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PROVISION OF SAFE DRINKING WATER IN RURAL POVERTY AREAS OF THAILAND

CASE STUDY IN YASOTHON PROVINCE

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FOREWORD

This publication is based on a case study conducted in five villages in Yasothon Province in north-east Thailand. The study was designed to assess the impact of the Programme for the Provision of Safe Drinking Water in the Rural Poverty Area, which forms part of Thailand's fifth and sixth national plans.

Detailed interviews with a total of 513 households form the basis of the conclusions, which include recommendations for improving the impact of the programme.

The research was carried out by the Faculty of Social Sciences and Humanities of Mahidol University, with the cooperation of the Department of Public Health, Ministry of Public Health and the National Economic and Social Development Board. Financial support for the study came from the UNDP/WHO International Drinking Water Supply and Sanitation Decade Advisory Services Project.

AUTHORS' NOTE

There can be no doubt that the impact of the rural poverty area drinking water supply programme in the five villages which formed part of this study has been much less than hoped. In the first two years of the programme, only 6 per cent of the 513 families interviewed have taken advantage of the facilities on offer through the programme.

This first analysis of the operation of the programme has been very revealing, and has helped to identify a number of ways in which implementation of the programme might be adjusted to strengthen its impact.

It is quite clear that Thai villagers recognize the merits of storing rainwater through the dry season, as a substitute for water of more dubious quality from their present dug wells. On the other hand, there are misgivings about the taste of water stored in cement containers, and some unfortunate experiences with the early facilities have had a discouraging effect.

The answers we propose are not dramatic; they do not need to be. The basic formula of training a village sanitary craftsman to work both as a technician and as a motivator, and of having standard facilities that people are able to look after for themselves is the right one. What is needed, it seems to us, is for the craftsman's motivating role to be strengthened, for quality control over construction of demonstration facilities to be improved, and for the range of facilities offered to reflect people's expressed preferences for clay or ceramic containers.

Given those improvements, and some reinforcement of the financial support provided through the village sanitary revolving funds, this study has shown that people will respond by joining in programme activities and thus bring themselves safer water and better health.

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CONTENTS

1. SUMMARY

1.1 Programme Aims

In Thailand's fifth plan (1982-1986), provision of safe drinking water supply to rural poverty areas is the responsibility of the Department of Health, Ministry of Public Health. The rural poverty area programme seeks to promote self-reliance in drinking water provision through simple technology, backed by training and financial support.

Villagers are encouraged to buy or build storage and filter systems which will enable them to use rainwater throughout the year as this is seen as less liable to contamination than the dug-well water which the majority use now. There are three principal facilities associated with the drinking water programme:

- A cement water tank with a capacity of 3000-5000 litres, built using standard moulds.

- A big cement jar (1000-2000 litres), which can either be made in the village or bought in the nearest town.

- A family water filter, made locally from cement and based on a pattern or mould from the Ministry of Public Health.

The first step in implementing the programme is training. The tambon (subdistrict) council committee is trained in the provision of safe drinking water and in the prevention of food- and water-borne diseases. A local mason or a villager with a crafts background receives training in the construction of the three elements of the drinking water programme. The village sanitary craftsman, as the trained person is known, is also taught to build latrines, biogas installations, and other sanitary facilities. Dissemination of knowledge and information about the programme is an important part of the village sanitary craftsman's job.

Financial support for programme implementation comes through the establishment of a village sanitary revolving fund. Administered by the local committee, the fund is intended to provide loans to villagers for construction or purchase of programme facilities.

1.2 Survey Findings

More than two years into the programme, this study of five villages in a rural poverty area of north-east Thailand has found a disappointing impact. Of the 513 households surveyed, only 12 (2.3 per cent) have built a cement rainwater tank; 18 households (3.5 per cent) have acquired big cement water jars (only three of those were built in the village, all during demonstrations by the village sanitary craftsman); and there were only six family water filters in the area at the time of the study, all of them constructed as demonstrations during the training of the sanitary craftsmen.

Although during the rainy season 95 per cent of the households drink rainwater, lack of storage facilities means that for about eight months of the year only 3 per cent can do so, while 94 per cent rely on dug wells.

Most families store water in clay jars with capacities of 10-40 litres and ceramic jars holding 160-240 litres. Totalling the volumes of all the containers owned by the households surveyed, the average household can store about 800 litres at a time. Based on the Ministry of Public Health's standard for drinking water consumption - 2 litres per person per day - a typical family of 5-7 members would need 3000 litres of storage to see them through the dry season.

The biggest problem seems to be public awareness of the programme. Some 74 per cent of households said that they did not know about the village sanitary craftsman and another 10 per cent had the wrong information. A similar number (72 per cent) were not aware of the sanitary revolving fund, and again those who did know about the fund had only sketchy knowledge. Just 90 people (17.6 per cent) had taken part in one or more meetings about the fund.

