in the country. A homemade latrine simply consists of a hand-dug pit covered by a wooden platform with an opening, and a lid to cover the hole.

Experiences to date have shown that simple pit latrines using locally available

Promotion of low cost technologies is important





Building a pit latrine

materials such as bamboo or wood are both hygienic, acceptable and affordable. 30% of families who build homemade latrines use entirely home available materials, and 20% spend less than Tk. 100.

A refinement to a homemade latrine which is being promoted is "Sanplat". This consists of a concrete slab platform with an opening, which can be used instead of wood or bamboo.

Other options, such as the use of plastic pans, are also being investigated in order to give users a wider range of low cost options.

The Integrated Approach

Up until 1987, two separate products were being promoted : tubewells and latrines. The next logical step was to link the two and connect them to the promotion of health and hygiene.

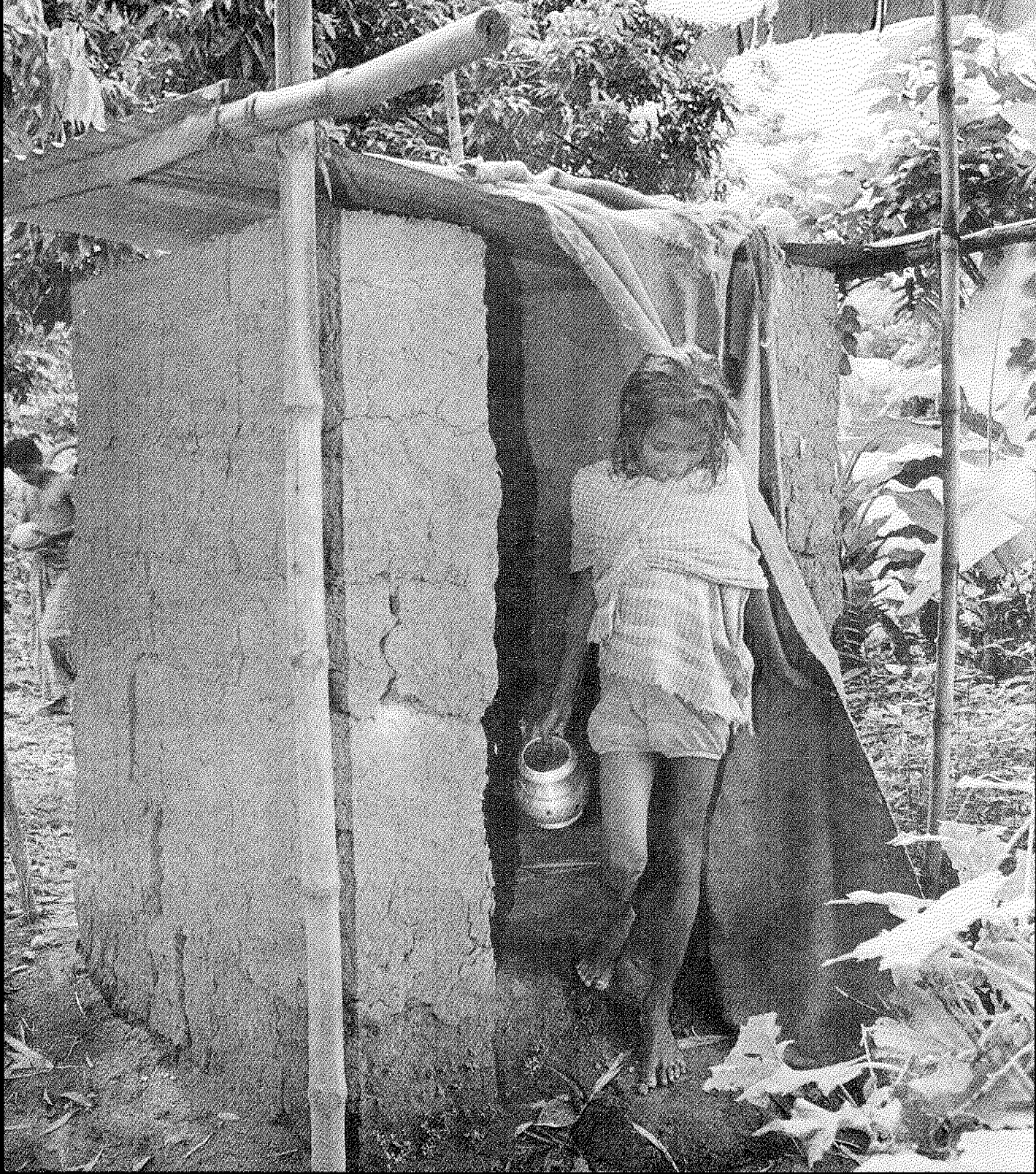
In 1987 an experiment was carried out to increase the use of sanitary latrines. To qualify for a tubewell 5 out of the 10 applicant families had to construct and use a sanitary latrine before the tubewell materials were released. At a later date all the applicant families were targetted. The families were also given health and hygiene education.

This policy of linking the promotion of latrines with tubewells was called the "Integrated Approach" (IA).

The conditionality is no longer adhered to. But the aim of getting all families who apply for a tubewell to use sanitary latrines continues to be actively promoted. The ratio of sanitary latrines to new tubewells in IA Thanas in 1991-2 was estimated to be 7 per tubewell.

An integral part of promoting sanitation is health education. The current DPHE-UNICEF programme focusses on forging alliances to reach out to the community and promote behavioural change.

In addition to health messages the programme emphasises the privacy



This logo promotes the integrated approach

and convenience of using a latrine. This is found to be a particularly effective message amongst women.

