

Original article

Water supply status of a community and its attitude towards using a new method for raw water treatment

Aschalew Hundel, David Zakusl

Abstract: A pre-intervention sample survey was carried out on a study community in North Omo Zone (Southwest Ethiopia) with regard to its water supply status. This survey was done before introducing a new technique of using the seeds of *Moringa stenopetala* in raw water treatment at the household level. A total of 100 out of 550 houses in Qola Shara, the study community, were surveyed using a questionnaire. The study reveals that the community is totally exposed to the risk of water related diseases. It also evaluates the attitude of the community members towards the use of *Moringa* seeds for the treatment of drinking water. It was observed that all members of the study group would like to try and see the effect of the seeds in water treatment. [Ethiop. J. Health Dev. 1996;10(2):83-87]

Introduction

Since water is the most essential component of life and a good medium for disease transmission, it needs maximum care during acquisition, delivery, storage and utilization. Pollution due to various sources makes such measures important. The objective set out by the World Health Organization(1,2) to provide every rural household in these countries with standard water supply by the end of 1990 was not achieved mainly because of the paucity of resources available to these countries to implement adequate purification and delivery services. In these countries, where 86% of the people live in rural areas(3), 5-10% of the mortalities and 10% of the inpatient and outpatient morbidities are due to water-caused infections, all of which have been completely overcome in developed countries(4) .Despite the concentration of the population in rural areas, far more is done to supply the urban areas of these countries with standard water than the rural ones where the majority of the people live(5).

In Ethiopia, safe water supply is available only to about 12% of the population. Mainly because of this, many major health problems are associated with sub-standard water supply(6). Most of the people are using untreated surface water with little or no understanding of the importance of safe water(at least for drinking), and due to the scarcity and/or unavailability of the means to provide standard water supply. Various efforts have been made in Ethiopia, to provide communities with adequate and safe water supply. But many of them have failed due, probably, to their complex technology, high cost and low community participation, as confirmed by one evaluation where about 95 % of the 58 observed drilled wells were partially or completely non-functional due to poor maintenance and lack of community participation(7) .

To resolve this problem the principles of Primary Health Care (PHC) should be employed. Providing safe and clean water as an important component of PHC should be based on the principles of local resource utilization, community participation and the use of appropriate technologies, all of which accommodate the needs of communities and foster their awareness and

involvement. With regard to implementing the principles of PHC in the improvement of water supply quality, the contribution of flocculants of natural

¹From Dept. of Drug Research, Ethiopian Health and Nutrition Research Institute, P.O. Box 1242, Addis Ababa, Ethiopia and ² Department of Community Health, Addis Ababa University , Addis Ababa (Currently at the Dept. of Health Administration, University of Toronto).

origin has been confirmed since prehistoric times. Leaves of different plants and various types of clays have been used to treat foul waters in some parts of the world(8,9). In Ethiopia the roots of *Maerua subcordata* are 'being used by local communities near the banks of Omo River and in Borana to treat the highly turbid river waters and make them clear , potable and palatable for use. The seeds of the *Moringa* tree have also been in use to treat raw waters in some parts of Africa and Asia(10), and detailed studies have been carried out on the seeds of different species of this plant. The results clearly indicate their efficacy in removing turbidity, colour, and indicator bacteria(8,10,11); the most important parameters in rural water supply schemes(4). The seeds were also found to be non-toxic, even at doses much higher than that required for raw water treatment (12). A preliminary study carried out on the water clarifying properties of the *Moringa stenopetala* seed and *Maerua subcordata* root revealed their potency in significantly improving raw water quality (11). It was also suggested in this preliminary study to carry out a pilot field study at household level to evaluate the plant's acceptability and capacity in improving the water quality of the study community .Given cultural and scientific reasons described above, there is a need to evaluate the acceptability of *M. stenopetala* seeds to treat community water supply.

The objectives of this study, therefore, were to assess the water supply and related problems of a study community and evaluate its attitude towards potentially using a new technique of treating raw surface water, i.e. by utilizing the seeds of *Moringa stenopetala*.

Methods

The criteria for selecting the study community were complete absence of standard water supply, nearness to a water quality analysis laboratory , and indigenous knowledge of the clarifier tree, *Moringa stenopetala*.

The study community is situated in Qola Shara village, about 10 Km from Arbaminch town near the Arbaminch Water Technology Institute (A WTI). The village has about 550 houses and a population of about 3000 inhabitants. It has no source of safe or protected water supply, which leads the residents to use water from irrigation ditches, which are highly contaminated by human and animal excreta(Table 1). The inhabitants of the village have been settling there since 1978, coming from the surrounding highlands. Because the land is fertile and there is a continuous supply of water for irrigation, there is a biannual crop production. The farmers mainly subsist on the sales of their agricultural produce.

Table 1: Results of water analysis from the irrigation ditches in Qola Shara village (Nov,1994)

Sample No	Bacterial Count (cfu/ml)	Turbidity(NTU)
1	TNC	12

2	1800	23
---	------	----

cfu - Colony forming units NTU -
Nephelometric Turbidity Unit
TNC - Too Numerous to count

The hundred(100) households were selected for this study after discussing with the leadership of the village's Farmers Association. The reason for selection was a relatively higher exposure to more contaminated water than other members of community, because they live near the en4, bt the irrigation ditches after the water is being used by 811 other groups of people and domestic animals.

Training was given to surveyors on how to administer questionnaires am a total of 100 houses (50 from each group) were surveyed. November 1994 using a previously tested; questionnaire. The amount of water consumed by a household was estimated in terms of a 5- litre capacity plastic jerry can.

Results

Out of the 100 questionnaires completed in the study group, 88(88%) of the respondents were household heads, while the rest of the questionnaires were administered in the absence of the family heads; to anyone of the family members who was present during the visit by the surveyors. Ninety percent of the respondents and household heads were male. Forty tw9 out of 100 household heads were illiterate, while the rest had educational levels ranging from reading and writing to high school completion (Table 2). Eighty four household heads were farmers, 10 were housekeepers and the remaining six had no regular jobs.

Table 2: Sex, Occupation and level of education of the 100 household heads (Nov,1994)

Sex		Occupation			Education level			
Male	Female	Farm	House keeper	No job	Literate	Read and write	Elementary	>Elementary
90	10	84	10	6	42	22	12	24

The total population of the study group was 658 which averages about 6.6 people per household.. Out of these, 306(46.5%) were males and 352(53.5%) were females; while 330 (50.2%) were, below 15 years of age, 322(48.9%) were 15-45, and only 6(0.9%) were above 4.5 (Table 3). Ninety four families earned their living from farming, with the majority (50 families) earning 50-100 Birr. per month and 30 families earning less than 50 Birr per month, With regard to disease prevalent in the area, all households(100%) complained of malaria and 84 considered diarrhea as the primary or secondary cause of morbidity and/or mortality .Forty four (32.3%) children of less than five years of age in 42 families had diarrhea in the previous month, and over the last year 13 people died due to malaria, diarrhea and unknown causes.

Seventy eight of the respondents considered water and 13 food as the possible causes of diarrhea diseases (Table 4), Because the study houses are situated at distances between 20-500 meters from the irrigation ditches, all respondents said that they get enough water for their daily needs by collecting once (52%), twice (24%), three times (16%) and as required per day (8%), Thirty six households(36%) were found to consume 10- 20 litres of water per day and 44(44%) 21-40 litres for cooking and drinking purposes only, About 50% indicated that they collect their water early in

the morning to avoid possible contamination by animals and humans. Sixty eight described the water quality as poor because of contamination while 90 suggested treatment of the water as proper to avoid the risks of contamination, Only 30 knew of methods of water treatment(mainly boiling and filtering through cloth), and 28 said that they treat their water by filtering through cloth and/or adding lemon juice to it, The rest(72) do not treat the. water because it either appears clear to their eyes or they think treatment(particularly boiling) changes the taste.

Table 3: Sex, age, and average monthly income of the study population (Nov,1994)

Sex		Age (%)					Average income (Birr) (%) of the 100 households			
Male	Female	0-1	1-5	5-15	15-45	>45	No leg. Income	<50	51-100	100-200
306(465)	352(53.5)	22(3.3)	108(16.4)	200(30.4)	322(49)	6(0.9)	4(4)	30(30)	50(50)	16(16)

Table 4: Percentage perception of the interviewees about possible causes of diarrhea (Nov. 1994)

Water %	Food % Climatic change (%) Spritual (%)	Unkown (%)
78 (78)	13(13)	9(9)

All the respondents were found to know the Moringa (vernacular name Aleko) tree as a food source (the leaves are eaten as a cabbage regularly) (80%), medicine and food(16%) and food and fire wood(4%).None, though, had any knowledge of its use in raw water treatment. Therefore, no comments were given on whether it would be good or not in the treatment of raw water, but all suggested that they would like to try and see its effect. From this survey, it is clear that the community under study is highly exposed to and greatly suffers from water-borne and watercaused diseases. Particularly, the incidence of diarrhoeal diseases in the village calls for immediate action. Previously, it was tried to provide the village with protected water supply by digging wells, all of which are at present totally out of use, due mainly to the lack of interest by the dwellers to use the water. They said it has a disagreeable taste and caused diarrhea, probably due to its high magnesium content, according to information from the AWTI. It can also be seen from this study that most of the respondents were aware of the major cause of diarrhea. This might be attributable to their level of literacy and their nearness to town, which hopefully facilitates any health promotion activity .

Discussion

It was observed from this study that only 28 households(28 %) treated their water after collection, while 90 households(90%) understood the importance of treating the water. On the other hand, only 30 respondents(30%) knew one or the other methods of raw water treatment, and of these, boiling the water is unacceptable as it makes . the water totally tasteless. This indicates that there is a felt need by the community to get treated water, but that they lack the know how. This strongly suggests that a simple and easily available treatment method(s) be taught to the community so that they can improve their water supply and hopefully alter the existing health situation. It is felt that this is a good indication for recommending a locally available raw water treatment technique which does not alter its taste the seed of the Moringa tree.

One of the objectives of this survey was to assess the attitude of the community towards using the Moringa seed for raw water treatment. It was initially known that all the respondents know the Moringa tree and use it

in their daily lives, though not for water purification. All said that they do not know whether or not it is good to use the seed for water treatment, but suggested that it would be good to try it and see.

Therefore, considering the serious problem related to water supply of the community, their positive attitude towards treatment of water, and the already present indigenous knowledge of the Moringa tree, one can conclude that it is possible to introduce the technique of using the seed of this tree as a coagulant (flocculant) for household water treatment and evaluate its effect in altering the health situation of the community under study.

Acknowledgments

Thanks are due to the World Health Organization (WHO) country office Ethiopia, for providing the financial support which made this study possible.

We are also indebted to the Department of Drug Research, Ethiopian Health and Nutrition Research Institute (formerly Department of Traditional Medicine of the Ministry of Health) of the Government of Ethiopia for facilitating the study by making all necessary facilities available.

The cooperation of the Department of Health of the North Omo zone and the unreserved support of its staff members Messrs Indrias Alito and Amare Sorate, since the beginning of the study should also be very much acknowledged.

Reference

1. WHO, The International Drinking Water Supply and Sanitation Decade in South-East Asia WHO Chronicle 1984;38(2):60.
2. UNICEF Annual Report 1990;23-24.
3. Gus T; Environmentally Sound Small Scale Water Projects Guidelines for Planning, CODEL & VITA, U.S.A. 1981.
4. Richard F, Michael M, Duncan M .Water wastes & Health in Hot Climates, Wiley Interscience Chichester New York, U.S.A. 1977.
5. Rayuxmd BL. Water Supply and Sanitation in Africa, World Health Forum 1985;6:213- 218.
6. G.Amanuel T. Water Supply and Sanitation. In: .Helmut K, Zein AZ. editors. The Ecology of Health and Diseases in Ethiopia. Westview Press, Colorado, U.S.A, 1993;179-90.
7. Hagos MA. Ethiopian Water Supply Planning and Evaluation (MSc Thesis Report) Stockholm (Sweden) Royal Institute of Technology, Dept. of Civil Engineering, 1981.
8. Jahn SAA. Proper Use of African Natural Coagulants for Rural Water Supplies, GTZ Publication NQ 191, Eschborn, Germany. 1986.
9. Jahn SAA. African Plants Used for the Improvement of Drinking water. Curare 1979; 2(3):183-184.
10. Jahn SAA. Traditional Water Purification in Tropical Developing Countries-Existing Methods and Potential Applications, GTZ Publications NQ 117, Eschborn, Germany. 1981.
11. Hunde A, Adam A. Preliminary Study on Water clarifying properties of Moringa stenopetala and Maerua subcordata, Ethiopian Pharmaceutical Journal 1991 ;9(1): 1-11.
12. Berger M, Habas M, Jahn SAA, schmal D. Toxicological Assessment of seeds from Moringa oleifera and Moringa stenopetala, two highly efficient primary coagulants for domestic treatment of raw water. East African Medical Journal 1984;61(9):712-715.