Unfortunate experiences with some of the facilities which have been built have made motivation of villagers more difficult. Of the 12 cement tanks built under the programme, 2 leaked and one burst; the leaking tanks were repaired by the owner and the village craftsman. A total of 18 big cement jars were purchased, of which four leaked and broke after a short period of use and were not repaired, while two were bought

after the rainy season ended and sat empty in the sun through the dry season. As a result, the jars cracked and broke into pieces when rainwater was put into them. None of the six family water filters has actually been put into use; the owners say that they don't like the look of them and that they are complicated to use.

More hopeful pointers emerging from the case study relate to people's declared preference for rainwater for drinking, and replies indicating that a majority identify a need to have facilities through the programme at some time in the future.

Given the choice between rainwater and dug-well water, only 11.5 per cent of the respondents would choose dug-well water, though that figure rises to 33.3 per cent when it is specified that the rainwater would be stored in a cement facility. Those answers were given in response to interviewers' questions. When 100 villagers were asked to taste three types of water, without knowing which was which, 59 favoured dug-well water, 29 rainwater from a ceramic jar, and only 12 preferred rainwater from a cement tank.

About 80 per cent of the people presently without programme facilities told the interviewers that they might have one or more in the future. In all, 302 of the 478 who

TABLE 1. Future plans for programme facilities

Type of facility	Number	Per cent
Cement water tank	173	36.1
Big cement jar	67	14.0
Family water filter	7	1.5
Cement tank and cement jar	48	10.3
Cement tank and filter	18	3.7
Big cement jar and filter	8	1.7
Cement tank, jar and filter	63	13.2
Total wanting new facilities	**384**	**80.4**
Total not wanting new facilities	**94**	**19.6**
Total without facilities yet	**478**	**100.0**

have not yet participated in the programme, said that they would like to have the cement water tank, either alone or with the cement jar and/or the filter. Table 1 has the details.

With so few households (6 per cent) having participated in the programme, correlation between participation and socio-economic factors is based on a very small sample and from the statistical point of view has limited significance. Occupation, level of education, and family income, did not appear to influence the decision about whether to have water facilities under the programme.

The three elements found to have a significant effect on people's decision to have water facilities were not really surprising:

- Those who had participated in the programme's training activities (15 per cent of the households in the sample had at least one family member who had done so) were much more likely to have bought a tank, jar or filter than those who had not. Some 17 per cent of the training participants were found to have new water facilities, while only 5 per cent of the non-participants had them.

- Purchase of new facilities was clearly linked to an individual household's perception of its water shortage problem. Of the households which told interviewers that they suffered from a shortage of water, 14 per cent had new water facilities under the programme. That compares with just 3 per cent among the respondents who did not believe that they had a water shortage problem.

- Households which have latrines (half of the sample) are more likely to have participated in the water programme (10 per cent of them had water facilities) than those without latrines (only 3 per cent had water facilities).

Looking ahead to future participation in the water programme, perceived water scarcity is again a significant element. Only 24 per cent of households claiming no scarcity problem said that they would be having new water facilities,

while 76 per cent of those who believe that they suffer from a water shortage plan to do so. Findings from this larger sample confirm the judgement based on the analysis of those who have already bought new facilities, that education, income and occupation have no significant influence on a household's decision to participate in the drinking water programme.

The survey assessed people's attitudes towards the programme for the provision of safe water supplies in rural poverty areas, and more specifically towards the kind of water provided under the programme, by means of a series of statements which could be rated as "positive", "neutral", or "negative". The general result was that more than half (54 per cent) had a positive attitude towards the programme and no-one had a negative attitude. There was less enthusiasm for the actual water made available through the programme. A big majority (70 per cent) could be said to be neutral, about 20 per cent had a positive attitude towards water stored in cement facilities, and 10 per cent were negative.

A more detailed analysis of this part of the survey shows that very high percentages of those interviewed want to see villagers having a say in the construction of public water supply facilities, and that they are willing to give some money and labour for construction. On the other hand, most believe that both construction and maintenance should be the government's responsibility, with help from villagers. The feeling is that the programme facilities are too difficult for villagers to construct, though the majority think that every household should have a cement tank.

The idea of a village sanitary craftsman is generally welcomed, with villagers wanting to be involved in selecting the person to be trained, and seeing a more positive role for the craftsman in promoting construction of new facilities and in transferring his knowledge to others. Half the people thought it was necessary to have a sanitary revolving fund in the village.

In expressing their views about different types of water, people distinguish between cleanliness and taste. Though 85 per cent described rainwater from a cement tank or jar as "clean", most preferred the taste of dug-well water. It seems

to be cleanliness which dominates consideration of future water supplies, as 451 of the 513 households said that, if possible, they would be getting more rainwater storage facilities. Responses also suggested that villagers would prefer a wider choice of facilities to be made available through the programme. In particular, the big cement jar was regarded as unwieldy, there being an obvious preference for a ceramic jar.

1.3 Recommendations

1. More community education is needed to overcome the recorded lack of awareness among villagers of the actions open to them under the rural poverty area water supply programme. Early involvement of villagers in decisions, including the selection of the village sanitary craftsman, needs to be encouraged.

2. Quality of the products offered needs to be of a higher standard and more consistent. In particular, special attention should be given to demonstration facilities, where poor results in the past have made motivation of villagers more difficult.

3. The selection of water facilities available should be broadened, and include items for which the people have expressed a preference, such as clay or ceramic pots. On the other hand, the family water filter is clearly not popular and should be removed from the programme in the study area.

4. The role of the village sanitary craftsman will be appreciated more by the villagers if the craftsman can be encouraged to take a more active part in spreading information about the programme and to use his training more by actually constructing facilities with new owners.

5. Timing of budget allocations needs to be carefully considered, so that it fits better with the seasons when villagers may be available to carry out work for themselves.

6. This study has been restricted to five villages in the province of Yasothon. A more complete picture of the effectiveness of the rural poverty area drinking water programme would need similar case studies in other regions. A policy could then be formulated on the basis of facilities found to be acceptable in varying circumstances.

1.4 Socio-anthropological Study

In one of the five villages (Kudhae), a separate socio-anthropological study was carried out to determine any underlying attitudes or cultural aspects that might influence programme implementation.

The principal findings of this study were:

1. The close proximity of neighbouring houses restricts the space available for water storage and makes it difficult to accommodate the cement water tank and even the big cement jar.

2. Most people are Buddhists, which means that there is respect for older people and for those who do well. Village life is very simple.

3. There are good dirt roads which means that a cart is easily pushed when carrying water from the wells.

4. Village projects generally have good participation, particularly traditional and cultural activities, cleaning of the village and maintenance of dug wells.

5. Most people believe that a clean well must be located outside the village.

6. Farmers spend about four months of the year on the farm, and some live there permanently at that time, using dug wells in the fields for drinking water and the fields instead of latrines.

7. Women and children are the most important water carriers.

8. The villagers believe that rainwater is clean and tasty and drink it from choice, but prefer it from a ceramic rather than a cement container. Taste of water is more important in selecting a water source than the distance to the well.

2. BACKGROUND

2.1 Drinking Water Supplies in Rural Thailand

The Thai Government has, for a long time, been aware of the problem of providing safe drinking water sources in rural areas of the country, and various measures for tackling the problem have been implemented since the first National Economic and Social Development Plan. Programmes have included the construction of wells fitted with handpumps, improvements to shallow wells, and construction of piped water systems and cement water tanks. The Ministry of Public Health, Ministry of Interior and a number of other agencies are active in the supply of safe water supplies for rural areas.

The fifth and sixth National Economic and Social Development Plans cover the period 1982-1991, substantially coinciding with the International Drinking Water Supply and Sanitation Decade (1981-1990). Thailand has adopted the aims of the IDWSSD and has been working towards the goal of having adequate safe water for all people by the year 1991. In the fifth plan, the target is to serve 95 per cent of families by 1986 and 100 per cent by 1991.

A study of drinking water and sanitation behaviour and attitudes in north-east rural areas conducted in 1982 showed that 98.1 per cent of the people drink dug-well water.

2.2 The Rural Poverty Area Programme

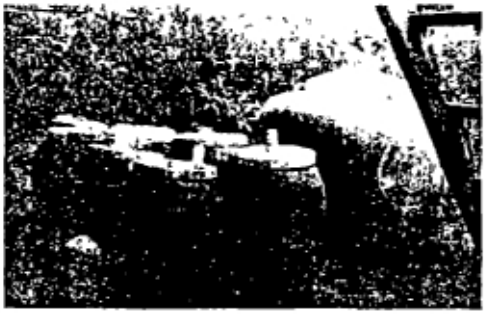
The fifth plan makes the Department of Health, Ministry of Public Health, responsible for providing safe drinking water supplies in rural poverty areas. The programme designed to meet this objective is geared towards self-reliance. It recognizes that earlier attempts to introduce piped supplies or handpumps have had limited impact (the people like the convenience of handpumps, but rarely use the water for drinking, because they don't like the taste or the often high iron content).

The present programme is based on three main elements, which villagers are encouraged to buy or build, with trained assistance, to provide them with a year-round supply of safe water. The three elements are: a cement water tank; a big cement jar; and a family water filter.

The cement water tank holds 3000 litres of rainwater - enough to meet the drinking water needs of a family of 5-7 people through the dry season.

The cement water tank is built using standard moulds and has a capacity of 3000 litres, which can be extended if the owner wishes. The capacity is based on the storage needed to provide a family of 5-7 people with 2 litres per head per day of drinking water through the dry season. The tank is filled by collecting rainwater from the house roof. The estimated cost of building a tank is 3000 Bahts.

The big cement jar too can be built in the village, but it is also available on sale in the towns. It holds 1000-2000 litres and costs about 400 Bahts.



