WATER SUPPLIES IN SOME RURAL COMMUNITIES AROUND CALABAR, CROSS RIVER STATE, NIGERIA: IMPACT ON WATER-RELATED DISEASES

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Abstract. Two traditional surface water sources and one piped supply around Calabar, Nigeria were examined to reveal the community water use patterns and the impact on water-related diseases. Using questionnaires, it was shown that some communities trekked long distances (up to 5 km) to reach their supply source. The quantity of water collected per day in each of the five rural sources was inadequate (approximately 6 buckets or 90 liters). The traditional water sources were not available all year round, forcing users to trek longer distances for alternative supplies. Only 4.4% of rural water users subjected them to any further treatment, such as boiling or filtration. Fetching water was the occupation of children; they were the worst hit by water-related diseases, such as diarrhea/dysentery, stomachache, worms and scabies/craw-craw. About 84% of the respondents were dissatisfied with their water supplies. Deaths due to apparent water-related diseases occurred among 6.3% of respondents during the twelve months preceding the study. The overall impact was a loss of school hours/days, loss of labor and general discouragement. The community served with piped treated water fared better in all respects.

INTRODUCTION

Over the years, it has been traditional medical practice to group water-related diseases according to the biology of their pathogens. This biological classification unfortunately does not give a clear understanding of the mechanisms that link different diseases to water, nor does it enable one to predict the most suitable improvement scheme. A more suitable environmental taxonomy of water-related diseases has since been proposed and adopted (White et al, 1972; Feachem, 1977). Thus it has been acknowledged that providing potable water to a community may not completely address the problem of water-related diseases (Hurst et al, 2003). Both water quality and quantity are important.

Water supplies feature prominently in the day-to-day activities of rural communities around Calabar, the capital of the Cross River State of Nigeria. Although not far from the metropolis, the inhabitants of these rural communities do not have regular treated piped drinking water. They depend on traditional sources, such as those described by this author in this journal (Opara, 2005). Certain water-related diseases are en-

demic in the northern Cross River State of Nigeria, including the present study areas (Alaribe et al, 1998; Braide et al, 1999; Okon and Umeche, 2003).

This is the second part of a two-part study on the drinking water supply available to rural communities north of Calabar, Nigeria. The first part focused on the bacterial quality of the water supply. In this second paper, the impact of the water supply on certain observable water-related diseases was studied. Questionnaires were used to indicate the sources of water, their locations, the distance travelled in quest of water, the quantity collected, and user satisfaction. The overall impact of the water supply on the health and activities of the users are highlighted.

MATERIALS AND METHODS

Water sources and sampling

Water supply sources and sample collections are described by this author in part one of this article, published in this journal (Opara, 2005).

Questionnaires

Information regarding water availability, quantity and proximity to households, as well as the prevalence of manifested water-related diseases, were obtained by questionnaires distrib-

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uted among representative members of the communities studied. One thousand questionnaires were randomly distributed, 660 were returned for analysis. Details of the questions asked are contained in Tables 1-3 of the results section.

RESULTS

Data relating to water procurement are presented in Table 1. From this, it can be seen that the longest mean distance travelled in quest of traditional untreated water was 5 km (Ayip Efugho source). This is in contrast to the distance travelled to the piped treated waters which was only 0.2 km. The mean number of times water was fetched from the treated sources was about four times the number from the traditional source which, in this case, was the Ayip Efugho. The amount of water used by the rural population was in all but one case smaller than those used by the community served by the treated piped waters (mean number of buckets/day was 6 for rural water and 8 for piped water). About 74% of the respondents from the rural population did not have a steady water supply all year round. They had to depend on other traditional sources further away.

Further responses to the questionnaires are presented in Table 2. It shows from those who responded, that in four out of six communities, no form of additional treatment was given to the waters before being drunk. About 84% of the respondents from the rural population did not have enough water for domestic use and hence 90% of them were dissatisfied with their water supply. Over the preceding twelve months (from sampling date), deaths from seemingly water-related diseases occurred among 6.3% of the respondents. No such deaths were reported among users of the piped treated waters during the same period.

