HANDPUMPS FOR HEALTH

Water use in village India

This booklet draws upon information contained in the 1984 UNICEF report, "Survey on the functioning of handpumps and water uses in selected rural areas." This survey was conducted for UNICEF by Operations Research Group, an Indian consultancy firm. The views expressed are not necessarily those of UNICEF.

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Editing, graphics and production: Asia Alert, New Delhi

Published by Water and Environmental Sanitation Section, UNICEF
Regional Office for South Central Asia, 73, Lodi Estate,
New Delhi 110 003, India.

Handpumps for health

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Introduction

In the early 1980s over 230,000 Indian villages did not have reasonable access to potable water. Despite government efforts, successive droughts had probably increased the number of villages without reasonable access to water. But a major thrust in the country's rural water supply programme in the following years brought that number down to 37,000 by 1985. Still India had a long way to go to reach its goal of providing safe drinking water within easy reach for all its 500 million villagers—a tenth of the world population—by the year 1990.

In India, as in other low-income countries, the lack of sufficient quantities of safe drinking water (together with poor sanitation, malnutrition and poverty) contributes to much of the sickness and disease. Children are the most susceptible to these risks. For instance, millions of children suffer recurrent attacks of diarrhoea which debilitate and retard growth. It is estimated that every year 1.5 million pre-school children in India die of diarrhoea.

Potable water is not a magic formula to reduce infant mortality. But it is is a vital element in the package of services required to reduce water-related diseases from spreading through poor areas. As such it is a key to better child health.

The burden of coping with too little water, or water that is too far away, falls mainly on women and girls. In many parts of India women have to walk long distances to fetch water in pots, making many trips a day. It is likely that the poorer they are, the greater is the distance they have to walk to and from the water source. The majority of rural women already bear a heavy burden of work in the house and field; they must also collect fuel and fodder. Easy access to safe water can help ease the pressure on women's time and labour, and also safeguard the family's health.

water for women and children




The improved drinking water supply programme aims to:

- reduce the incidence of water-related diseases
- reduce the time and labour women spend in fetching water
- motivate rural communities to participate in the programme

The deep bore-well is one of the safest sources of drinking water. Streams, open wells and reservoirs can be easily contaminated. But the water in a bore-well comes through a pipe from below the ground. A bore-well, once properly sealed, is safe; germs cannot enter it. The water that is pumped up through the handpump is thus protected. Safe drinking water helps keep disease away.