The big cement jar stands alongside ceramic jars, each capable of holding 160-240 litres.

The family water filter can be made locally, from moulds supplied by the Ministry of Public Health.

The family water filter is also designed to be manufactured locally from cement, using moulds supplied by the Ministry of Public Health. Average cost of one filter is 216 Bahts.

The key element in the water programme is the village sanitary craftsman. A villager with a crafts background, such as the local mason, is selected for training, which includes construction techniques for the three water facilities on offer. The intention is that the village sanitary craftsman should then become a local motivator, encouraging villagers to participate in the programme, and disseminating his knowledge and skills, to build up a self-help environment.

To assist this objective, training is also given to the tambon or subdistrict council committee in the area. This training focuses on means of providing safe drinking water supplies and on prevention of food- and water-borne diseases.

Thailand's National Economic and Social Development Board Survey estimated that a family income of 25 000 Bahts per year is a minimum requirement for nutritional needs to be satisfied, but many families in the rural poverty area have

incomes below this figure. Costs of acquiring the programme's water facilities therefore represent a significant investment.

The programme includes provision for a village sanitary revolving fund to be set up in each village, to assist people in financing the purchase of new water facilities. Money from the fund can also be loaned for construction of latrines or of biogas installations. The fund is administered by the local committee, which has the responsibility for selecting those who receive loans and for setting the terms under which the money should be paid back.

2.3 The Case Study

The rural poverty area drinking water supply programme began in 1982, and after two years of implementation it was thought timely to review the impact of the programme and evaluate any problems or obstacles. Financial support for this case study came from the UNDP/WHO International Drinking Water Supply and Sanitation Decade Advisory Services Project. The study was carried out by the Faculty of Social Sciences and Humanities, Mahidol University, with the cooperation of the Department of Health, Ministry of Public Health and the National Economic and Social Development Board.

The objectives of the study were:

1. To document approaches used and impact derived from the programme for provision of safe water supply in the rural poverty area.

2. To study the motivation and attitude influencing the households to accept or reject the programme facilities.

3. To give recommendations or guidelines and procedures which may enhance the successful implementation of the programme.

The scope of the study was restricted to the programme contained in the fifth National Economic and Social Development Plan, implemented by the Division of Health, Ministry of Public Health.

North-east Thailand was chosen as the study area, because the region has been one focus of the fifth plan rural poverty area programme. It has a general problem of providing safe water supplies, and the people are generally poorer than in other parts of the country.

Yasothon Province was chosen at random from the 17 provinces in the north-east region. Within Yasothon, five villages were selected to give a range of phases of programme implementation and perceived successes. Two villages assessed as comparatively successful after the first year of programme implementation were included with two deemed less successful at the same stage and one in which there had been two years of programme activities. Within the five villages, half of the households were interviewed on the basis of random selection. That made 513 households in all (see Table 2). Wherever possible, the head of the household or the spouse was interviewed.

TABLE 2. Households interviewed in five villages of Yasothon Province

Village	Tambon	Amphur	Total h'seholds	H'seholds in sample
Ban Kokeyao Mu 8, Mu 9	Kokeyao	Saimoon	195	90
Ban Dongmafai Mu 1, Mu 8	Dongmafai	Saimoon	288	143
Ban Wai	Samakki	Lerngnotka	192	95
Ban Kudhae	Kudhae	Lerngnotka	261	136
Ban Langpan	Kujan	Kamkern-kaiew	95	49
Total			**1031**	**513**

A seven-part questionnaire (**Annex 1**) was developed in consultation with the officers of the Sanitation Department Ministry of Public Health. It was pre-tested in comparable Yasothon villages to the case study villages, and adjusted to improve its reliability before the study commenced. The ten interviewers are all natives of north-east Thailand, and they all underwent a two-day course to familiarize them with the programme and the objectives of the study. The survey took place in January 1984, with interviews averaging 45 minutes per household. Data were analysed by computer.

The seven parts of the questionaire sought information on:

- Socio-economic and demographic data
- Household drinking water
- The sanitary revolving fund in the village
- Provision of safe drinking water supplies under the rural poverty area programme of the fifth plan
- Public drinking water supplies
- The village sanitary craftsman
- Attitudes towards the programme itself and the water provided through the programme.

3. SURVEY DETAILS

3.1 Demographic and Socio-economic Characteristics

Average family size of the 513 households in the study was 5, which in Thailand is considered a large family, but which is common among northeastern families. Comparison with the 1980 population and housing census suggests that the family size is reducing; then the average family in Yasothon Province had 5.7 members.

More than half the respondents were aged between 40 and 60, the average age being 45 (there was a deliberate aim to interview heads of households or their spouses). Most (92 per cent) of the people under study are rice farmers, and almost all have four years of education, which is the norm for rural people.

The family income is low, with 72 per cent of the households earning less than the 25 000 Bahts per year which the National Economic and Social Development Board says is needed to afford proper nutrition. Just 18 per cent of the families have yearly incomes between 25 000 and 50 000 Bahts; 7 per cent between 50 000 and 100 000 Bahts; and 2 per cent earn more than 100 000 Bahts per year. That brings the average to 23 453 Bahts per year, though clearly many families have less.

Half of the families are in debt, with 73 per cent of those owing less than the 10 164 Bahts average debt. This is a typical situation among farm families, and most of the people believe that they will be able to pay back their debts on time. Almost half (44 per cent) of the families have some money saved, the average amount being 6823 Bahts.

People in the study area own just a little less land than the Yasothon average - 27 rais compared with the provincial average of 29 rais (2.5 rais = 1 acre).

Some 71 per cent of the homes have electricity, mostly from government power lines; the rest use kerosene lamps for lighting. As a measure of economic status, television ownership was noted. Only 19 per cent of the respondents have a TV set in their houses.

Half of the households have latrines, mostly of the water-seal type.

3.2 Village Drinking Water

None of the study villages has access to piped water. Wells equipped with handpumps do exist, but are not liked as drinking water sources. Schools, temples and health centres usually have a cement rainwater tank, which is meant to be a public drinking water facility.

The survey revealed (Table 3) that during the rainy season more than 95 per cent of the people drink rainwater, with only 23 households from the 513 sample indicating dug-well water as their most common source. The figures are almost completely reversed in the dry season, when 94 per cent rely on dug-well water, and only 14 households claim to drink rainwater. Asked to identify the type of water used most over the whole year, 455 families (88.7 per cent) said that it was dug-well water.

TABLE 3. Drinking water source most used by households

Type of water	Rainy season		Dry season		Whole year	
	No.	%	No.	%	No.	%
Dug-well water	23	4.5	481	93.8	455	88.7
Rainwater	490	95.5	14	2.7	46	9.0
Other sources	-	-	18	3.5	12	2.3
Total	**513**	**100.0**	**513**	**100.0**	**513**	**100.0**

Clearly, when there is rainwater available, most people will choose to use it for drinking. When the rainwater is gone, they resort to dug-well water. The amount of available storage is therefore crucial, as it is reasonable to speculate that if people had enough rainwater stored they might drink it throughout the year.

In fact, the study showed that very few families have either the cement tank (15 families own them) or the big cement jar (20 families) offered by the programme. Water is generally stored in small clay jars with capacities ranging from 10 to 40 litres, or in ceramic jars holding 160 to 240 litres. A family will usually have several of each type of jar, the average being 2.6 small clay jars and 4.3 ceramic jars per family. On that basis, the average household in the study area can store 798 litres of water at a time. To match the Ministry of Public Health's standard for drinking water consumption (two litres per person per day), a family of 5-7 people would need to have 3000 litres of storage to use rainwater through the dry season for drinking purposes only.

The anthropological study showed that people choose which dug well to drink from largely according to the taste of the water. Though 35 per cent of the households (180) owned their own well, less than a third of them (52) used it for drinking purposes. In all, 82.4 per cent said that the well they used most for drinking water was a public one, and in almost every case it was located outside the village boundary.

In each village, there might be one or two wells popular for drinking water, out of about ten wells used for all purposes. Wells which dry up are commonly cleaned and redug by the villagers, to continue providing water. For most households, water collection involves a trip of less than 30 minutes. A little over half of the households carry the containers back by hand, the remainder using hand-pushed carts.

Women and children are the main water carriers; in only 13 per cent of the households was a male family member responsible for fetching water. Responses to the questionnaire revealed that the majority (72.5 per cent) regard water carrying as a burden.

Though more than 70 per cent of the respondents have tasted water from a hand-pumped well, only 2 per cent of them said that the water tastes good. Another 37 per cent believed the water to be potable but didn't like the taste, while 32 per cent described the water as undrinkable because of taste, smell or cleanliness. The people who had not tasted the water

from a hand-pumped well, all thought that it was not potable. In response to the specific question: "Do you drink water from the hand-pumped well?" about 20 per cent replied that they did. It seems that people do not drink hand-pumped well water if there is any choice.

Many hand-pumped wells draw water which is very high in iron. Both the smell and the rusty coloration of water containers deter people from using the water for drinking. Nevertheless, some 94 per cent of the people see the hand-pumped wells as appropriate for their village because they provide year-round supplies for domestic (non-drinking) uses and are convenient to use. Most (64 per cent) use hand-pumped water for household and agricultural purposes, 29 per cent use it just for household purposes, and 7 per cent limit it to agricultural use.

None of the study villages has a piped water system, and the 77 per cent of the people who have sampled piped water elsewhere thought that it had a bad taste and smell.

3.3 Programme Impact

Since the rural poverty area programme of the fifth plan got under way in 1982, just 10 per cent of the households taking part in this survey have participated in the programme's training activities on the provision of safe water supplies. A further 5 per cent indicated that they had been involved in earlier training programmes on the same theme.

An important element in the programme is the construction of a demonstration cement rainwater tank in various public places, such as the school, public health centre, or temple. Virtually all (99 per cent) of the households were aware of the demonstration tank construction, but only 10 per cent had ever used the water stored there, though the intention is that it should be a public supply.

In general, the villagers say that they have their own sources of drinking water, or don't want to bother the school, temple or public health centre because they believe that water should be reserved for the students, priests or public health workers respectively.

The village sanitary craftsman is the crucial element in the programme, so that villagers' knowledge about the individual selected for that role was thought to be a useful measure of the programme's impact. The results were disappointing. Some 74 per cent of the households did not know about the sanitary craftsman. Of the 26 per cent who said that they did know about the craftsman, only 16 per cent identified the right individual. Generally, knowledge about the village sanitary craftsman came to people from the village headman or public health workers. Only two of the 513 households said that their knowledge came from seeing the craftsman at work.

The "don't know" response dominated replies about the work of the village sanitary craftsman, with just 13.7 per cent knowing the reason for training the craftsman, 15.2 per cent believing that such an individual did useful things for the village and 13.4 per cent saying that the craftsman could assist with water and sanitation facilities.

There was a similar lack of knowledge about the sanitary revolving fund; some 72.2 per cent of the respondents were not aware of the existence of such a fund, and only 22.5 per cent knew that there had been meetings in the village about it.

Actual participation in programme activities was very low. Only 33 of the 513 households had constructed one or more of the water facilities.

The small number of participants makes statistical analysis of limited value, and individual reasons for joining or not joining in programme activities may be more significant.

Just 12 households have built cement rainwater tanks in the first two years of the programme. The average cost works out at 3440 Bahts, higher than the 3000 Bahts estimate because some owners have increased the size to 5000 litres. Only 337 Bahts represent labour costs, the rest being materials. Nine of the 12 owners borrowed all of the money from the village sanitary revolving fund and two others borrowed part. This is a restriction on the rate of progress as funds are not being increased, so a new household can only borrow when the previous one has paid back the loan - usually in 10-12 months.

There are 18 cement jars which were acquired after the programme started. Only in three cases were the jars made locally, in each case during demonstrations by the village craftsman and headman. The rest were bought by the owners from the town.

Half of the new jar owners borrowed the money (average cost 407 Bahts) from the sanitary revolving fund; the rest paid from their own pockets for the jars.

In the case of the family water filters, only six have been built and all six were constructed as demonstration facilities during the training of the village sanitary craftsman. One owner paid for the filter using his own money, the other five borrowed from the sanitary revolving fund. The average cost of the filters was 216 Bahts.

Though the sample is small, and results need to be treated with caution, it does not seem that education or income levels influenced people's decision as to whether to participate in the water programme. The variation in percentages of people from different income and education groups who had built water facilities was not statistically significant.

Only when the analysis took into account factors more directly linked to health or water matters did correlations start to appear. For example, 14 per cent of households who told interviewers that they had a water shortage problem had also taken part in programme activities, whereas only 3 per cent of those without such a problem had built new water facilities. Households which possessed latrines (50 per cent of the sample) were more likely to have the new water facilities (10 per cent of them did) than those without latrines (only 3 per cent had water facilities).

Another significant factor influencing whether households opted to participate in the water programme was found to be previous participation in the training programme. Where a member of the household had been involved in training associated with the provision of safe water supplies (this applied to 15 per cent of the sample), 17 per cent had subsequently purchased a cement tank, big jar or family water

filter. This compares with an overall figure of 6 per cent, and 5 per cent for families who had not taken part in training activities.

Lack of knowledge about the water programme for rural poverty areas has quite clearly been an obstacle in the early years of the programme and is the main item to be tackled if the impact is to be improved.

3.4 Motivation and attitudes

As well as analysing the reasons why people have or have not built water facilities already, the survey attempted to assess villagers' intentions as to future participation in the programme. Again responses were considered in relation to various socio-economic parameters and to attitudes towards the programme measured through specially designed questions.

Among those who have not yet built new water facilities, only 20 per cent say that they do not want to take part in the programme in the future. The rest say that they would like to have one or more of the facilities on offer, with most favouring the cement rainwater tank. see Table 1 on page 3).

It is noticeable that, in comparison with the cement tank and the big cement jar, few people opt for the family water filter, except as part of a desire to have all three items (13 per cent of the sample).

The 94 families who told the interviewers that they did not want any of the facilities were asked to give reasons. Response was low, but the reasons included: lack of money; no need for it; no space; dislike taste of water from cement storage facility; fear of breakage; and in the case of the cement jar, difficulty in moving it and small capacity.

Some of these items merit close consideration. The socio-anthropological study confirmed that space is an important criterion. In parts of the village where this study was carried out, houses are very close together, and the researchers noted that "it will be very difficult to introduce a water container which requires considerable space, such as a cement water tank or a big cement jar. The space underneath

most houses is also used to keep animals, and anyway wastewater is usually let down under the house without proper care". For houses where there is a shortage of available space, a different design of programme facilities is needed.

