# Survey of water use behaviour in rural North Ghana

**Stephen B. Kendie**



*Evaluation research of rural water projects has not paid much attention to examining the extent to which intended beneficiaries actually utilized the new water points for drinking purposes. This paper presents a survey of water use patterns in a rural district of Ghana to find out the source(s) of water for drinking both at home and when on the farm. Because farms are at a considerable distance from the settlements where the boreholes are located, the use of borehole water when on the farm provides a good standard with which to evaluate community education components of the water programmes.*

Since the United Nations Declaration of the 1980s as the International Drinking Water Supply and Sanitation Decade, many articles have appeared, particularly in *Natural Resources Forum*, that evaluate the performance of projects in the sector. Najlis and Edwards [18] provide a summary that captures the crux of the now wide array of reviews, discussions and prescriptions.

In the main, the articles have been concerned with the bottlenecks that affect the implementation of various country programmes and have sought to evolve an acceptable framework for policy formulation and implementation in the sector [1,11,13,16,20 among several others]. The discussions highlight the now familiar themes of financial resource scarcity, problems in institutional coordination and decentralization, legal and political hindrances, the lack of community participation and the neglect of women in project planning [8,10,19], the inadequacy of linkage of type of technology selected to the management capacity of the community [11], and finally, cost recovery [3,17].

Another important area, but one which has not received similar attention, is the design of criteria to measure success of the water supply and sanitation projects. Chandler [7] has noted that in the flurry of activity to provide rural communities with those necessities, the overriding concern has been population coverage. Indeed, the 1991 calendar of the Ghana Upper Region Water Supply Project (URWSP) contained the following footnote:

> To judge the health of a nation, don't count the hospital beds, count the water points.

But as it is now known that the hospital bed–population ratio, by itself, is a weak indicator of the health of a community, so are water points without corresponding measures aimed at changing long established water use patterns. Chandler, as well as Narayan Parker [19], discusses at length three criteria for measuring success: coverage, operational sustainability and effective utilization. The latter defines operational sustainability as the ability of the beneficiary community to maintain the new water points even after the phasing out of external assistance in financing, maintenance and management. Utilization refers to the institutionalization of the use of the new and safer water facilities for drinking purposes.

Defining project success in these terms has obvious advantages in pointing funding and implementing agencies towards other issues such as community participation and education, which are basic ingredients affecting community predispositions to take responsibility for the new facilities. It is worthy of note that the above concerns have certainly percolated into the vocabulary of funding and implementing agencies, as well as developing country governments, and slowly into the design of new programmes (see [3], 24). Thus, more research is needed to define, in specific terms, and in relation to actual examples, the measures to be used to evaluate success.

A World Bank ([23], p 9) survey of seven rural water programmes in francophone West Africa, made the following observation:

Stephen B. Kendie is a doctoral student at the Center for Urban and Environmental Studies, Rensselear Polytechnic Institute, Troy, New York, 12180, USA.



0165-0203/92/020126-06 





in all projects, the majority of communities have alternative sources of water (eg traditional wells) in the rainy season which they use as supplements to the hand pump water. The other sources are usually polluted, but people do not mind this since their priority is to have water in quantity.

A 1985 survey of villager's use of water in a district of the Upper Region of Ghana found that, on average, 215 drawers used the pump per day in the dry season and 142 drawers used the pumps daily in the wet season [15].[1] On both occasions, no attempt was made to further question the causes of the lower wet season use or to examine the impact of this on the design of future projects (particularly of the education component).

As much as the aforementioned discussions have broadened the scope of analysis (for instance in changing the implementation approaches based on a better appreciation of community controlled variables),[2] much more research needs to be carried out at the micro-level to explore further the factors impinging on the effective use of the new water points as an input to the design of criteria to measure performance.