The prevalence of water-related diseases suffered by various users is shown in Table 3. In general, the prevalence of all categories of water-related diseases was higher among users of traditional untreated waters, than among those who used treated piped waters. Between 11-18% of the respondents complained of category A, 4.5-11.3% category B, 2.2-15.4% category C, and 5-3.1% category D. The prevalence of all disease categories among users of piped water never exceeded 1.3%. All four categories of water-related diseases were however consistently found among the rural water users.

DISCUSSION

The location and esthetic conditions of most of the rural water sources were unsatisfactory and have been described elsewhere in this journal (Opara, 2005). A good water source must be copiously available all the time (Report 71, 1969). It must be within easy reach and its collection must not involve any undue strains or dangers. The rural water involved in this study do not meet all these criteria. Some sources periodically dried up and users had to buy water or trek to other traditional sources further from home. Both the quality and quantity of the water were grossly inadequate. The waters did not meet recommended bacteriological standards (WHO, 1993); users trekked long distances (up to 5km) to access them, and not enough water was collected to ensure adequate use for drinking, washing and other domestic chores. This, in turn, impacted on the various water-related diseases. For example, the water-washed disease, scabies/craw, was highest in Ayip Ikeng and Ayip Ebarense, which were small percolating springs that afforded the users no access for bathing. Despite all these, the users of the traditional waters rarely boiled or filtered them.

There were dangers associated with fetching water from the rural supply. Apart from the long distances users traveled, they had to struggle up and down ravines and hills and in some cases through thick vegetation. This exposed them to water-based insect vectors, such as tse-tse flies and mosquitoes. These dangers have been highlighted earlier (White *et al*, 1972). Fetching water was the preoccupation of children, and they were therefore at the greatest risk of having water-related diseases, especially water-based and water-related insect vector borne ones. They also lost school hours. Although the mean volume of water collected daily by the users of piped water was greater (8 buckets) than those collected by the rural communities (6 buckets), the former were single house-holds, mainly students and couples, while the latter were large households of 3-5 people or more. Therefore the number of buckets collected by the users of piped water was more than adequate for their daily needs. The quantity of water collected by the

Table 1
Water procurement data showing quantity, distance and availability.

Source of water	No. of trips per day (mean)	Distance from water source (mean km)	No. of buckets[b] used per day (mean)	Water availability all year round[a]	
				Yes %	No %
Pipe-borne water	8	0.2	8	52.6	47.2
Idim Agriculture	4	2	6	4.5	1.2
Idim Ekpu	4	3	6	9.5	5.9
Ayip Ikeng	6	2	5	2.7	20.9
Ayip Asikimangfuk	3	4	5	0.45	10.5
Ayip Ebarense	5	2	8	0	24
Ayip Efugho	2	5	4	0	11.4
Overall rural supplies	4	3	6	17.2	74.2

[a]Based on number of responses to questionnaires; [b]1 bucket holds about 15 liters of water.

Table 2
Water treatment, satisfaction ratings and other responses to questionnaire by users of community water.

Source of water	Water treatment at home	Boiling/Filtration	Enough water for domestic use	Death by[b] WRD	Water supply satisfactory
Pipe-borne water	100/0[a]	100/0[a]	52.6/47.2	100/0[a]	21.1/78.9[a]
Idim Agriculture	5.9/0	0/0	2.3/3.6	5.9/0	5.5/0.5
Idim Ekpu	14/1.4	0.5/0.2	12.7/2.7	5.0/1.6	15.5/0
Ayip Ikeng	21/3.0	0.5/0.4	22.7/0.9	23.6/0	23.6/0
Ayip Asikimangfuk	10.9/0	0/0	10.9/0	10.9/0.4	10.9/0
Ayip Ebarense	24/0	0/0	24/0	24/3.1	24/0
Ayip Efugho	11.4/0	0/0	11.4/0	11.4/1.2	11.4/0
Overall rural supplies	87.2/4.4	1.0/0.6	84/7.2	63.7/6.3	90.9/0.5

[a]First figure indicates % who answered no: second figure indicates % who answered yes
[b]Ascribed mainly to enteric disease by surviving relations, no autopsy reports available.
WRD = Water-Related Diseases.