The fear of breakages may well be linked to people's observation of some of the facilities which have been built under the programme. Of the 12 cement tanks built in the first two years, two leaked and one burst. Though the two leaking tanks were repaired by the owner and the village craftsman, the experience of witnessing poorly operating facilities has stayed with some villagers. Unfortunately, similar incidents have occurred with the big cement jars, four of the 18 purchased leaked or broke and were not repaired, while two stood empty in the sun through the dry season with the result that they cracked and broke into pieces when rainwater was finally put into them.

The problem with the water filters is a little different. Though two of the six leaked, of which one was repaired, the filters are unpopular mainly because people do not like the look of them and because they do not see any benefit in using them. The filters are perceived as difficult to use, and people say that the filtered water anyway may not taste as good as the water straight from a dug well.

Asked what water facilities they would like to have without the constraints imposed by the programme, not a single respondent wanted a family water filter. The cement tank remained the most popular item, and the big cement jar was second in popularity, but a significant number of people indicated a preference for options not currently on offer through the programme. Clay and ceramic jars were frequent choices, and others included zinc tanks and piped water.

A highly significant response came to the question on what villagers would do if they wanted additional facilities but did not have enough money. More than three-quarters said that they would wait and do nothing. Only 9 per cent indicated that they would borrow money from the sanitary revolving fund.

Responses related to the taste of different types of water varied considerably depending on the way that the

TABLE 4. Water facilities favoured by villagers

Water facility chosen	Number	Per cent
Cement tank	208	41.0
Cement jar	98	19.3
Ceramic jar or clay jar	67	13.2
Cement tank+jar+ceramic jar	24	4.7
Other items	34	6.7
Nothing	76	15.0
Total	**507**	**100.0**

question was framed. When asked to assess the characteristics of the dug-well water that they used most, more than 90 per cent in each case said that it was tasty (94 per cent), clear (96 per cent) and clean (91 per cent).

The villagers judge the cleanliness of the well water by the physical location and characteristics of the well itself. If there is no visible debris, the well is outside the village, and there is a high kerb around the edge, the well is rated "clean". Wells which are used by lots of people, or are close to a children's play area, or have no kerb are described as "unclean" and their water will not generally be used for drinking.

During the anthropological study, drinking water wells in the village concerned were analysed. The results, shown overleaf, revealed that hand-pumped wells have low bacteria counts but are high in chloride, iron, hardness and colour.

Dug-well water, though still higher than WHO recommendations for hardness, and in some cases for chloride and iron, generally had lower values for these characteristics than the water from hand-pumped wells. On the other hand, the dug-well water had much higher coliform bacteria counts.

Table A3. Result of laboratory test for water quality of 28 domestic use water wells from Khudae village (Tested on February 26, 1984)

Well Code	PH	Color (Unit)	Turbidity (NTU)	Hardness (ppm)	Chloride (ppm)	Iron (ppm)	Total Coliform bacteria per ml.	Type of well	Remarks
1 U	3.3	5	2	416	400	1.86	38	dugwell	Public
2 U	4.5	5	0	432	380	0.34	23	dugwell	Private
3 U	4.1	5	2	1 216	1 120	0.30	30	dugwell	Private
4 U	6.3	5	0	784	660	0.26	20	dugwell	Public
5 U	7.0	30	9	1 280	1 480	2.58	4	deep hand pump	Public
6 U	6.7	10	2	784	400	0.60	21	shallow hand pump	Private
7 U	4.9	20	6	176	620	3.60	22	dugwell	Private
8 U	5.9	100	100	512	1 300	6.00	6	deep hand pump	Public
9 U	5.3	25	21	160	480	3.40	51	dugwell	Public
10 U	7.0	10	2	1 072	960	0.66	0	deep hand pump	Public
11 U	4.3	5	2	96	220	0.58	44	dugwell	Public
12 U	5.1	5	2	128	206	0.80	44	dugwell	Public
13 U	4.4	10	2.5	352	260	1.50	46	dugwell	Private
14 U	3.7	5	2	320	360	0.40	34	dugwell	Private
15 U	8.2	0	2	352	260	0.16	14	dugwell	Private
16 U	4.4	5	0	544	400	0.22	40	dugwell	Private
17 U	3.9	10	0	240	400	1.86	34	dugwell	Private
18 U	5.8	5	0	480	380	0	33	dugwell	Private
19 U	6.5	5	0	1 296	1 040	0.14	11	shallow hand pump	Private
20 U	4.0	60	4	1 168	320	3.60	26	dugwell	Private
21 U	4.7	5	0	912	340	0.52	34	dugwell	Private
22 U	5.4	5	0	304	400	0.22	61	dugwell	Private
23 U	5.6	5	2	368	500	0.40	34	dugwell	Private
24 U	4.5	5	0	608	920	0.34	11	dugwell	Private
25 U	5.4	20	2	416	1 280	1.70	10	dugwell	Private
26 U	4.1	5	0	304	1 340	0	0	dugwell	Public
27 U	5.9	5	0	448	1 120	0.48	5	dugwell	Private
28 U	6.2	100	92	480	1 120	6.00	6	deep hand pump	Public

Eighty per cent of the respondents said that their dug-well water was drunk directly, without any treatment; 10 per cent let the water sit in the jar to allow sedimentation; 8 per cent filter the water through a thin cloth; and 2 per cent occasionally boil the water before drinking it.

Though such large numbers were clearly satisfied with the taste and cleanliness of their dug-well water, only 13 per cent thought that it tasted better than rainwater, when asked simply to make a theoretical taste comparison between the two. Another 12 per cent rated the two about the same, while 74 per cent said that rainwater tasted better.

Asked which type of water they would drink given a free choice, 83 per cent favoured rainwater. The same question was then asked, but with the additional condition that the rainwater was stored in cement facilities, and this time the percentage favouring rainwater dropped to 61 per cent. It is worth noting here that only a little over half of the respondents had actually tasted rainwater from cement facilities and in that group only 15 per cent said that it was tasty.

During the anthropological study, a more direct test of taste was carried out. In this so-called "blind test", 50 males and 50 females were invited to taste water from three closed and unlabelled containers on a pushcart. Results from this test, where the villagers did not know which water they were drinking, showed that over half (59 per cent) preferred the water taken from a dug well, 29 per cent put water from the ceramic jar as their first choice, while only 12 per cent selected water drawn from a cement tank.

It seems that people actually prefer to drink water to which they are most accustomed, though there is a strong in-built feeling that rainwater is better. The survey team concluded that *though the present motivation is not high*, people will respond to the programme if the emphasis is changed.

Analysis of people's expressed intentions about purchase of water facilities in the future tended to confirm the conclusion drawn from the smaller sample of people who had

already participated in the programme. Education, income and occupation do not have a significant influence on the decision to have new facilities.

As before, the household's perception of its water scarcity problem is a key factor. Among households judging that they have a water shortage, 76 per cent say that they will buy extra facilities in the future. Only 24 per cent of those who say that they have no water scarcity plan to purchase new facilities.

People's attitudes towards the provision of safe water in rural poverty areas programme itself were assessed through responses to 35 statements with which they were invited to agree, disagree, or express a neutral opinion.

Some important pointers emerged from this part of the survey, which is analysed in full in **Annex 2**. The majority of people thought that villagers should be more involved in programme development. They wanted to be able to express opinions in the early stages and to help, for instance, in the selection of the person to be trained as village sanitary craftsman. Most said that they were willing to donate some money and to give their labour to help construction of public water facilities.

However, there was also a majority who said that government should build and maintain public water facilities, and should pay for them too.

The cement tank was generally seen as too expensive and too complicated for villagers to build for themselves, and similar feelings emerged in respect of the big cement jar. Though the majority think that every household should have a cement tank, only half of the respondents judge the investment to be worthwhile.

In more detail, a majority favoured a faucet on the cement jar, but the size of the jar is still seen as an inconvenience because of the difficulty of moving it. The role of the village sanitary craftsman is seen as important, and about half of the people see a need for the sanitary revolving fund.

Totalling up all the responses to the 35 statements, the conclusion is that 277 (54 per cent) of the respondents can be categorized as having a "positive" attitude to the programme, while the remaining 236 (46 per cent) come out as "neutral". Noone emerged as having a "negative" attitude.

Another 11 statements set out to study respondents' attitudes towards the type of water provided under the programme. These revealed that most people think that rainwater stored in a cement tank or jar is clean, but two-thirds of the people don't think that it tastes nice.

The overall assessment from the 11 statements was that a big majority (70 per cent) of the people have no strong opinion - i.e. they are neutral about the water provided. The remainder divide into 20 per cent with a positive attitude and 10 per cent rated negative.

Males appear to have a more positive attitude towards the programme as a whole than females, and younger people to be more in favour than older ones. Education level too emerged as important here, with 71 per cent of the people with more than four years education judged to have a positive attitude, compared with 52 per cent of those with four years or less. Looking at income levels, 76 per cent of those with annual incomes above 50 000 Bahts came out as positive towards the programme, compared with 70 per cent and 48 per cent respectively for income levels of 25 000-50 000 Bahts and below 25 000 Bahts.

The overall conclusion of the researchers was that motivation of households to accept the water programme in its present form is not very high. The water facilities on offer have many weak points, which discourage people from investing in them. Taste also seems to be an important criterion, with cement containers having limited popularity.

However, the potential of the programme is seen as good if some of the defects can be remedied and if the focus can be switched to take account of people's expressed preferences. These considerations have been carried forward into the six principal recommendations on page 6.