A survey of the community water supply of some communities in Rivers State, south-south Nigeria.

Type of Article: Original

Best Ordinioha * Adebisi Adeosun **

Department of Community Medicine Department, University of Port Harcourt Teaching Hospital, Port Harcourt and ** Scientific Ideas Limited, Port Harcourt.

ABSTRACT

Background: Water is essential for health, and therefore considered a fundamental human need that as a matter of right should be provided for all. The provision of quality portable water is therefore one of the millennium development goals. The objective of this study is to examine the water situation in some communities in the oil rich Niger delta region of Nigeria.

Method: The study was carried out in 14 rural and semi-urban communities in Rivers State, south-south Nigeria, using a descriptive cross-sectional study design. Data was collected using key informant interviews, field observations and focus group discussions. An inventory of the community water supply facilities in the communities was done, and information collected on the functionality, access and quality of the facilities.

Results: There were a total of 89 community water supply facilities in the communities, an average of 6.4 per community. However, only three of the communities had piped water supply, but with very few household connections. Most of the facilities were either provided by government and its agencies (73.03%), or provided by the oil companies operating in the communities (24.72%). Only (34.83%) of the facilities were however noted to be functional. Even as 32.43% of the water samples were found to contain significant numbers of *Escherichia coli;* all the samples collected from the rivers in the communities were found to be heavily contaminated. The median time spent in a round trip to a water facility was found to be 7.8 minutes, with 75.37% of the drawers spending less than 15 minutes for the trip.

Conclusions: Most of the oil bearing communities had easy access to improved water supply, but most of the facilities were nonfunctional, with little community input in their operation and maintenance.

Keywords: Community Water Supply, Niger delta, Nigeria.

Correspondence: Dr Best Ordinioha

INTRODUCTION

Water is essential for health; the World Health Organization estimates that water related diseases are responsible for 5.8% of all deaths and 5.5% of Disability Adjusted Life Years (DALYs) in high mortality developing countries[1]. This includes the four billion cases of diarrhoea that occur throughout the world each year, and the resultant 2.2 million deaths[2]. It also includes those caused by other water related diseases like typhoid fever[3]. These diseases result not only from the ingestion of pathogens contained in poor quality water[4], but also due to inadequate water supply for personal and domestic hygiene practices[5,6]

The importance of water in the maintenance of life and health makes it an essential human need that as a matter of right should be provided to all human being, irrespective of class or residence[7]. The quest to realize this all over the world has led to several international conventions, including the International Drinking Water Supply and Sanitation Decade declared in 1980 by the United Nations General Assembly[8], and target 10, goal 7 of the Millennium Development Goal[9]. Like all fundamental need, the quest to grant universal access to adequate potable water often attracts international assistance and cooperation[10]. According to the 2003 National demographic health survey (NDHS), the south-south region had about the worst water situation in the country, in spite of its huge water resources. According to the survey, only 3.2% of households in the region had piped water supply, compared to the national average of 6.6%, while most of the households got their water from either a protected public well, or from the river/stream[12]. As concerted efforts are being made in Nigeria, and through out the world for universal access to adequate potable water, it is important to evaluate the water situation in the oil rich Niger delta region of Nigeria, especially with the growing agitation of the people for development.

This study reports the situation of the community water supply in 14 communities, in four Local Government Areas of Rivers State, south-south Nigeria as part of a baseline Health Impact Assessment study conducted in the communities for an oil and gas pipeline project.

MATERIALS AND METHODS

Study site: The study was carried out in 2006, in 14 communities in four Local Government Areas of Rivers State, south-south Nigeria. The communities are: Ogbogu, Mgbede and Okwuzi in Ogba/ Egbema/ Ndoni Local Government Area; Ubarama, Ubio, Ubeta and Awunugboko in Ahoada-West Local Government Area; Ogbo, Abarikpo, Ula-Ehuda, Odiemereyi and Ekpena in Ahoada-East Local Government Area; and Elele Alimini and Ndele in Emuoha Local Government Area. The communities were small rural or semi-urban, oil bearing communities in the north-eastern part of Rivers State, with a combined population of about 150, 000 people (projected with the 1991 national census, made up mainly of farmers,

fishermen, artisans and workers in the companies engaged in oil exploration and exploitation activities in the communities. These communities are said to be "upland" communities because they are located in the drier part of the Niger delta.

.

