Household Access to Sustainable Safe Water Use and Its Implication on Diarrhoea Incidence in Nigeria

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Abstract: Inadequate access to safe water use remains a global issue and a threat to the wellbeing of people. This led to the dependence of households sourcing water from unprotected means. As a result of shortcomings in the nations water supply system, there is a prevalence of some sanitation and water related diseases like cholera, diarrhoea, among others. Important relationship between household access to safe water use and diarrhoea incidence were identified as well as other determinants of diarrhoea which include socioeconomic and environmental such as age of child, toilet facility, place of residence, mother's literacy level and household wealth status. Policy actions were identified as synergy between water and sanitation sector should reflect in the reduction of water related diseases in the country.

Keywords: Diarrhoea, Diseases, Nigeria, Safe Water

1. Introduction

Access to safe water has remained a major global issue and most importantly it reflects the state of wellbeing of the nation. Water is an essential commodity for sustenance of life and every living thing depends on it for existence. Its level of usage depends on prevalent human activities which include domestic, agricultural and industrial purposes. Its availability in safe condition often guarantees improvement in the quality of life and is fundamental to sustainable development and human health. Access to safe water is measured by the proportion of population with access to an adequate amount of safe drinking water located within a convenient distance from the user's dwelling [1]. In addition, it is measured by the number of people who have reasonable means of getting an adequate amount of water that is safe for drinking, washing and essential household activities expressed as a percentage of the total population [2].

According to [3], water is paramount in the hierarchy of citizens' needs. Failure to meet water requirement by households result in relatively low levels of personal hygiene and environmental sanitation, disease outbreak and also
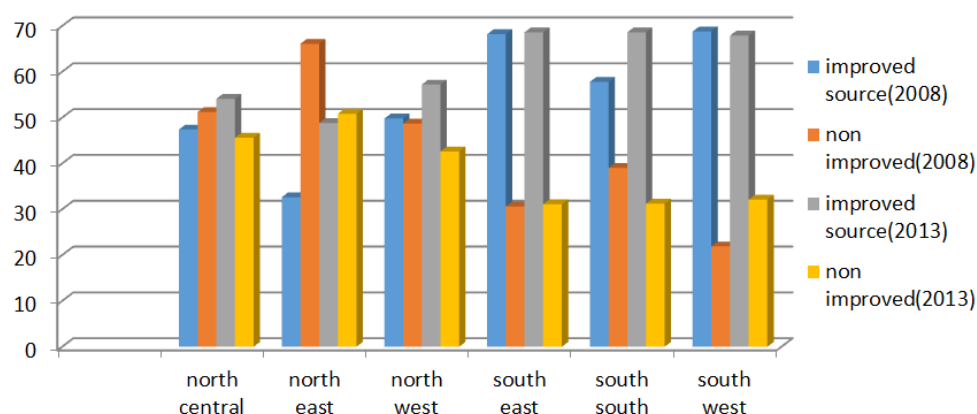
reduction in agricultural productivity [4]. In Nigeria, access to safe water supply is jeopardized by some factors which include inadequate catchment management and widespread pollution as well as the indiscriminate disposal of hazardous substances in water bodies [5]. Coupled with these, poor institutional framework, service irregularities and lack of consistency in public water supplies sector constraints people access to safe water use. However, inadequate access to safe water can have serious implication on the economic development and wellbeing of a nation. These is feasible in the sense that time and drudgery involved in accessing safe water often result in loss of human capital, lack of social adaptive capacity and nation's workforce as thousands of man–hours are lost to communicable water-borne diseases [6] which can reduce economic productivity.

In Sub Sahara Africa, 319 million people are without access to improved reliable drinking water sources [7], two thirds of 159 million people still source water from surface water while 2.4 billion people are without improved sanitation facilities [8]. Though globally, there has been a considerable improvement in access to safe water as about 89% of the global population had access in 2012, equivalent to an

increase of 2.3 billion people with fifty-six percent of the global population, almost four billion people have highest level of access: a piped drinking water connection on premises [9]. Likewise, in Nigeria, percentage of population with access to safe drinking water using improved sources increased steadily in 1990, 2000 and 2011 by (47, 55 and 61) % respectively. Meanwhile, about 62% of this population were without access to improved sanitation in 1990 and increased to 66% and 69% in 2000 and 2011 respectively [10]. In light of the fact that 39% of the population of Nigeria still lacks safe water while 69% lacks basic sanitation [11], many people are still not served by water supply services in Nigeria, therefore, there is a potential risk that people will consume polluted or unsafe drinking water. A study by [12] reported that water sourced through river by households as a result of poor access to water especially in rural areas result in higher risk for river blindness. Moreover, a decline in combating water borne disease ought to be an outcome of improved access to safe water which is not the case as there is still remain a gap as to an increase in water-related diseases. Therefore, it is imperative to the trend between safe water use and diarrhoea incidence in Nigerian households.