With a view to contributing to this effort, our underlying hypothesis states that rural community work patterns (which are season based) affect the extent to which safe water sources would be used for drinking purposes both at home and when on the farm. We are aware of the effects of other cultural factors and poverty on rural water use, but these have been extensively discussed in the literature [9,16,20,23]. We would argue that the above noted shortfall in safe water use in the wet season relates to the work pattern and that attempts at community education, to be successful in changing water use patterns, must be stepped up during the wet season. There is sufficient evidence to show that much of the educational efforts of water projects are carried out in the dry season, which is also the water deficient season. Every woman, by necessity, must go to a hand pump for water during that period. It is, however, in the wet season when natural and thus contaminated sources are available and often easier to draw water from that such education is even more needed.

## 'Dry season biases'[3]

The wet season, to most subsistence economies in sub-Saharan Africa, is the most important period in the year because a large part of agricultural work is done during that season. And because women – the main water collectors – are estimated to carry out at least 70% of the agricultural work, this can limit the decision of which water source to use to those nearest to the home.

Chambers [6] has written about the tendencies of rural development planners, researchers and administrators to engage in rural development activity mainly during the dry season. Of course, there is little work to be done, leaving the villager with much time to answer the researcher's questions and for women to go to the hand pump to fetch water and be photographed. It becomes necessary then to question the validity of the conclusions based on such surveys, particularly when they are used as the sole basis for programme design.

## Research methods

This survey, which is a portion of a much larger study,[4] is aimed at examining water use behaviour patterns both at home and when on the farm in the Sissala district of the Upper Region of Ghana. The survey was carried out in July/August 1991 – the peak of the agricultural cycle in Northern Ghana. Attempts were made to solicit information on water use patterns in both the wet and dry seasons and to find out the effects of variables such as income, occupation, family size, education of women and their husbands, participation in water user activities and education on the usage of the hand pumps as drinking water sources.

Because women are the main water collectors in this largely patriarchal region [5,8], it was decided to direct the questions on water use patterns to them. For reasons of inadequate resources, the survey was

[1] This survey was carried out before the institution of the water health integrated programme in 1985. Has the education programme made any impact in changing these findings? It is one of the purposes of this research to find this out.

[2] The implementation of most water programmes initially followed the top-down approach. Community involvement and education was minimal, if at all. According to MacRae and Whittington ([14], p 247).

> Typically a central Ministry has been given responsibility for rural water supply systems and has chosen the service level, pricing, and the site with little input from the local community . . . (on the assumption that water supply is a basic right). . . . The assumption of a basic right does not assure that particular water systems will be used or maintained by the recipients.
>
> The overwhelming evidence of water points and sanitary facilities being used by only a fraction of the population and or breaking down one year after installation forced changes in project design to incorporate community variables.

[3] The concept is derived from Chambers [6].

[4] A larger study in progress. Many of the relationships will be addressed in that report. In this article, only the results of the survey on water

limited to five villages randomly selected from a listing of all settlements in the district. Because each pump is expected to serve about 300–500 people, the sample size for each community was the same (10 women each).

## The study district

The main characterizing feature of the Sissala district, which sets it apart from many of the other districts in the Upper Regions that were served by the Canadian International Development Agency – Upper Region Water Supply Project (URWSP), with regard to agriculture, is that farming takes place at a considerable distance from the settlement (averaging 4–6 km).[5] This makes carrying water to the farm for drinking an added burden to women and children. Traditionally, therefore, except in the most severe cases of drought, water for drinking on the farms is obtained from nearby streams and rivers.

The district, like the rest of Northern Ghana, has a marked seasonal variation in rainfall. The rainy season runs from April to October, with annual rainfall seldom exceeding 1500 mm. The dry season is generally a period of severe water shortage because the natural sources run low. Prior to the water project, women walked long distances – approximately 8 km – in the search for water in the dry season. And because these natural sources are susceptible to contamination, water-borne and water-related diseases were prevalent.

It was to alleviate these problems that the URWSP was established in 1974, following the signing of a Memorandum of Understanding between the Canadian and Ghanaian governments. Under the management of the Canadian International Development Agency (CIDA) and the Ghana Water and Sewerage Corporation (GWSC), the project has installed about 2600 hand pumps serving a population of about 700 000. Since then several CIDA reports have been prepared to evaluate the technical, economic and educational components, and these have led to several changes in project design culminating in the present emphasis on water health education. The present study should be seen as part of the effort to improve the educational programme so as to optimize health benefits.

## Coverage

The 1984 population census report showed that 70.5% of the settlements in the district had access to hand pump/boreholes covering a population of 42 601 (or 72.2% of the total population of 59 012). A further 14.3% of the population in the larger settlements were served from motorized boreholes. Thus, only 13.5% of the population in the district did not have any safe source of water supply. By developing country standards, the district is better off than most and certainly more fortunate than other rural areas of Ghana (where only 42% of the rural population has access to hand pumps/boreholes).

The CIDA reports mention that one success of the project was the improved accessibility to a safe water source. A 1985 report '. . . established that 80% of the population of the Upper Regions . . . was within a walking distance of approximately 800 metres from a hand pump instead of 10 to 20 kilometres to a polluted source' [15]. The latter figure may perhaps be an exaggeration, but when asked 'Why they think the village should have a hand pump?', 90% of the women in our survey mentioned reduced distance/time to a water source in the dry season, in the first instance. For the 10% mentioning two other reasons: to provide good water and to reduce diseases – the distance factor immediately followed.

## Community education

The URWSP has since 1985 laid down an elaborate structure of regional and district teams to train community water organizers (CWOs) who, in turn, educate villagers on water use, health and sanitation. In 1990, over 5000 such CWOs were trained and these have been successful in spreading messages about water and sanitation within the limits of the constraints discussed below. All of the respondents to our survey knew about the educational activities of the CWOs and could list specific water health messages discussed. But they always concluded the discussion by lamenting their inability to apply the messages because of the lack of time during the wet season.

A more fundamental problem, however, is that the CWOs are themselves subsistence farmers who must tend to their crops. This limits the time available for educational visits to other households. Another factor limiting their educational activities is the entrenched concept of community service as 'work no pay', thereby reducing the urgency of the mission.[6]

[5]The farming system is largely of the bush fallow, land rotation type and is characteristic of the sparsely populated middle belt of Ghana. The adjacent Wa district has a similar agricultural system.

[6]This has its roots in colonial policy when villagers were mobilized to build roads so as to open up the countryside. Nevertheless, this became entrenched in the post independence era as Ayibotele [1] observed, when politicians traversed the countryside promising what they would do for the people and not what the people would do for themselves. The CWOs I talked to all complained about the lack of incentives to carry out their mission.





Table 1. Main drinking water source at home by season.

| Source | Season Wet/rainy Number | Percent | Dry Number | Percent |
|---|---|---|---|---|
| Borehole/hand pump | 23 | 46 | 42 | 84 |
| River/stream | 18 | 36 | 3 | 6 |
| Pond/well/dug-out | 9 | 18 | 5 | 10 |
| Total | 50 | 100 | 50 | 100 |

## Rural health

Environmental sanitation is poor in the rural areas of Ghana. Kendie [12] discusses the state of environmental sanitation in rural Ghana, noting the inadequate protection of domestic water sources, and the lack of effective garbage disposal methods. He writes (p 55):

> The general picture is that sources of water are not adequately protected and pools created from the inappropriate disposal of household waste-water provide breeding grounds for mosquitoes and other disease vectors.

A CIDA [5] report also notes that in one out of three village compounds in the Upper Regions stored domestic water was contaminated.

In consequence, water related diseases prevail in the rural areas. In Northern Ghana, UNICEF estimates that the average child will have between 6 and 16 bouts of diarrhoea per year [5]. Diarrhoea accounts for 25% of all child deaths. Infant mortality rates are put at 250–300 per 1000 live births. Guinea-worm has been in the national limelight in recent years. A recent Ministry of Health survey found 106 out of 139 villages in the adjacent Wa district had the disease. The 1990 national guinea-worm case count found 209 endemic villages in the Upper West Region, as a whole, with 2918 cases.[7] In the Sissala district, 11 endemic villages were found, with 145 cases. In the five villages visited for this survey, two reported the presence of the disease.