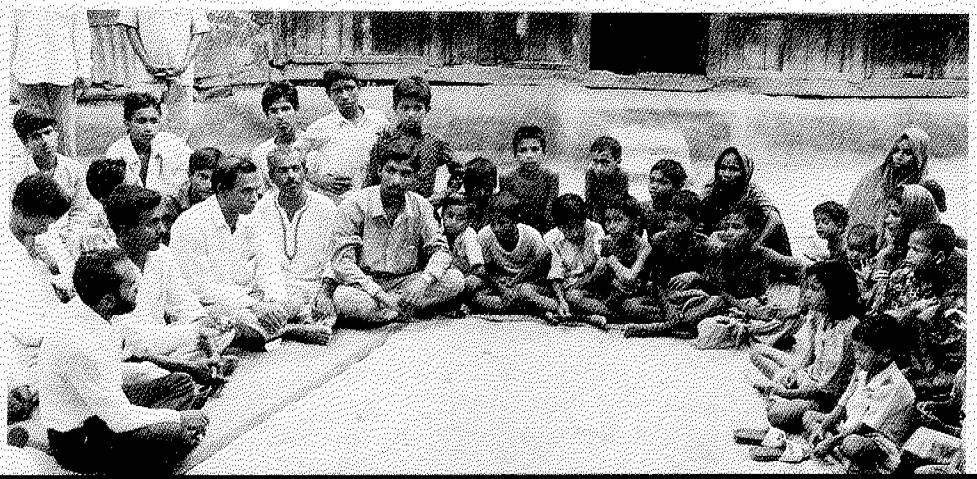
The DPHE organises seminars to motivate community leaders. This includes village level health workers, teachers, social workers, NGO workers, volunteers, local politicians and government officials. All are seen as essential allies by the government to spread vital health education messages.

An example of the success that can be achieved through this kind of "social mobilisation" campaign is in Barisal District. In 1990 an intensive campaign was launched by the District Commissioner in collaboration with the DPHE. This raised the latrine construction and usage to over 70% in 3 Thanas within 18 months.

This was done through seminars and meetings of family planning workers, social services, agriculture, public health and education and through schools. Greater awareness and peer pressure initiated change.

The majority of families spent no cash on building sanitary latrines, and resorted to home-available materials. Furthermore, the linkage between the use of sanitary latrines and good health was well understood.

A courtyard meeting is underway



Future Challenges

Progress has been great, but as in any dynamic programme, the priorities keep changing. As the programme evolves, new challenges must be taken on.

Changing people's hygiene habits is one of the challenges currently facing the programme. Such changes in behaviour demand concerted efforts in public health education.

People won't change their habits unless they understand why it's so important.

For example, although tubewells are now almost universally accessible in rural areas, only 16% of rural people use tubewell water for all their needs. Although the majority drink tubewell water, they still use polluted ponds and rivers for cooking, for washing pots and pans and for bathing their children.

Similarly, owning or having access to a sanitary latrine is not enough. Mothers must persuade their children to use them, and not defecate out in the open.

Health education, particularly for women who have charge of caring for children and other domestic matters, is vital.

The programme also needs to find ways of increasing community participation. This is particularly important for women who are still largely excluded from decision making and control.

Strategies are needed to encourage women to take on a more active role in water supply and sanitation, for example in site selection and maintenance of tubewells. Programme planners are aware that this is a challenge that they cannot ignore.

Further efforts are also needed to stimulate the growth of the private sector for sanitation. To a large extent this has already been achieved for water supply, with encouraging results.

Women are key in creating good hygiene habits

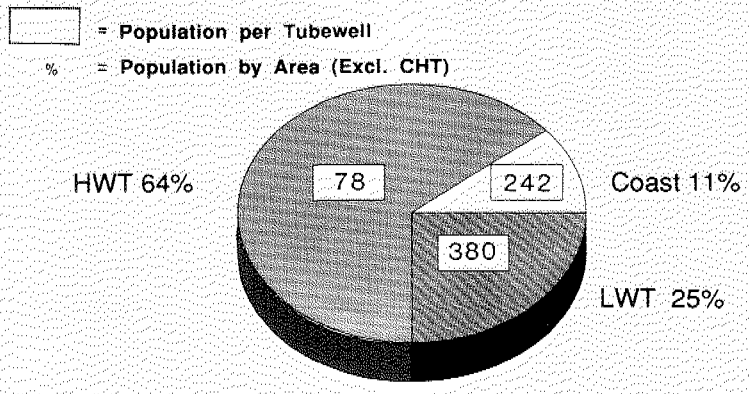
PHOTO : NAZMUL AMEEN

Private producers are contributing to the growth of sanitation

Within water supply, while service coverage is impressive, it has not been even. The average of 92 persons served per tubewell (1992) hides the regional disparity. Coverage actually varies from 78 people served per tubewell in high water table areas, to 380 people per tubewell in low water table areas.

Strategies and technologies must be developed to meet the needs of people in the underserved parts of the country. As well as the low water table area, these include the coastal belt and stony areas in the north and in the Chittagong Hill Tracks.

Area-wise Coverage & Population per Operating Public Tubewell (Rural) 1992



Average Population served per Operating Tubewell = 92 *

(* Increased to 123 if suction tubewells affected by ground water decline considered).

Urban slums need more attention

A high priority must also be given to developing a low cost solution to the rehabilitation of tubewells affected by the declining water table.

Another area which needs attention is providing services in urban slums and fringes. Piped water supplies and sanitation generally only serve the core area of towns, leaving people in urban sprawl and slums in an even worse situation than in many rural areas.

The daily influx of people to urban areas is creating more and more pressure on basic services. The rural programme is therefore being extended to try to serve these people.

The challenges are many: from addressing the problems of regional disparity in water supply and the declining water table, to health education and the further involvement of women.

But maybe the greatest strength of the programme is the ability of the government to adapt to ever changing circumstances and information.

References

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