HOUSEHOLD WATER SUPPLY AND SANITATION - A USER'S OR A SUPPLIER'S PROBLEM?

Evaluation of the impact on health and social conditions

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Introduction

Provision of water for household consumption is vital in Third World countries. Apart from tedious work connected with the drawing of water from far away sources, the situation is characterized by human sufferings in terms of poor health. According to a WHO survey of 91 developing countries in 1970, 1.100 million or 86% of the rural population in these countries were without reasonable access to safe water. The situation was worst in South-East Asia and Africa with 662 million or 91% and 136 million or 89% people respectively affected. By 1980 it was estimated by ECOSOC on the basis of country reports, that 29% of the rural population in Third World were served with safe water within a "reasonable" distance to safe water.

In Malawi piped gravity water supply has played a significant roie in providing improved water in rural areas since the end of the 1960's. These projects have involved the population to be served not only in digging trenches and laying pipes but in all stages from the original initiative, the planning and implementation to finally the operation and maintenance of the project. Thus, the involvement and participation of the people is not only in order to reduce costs.

A recent WHO/World Bank Report on Malavi found that "excellent progress has been made during the past few years in the provision of rural water supplies and there is every indication that the impetus generated, principally through the success of the Ministry of Community Development and Social Welfare self-help gravity (water) supply programme. This programme is undoubtedly the most impressive of its kind encountered by the mission members and depends very largely on the involvement of the potential beneficiaries through the whole cycle of planning, construction, operation and maintenance". As a result of this involvement "a genuine sense of pride and ownership in the projects is generated within the local communities. This is reflected by the fact that in all the schemes visited by the mission an extremely high level of maintenance was observed".

Concerning groundwater supplies, the shallow wells programme has since the 1970's had a similar approach as the piped water programme. The borehole programme has been extremely expensive compared with the two others. Recently, a new low-cost groundwater approach has been launched, integrating boreholes and wells.

In a recent paper on the piped rural water supplies of Malawi, five factors are identified as the most important in creating the relative success of this programme.

1) A long history of selfhelp.
   People have since many years realized that they will not get any improved conditions if they do not contribute to the work themselves.

2) The evolution of the programme.
   Local leaders and people are cautious about the introduction of new ideas until it has been shown that these ideas will be of benefit to them. Therefore, each time piped water projects are introduced in new areas, a pilot scheme is carried out on a small scale in order to demonstrate to the people the feasibility of these projects.

3) The evolution described under no 2) above together with the low breakdown records have generated a widespread popular demand in most parts of the country.

4) Proper community organization.
   Both party and traditional leaders are involved. Project officials have (formally) no direct contact with the population but work through the recognized leaders. The leaders have on several occasions through their enthusiasm managed to encourage the population to go on with the work despite great difficulties for up to four years.

5) Controlled growth of the programme.
   This programme has grown within a small non-technical Department of Community Services with a relatively slow increase in numbers of staff. Another important factor is the concentration of the programme to a few focal areas.

The above mentioned paper concludes that "piped water schemes should not only be looked at from the technical aspect to the neglect of the vital element in the success of the programme so far, genuine community involvement. Neither should the community be looked at just as a source of cheap labour, however important this might be in itself. The aim of community participation should be to give a chance to the people to play a role in shaping their own future, give them personal dignity, self-confidence and a sense of responsibility". It may be argued that the approach outlined above should be applied in all aspects of rural development, if any significant impact is to be expected.

Apart from the study by Glennie, comprehensive evaluations of the functioning and the utilization of water supplies have been done by the Christian Service Committee and the Centre for Social Research at University of Malawi, while there has been no evaluation of the health impact of improved water supplies. The authors of this paper are in co-operation with researchers in Malawi at present carrying out such an evaluation one year before the intervention with improved water and one year after in three acres each with around 150 households. One of the areas will get improved water as well as hygiene education and sanitation promotion. The second area will get improved water only, while the third will act as a control area and will get no intervention during the first year after.

Water supply and human health

The impact of water supplies on the health status of the recipients is based on their potential capacity to control water-related diseases. The latter have been divided into four main categories: waterborne, water-washed, water-based and spread by insect vectors. of these, the first two are more directly related to poor and scanty household water supply than the last two. Water-washed diseases are divided into two groups: a) infections that affect eye and body surface with a limited epidemilogical importance and b) diarrhoeal diseases, the most important of water-washed diseases because they constitute a leading cause of childhood morbidity and mortality.