One of the risk factors of diarrhoea disease is inadequate access to safe water use in household caused largely by poor sanitation and a contaminated water supply [13]. Diarrhoea has been identified as a major cause of morbidity and mortality among children accounting for about three million deaths in developing countries and Nigeria [14]. This disease varies with age of children as vast majority of deaths from diarrhoea are among children under 5 years of age [15] living in low- and middle income countries [16]. In developing countries, approximately 2 million people, the vast majority of whom are under-five children, die from diarrhoea each year [17] as about 90% of diarrhoea is attributed to unsafe drinking water, inadequate sanitation and poor hygiene especially during food preparation and stool disposal in dwellings.

According to 2014 pneumonia/ diarrhoea report, pneumonia and diarrhoea caused over 1.5 million under-five child deaths, respectively accounting for 15% and 9% of the 6.3 million under- five deaths that occurred globally in 2013, compared to 1.6 million deaths in 2012 [18]. This implies that a parent lose their young child to one of these deadly but preventable diseases every 20 seconds. Nigeria was ranked 2nd after India in diarrhoea deaths in children under age 5 (197 in 1000s). This is in addition to the fact that Nigeria was among the nineteen (19) Africa countries with the least sustainable access to improved/clean water sources with about 42% of nation's population without improved drinking water, 68% without improved sanitation with 12% global child mortality ranking most affected by various causes including unclean water [20]. It is on this premise that this paper will examine the trend in access to safe water use in Nigeria using descriptive statistics such as tables, charts and discuss the prevalence of diarrhoea cases in Nigeria using Nigeria Demographic Health Survey report for 2008 and 2013.

2. Sustainable Access to Safe Water Use by Households in Nigeria

The Nigeria Demographic Health Survey (NDHS) is a national sample survey that provides up-to-date information. It was designed to provide data to monitor the population and health situation in Nigeria. This is implemented by the National Population Commission (NPC), the agency charged with the responsibility of collecting, collating, and analysing demographic data [21]. NDHS report helps in assessments of water supplies and sanitation services in the country every 5 years. These assessments have been an important basis for showcasing improvement in water accessibility and its implication on health sector policies actions at the global, regional and national levels.

2.1. Distribution of Water by Geopolitical Zone

Source: Demographic Health Survey (2008 & 2013).

Figure 1. Percentage distribution of population drinking water by geopolitical zones: 2008 & 2013.

According to [21], improved sources are sources that provide water suitable for drinking which include a piped
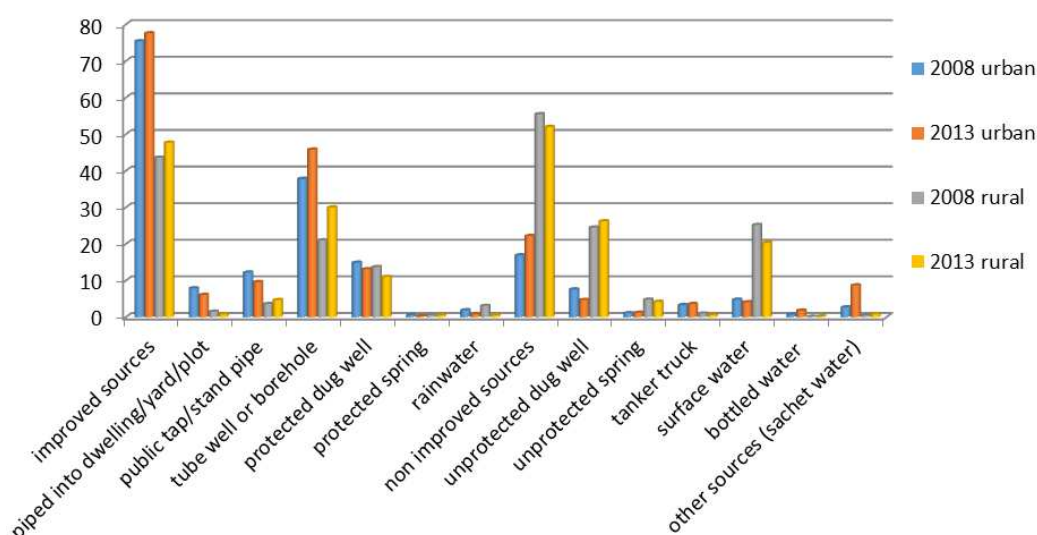
source within the dwelling, yard, or plot; a public tap/stand pipe or a borehole; a protected well or spring; and rainwater

while non-improved ones include unprotected dug well, unprotected spring, tanker truck, surface water, sachet water, bottled water. Disparities exists in access to safe water use across zones as shown in (Figure 1). Non improved sources are prevalent in northern part of the country especially North East which could be as a result of topography or geographical location/water level in the area. This is further supported by [22], that Northwest Nigeria often beset with inadequate water supply jeopardized the safety of drinking water of the people. This lack of wholesome drinking water often results in incidences of waterborne infections including diarrhoea especially among children. Meanwhile, the southern part experience significant access to water this might be attributed to the geographical terrain of the area.