The survey

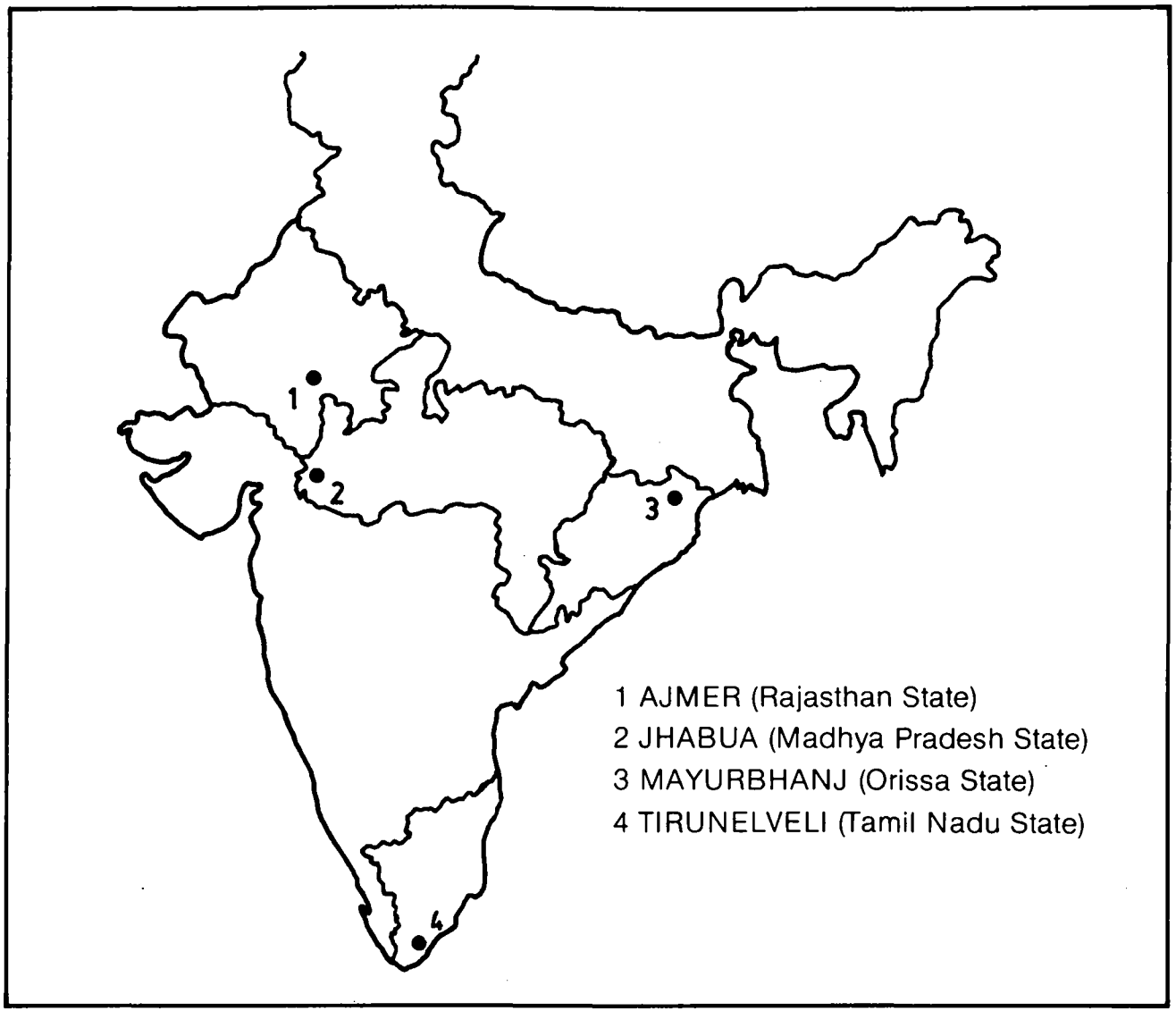
Although UNICEF's financial contribution to the national water supply programme is less than 2 percent of the total cost, it has played a catalytic role in some aspects of the programme. UNICEF has helped to develop the technology of well construction, standardise the design and production of handpumps, and improve implementation. The effort now is to link rural water supply with other child welfare programmes.

A key factor in rural water supply is a sturdy and reliable handpump. The India Mark II handpump is believed to be among the most efficient deep bore-well handpumps for village use. As more and more states in India switched from various conventional pumps to the India Mark II type, many questions were raised about the functioning and use of the pump, and about village water use in general. How much water do people use? How much do the quantities vary during the hot, dry months of the year? How well does the India Mark II handpump work? Why do pumps break down, and what happens then? How good are the different systems of maintaining handpumps in the various states of India?

In order to answer these and other questions, UNICEF selected four districts to survey, providing a representative variety of geographical areas, social-cultural practices and handpump maintenance systems. The districts were: Ajmer (Rajasthan), Jhabua (Madhya Pradesh), Mayurbhanj (Orissa) and Tirunelveli (Tamil Nadu). The districts vary in the size of the villages and the settlement patterns, in the density of the population and the availability of water sources, and also in the people's diet and lifestyle. Jhabua is almost entirely tribal; Mayurbhanj is half-tribal. Villages in Tirunelveli and Ajmer are dominated by upper castes, but one fourth of the people are Harijans (who ranked so low in the traditional Hindu caste structure that they were not considered a part of it—Mahatma Gandhi called them "Harijans", the children of God).

A total sample of 1,254 handpumps and 2,250 households was surveyed, in 205 villages, using both direct observations by field investigators and interviews based on questionnaires.