One of the most important benefits anticipated when improving water supply is improved health. However, it has been maintained that the recent popularity for support to rural water supply projects among donors and recipient governments is due to the increasing general interest in rural development. "For the aid donor - nation, international and voluntary agencies - rural water supplies are visible evidence that their money reach the rural poor" contrary to much of capital investment and technical assistance. Further, "the current enthusiasm has led to a certain amount of wishful thinking about the benefits of village water supplies, to the extent that rural water supply is sometimes seen as promoting development on its own, and not as part of an integrated rural development programme ... although water supplies are probably a necessary condition for achieving improvements in the rural economy and the public health, they are by no means a sufficient condition.

Therefore, what are the minimum requirements to achieve better health? It is now widely acknowledged that not only water, but also sanitation and hygiene, are important in order to reduce water-related diseases. This would certainly be the case if complete water and sanitation facilities were installed in every house. However, with the present level of available resources only limited improvements will be possible. Relatively few studies (in Hugh's review four in Africa) have evaluated the impact of improved water supplies upon health with studies both before and after intervention.

Of the 43 studies reviewed by Hughes, several have shown that improved water supplies and hygiene have some effect on diarrhoeal disease (see also McJunkin). This suggests that "previous attitudes concerning the lack of documentation of health benefits associated with water and excreta disposal projects may be unnecessarily pessimistic Young children are those who benefit most. When improved water is combined with improvements in hygiene and sanitation, reductions of 20 to 40 percent in dairrhoeal mobidity among children are not unusual Often the effect of increased water availability may be more pronounced than the effect of improved water quality.

The minimum amount of water for daily consumption, which is required to prevent illness is not yet known. Also, it is difficult to determine an exact figure as the quantities needed vary with a number of circumstances. Hughes notes that data from the several studies included in his review " suggests that volumes in the range of 20 - 30 litres per capita and day may be a minimum required to yield reductions in diarrhoeal disease morbidity" On the other hand, McJunkin in his literature review concludes that "fifty litres per capta and day should be a minimum goal".

Where water of good quality is provided it is often contaminated during collection and storage. Therefore, a good knowledge about the relationship between water and health, attained by hygiene education, may be as essential as water-quality at tap reducing water-related diseases. It is then important to determine the significance of inputs like improved water, organisation and management of water projects, participation hygiene education, sanitation promotion and food intake, upon health and social conditions in order to find the most cost-efficient solutions.

Assessment of the impact of water and sanitation projects

As pointed out recently in a document on "Minimum evaluation procedures for water supply and sanitation projects" evaluation of water supply and sanitation projects should be done in three stages, i.e. firstly, assessing whether

the facilities are functioning in the correct way, secondly assessing whether they are utilized by the population and thirdly assessing the impact.

If there are deficiencies in one of the earlier of these stages, there is no reason to expect that the subsequent stages will have any successful performance, as both functioning and utilization are necessary (but not sufficient) conditions for the following stages. Therefore, it is no point to evaluate the utilization until the functioning is satisfactory and evaluation of impact will not be worthwhile until the facilities are properly utilized.

If however, the functioning and utilization are known to or could be expected to be satisfactory, the evaluation could aim at assessing the health and social impact of improved water-supply, hygiene education and sanitation promotion. A proposal for a number of hypotheses to be tested concerning what factors, according to the present state of knowledge, are thought to be of importance for attaining health and social impact of improved water supply and sanitation projects, are given in fig. 1. The figure also indicates (with arrows) the relationships to be tested.

Functioning of the improved water supply

This assessment will mainly be done by the Department of Lands, Valuation and Water. It concerns the reliability of the operation of the various parts of the project like intake, pipes and taps. The focus is especially on assessment of the operation and maintenance of the project by the population and the personnel. Of special importance is how replacement of spares is managed and how it is paid for.

Social impact

The present study evaluates to what extent there are changes in social, economic and health conditions (output factors) due to intervention with improved water supply, hygiene education and sanitation promotion (input factors), see fig. 1. However, social and economic processes in a society are very complex. It is often difficult to determine what is the cause to a certain change. This is a major problem in all social sciences and therefore requires that the social impact is studied only in respect of very clearly defined variables, for which a relationship with the input variables is known to exist or at least is expected to. The social impact will be measured as

a) changes in utilization of water
   - choice of water- source (whether improved or traditional source; maybe different sources are used for different purposes)
   - distance of water-source
   - quantity of water used
   - water-handling
   - water-contamination
   - water-quality at consumption

b) changes in utilization of sanitation facilities
   - proportion of people who use the facilities

c) changes in social conditions other than utilization of water and sanitation facilities
   - time spent collecting water
   - attitudes to the water-source available
   - appreciation of the quality of water
   - changing positions of power in the village (e.g. membership of health committee; Malawi Congress Party branch committee etc.)