Study design: A descriptive cross-sectional study design was used, with the data collected using key informant interviews, field observations and focus group discussions. A triangulation of these qualitative research techniques were used to help gain a deeper insight into the context of the water situation in the study communities.

Data collection: In each of the study communities, all the water facilities available to all members of the community were identified, and information collected on how the facilities were constructed, operated and maintained, and their functionality as at the time of the study. The water facilities were classified as piped household supply, public standpipe, hand-dug well, hand-pumped well, machine-pumped well, and surface water (stream/river/pond). The operation and maintenance of the water facilities were assessed by the existence of a functional committee for the purpose and the availability of the appropriate resources in the community for the maintenance[14]; while the functionality of the water facilities was determined by their ability to deliver the expected quantity of water.

A sample of the water from each of the facilities was also collected for microbiological analysis. The water was collected in sterile 500ml plastic bottles, stored in ice-packed coolers, and examined within 24 hours of collection, using the membrane filtration technique, with Escherichia coli as the indicator organism[15].

Ten women from various ends of the community that used each of the functional water facilities were interviewed in each of the study communities. They were interviewed to ascertain the quantity of water collected per capita, per day for their households, and timed as they set out for the water facility, to assess the time spent in collecting water from the water facility, during the evening peak water collection time. It was made clear that the water assessed was only those collected for drinking, cooking, personal and household hygiene and sanitation.

A session of focus group discussion was held in each of the study communities, with women drawn from all corners of the community. The discussion was to gain further insight into the information collected during the key-informant interviews, especially to put into context the water situation in the community, and the efforts made by women and other drawers of water in tackling the situation. The discussion was conducted in Pidgin English and the local language, recorded using notes and audiotape, and then analyzed; all using the standard method [16].

Data Analysis: The collected data were checked for consistency and completeness before being manually analysed. Summary measures were calculated for each outcome of interest using a scientific calculator. The data collected during the key informant interviews and focus group discussions were analyzed according to the standard method[16]. Direct quotations from the participants were used for supportive and illustrative purposes; even as the names and profane words were removed from the quotations. The results of the analysis of the water samples were considered to be significantly contaminated if they were found to contain more than 10 E.coli per 100ml of the sample, because they present a higher risk to health from faecal contamination[17].

Results

All the study communities had varied sources of community water supply. The number and type of the water supply facilities are shown in Table 1. There were a total of 89 community water supply facilities in the communities, an average of 6.4 per community. However, only 3 (21.43%) of the study communities had piped water supply, but with very few household connections.

Surface water was not included as a water facility, but was an important source of drinking water for 6 (42.86%) of the communities; most people in the other communities only used the river/stream as a back-up supply in the event of breakdown of other preferred sources.

Rain water was an important source of water supply in 11 (78.57%) of the communities, especially during the rainy season, but the communities in the Ogba/ Egbema/ Ndoni Local Government Area with more oil exploitation activities did not routinely use rain water, because it was said to contain a lot of soot.

Table 2 shows how the water facilities in the communities were provided. Most of the facilities were either provided by government and its agencies like the Niger Delta Development Commission 65 (73.03%), or provided by the oil companies operating in the communities 22 (24.72%). However, only 31 (34.83%) of the facilities were noted to be functional as at the time of the study; and only the three communities with piped water supply were found to have a functional committee for the maintenance of the water facilities; but even at this, most of the maintenance costs were borne by the oil companies operating in the communities.

Table 3 shows the results of the microbiological analysis of the water sample collected from the various water sources in the communities. Twelve (32.43%) of the samples tested were found to contain significant numbers of Escherichia coli; but the 6 samples collected from the rivers/streams from which members of the communities routinely drank from, were all found to be heavily contaminated with Escherichia coli.

The communities had little piped household supply, so most of the households collected from the various water sources in the communities. A total of 410 Women were interviewed in the communities. The median time spent in a round trip to the functional water facilities by the women was found to be 7.8 minutes, with 309 (75.37%) of the women spending less than 15 minutes for the trip.

Table 1: The number and types of community water supply facilities in the study communities

Facility	Functional	Nonfunctional	Total
1. Community piped supply	3	0	3
2. Protected hand-dug well	0	6	6
3. Hand pumped well	22	41	63
4. Machine pumped well	6	11	17
TOTAL	31	58	89

Table 2: The sources of the community water facilities in the study communities

Facility	Govt and its agencies	Oil companies/ NGOs	Community effort	Total
1. Community piped supply	3	0	0	3
2. Protected hand dug well	3	2	1	6
3. Hand pumped well	51	12	0	63
4. Machine pumped well	8	8	1	17
TOTAL	**65**	**22**	**2**	**89**

Table 3: The results of the microbiological analysis of the water sample collected from the various facilities in the communities

Facility	Number tested	Number positive (%)
1. Community piped supply	3	2
2. Protected hand-dug well	-	-
3. Hand pumped well	22	3
4. Machine pumped well	6	1
5. Surface water	6	6
Total	37	12

DISCUSSION

The study showed that the study communities were served by an average of 6.4 community water supply facilities, and that most of the inhabitants spent less than ten minutes to draw water from the facilities. This compares well with the WHO recommendation of less than 15 minutes to and fro journey to drinking water source [8, 14], and generally better than the figures obtained during the 2003 National Demographic and Health Survey[12]. According to the survey, an average of 56% of Nigerians had access to water within 15 minutes, compared to the 46% average obtained for south-south Nigeria, and the 75% obtained in the study.

The median time spent to fetch water from a source of drinking water was also better in the study communities. This means that members of the study communities had better access to drinking water than most other communities in Nigeria. It is interesting to note that most of the water facilities were provided, not by members of the communities, but by the government, government agencies like the Niger Delta Development Commission (NDDC), and the oil companies operating in the communities (Table 2).

However, most of the community water facilities in the study communities were not functional as at the time of the study (Table 1). This has also been noted in other communities in Nigeria[18]; and blamed on factors that include amongst others, the lack of maintenance of the facilities, and poor workmanship by dubious contractors[18]. These factors were also noted in the study communities as only three of the communities had a functional committee for the maintenance of the community's water facilities; while there were reports of water projects breaking down few months after they were commissioned. The issue of operation and maintenance must be given priority attention, if the desired sustainable development of the Niger delta region is to be achieved. At the start of the International Drinking Water and Sanitation decade, Village Level Operation management of Maintenance (VLOM) was advocated for the maintenance of the water facilities, to ensure their sustainability[19].The VLOM approach restricts technology choices to those that can be operated and maintained within the communities for which the intervention is intended. This, as a matter of urgency should be applied in the Niger delta, and all other communities in Nigeria. But, village level management of maintenance would not achieve much except the committee is provided with the needed technical and financial support by the government and its agencies[18, 20]. This also calls for the establishment of a well funded rural water supply agency.

Interestingly, most of the water samples collected from the public standpipes in the three communities with piped water supply was significantly contaminated with E.coli; whereas only very few of the hand-pump operated wells were so contaminated. This indicates a problem with maintaining the integrity of the piped water distribution system; a problem that has been noted in other communities in Nigeria[21]. A study carried out in Lagos, Nigeria found that water from boreholes were generally free from E.coli contamination, but pipe-borne water got increasingly contaminated with increasing distance from the utility station[21]. The difficulty in maintaining the quality of water from the point of collection to the point of use has led to increasing recommendation for point-of-use water purification systems[22, 23]. Research on the economics of such interventions suggests that they are among the most cost-effective approaches in the prevention of diarrhoeal diseases[1].

The study also showed the heavy contamination of the rivers/streams in the communities. This has been observed in other southern Nigerian communities[24], and hardly surprising considering that the jetty-type toilet is used in some of the communities; while in others, the banks of the rivers were found to be littered with human excreta, often deposited when the inhabitants of the communities go river to recreate, bath, wash or fish. Outside these, human activities have generally been found to contaminate surface water bodies [25,26]. Although the health benefits of improvement in water quality have been found to be equivocal[27], the importance of combining improved water quality with safe disposal of excreta cannot be over-emphasized. Esrey[28] In a review of several studies, found that whereas improvements in the quantity and quality of water alone were able to reduce the morbidity due to diarrhoeal diseases by just 17%; combinations of water and sanitation projects had the capacity to reduce the morbidity by as much as 30%[28]. This synergy stems from the fact that both work together to reduce the pathogen load in the ambient environment, and in the interruption of the transmission of the pathogens.

CONCLUSION

Most of the oil bearing communities had easy access to improved water supply, but most of the facilities were nonfunctional, with little community input in their operation and maintenance. The village level operation and management of maintenance of the water facilities, with the technical and financial support of government and donor agencies is hereby advocated.

