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

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1. 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" (ref 1). 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 the Third World were served with safe water within a "reasonable" distance to safe water (ref 2).

In Malawi piped gravity water has played a significant role 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 (ref 3).

A recent WHO/World Bank Report 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, will continue. 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". (ref 4). 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 of the schemes visited by the mission an extremely high level of maintenance was observed" (ref 5).

Concerning groundwater supplies, the shallow wells programme has since the 1970s 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 (ref 6).

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 (ref 7) and the Centre for Social Research of University of Malawi (ref 8), while there has been no evaluation of the health impact of improved water supplies. The authors of this paper are in cooperation 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 areas 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.

2. 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. These have been divided into four main categories: water-borne, water-washed, water-based and spread by insect vectors (ref 9). 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: infections that affect eye and body surface with a limited epidemiological importance and diarrhoeal diseases, the most important of water-washed diseases because they constitute a leading cause of childhood morbidity and mortality.

The most important benefit 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 donors - national, 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 (ref 10). 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" (ref 11).

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 (ref 12). This would certainly be the case if complete water and sanitation facilities were installed in every house. However, the available resources will only allow limited improvements. Relatively few studies (in Hughes's review (ref 13) four studies 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 (ref 13), several have shown that improved water supplies have some effect on diarrhoeal disease (see also McJunkin (ref 14). This suggests that "previous attitudes concerning the lack of documentation of health benefits associated with water and excreta disposal projects may be unnecessarily pessimistic" (ref 15). 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 diarrhoeal morbidity among children are not unusual (ref 16). 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. Hughes notes that data from the several studies included in his review "suggests that volumes in the range of 20 - 30 litres per capita per day may be a minimum required to yield reductions in diarrhoeal disease morbidity" (ref 17). On the other hand, McJunkin in his literature review concludes that "fifty litres per capita per day should be a

minimum goal" (ref 18).

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 in 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 and sanitation promotion and food-intake, upon health and social conditions in order to find the most cost-efficient solutions.

3. FACTORS TO BE ASSESSED WHEN EVALUATING HEALTH & SOCIAL IMPACT OF IMPROVED WATER SUPPLIES

As pointed out recently in a draft on "Minimum evaluation procedure for water supply and sanitation projects" (ref 19), evaluation of water supply and sanitation projects should be done in three stages, ie 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 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 which 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. It also indicates (with arrows) the relationships to be tested.

4. HEALTH IMPACT

Health is a broad phenomenon with many aspects to evaluate. 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 draft "Minimum evaluation procedures for water supply and sanitation projects" (ref 19) some recommendations are given: "A good indicator should:

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

The following are recommended 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 conditions. A high percentage of diseases is associated with bad hygiene, inadequate water for personal use and lack of sanitation (about 80% related to the lack of safe water (ref 20). In the figure 80% malaria is included, which has little association with drinking water supply, hygiene and sanitation. Therefore, it is appropriate to assess the health impact as improved health of children.

Diarrhoeal disease

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 the 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 faecal-orally transmitted but the modes of transmission and the relative importance of different routes varies (eg waterborne, food-borne, 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 conjunctivitis, are conditions which are often associated with dirt and bad hygiene (ref 21). Moreover, the duration of skin and eye infections seems to be good indicators of routine child care (ref 22).

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 hygienic 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, with a sanitation promotion programme and health education, a reduction of the prevalence should be achieved.

Nutritional status

The nutritional status is an important measure of the general well-being of a child. The main factors that interfere with a child's growth potential are infections, especially diarrhoeal disease, and a deficient diet. Diarrhoea seems to be the most important factor behind malnutrition except in situations when food availability is extremely low (ref 23). 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 (ref 24).

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