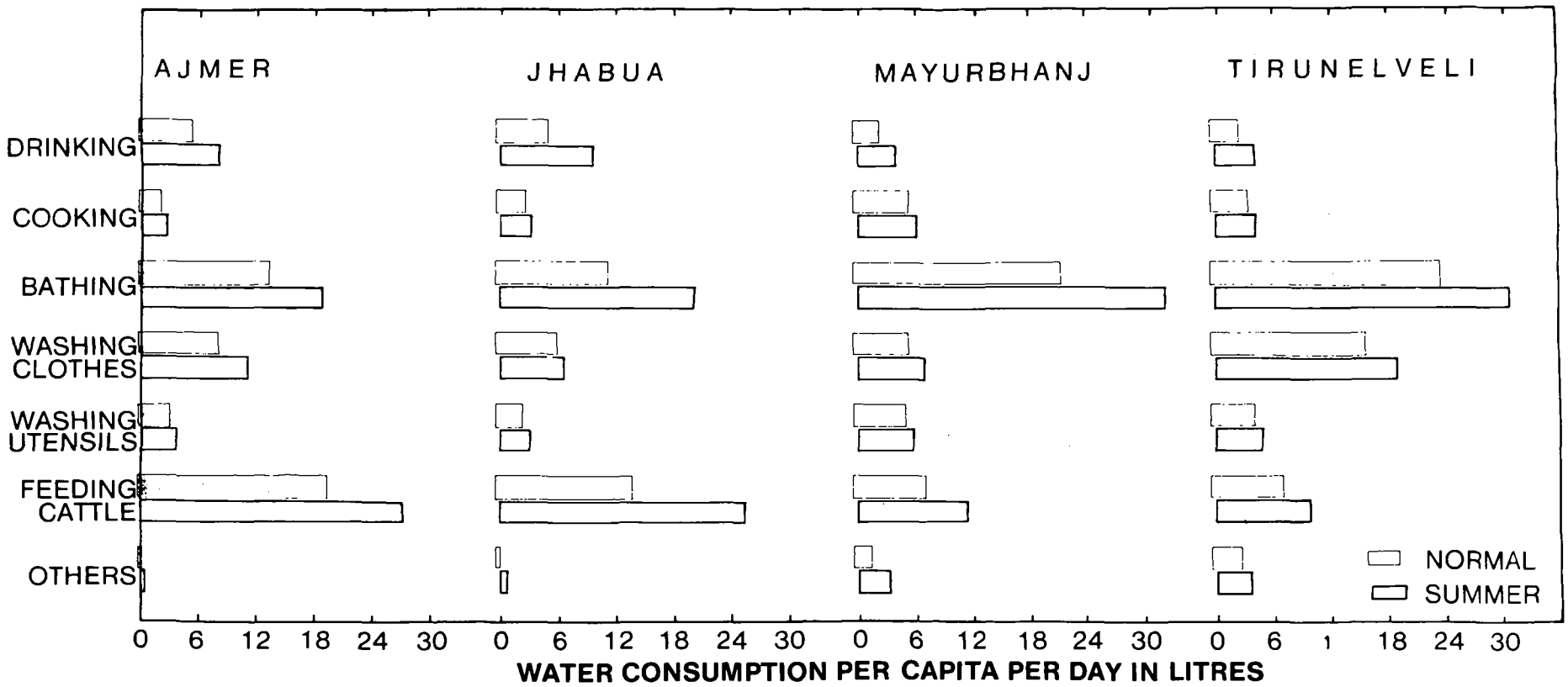
four districts



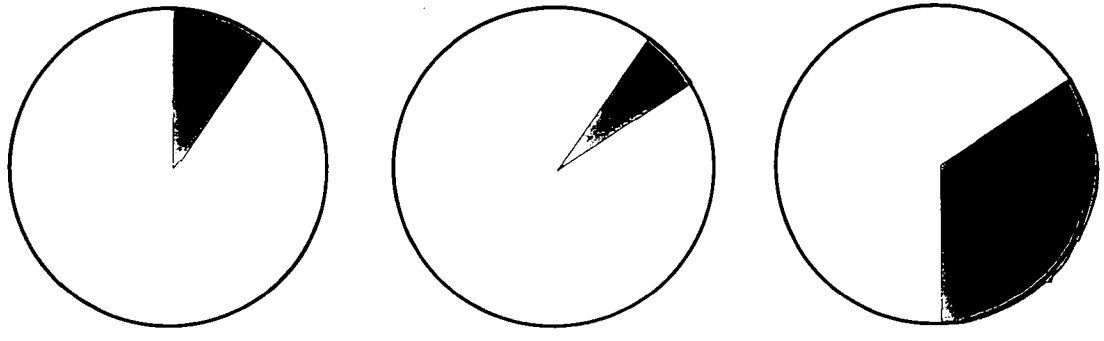
How much water do people use?

The quantity of water used by a person is determined by many factors, varying from season to season and from district to district. In the hot summer months from March to June when the dug wells, ponds and streams dry up, there is also a higher demand for water, both for drinking and for other domestic purposes.