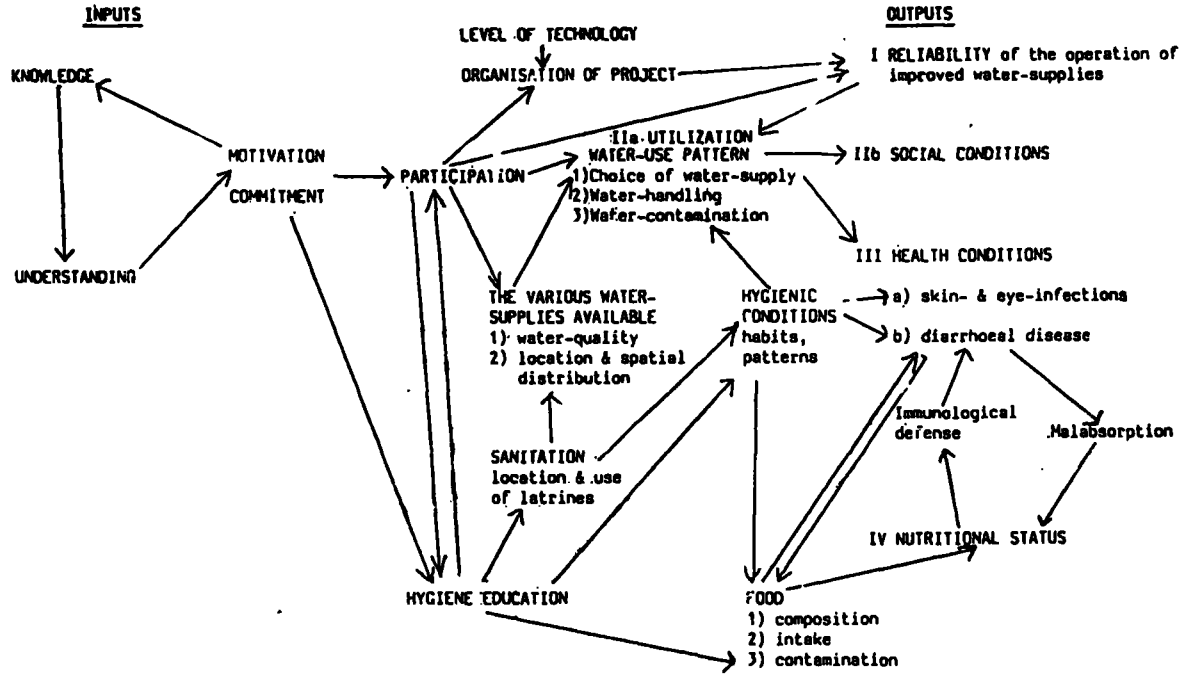
There may also be other impact on social conditions due to the project activities, but they are likely to be less tangible and more difficult to isolate from other changes in society. Further, as pointed out earlier social and economic processes are indeed so complicated and interwined that it is virtually impossible to apply a cause-effect model in the analysis.

It may therefore be that the change in the "output factors" is more influenced by other basic conditions in society rather than by the input factors. In order to determine to what extent such other conditions (general change in society etc.) contribute to changes in the social impact variables, a control area without any intervention, but with features similar to the two Intervention Areas, is included in the study.

It is then crucial that from the onset of the study, such other conditions are included for each of the households. These other conditions to be covered are as follows:

- household size and composition
- formal education
- socio-economic status (religion, power and influence, e.g. positions held by household members)
- cash income
- land ownership, tenure, right to use etc.

FIG. 1 THE RELATIONSHIP BETWEEN VARIOUS FACTORS WHICH MAY BE IMPORTANT IN ORDER TO MAKE WATER PROGRAMMES SUCCESSFUL



- agricultural production
- other production
- standard of house, equipment etc.
- food (composition, preparation, consumption)

Also, attitudes about the available water-supplies, health and hygine conditions need to be studied. Information on these conditions is collected at the beginning of the study and then checked at various intervals depending upon the character of the issue.