The incidence of guinea-worm in the district and the region is among the lowest in the country, attesting to some measure of success of the URWSP. However, the prevalence of diarrhoeal diseases, and with 63% of the respondents listing hunger as the 'major problem in the village right now', other more significant health issues are raised. Those other issues relate to poverty alleviation, the provision of health facilities and hygiene education.

## Water use patterns

Water use from various sources and by season as determined by the survey is presented in Table 1. 46% of the women indicated they used the hand pump consistently for drinking purposes during the wet season. 54% used other sources. In the dry season the number using the hand pumps consistently almost doubles. To the question 'Under what circumstances would you fetch water from a source other than the hand pumps in the wet season?', 53% mentioned 'no time after returning from the farm to go a longer distance to get water', 24% mentioned being too tired 'to go pumping water' and 20% mentioned 'family size'. (In the latter case, the concern was to have enough quantities of water available.) Why these reasons should pose a barrier in spite of almost 18 years of the project work is examined below.

Time and distance are related variables. Thus, where time is short and the distance to a hand pump great, water is likely to be collected from the nearest source, regardless of safety. The other most frequent reason mentioned for not using the hand pumps even if they are of equal distance from a natural source is the energy expended to draw the water. This was found to be the case in villages with the Moyno pump[8] which some say requires a great deal of effort to use.

Table 2 presents data which examines the source of water on the farm. It is obvious that the hand pumps are a secondary source during both seasons. It is worthy of note that the women indicating they carried borehole water to the farm were all community water organizers (CWOs).

## Discussion

The source of water for drinking is one indicator of a community's awareness of the relationship between safe water and health. In the wet season, when all daylight hours are spent on the farm, the source of water on the farm becomes an even more useful measure of the impact of community education efforts. In areas where farms are at a distance from

[7]The statistics were derived from files of the Ghana Guinea worm Eradication Project in Accra.

[8]A 1985 [4] technical evaluation report on the hand pumps noted that the choice of the Moyno pump was a trade off of user acceptance and maintenance against a promise of dependability. The Moyno wells were found to yield half the water produced by the Monarch – the other pump installed by the project. They were also less convenient to use, making villagers resort to traditional sources.

Table 2. Main drinking water source on the farm by season.

| Source | Season Wet/rainy Number | Percent | Dry Number | Percent |
|---|---|---|---|---|
| Borehole/hand pump | 14 | 28 | 17 | 34 |
| River/stream | 22 | 44 | 5 | 10 |
| Pond/well/dug-out | 14 | 28 | 28 | 56 |
| Total | 50 | 100 | 50 | 100 |

the settlements, the source of water on the farm should be worked into the educational messages. The non-residency of farm workers makes the sinking of wells on the farms a costly venture, so education programmes will need to deal with that fact.

The study also confirms what has been known all along – the education and involvement of women in the water programme improves community health. That female CWOs actually carried water to the farm (and were observed to do so) makes it necessary to expand the role of women in the water committees. The present policy of one male and one female community water organizer for each pump may have to be revised to increase the participation of women. The need for this becomes evident as a study of the husband's level of formal education and the wife's choice of water sources did not reveal any significant connection between the level of education of the husband and the water source used.

To advance the benefits of new water programmes, education has to be linked to the time when people are most likely to use water from contaminated sources. For many rural areas, this is the rainy season. Sustained education in this season, difficult as this would be, is indispensable to achieving lasting health benefits.

As mentioned earlier, the activities of the water organizers are limited in this season for economic reasons. This leaves a vacuum which should be filled by the extension personnel in the employ of the project and related agencies. But those personnel often tend to visit rural areas only during the dry season. Their work is restricted by the often impassable nature of the roads during the wet season and that lends support to the need to involve more women in the health education activities of the projects.

## References


1 N. B. Ayibotele, 'Institutional aspects of water supply and sanitation in Africa', *Natural Resources Forum*, Vol 12, No 4, 1988, pp 353–367.

