Physics and Chemistry of the Earth 36 (2011) 1189–1196

Contents lists available at ScienceDirect

Physics and Chemistry of the Earth

journal homepage: www.elsevier.com/locate/pce

Source to point of use drinking water changes and knowledge, attitude and practices in Katsina State, Northern Nigeria

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ARTICLE INFO

Article history:
Available online 6 August 2011

Keywords:
Drinking water quality
Monitoring
Knowledge
Attitudes practices
Source to point of use

ABSTRACT

In many Sub-Saharan countries such as Nigeria, inadequate access to safe drinking water is a serious problem with 37% in the region and 58% of rural Nigeria using unimproved sources. The global challenge to measuring household water quality as a determinant of safety is further compounded in Nigeria by the possibility of deterioration from source to point of use. This is associated with the use of decentralised water supply systems in rural areas which are not fully reticulated to the household taps, creating a need for an integrated water quality monitoring system. As an initial step towards establishing the system in the north west and north central zones of Nigeria, The Katsina State Rural Water and Sanitation Agency, responsible for ensuring access to safe water and adequate sanitation to about 6 million people carried out a three pronged study with the support of UNICEF Nigeria. Part 1 was an assessment of the legislative and policy framework, institutional arrangements and capacity for drinking water quality monitoring through desk top reviews and Key Informant Interviews (KII) to ascertain the institutional capacity requirements for developing the water quality monitoring system. Part II was a water quality study in 700 households of 23 communities in four local government areas. The objectives were to assess the safety of drinking water, compare the safety at source and household level and assess the possible contributory role of end users' Knowledge Attitudes and Practices. These were achieved through water analysis, household water quality tracking, KII and questionnaires. Part III was the production of a visual documentary as an advocacy tool to increase awareness of the policy makers of the linkages between source management, treatment and end user water quality. The results indicate that except for pH, conductivity and manganese, the improved water sources were safe at source. However there was a deterioration in water quality between source and point of use in 18%, 12.5%, 27% and 50% of hand pump fitted boreholes, motorised boreholes, hand dug wells and streams respectively. Although no statistical correlation could be drawn between water management practices and water quality deterioration, the survey of the study households gave an indication of the possible contributory role of their knowledge, attitudes and practices to water contamination after provision. Some of the potential water related sources of contamination were poor source protection and location, use of unimproved water source and poor knowledge and practice of household water treatment methods, poor hand washing practices in terms of percentage that wash hands and use soap. Consequently 34 WASH departments have been created at the local government level towards establishment of a community based monitoring system and piloting has begun in Kaita local government area.

1. Introduction

The Millennium Development Goal (MDG) 7 aims to halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. According to The WHO/UNICEF (2010), Sub-Saharan Africa faces the greatest challenge in increasing the use of improved drinking-water facilities with 37% of the 884 million people that still use unimproved sources living in this region. In Nigeria for example only about half (58%) of its very large population (155 million) have access to improved drinking water sources.

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doi:10.1016/j.pce.2011.07.038

The challenges in increasing access to improved drinking water is further complicated by disparities in provision, which may be geographical (between urban and rural); socio economic (between the poor and more economically disadvantaged) or related to the disproportionate focus on water in comparison with sanitation. For example in comparison to the 72% of Nigerians in the urban areas only 47% of the rural populace have access to improved water sources; whilst the ratio of water access to sanitation is only 2:1 i.e. 58% water to 26% adequate sanitation (WHO/UNICEF, 2010). The north central (NC), north eastern (NE) and north western (NW) zones of Nigeria are affected by these disparities with improved drinking water access of 52.2%, 27.3%, 42.5% respectively in comparison to 72.7% and 54.1% in the south western (SW) and south eastern (SE) zones respectively. Furthermore, only 29%, 34.4%, 34.1% in NC, NE and NW respectively use improved sanitation in comparison to 55.5% and 55.0% in SE and SW zones respectively (NBS, 2007).

The implications of these are grave with diarrheal diseases causing 1.8 million deaths and approximately 4 billion cases of illness annually (WHO, 2007). The great majority of those affected are children in developing countries. In Nigeria, between 5.4% and 12.5% of the children surveyed had diarrhoea in the 2 weeks preceding the Multiple Indicator Cluster Study (MICS) in the south west and north east respectively (NBS, 2007).

