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Household water in rural Kwara

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ABSTRACT

The Kwara State Government embarked on a programme of provision of potable water for its rural communities through drilling of boreholes. Water from these boreholes were analysed for bacteriological quality. A follow-up study assessed the household waters from villages that had been provided with boreholes after 6 months, 1 year and 2 years of post intervention.

After 6 months of post intervention, 91.43% of the boreholes were bacteriologically satisfactory. Also, bacteriological results at 1 year and 2 years post intervention gave 80% and 85.72% satisfaction respectively. It was found that provision of potable water alone to the rural communities, without adequate sanitation, continuous pre and post intervention health education, and protected fetching and storage containers may not achieve the level of success desired in dealing with water borne and water related diseases in Rural Africa.

Furthermore, the habits of the rural communities with respect to water use, personal hygiene and good sanitation may take years before a reasonable level of change could be achieved.

Efforts of the Health Educators and other community workers must continue even when the people apparently remain adamant after a reasonable period of enlightenment.

Government must be ready to pay the price of such high cost of continuous health education in the rural areas of African communities if good health for the people must be achieved.

Finally, a package of Water and Sanitation Project would go a long way in improving the health of the rural communities.

INTRODUCTION

Kwara, is one of the twenty-one states of Nigeria with a population of about 2.9 million majority of which live in the rural areas. (Ref.6).

The rural communities of this state obtain their household waters generally from rivers, ponds, streams, wells and other unprotected sources. Such traditional sources may have faecal coliform bacteria contents of over 50,000 per 100ml of wa t er, and additionally may frequently be located far away from the households leading to long treks of distances to obtain water.

The quality of water that is usually found at the household level in such rural communities of developing countries as well as the health implications have been well documented by various authors (Ref.3,5,8, 10,12). Many of the diseases which have led to the death of several millions of rural dwellers in developing countries especially children, have been found to be due to lack of potable water (Ref.8,9).

It was a recognition of this insufficiency of water for domestic use, especially in the months of dry season and the prevalence of debilitating diseases contacted through impure domestic water sources t hat made the Kwara State Government through foreign assistance, initiate a rural potable water and sanitation project in the state in 1984. This Project sought to provide potable water for domestic use through a borehole scheme. The Project has two advantages. It significantly limits the exposure of the population to their traditional sources of water which has been shown t o be hazardous to health (Ref.2,3,5,8,10,12).

Secondly, it sought to provide potable water in sufficient quantities all year round. The Project additionally, sought to get the communities to change their defaecation habits by encouraging the building of latrines.

An integral part of this Project is the monitoring of the water provided chemically and bacteriologically with a view to ensuring its potability. Further, the bacteriological quality of the same borehole water consumed at the household level from storage containers was monitored.

The relationship between the bacteriological quality of the borehole water at source with that at consumption points in the storage containers in the households form the basis of this paper. The objective of this paper is to first ascertain whether or not the quality of water given to these communities were maintained at household levels. This is necessary in order to help the various Governments in developing countries in Africa embarking on Rural Potable Water Supply Projects to design their Projects in such a way that the objectives of such Water Projects could be realised. (Ref. 3,5,10).

MATERIALS AND METHODS

Bacteriological analyses were carried out on samples taken from the boreholes. Samples were collected into autoclaved plastic sample bottles using standard methods. These were kept in cold boxes and transported to the Laboratory for analysis within 6 hours of collection.

The Membrane Filtration Technique was used for Faecal coliform enumeration of all samples. (Ref 1,4) Membrane Lauryl Sulphate Broth (MSLB Oxoid and BDH) was the only medium used for Faecal coliform enumeration throughout the study period. Faecal coliform plates were incubated in a warm air incubator at 37^{oc} for 4 hours, and then transfered to a water bath incubator at 44.5^{oc} for 20 hours. Two filtration volumes were used for all the boreholes. Pure yellow colories on MLSB were counted as faecal coliforms.

In order to assess the relationship between certified potable borehole water and the household water at the point of consumption, bacteriological household analysis of waters in the storage containers of the households were carried out simultaneously with that of the borehole at 6 months, 1 year and 2 years of post intervention in the communities. Four households per village were randomly selected for the household analysis on each occasion. The samples were assayed for faecal coliforms as earlier described. Samples collected at 6 months and 2 years post intervention corresponded with the period of dry season while those collected at 1 year post intervention corresponded with the period of rainy season.

Smaller volumes were filtered for the household samples. The lower volumes were made up to 100ml with sterilized waters for proper mixing and results were calculated per 100mls. of the sample. 100mls samples of the sterilized water used were also filtered and incubated to serve as control.

RESULTS

Details of results obtained are tabulated on Table 1

TABLE 1

AVERAGE FAECAL COLIFORM COUNTS PER 100ML SAMPLE OF HOUSEHOLD STORED WATERS COLLECTED FROM THE COMMUNITY HANDPUMP(S) AND THAT OF THE PUMP(S) AT PUMP SITE OVER A PERIOD OF 6 MONTHS TO 2 YEARS OF POST INTERVENTION