Much of the change taking place may not necessarily improve living conditions but it may be the reverse at least to some people. The inequalities even among the poor may increase. Castro, Hakansson and Brokensha have reviewed a number of indicators of rural inequality which show that land is the single most important indicator. Attempts will be made to estimate any trends of changes in poverty.

Health impact

Health is a broad phenomenon with many aspects to consider. For an impact study some indicators must be chosen which have as close relationship as possible to the environmental and behavioural changes to be studied. In the above referred document "Minimum evaluation proceedures for water supply and sanitation projects" some recommendations are given : A good indicator should be :

- a significant public health problem in the project area;
- likely to change substantially as a result of the project;
- easy to measure.

The following are recommend ed as meeting these criteria:

- diarrhoeal disease;
- infection by common gut nematodes such as Ascaris;
- nutritional status of young children; and in some regions,
- Guinea worm"

To the above mentioned indicators might be added skin-and eye-infections and in addition to nematodes the total parasite load.

Children are those suffering most under poor living conditions. A high percentage of diseases is associated with bad hygiene, inadequate water personal use and lack of sanitation. Therefore, it is appropriate to assess the health impact of improved water, sanitation and hygiene as improved health of children.

Diarrhoeal dosease

This is the most important water-related disease to be studied. The age group under five is chosen because diarrhoeal disease is most common and has the most vital importance in this group, especially under tha age of two. It is a well recognized disease among villagers and it can be studied through interviews and histories from the mothers.

Diarrhoeal diseases are a heterogeneous group of diseases caused by different infectious agents, bacterias, viruses and protozoas. These agents are fecal-orally transmitted but the modes of transmission and the relative importance of different routes varies (e.g. waterborne, foodborne, person-to-person, animal contact) So the impact of any change in environment or behaviour upon diarrhoea will be different for diarrhoeas of different etiology.

Skin-and-eye-infections

Skin-infections, such as bacterial skin-infection and scabies, and eye-infections, like conjunctivities, are conditions which are often associated with dirt and bad hygiene . Moreover, the duration of skin and eye-infections seems to be good indicators of routine child care

In the present study the morbidity in diarrhoeal disease and skin-and eye-infections is studied through fortnightly visits to the homes and interviews with 24 hours recall carried out by non-medical personnel.

Parasites

Intestinal parasites are common in developing countries. With a safe excreta disposal (if latrines are used also by children) and good hyginic practices in and around the home a reduction in hookworm disease, ascariasis and trichuriasis can be expected. Dracunculiasis is essentially waterborne and the prevalence may be affected by the introduction of safe water. Improved water supply will not bring about any immediate change in the schistosomiasis prevalence. However, as time goes on with sanitation promotion programme and health education, a reduction of the prevalence should be able to achieve.

Nutritional status

The nutritional status is an important measure of the general wellbeing of a child. The main factors that interfere with a child's growth potential are infections, especially diarrhoeal disease, and a defieient diet. Diarrhoea seems to be the most important factor behind malnutrition except in situations when food availability is extremely low. Attempts have been made to find a relationship between water-supply and malnutrition. However, the situation is complex and it has not been possible to draw any conclusions. It is uncertain whether water purity alone matters or whether the more complex relationship of unhygienic practices is the most important.

Conclusions

The questions to be answered are:

a. Can a water-source of good quality and with a tap in relatively closeness to people's houses reduce both waterborne and water-washed diseases?

b. Will people use larger quantities of water when it is more easily available?

c. What is the effectiveness of hygine education? Will it result in larger quantities of water used? Will it result in a better awareness of for example washing hands after defecation?

d. How will hygiene education effect the handling and storage of water?

e. How will pit-tatrines be accepted and in what conditions will they be kept?

f. Will the introduction of latrines and hygiene education effect also the defaction habits of children?

g. Can a good intervention programme of water supply, sanitation and hygiene education reduce the incidence of diarrhoeal disease, decrease the intestinal work load and improve the nutritional status?

h. What socio-economical changes will take place in the villages?

Analysis of data concerning the households in the survey will be done by relating these to water use and sanitation to household background factors e.g. what is the consumption of water in the household when the mother is well educated, has many children under five, is young, father is absent etc. Multiple regression analysis will be used to assess the relative importance of different background factors as predictors of water - and hygienic behaviour.The data for individual children will be analysed in the same way relating child illness and feeding pattern to different background factors.

Hypothese about the consequences of various types of intervention can then be made and then be tested in the interventions which are going to take place in the villages.

(Source : *Tema V Report 9, 1984*