For decades, universal access to safe water and sanitation has been promoted as an essential step in reducing this preventable disease burden, using decentralised water supply interventions as a major strategy to address the disparity in access, with the World Bank investing US$5.5 billion in rural water and sanitation from 1978 to 2003 in mainly (95%) community level interventions; which are not fully reticulated to the households thus predisposing rural supplies to recontamination along the collection, transportation and storage water chain (Clark and Gundry, 2004; Iyer et al., 2006; Meierhofer and Landolt, 2009; WHO/UNICEF, 2010).

Enabor et al. (1998) in a Nigerian field trial of solar water disinfection found that household water storage containers (before exposure to the sun) had a percentage increase in coliform count of between 543% and 6000% when compared to their original well water sources. This observed inability of decentralised systems to guarantee water that is consistently safe to the point of use provides justification for the school of thought which believes that there is a need to expand access to household water treatment systems, water storage and water quality monitoring at the point of use (Mintz et al., 2001; Wright et al., 2004). In spite of the globally available evidence that simple acceptable low cost interventions at the household and community level are capable of reducing the attendant risks of diarrheal disease and death (WHO, 2007), there is no context specific information on efficacy of household water treatment in the northern parts of Nigeria to influence strategic planning. The study was implemented as the 1st step towards promoting a comprehensive community based drinking water quality system in Northern Nigeria.

It aimed to assess institutional capacity for household level drinking water quality monitoring in Katsina State; ascertain the safety and possible deterioration of drinking water provided to communities from source to point of use and examine the contributory role of the study households' water and sanitation related Knowledge Attitudes and Practices (KAP) to the observed deterioration in quality.

2. Methodology

To facilitate understanding, the method for each of the three parts of the study is described after the description of the study area.

2.1. The study area

Katsina State is situated in the northern western zone of Nigeria with a current projected population of 5,792,578 million out of which 60% is rural (NBS, 2006). It is made up of 34 local government areas and is bordered to the north by the Republic of Niger, and by the Nigerian states of Jigawa and Kano to the east, Kaduna to the south and Zamfara to its west. Rainy season is from May to September, with an annual average of 750 mm (Adefolalu, 1986). The main vegetation type is shrub vegetation with some wooded savannah in the south. It is mainly inhabited by Muslim Hausa (the Katsena [Katsenawa], Kano [Kanawa], and Bugaje branches) and Fulani peoples and by a few Maguzawas (animistic Hausas), who farm as the main occupation.

2.2. Methods for part 1

A consultant was hired by the Katsina State government with the support of UNICEF Nigeria, to collect and document information from the relevant stakeholders in Katsina State using Key Informant Interviews (KII) on water quality related legislation and policies, institutional arrangements and capacity for water quality monitoring, financing mechanisms, availability of water quality monitoring tools and challenges to water quality surveillance/monitoring. Data collection methods included desk top review of relevant documents, KII with relevant stakeholders and site inspections of infrastructure such as laboratories. The stakeholders included the state ministries of Water Resources, Health, Environmental Protection Agency and Local Government and Chieftaincy Affairs, Water Board, the Rural Water and Sanitation Agency and the Primary Health Care department. At the local government level, the local government councils, the water and sanitation units as well as the community level water and sanitation committees. The results obtained were then presented at a zonal workshop for the states in the north western and north central zones.

2.3. Methods for part 2

The study was conducted in 23 communities in four Local Government Areas (LGAs) of Katsina State they are low income and characterised by poor infrastructure. The descriptive cross-sectional study employed a three stage sampling procedure. Firstly, randomly selecting 40% of the International Year of Sanitation (IYS) LGAs based on the national population census, 2006. Secondly, randomly selecting 40% of the IYS communities in each of the selected LGAs and proportionally allocating sample sizes to the selected communities based on the proportion of each LGA's population to the total state population. The last stage was the random selection of households for questionnaire administration.

Using this method, 711 respondents were selected for questionnaire administration and 56 water sources from the 23 communities. In addition, 56 samples were taken from households before the water was poured into their storage containers (Household Fresh – HHF), 56 samples from household storage (HHS), eight samples from the sediments in the storage container and one sachet of vended water, a total of 121 samples from source and households were analysed to assess their bacteriological and physico chemical properties (Table 1).

Qualitative and quantitative information was collected by a team of trained interviewers using Focus Group Discussions (FGD), Key Informant Interviews (KII), semi structured questionnaire, observational check list, laboratory analysis as well as Geographic Information Systems. The most senior person in the household was interviewed. The information obtained included the following: