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## Research reports

# Maintaining village water pumps by women volunteers in Bangladesh

BILQIS AMIN HOQUE<sup>1</sup>, KMA AZIZ<sup>2</sup>, ZAHID HASAN<sup>3</sup> AND MK PATWARY<sup>4</sup>

<sup>1,2,3</sup>Community Health, <sup>4</sup>Researcher, International Centre for Diarrhoeal Disease Research, Bangladesh

Sixty-three women in the district of Mirzapur, Bangladesh, were trained as voluntary pump caretakers using 21 Tara handpumps. They received 6 hours classroom training and 2 hours of practical training. When evaluated over a 15-month period the pumps maintained by the women volunteers functioned as well as those maintained by trained pump mechanics. These findings are significant as an indication of how rural water supply can be sustained and integrated with women's own development.

### Introduction

The importance of women as domestic water managers in developing countries is well known,<sup>1,2</sup> but it is only in the last few years that their role as potential carers for handpumps has been discussed.<sup>2,3</sup> There are a number of reports which have claimed that women can be successful as maintainers of community handpumps,<sup>2,3,4</sup> but these have failed to select a representative group of rural women, or have lacked appropriate methods for evaluating pump performance.<sup>4,5</sup>

In Bangladesh more than 80% of people use handpumps to draw drinking water.<sup>6</sup> A survey in 1983 indicated that although more than 80% of the pumps were functioning, 79% of handpump failures were due to servicing problems.<sup>6</sup> If handpumps fail, even for a short time, people are likely to use other sources, such as polluted surface water.<sup>6</sup> Handpump maintenance is therefore crucial for ensuring health protection.

Women in Bangladesh are the main drawers of water, and are its most under-developed resource.<sup>6,7</sup> Women could be given responsibility for handpump care, but because of the segregation of women and the traditional division of labour in the Indian sub-continent,<sup>7,8</sup> it is

necessary first to test this approach in a typical community.

This paper presents the experiences of the Mirzapur Handpump Project, an integrated rural water supply and sanitation study which used women volunteers as handpump caretakers. The paper consists of a description of the training procedures, data on the performance of the women volunteers and a discussion of the implications of the findings.

### The project

The Mirzapur Handpump Project was conducted by the International Centre for Diarrhoeal Disease Research, Bangladesh, and funded by the Canadian International Development Agency (CIDA), United Nations Development Programme (UNDP) and the World Bank. The project provided 148 handpumps, 754 twin pit-latrines, and hygiene education promoting the use of these facilities in two villages in Mirzapur sub-district, Bangladesh. The villages comprised 789 households and 4856 people. More than 70% of households were Muslims and literacy rate among people older than 15 years was 42% for males and 17% for females.

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One of the main objectives of the project was to field-test a newly developed handpump, called the *Tara* handpump, with volunteers, and to study the impact on health of combining these new facilities with hygiene education in comparison with a similar population, in a control (project) area who had neither these facilities nor any hygiene education.

The field-testing of pumps continued over a period of about five years from 1984 to 1988. The field-testing and design objectives of the project required that all the *Tara* handpumps should be grouped into four design groups and have undergone design modifications suggested by the design development study. Every pump was routinely tested and maintained by project mechanics. The details of the project are described elsewhere.<sup>9</sup>

To monitor performance, each pump was tested every fortnight using a standard discharge and leakage test.<sup>9</sup> A pump discharging seven or more litres of water per 16 to 17 strokes of 30 cm length during 30 seconds of pumping, and which showed no leakage after 10 minutes of rest was classified as 'fine'. If a pump did not reach this standard, a mechanic came to repair it.

The caretaker study was discussed with the community in late 1986 and training conducted in March 1987. The performance of the women volunteers was observed over a period of 15 months, from April 1987 to June 1988. By April 1987 the design study had decided on a standard design for the pump. Out of the four groups of pumps, one was designated for this evaluation study.

#### **Selection of handpumps for volunteer care**

Out of 148 *Tara* handpumps, 21 were selected using the following criteria: (i) pumps of the standard and unmodified design; (ii) at least one pump was from every social unit, known as a '*hati*' (neighbourhood) or '*para*' (hamlet); (iii) a representative range of pumps were selected according to their date of installation, and; (iv) in terms of the number of people using the pumps.

#### **Selection of volunteer pump caretakers**

A group of project workers initially discussed with the male community leaders the possibility

of involving local women in the voluntary care of handpumps. The benefits were explained, emphasizing continuous functioning, benefits to health, more spare time for wage-earning males, and money saved by not calling a pump mechanic for minor repairs. It was also pointed out that pumpcare occurs indoors, and is therefore in keeping with *purdah*, and that women would have a chance to become more self-confident.

The project staff visited the 21 handpump sites and asked for the names of three women who could maintain the pumps, because experience had shown that at least two people were necessary to replace and repair the pump components. The project staff then approached these women and explained the programme and requested that they attend the scheduled training sessions. The women nominated were not confident in their abilities and most were initially reluctant to attend the classroom training at the main office because of *purdah*.

#### **Training**

Volunteer training was done in two teaching sessions: classroom training used a cross-sectioned demonstration pump and a drawing showing the replaceable components labelled in Bangla. A practical session enabled the volunteers to inspect the pumps' condition, identify the problems, dismantle and replace components and undertake different maintenance tasks. The caretakers were told to report major breakdowns to the project mechanics. Two project pump mechanics then visited the pump sites and asked the volunteers to repeat the maintenance that they had learned during the classroom training. A concerted effort was made to encourage self-confidence and volunteers were encouraged to discuss their problems with the mechanics.

After this training, the 21 groups of volunteers were given formal responsibility for their 21 pumps and the project maintenance was withdrawn. The woman living closest to the pump kept the maintenance tools at her house. All spare parts were made available free of cost and project staff did not discuss problems with the caretakers, but a record was maintained of the spare-part taken for each pump.

**Table 1.** Summary of pump maintenance by women volunteers and by project staff

	Volunteer Scheme	Project Scheme
Number of pumps	21	49
Number of inspection visits	494	1247
Number of 'fit' pumps (%)	439 (89%)	1072 (86%)
Pump components replaced/pump/year	2.6	3.2
Piston Assembly replaced/pump/year	1.5	2.0
Foot valve Assembly replaced/pump/year	0.5	0.7
Handle Assembly replaced/pump/year	0.4	0.5
Estimated water drawn per person per pump per day	36 litres	33.7 litres

### Assessment of the volunteers' performance

The project pump inspection and testing system enabled the project pump maintenance and women caretakers' performance to be compared by using inspection data from the 21 volunteer pumps and from 49 project pumps of the same design. The quality of the pump maintenance data was checked by the project engineer, who made unannounced visits to the pump sites. At the end of the study, each volunteer produced their handout and was tested on a suggested repair. Data from the handpump water consumption survey of September-October 1987 was used to compare usage between people using volunteer-maintained handpumps and project pumps.<sup>9</sup>

### Results

During the 15-month observation, the average number of users per volunteer pump was 31, and that of the 49 project pumps was 32. The mean age of the 21 caretaker-maintained pumps and the 49 project pumps was 46 months and 47 months respectively. During the study there was only 1 major breakdown of a caretaker pump and 1 of a project pump.

Table 1 shows the results of pump inspections. The percentage of pumps in a fit condition was 89% for the volunteer pumps and 86% for the project pumps. The component replacement rate in the two groups was similar in both groups.

The mechanics visited about 20 project pumps per day and worked about 62-man days on them, at a cost of about US\$800 or US\$16.30 per pump. The women caretakers were only provided with about US\$0.5 per person to cover their transport costs during their classroom training. The survey revealed that out of 63 volunteers, 47 (75%) could produce their handouts. Fifty-eight of these 63 volunteers (92%) claimed to have used the handout at some time. All 63 volunteers (100%) were able to compare the sketches with a suggested pump repair. The estimated average rate for water drawn from the 21 volunteer pumps was 36 litres per person per day, compared with 33.7 litres from the 49 project pumps.

There was no statistically significant difference in the socio-economic and demographic characteristics between the volunteers and community women. Eighty-one percent of the volunteers had not been to school, nor could they read or write Bangla. This was true of 83% of women in the same community. About 42% of waged male partners of the volunteers were engaged in agriculture compared with 44% of the males in the control (project) area.

### Discussion

The potential of rural women to be voluntary handpump caretakers has been well demonstrated. The users were satisfied with their

performance and accepted this arrangement for pump maintenance. After 15 months of maintenance by these women, the condition of the pumps was found to be as good as that of the pumps maintained by trained project mechanics.

Statistically there was no significant difference in the rate of replacement of spare parts, or in the condition of the volunteer pumps compared to the project pumps. In addition, no significant differences were found between the rates of water consumption, expressed as litres per capita per day, between the volunteer pump and the project pump areas. This evidence also supports the suitability of women as caretakers.

The training of caretakers was designed to take into account the dominance of men in the society, the needs of local women and the nature of the job. The initial involvement of the whole community helped to gain the essential support of male members, without which the project would not have succeeded. A combination of classroom and pump-site training helped the caretakers to understand the broader aspects of handpump care, its expected health benefits and the technical issues.

The users of the 21 pumps nominated women from their own communities to care for their pumps without influence from the project managers. The rural community selected women who were representative of the society indicating that ordinary women can become good handpump caretakers.

Volunteer women dismantled the pumps only when they felt that it needed maintenance and/or the replacement of worn components. These women could do the maintenance tasks as well as the more highly trained mechanics and the difference in cost is marked. A review of the daily and monthly tasks of handpump caretakers<sup>10,11</sup> and project scheme mechanics<sup>12</sup> did not reveal any task that could not be carried out by women.<sup>3</sup> The fact that all the volunteers were housewives is evidence that their new roles were accepted and supported by the male members of the house and by the extended family within the 'bari' (homestead). This observation shows the cultural acceptance at rural community level of handpump care carried out by women.

The Mirzapur Handpump project was based on a newly designed handpump, and an important concept in the design of these pumps was that they could be easily maintained by someone with minimal skills using only a few tools. Our experience with the *Tara* pump has significant policy implications for women and communities in other developing countries.

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### Biographies

Bilqis Amin Hoque has a PhD in Environmental Engineering from Oklahoma State University, USA, and is the Environmental Engineer (Research) in the Community Health Division at ICDDR, Bangladesh.

KMA Aziz has a PhD in Social Sciences from Rajshahi University, Bangladesh, and is a research scientist in the Community Health Division.

Zahid Hasan is a qualified doctor from Chittagong Medical College, Bangladesh, and has an MPH from Johns Hopkins University, USA. He is an Assistant Scientist in the Community Health Division.

MK Patwary has an MPH from the National Institute for Preventive and Social Medicine (NIPSOM) in Dhaka and is a researcher at ICDDR, B.

*Correspondence:* Dr BA Hoque, International Centre for Diarrhoeal Disease Research, Bangladesh, GPO Box 128 Dhaka - 1000, Bangladesh.