2 M. G. Beyer, 'The Global Consultation on Safe Water and Sanitation for the 1990s', *Natural Resources Forum*, Vol 15, No 2, May 1991, pp 118–122.

3 M. Brewster, 'Water resources management in small island countries: cost recovery and demand management', *Natural Resources Forum*, May 1990, Vol 14, No 2, pp 120–124.

4 Canadian International Development Agency, Ghana Upper Region Water Supply Project, *Technological Evaluation of Urban and Rural Water Supply Systems*, 1985.

5 Canadian International Development Agency, *A Case Study on Water Health Education Project in Northern Ghana*, 1990.

6 R. K. Chambers, *Rural Development, Putting the Last First*, Longman, London, 1983.

7 R. G. Chandler, 'Beyond coverage, an integrated approach to rural water supply and sanitation projects and programmes', *Natural Resources Forum*, Vol 13, No 1, February 1989, pp 53–58.

8 R. M. Harkness, *Village Women, Water and Development, An Evaluative Study of the Upper Region Water Supply Project*, MS thesis, Department of International Affairs, Carleton University, Ottawa, Canada, 1980.

9 Z. Ikpindi, 'The CUSO–TOGO village water supply project and lucrative micro-projects', *Natural Resources Forum*, Vol 14, No 2, February 1990, pp 58–63.

10 S. Kampoare, 'Women as managers of rural water resources', *Natural Resources Forum*, Vol 13, No 4, November 1989, pp 319–321.

11 A. A. Khan, 'Institutional aspects of water supply and sanitation in Asia', *Natural Resources Forum*, Vol 12, No 1, 1988, pp 45–55.

12 S. B. Kendie, 'The state of rural sanitation in Ghana', *Oguah Social Science Journal*, Vol 1, No 1, 1990, pp 31–40.

13 M. H. McGarry, 'Matching water supply technology to the needs and resources of developing countries', *Natural Resources Forum*, Vol 11, No 2, 1987, pp 141–151.

14 D. MacRae and D. Whittington, 'Assessing preferences in cost–benefit analysis: reflections on rural water supply and sanitation in Haiti', *Journal of Policy Administration and Management*, Vol 7, No 2, 1988, pp 246–263.

15 J. G. Monney, 'Water supply development – Ghana's experience', paper presented at the International Conference on Planning for Growth and Development in Africa, Institute of Statistical, Social and Economic Research, University of Ghana, 13–17 March 1989.

16 M. Munasinghe, 'Water supply policies and issues in developing countries', *Natural Resources Forum*, Vol 14, No 1, February 1990, pp 33–47.

17 M. Munasinghe, 'The pricing of water services in developing countries', *Natural Resources Forum*, Vol 14, No 3, August 1990, pp 193–209.

18 P. Najlis and Anthony Edwards, 'The International Drinking Water Supply and Sanitation Decade in retrospect and implications for the future', *Natural Resources Forum*, Vol 15, No 2, May 1991, pp 111–117.

19 D. Narayan-Parker, *People, Pumps and Agencies, The South Coast Hand-Pump Project*, PROWESS/UNDP, New York, 1988.

20 A. Planas, 'Operation and maintenance of water projects and services in Latin America', *Natural Resources Forum*, Vol 15, No 3, August 1991, pp 229–234.

21 Republic of Ghana, *Population Census Reports*, Special Report D, 1984.

22 D. Whittington, D. T. Lauria and X. Mu, 'A study of water vending and willingness to pay for water in Onitsha, Nigeria', *World Development*, Vol 19, No 2/3, 1991, pp 179–198.

23 World Bank, *Seven West African Case Studies of Community Management of Rural Water Supply*, Regional Water and Sanitation Group, West Africa, Abidjan, January 1991.

24 World Bank, *Rural Water Supply and Sanitation, Kokrobite Recommendations*, Accra, February, 1991.




Survey of water use behaviour in rural North Ghana: Stephen B. Kendie