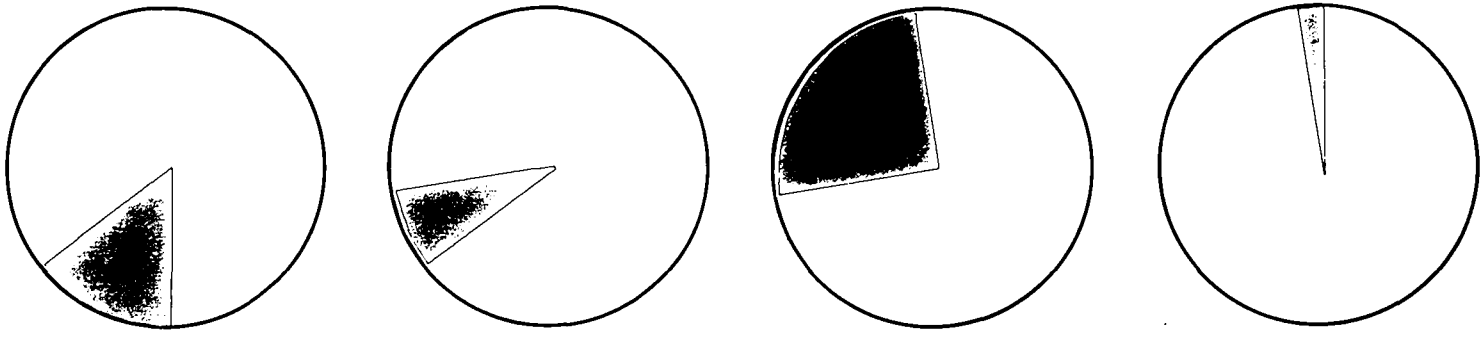
Wheat eaters drink more water than rice eaters, but rice requires more water to cook. On average a person uses 73 litres per day in summer. Of this 6 litres is for drinking and 4 litres is for cooking. The quality of drinking and cooking water is important for preventing the spread of water-related diseases.



AVERAGE PER CAPITA WATER USE IN SUMMER



DRINKING COOKING BATHING



WASHING CLOTHES WASHING UTENSILS FEEDING CATTLE OTHERS

Why many use handpumps

Where no suitable alternative drinking water is available, people rely almost exclusively on handpumps. The poorest villagers, Harijans and tribals, use handpumps as much—or more—than the upper caste villagers. This is significant.

This may be partly because the poorer people had fewer alternative sources in the past, or were denied access to common wells and reservoirs. Unlike the dug wells, the bore-well and handpump is not caste-segregated. Moreover, the Government of India gives priority to siting handpumps in the part of the village where the most disadvantaged sections of people live.

Thus as a development input, the handpump is a particularly effective means of reaching the people who are most in need.

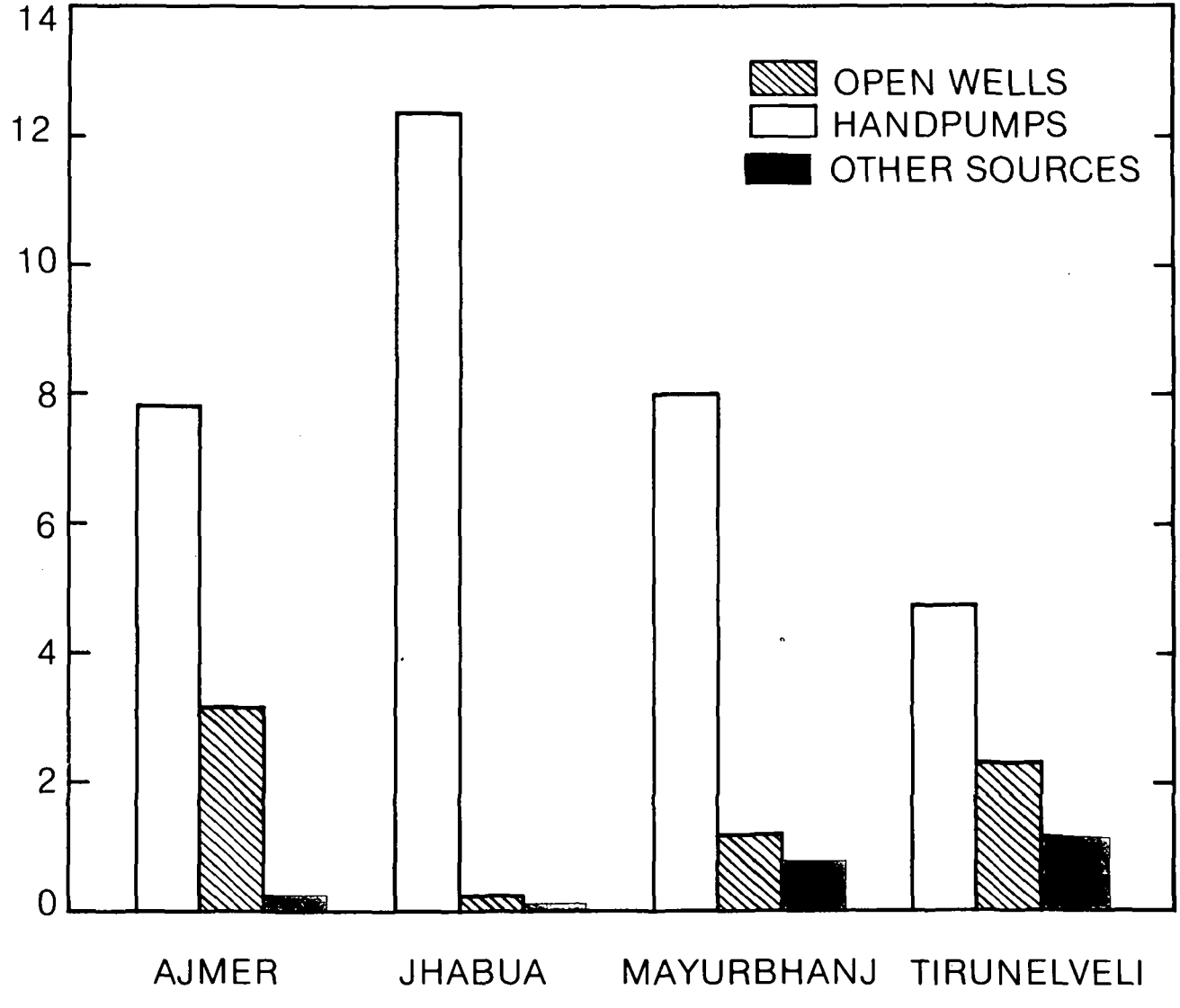
Although only 67 percent of the total consumption of water is covered by handpumps, 76 percent of the drinking and cooking water comes from handpumps. Perhaps, more people use handpump water for drinking and cooking because it is more reliable. Handpumps continue to provide water in the dry season when rivers, streams and ponds dry up.