Table 3
Water-related diseases suffered by users of various water supplies during the preceding one year.

	Disease		Categories	
Source of water	A No. (%)	B No. (%)	C No. (%)	D No. (%)
Pipe-borne water	9 (1.3)	6 (0.9)	6 (0.9)	3 (0.4)
Idim Agriculture	12 (1.8)	30 (4.5)	18 (2.7)	21 (3.1)
Idim Ekpu	66 (10)	48 (7.2)	57 (8.6)	64 (9.6)
Ayip Ikeng	72 (10.9)	54 (8.1)	102 (15.4)	84 (12.7)
Ayip Asikimangfuk	66 (10)	69 (10.4)	39 (5.9)	33 (5.0)
Ayip Ebarense	27 (4.1)	63 (9.5)	15 (2.2)	66 (10.0)
Ayip Efuho	75 (11.3)	75 (11.3)	26 (3.9)	33 (5.0)
Overall rural supplies	315 (47.7)	339 (51.3)	257 (38.9)	301 (45.6)

A = Diarrhea/Dysentery; B = Stomachache; C = Worms; D = Scabies/Craw-craw

users of traditional sources was, on the other hand, grossly inadequate.

The survey also revealed that the various categories of water-related diseases were endemic in the rural areas all year round. Physical observation of random members of these respondents showed that nearly every other child had skin disease, fever or was down with one stomach complaint or another. It must be emphasized that data in relation to the disease categories in Table 3 were obtained purely from questionnaires. The causes of death were as obtained from the questionnaires; no post-mortem reports from clinics/hospitals were available. The author does not, however, infer that deaths in the community were solely due to water-related diseases. Apart from the loss of lives from these diseases, there was a general economic loss from demobilization and diversion of labor.

It is clear from these studies that the quality and quantity of waters available to the community for their domestic use had a direct impact on the prevalence of water-related diseases. Improving the sanitary quality of the water available to the rural communities lies with providing piped treated water. In the interim, health education and improvement in personal hygiene should be driven home through community health workers. Finally, the water users should be encouraged to boil and filter their present supplies.

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REFERENCES

Alaribe, AAA, Utsalo SJ, Ezedinachi ENU. Prevalence of Crytosporidiosis among diarrhea patients in Calabar. *Global J Pure Appl Sci* 1998; 4: 423-5.

Braide EI, Adesina F, Obono O, Atting IA, Johnson ME. Influencing water use habits in Guinea worm eradication. The Role Health Education. *Niger J Parasitol* 1999; 20: 55-63.

Feachem RG. Infectious diseases related to water supply and excreta disposal facilities. *Ambio* 1977; 6: 55-8.

Hurst S, Montamed S, Robert C, Rougemont A. Drinking water in the District of Mfou, Cameroon: Bacteriological assessment and possible interventions at the point of use. *United Nations SCN News* 2003; 27: 64-8.

Okon OE, Umeche N. Distribution of urinary schistosomiasis among high school students in Utukwang, Obudu, Cross River State, Nigeria. *Global J Med Sci* 2003; 2: 19-22.

Opara AA. Water supplies in some rural communities around Calabar Cross River State, Nigeria: Bacteriology of drinking waters. *Southeast Asian J Trop Med Public Health* 2005; 36: 1025-7.

Opara AA, Braide EI, Eko FO. The bacteriology of open wounds caused by *Dracunculus medinensis* in Mkpani Community, Cross River State. *Niger J Microbiol* 1985; 5: 52-7.

Report 71. Bacteriological examination of water supplies. London: HMSO, 1969.

White GF, Bradley DJ, White AU. Drawers of waters: domestic water use in East Africa. Chicago: University of Chicago Press, 1972.

World Health Organization. Guidelines for drinking-water quality. Vol. 1. Recommendations. 2nd ed. Geneva: WHO, 1993.