COMM		6 MONTHS	1 YEAR	2 YEARS
1.	HH	10,825	5,548	10,828
	BH	Nil	Nil	Nil
2.	HH	783	4,125	4,330
	BH	Nil	15	Nil
3.	HH	3,600	10,950	19,500
	BH	Nil	Nil	Nil
4.	HH	423	6,300	1,975
	BH	Nil	Nil	Nil
5.	HH	6,445	11,025	7,925
	BH	Nil	Nil	Nil
6.	HH	3,000	2,535	6,800
	BH	Nil	Nil	Nil
7.	HH	7,250	15,525	16,000
	BH	Nil	Nil	Nil
8.	HH	3,340	4,088	18,273
	BH	Nil	Nil	200
9.	HH	4,125	2,535	32,360
	BH	Nil	Nil	Nil
10.	HH	355	3,800	3,593
	BH	Nil	1	Nil
11.	HH	4,575	4,830	4,850
	BH	Nil	Nil	2
12.	HH	1,390	675	2,325
	BH	Nil	Nil	Nil
13.	HH	249	5,800	4,615
	BH	Nil	Nil	Nil
14.	HH	1,385	905	373
	BH	Nil	Nil	Nil
15.	HH	586	595	3,473
	BH	3	Nil	Nil
16.	HH	1,488	14,600	2,528
	BH	Nil	Nil	Nil

COMM		6 MONTHS	1 YEAR	2 YEARS
17.	HH	1,841	3,580	2,155
	BH	Nil	Nil	Nil
18.	HH	2,875	920	2,005
	BH	1	Nil	Nil
19.	HH	6,250	760	1,075
	BH	Nil	Nil	Nil
20.	HH	3,050	433	510
	BH	Nil	Nil	Nil
21.	HH	5,163	775	893
	BH	Nil	Nil	Nil
22.	HH	1,909	1,373	4,743
	BH	Nil	30	Nil
23.	HH	2,859	765	3,075
	BH	Nil	Nil	Nil
24.	HH	9,165	538	4,125
	BH	Nil	Nil	Nil
25.	HH	1,098	21,175	1,370
	BH	Nil	10	Nil
26.	HH	2,063	12,450	2,693
	BH	1	Nil	Nil
27.	HH	161	8,500	6,893
	BH	Nil	Nil	Nil
28.	HH	4,209	3,600	1,590
	BH	Nil	Nil	Nil
29.	HH	390	3,570	3,000
	BH	Nil	Nil	Nil
30.	HH	339	1,983	4,300
	BH	Nil	8	Nil
31.	HH	2,793	2,360	1,845
	BH	Nil	Nil	Nil
32.	HH	328	4,215	6,600
	BH	Nil	Nil	Nil
33.	HH	2,108	533	3,329
	BH	Nil	Nil	3
34.	HH	1,827	2,378	1,069
	BH	Nil	20	Nil
35.	HH	5,944	6,028	4,125
	BH	Nil	Nil	Nil

HH = Household

BH = Borehole

DISCUSSION

Provision of water through borehole drilling ensures the exploitation of hitherto untapped underground water in rural Kwara State of Nigeria.

Boreholes have some advantages over the damming of surface water. Treatment plants are seldom required and the cost of erection and maintenance are relatively cheaper. Boreholes are particularly suited to the rural areas where there are no electricity. Further, there is the advantage of localization as hazards of massive pollution of a large surface water is limited.

Water from borehole is superior to the traditional sources of water such as streams ponds and shallow wells being previously used for domestic purposes in the rural areas of Kwara State where boreholes were provided. If the boreholes provide sufficient water for the use of the population all year round, then the cycles of water related disease can be broken. This is borne out by my observation that the high endemicity of guineaworm infection prevalent in the Rural Areas of Kwara been considered had reduced substantially in villages that have used the borehole water for over one year. In addition, the people claimed that there was reduction in the incidence of diarrhoea cases in the community. However, health improvement in populations provided with potable borehole water cannot be taken for granted.

It was shown in Table 1 that whereas the borehole waters were free from faecal coliform, the household waters were heavily contaminated. The sources of post-fetching contamination can be found in the habits of the villagers. Contaminated containers, defaecation in and around household, and generally dirty environment are the possible direct sources of contamination. This contamination at consumption point may defeat the purpose of providing potable water. The use of protected containers for fetching and transportation of waters from the boreholes to the households are suggested. It is also recommended that storage pots or containers with lids and taps be emphasised to the villagers. Pots or containers with taps if used for storage, would reduce human contacts with the stored containers.

Intensive health education aimed at a more sanitary habit has to be embarked upon to maximise the positive effects of provision of potable water. Such health education must be persistent and regular before any significant impact can be made. In addition, the people must be consistently encouraged to change their practice of open air defaecation and be persuaded to build private and community latrines for proper faecal disposal. Health Educators and Sanitatians must know and accept that the people may not readily accept a change from what they have been doing for several years. Persuation and patience may be required for years to effect the desired changes.

The need for monitoring community water supply in developing countries has been highlighted (Ref.7,11,12). There is the erroneous popular belief that underground water obtained from deep wells is always potable. From Table 1 it is clear that underground water could be bacteriologically contaminated. This belief coupled with the fact that a large number of boreholes in Nigeria are private projects mean that no initial certification and continuing monitoring as to the potability of borehole water are done. Mandatory monitoring of borehole water before they are commissioned and periodically during use are recommended.

Data presented has also shown that recontamination of borehole water is possible. Sources of contamination and recontamination of the borehole could have been caused by the following:-

(a) Incomplete disinfection before commissioning or after repair maintenance.

(b) Contamination from surface waters resulting from faulty construction or poor maintenance of platforms.

(c) Collapsing of the walls of the boreholes where the boreholes have not been cased.

The following suggestions are made to limit recontamination: The area of the borehole should be fenced to limit accessibility especially in villages without latrines; latrines should not be located in the vicinity of the boreholes; and casing should be done in all cases and should be properly done.

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