Open wells are the commonest alternative source, partly because previous programmes concentrated on digging wells. Individual households which can afford a private well in their own courtyards prefer open wells. But even those who have other sources rely on handpump water in the summer.

WATER USE	Ajmer	Jhabua	Mayurbhanj	Tirunelveli	Overall average
Population using handpumps (%)	79	57	55	47	60
Population per handpump (number)	235	154	139	204	183
Population per handpump for drinking and cooking	162	150	113	117	136

for cooking and drinking

Per capita water consumption in litres for cooking and drinking from various sources



. . . and some do not

Why do only 60 per cent of those who have access to handpumps use them? Why do some households prefer alternative sources of water, though less so for drinking and cooking?

There are four major reasons why handpumps are not used:

- Although people are prepared to walk longer distances to open wells, they will not walk more than 150 metres to a handpump. Beyond this distance usage rates are very low, and beyond 300 metres handpumps are not used at all.

- The location of the pumps within the village is crucial. Women who fetch water do not like public places such as the village *panchayat* (council) office, bus stand, school or market place.

- A widely scattered settlement has a low usage rate because the people live in far flung hamlets or huts. But a concentrated village settlement has a high usage rate, because most people live within easy reach of the handpump.

- Handpump water is sometimes unsuitable for drinking and cooking because of salinity or the presence of iron oxides.

  People also imagine that the water is unsuitable, even though this may have no basis in fact. For instance, one belief is that rice cooked in bore-well water does not taste as good, and that pulses do not cook well.

Women and girls fetch water from long distances. They make five to six trips a day, carrying a heavy load on each return trip.

As young children develop the habit of drinking bore-well water they have a better chance of growing up without suffering from water-related diseases.