REFERENCES

1. World Health Organization. The World Health Report: 2002: Reducing the Risks, Promoting Healthy Life. Geneva: World Health Organization. 2002.
2. Murray CJL, Lopez, AD. eds. The Global Burden of Disease, Vol. II. Global Health Statistics: A compendium of incidence, prevalence and mortality estimates for over 200bconditions. Harvard School of Public Health on behalf of the World Health Organization and The World Bank, Cambridge, MA; 1996.
3. Crump JA, Luby SP, Mintz ED. The global burden of typhoid fever. Bull World Health Organ 2004; 82: 346353.
4. Ezzati M, Hoorn SV, Rodgers A, Lopez AD, Mathers CD, Murray CJ. Estimates of global and regional potential health gains from reducing multiple major risk factors. Lancet 2003; 362: 271280.
5. Esrey S, Potash J, Roberts L, Shiff C. Effects of improved water supply and sanitation on ascariasis, diarrhea, drancunculiasis, hookworm infection,

schistosomiasis and trachoma. Bulletin of the World Health Organization 1991; 60:609 621.
6. Huttly S, Morris S, Pisani V. Prevention of diarrhoea in young children in developing countries. Bulletin of the World Health Organization 1997; 75(2):163-174.
7. World Health Organisation. Right to Water. WHO: Geneva. 2003.
8. World Health Organization, UNICEF. Water Supply and Sanitation Sector Monitoring Report 1990. New York, NY: UNICEF; 1992.
9. UN Millenium Development Goals Available at: http://www.un.org/millenniumgoals. Accessed June 2007.
10. WHO Commission on Macroeconomics and Health, Working Group 1. Health, Economic growth and poverty reduction: the report of the working group 1 of the Commission on Macroeconomics and Health. Geneva. WHO. 2002: 1 52.
11. Casson L .In the Year 1 Augustus Let the Good Times Roll. Smithsonian, 1999; 30(5)
12. National Population Commission (Nigeria) and ORC Macro. Nigeria Demographic and Health Survey 2003. Calverton, Maryland. 2004: 151 166.
13. Anker M. Inexpensive survey methods for developing countries. A discussion paper at the 1993 conference of the international statistics institute, Florence, Italy.
14. Billig P, Bendahmane D, Swindale A. Water and sanitation indicators measurement guide. Washington DC. Food and Nutrition Technical Assistance Project, Academy for Educational Development. 1999: 7 18.
15. Mates A, Shaffer M. Membrane filtration differentiation of E. coli from coliforms in the examination of water. J Appl Bacteriol 1989; 67: 343346.
16. Araoye MO. Research methodology with statistics for health and social sciences. Ilorin . Nathandex publishers. 2003. 119-120.
17. World Health Organization. Guidelines for drinking-water quality. 3rd ed. Geneva. World Heath Organization. 2006: 62 83.
18. Odumonu AO. Sustainable community water supply in Nigeria. Paper presented at the 21st WEDC conference held in Kampala, Uganda, 1995.
19. WEEL. Guideline manual for water supply and sanitation programmes. London. WEDC/DFID.1998
20. Bagamuhunda G, Kimanzi G. In the light of experience water policy and usage in Uganda. Waterlines 1998; 16(3):19.
21. Egwari L, Aboabo OO. Environmental impact on the bacteriological quality of domestic water supplies in Lagos, Nigeria. Rev Saude Public 2002; 36 (4): 513 520.
22. Clasen T, Roberts I, Rabie T, Schmidt W, Cairncross S. Interventions to improve water quality for preventing infectious diarrhea. The Cochrane Library, Issue 4, 2005. Oxford: Update Software.
23. Fewtrell L, Kaufmann R, Kay D, Enanoria W, Haller L, Colford J. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. Lancet Infect Dis 2005; 5: 4252
24. Blum D, Huttly SR, Okoro JI, Akujobi C, Kirkwood BR, Feachem RG. The bacteriological quality of traditional water sources in north-eastern Imo State, Nigeria. Epidemiol Infect. 1987; 99: 429 437.
25. Mokaya SK, Mathooko JM, Leichtfried M. influence of anthropogenic activities on water quality of a tropical stream ecosystem. Afr J Ecol 2004; 42: 281 288.
26. Mathooko, J.M. Disturbance of a Kenya Rift Valley stream by the daily activities of local people and their livestock. Hydrobiologia 2001; 458: 131139.
27. Cairncross S. Water supply and sanitation: an agenda for research. J Trop Med Hyg 1989; 92:301-14.
28. Esrey SA. Water, waste, and well-being: a multi-country study. Am J Epidemiol. 1996; 143: 608 623.