Drilling and drainage

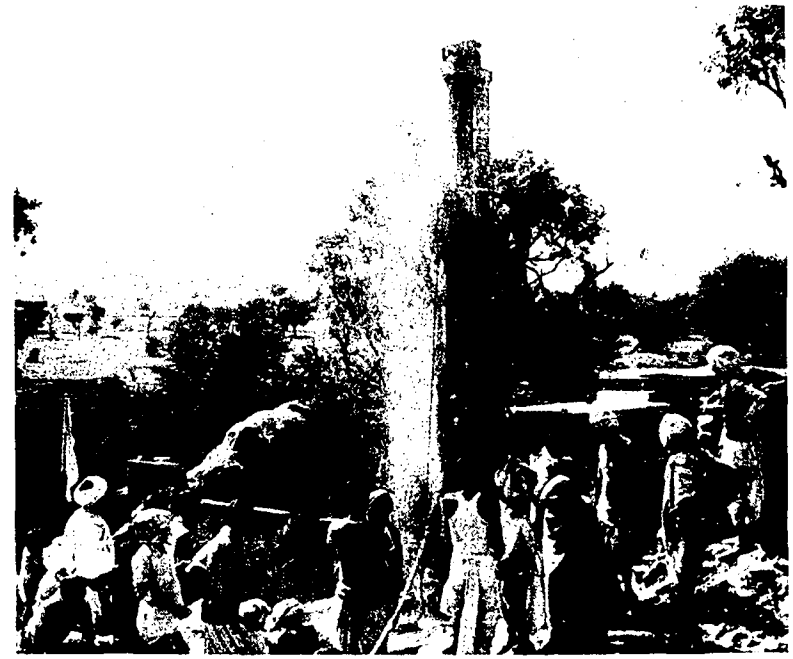
The majority of the pumps surveyed were recently installed India Mark IIs. In Tirunelveli where the programme began earlier, a small number of conventional handpumps are still in use.

Installation consists of three phases: drilling of the well, constructing the platform and soakpit for drainage, and installing the pump. Before drilling hydrogeological and geophysical studies can determine the possible location of water and depth of aquifer. Such studies are normally not needed because of the high success rate of the bore-wells.

Villagers are generally consulted about the location of the bore-well. But the time they have to decide may vary from one month to one day. Women are almost never consulted anywhere. Yet 80 percent of those who fetch water are women.

The drilling agency is different in each state, the drilling being done either by the state government or by private contractors. When a single agency handles both drilling and pump installation, as the government does in Jhabua, the time lag between the two jobs is just a fortnight. But with more than one agency involved, the time lag increases as there is a lack of coordination.

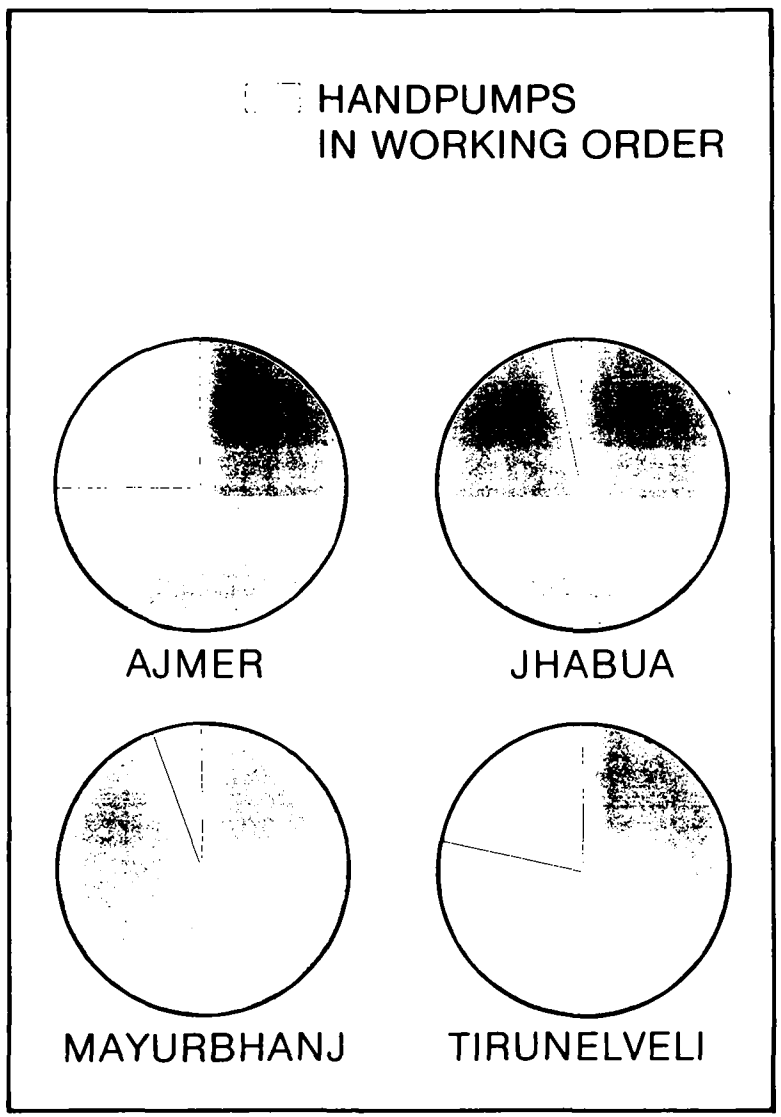
The quality of the installations is normally good, but deteriorates when the pumps are installed on a crash basis. Drainage is acceptable but soakpits are either crudely constructed or not at all.



Handpumps do work!

Most of the handpumps had worked for three to four years, on an average eight hours each day—11 hours in summer. But despite the heavy usage, the performance of the handpumps was excellent—averaging 87 percent in working order. The frequency of breakdowns was higher in Tirunelveli where the pumps were older.

However, it is recognised that with wear and tear the India Mark II handpump is likely to require specialised skill for maintenance and repair. The most vulnerable parts are the chain assembly above the ground, and the washer below the ground. The head assembly takes the greatest load during usage. This can be damaged due to mishandling—children find the India Mark II pump easy to use, but they sometimes drop pebbles, stone chips and garbage into the head. People also use jerky strokes, putting more pressure on the moving parts.



Caring for pumps

Each of the four districts follows a somewhat different maintenance system. In Tirunelveli, a three tier system was first established, with a village pump caretaker, a mechanic at block-level serving about 100 villages, and a district mobile team. In Mayurbhanj, a similar system is being introduced but is not yet operative. In Jhabua, there are no village caretakers but maintenance is done by block mechanics and district mobile teams. In Ajmer, the functions of the village caretaker and the block-level mechanic have been combined in a village handpump *mistry* or handyman, who is locally selected and trained in maintenance and repair, and backed by departmental mechanics.

The village caretaker is an unpaid volunteer. The handpump *mistry* is paid Rs. 150, including Rs. 50 towards the cost of spares (Rs. 10 = US $ 1). Regardless of whether the caretakers are paid or unpaid, or which system of maintenance is used, there remains much that needs to be done to improve the system.

There is very little village participation in maintenance, the reporting of breakdowns and the repair of handpumps. No greasing is done. Breakdowns are not promptly reported. The time lag between reporting and repair is high, and log sheets for repairs are not maintained. Even in Ajmer where the reporting system is functioning better, the repairs are not necessarily quicker.

Impetus for change

The task of providing potable drinking water to 500 million people by the year 1990 is not simple. It requires good administration, technology and funding, besides professional expertise and the participation of village communities. This survey has highlighted some of the key elements that need to be considered in a rural water supply programme. Although it is based on information from only four districts, they are representative of a wide spectrum of conditions in rural India. Information such as this has also contributed to official thinking on the need to change some of the norms of rural water supply.

Among the most significant trends are:

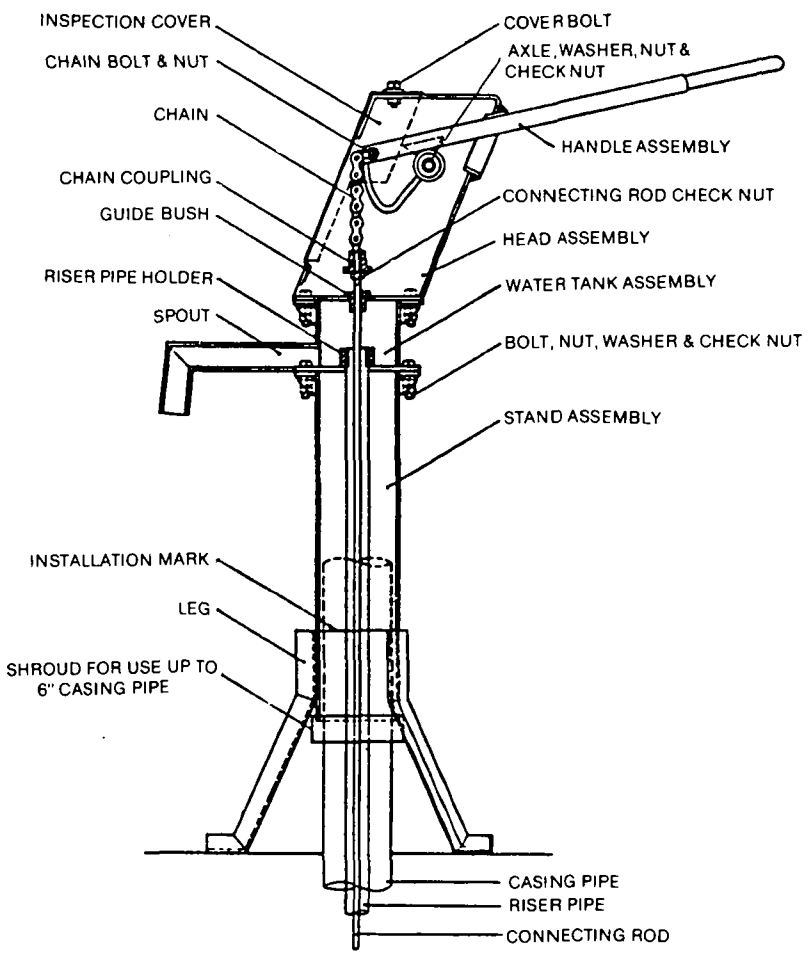
- treating the hamlet rather than the village as the basic unit in determining the number of villages to be served with potable water
- reducing the number of users per handpump from the present figure of 250 to a more realistic figure in keeping with actual usage
- ensuring the maximum distance to the handpump does not exceed 150 metres.

Other problematic areas which need attention for a successful rural water supply programme are:

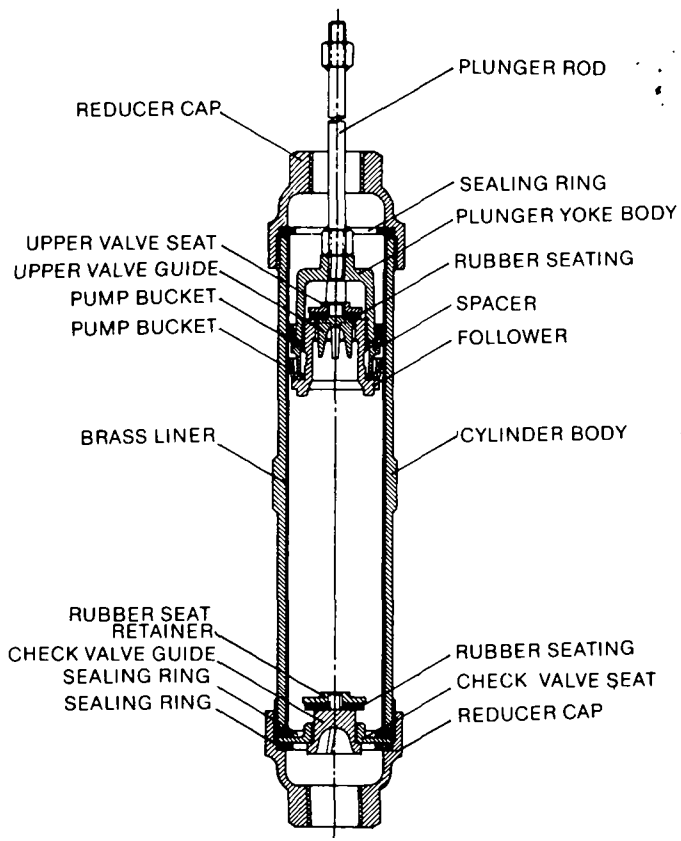
- considering the opinion of women on the location of the handpump
- using a single agency for drilling and installing the handpump for speedier implementation
- educating people to counter misconceptions about the unsuitability of bore-well water
- improving maintenance through regular greasing of handpumps; devising a system of incentives for caretakers; ensuring effective technical backup for repairs.

The India Mark II handpump

- The India Mark II evolved from a design first introduced by the Sholapur Well Service, a non-government organisation.
- A standard design emerged in the mid-1970s and was field tested by UNICEF.
- In late 1977 Richardson and Crudass (an Indian government company) began manufacturing the design approved by UNICEF. This was named the India Mark II.
- The design was not patented but the drawings and specifications were standardised through the Indian Standards Institution (ISI). The design is continually improving through field testing and revisions to the specifications. Today, 40 approved Indian manufacturers are producing the handpump.
- The pump consists of a stand, water tank and head. The stand contains the rising main and connecting rods. The connecting rods are linked to the handle in the head by a chain assembly, and to the cylinder down in the bore-well.
- When the handle is pushed down, the connecting rods rise, lifting the plunger in the cylinder and the water enters the tank. Water is thus pumped up through the rising main into the water tank and flows out through a spout.
- The whole system is held together very simply by washers, nuts and bolts.
- The India Mark II is sturdy and reliable, and—with UNICEF support—it has become the standard village-level handpump in India. It is also being used in other parts of Asia and in Africa where deep bore-wells are being drilled.



SECTIONAL DETAILS
OF PUMPHEAD ASSEMBLY



SECTIONAL DETAILS
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Printed at: Dynamic Art Printers, New Delhi-110 020 Tel.: 632283

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for South Central Asia, 73, Lodi Estate, New Delhi 110 003, India