2.2. Sources of Water

As shown in Figure 2, though most urban household used improved source. Though an increase in total access to safe water across the years, most urban households used dug private well in dwellings and tubewell/borehole (Figure 2). These two sources were classified as other improved sources by World Health Organization as quality could be compromised which could endanger human health if not properly done. There was a significant drop in household sourcing water through pipe connections. This is indicative of the decline in water supply by system in the country. However, in the rural areas, unprotected dug well and surface water are the major sources of water. Dwellers are liable to water-borne diseases such as diarrhoea and other neglected tropical diseases such as river blindness [12]. According to NDHS report, about 84.3 and 88.2 percent of the total population in 2008 and 2013 respectively do not treat water before use. In such situations water often fetched from a source that is not immediately accessible to the household may become contaminated during transport or storage. In addition, there can be presence of heavy metals and high acidity level in the water which may often result in health consequences.

Source: Demographic Health Survey (2008 & 2013)

Figure 2. Percentage distribution of population drinking water by sources.

3. Determining Factors of Diarrhoea Disease in Nigeria

Identifying the determining factors of a disease often help in designing effective strategies either for preventive purposes or curative. Access to water use has been identified as one of the causes of diarrhoea [15] coupled with behavioural factors which include lack of hand washing, poor infant feeding practices and lack of child immunization [6, 23]. As shown in Table 1, diarrhoea varies with age as infants between 6–11 and 12–23 months of age are more susceptible than other age group. It is the period when most children start additional food and exposure to contaminated weaning foods can be increased through the use of contaminated water to prepare food in an unhygienic environment. Higher risks could be attributed to the fact that children in age group 12–23 months which are either crawling or walking and are prone to pick dirt or other contaminated objects for playing or eating. This pattern was consistent with studies done by [24, 25]. Children less than 6 months of age were at a lower risk of diarrhoea. This might be the protective effects of breastfeeding which reduces incidence and severity of diarrhoea disease and less exposure of children to contaminated agents [26]. There was variation among the sex of children infected with diarrhoea.

An unimproved water source is among the potential sources of transmission of diarrhoeal diseases and this is often prevalent in rural areas of Nigeria. The rate of water source contamination is often a function of whether or not the source is protected. Though borehole and protected well water is usually found within the compound or in short proximity the yield is low especially during the dry season. Furthermore, in most instances these sources are dug within the compound in unsafe distance from pit latrines. In such situation the clean

water may easily be contaminated during storage or in the process of usage. This might be the case why the prevalence increased in household with improved source of water. Also rapid socioeconomic and demographic expansion over the years may probably have stressed existing facilities. In view of this availability of home-based drinking water treatment should be encouraged.

Table 1. *Prevalence of diarrhoea disease in Nigeria (% of children under age 5) by characteristics.*

Background characteristics	Diarrhoea		Number of Children	
Age in months	2008	2013	2008	2013
< 6	7.3	6.4	2874	2989
6- 11	17.1	16.7	2855	3263
12- 23	19.6	19.7	4945	5900
24-35	12.4	13.0	4633	5490
36-47	9.5	8.1	5013	5722
48-59	6.8	5.9	4633	5586
Sex				
Male	12.5	11.7	12614	14509
Female	11.7	12.0	12360	14440
Source of drinking water				
Improved	9.9	10.9	13235	16515
Not improved	14.7	13.2	11731	12381
Toilet facility				
Improved	13.0	11.4	7491	9172
Non-improved	11.6	10.3	17271	5551
Place of Residence				
Urban	9.2	10.0	7690	10403
Rural	13.4	12.9	17284	18547
Geopolitical Zone				
North central	6.7	9.0	3434	4019
North east	26.6	24.7	3989	5034
North west	15.4	10.5	7594	10485
South east	5.6	11.0	2428	2585
South south	5.4	6.0	3310	2742
South west	6.6	6.8	4221	4084
Educational status of mother				
No education	16.7	13.9	11342	13945
Primary	10.5	11.6	5805	5563
Secondary	7.0	9.3	6385	7697
More than secondary	5.2	7.7	1441	1744
Household wealth quintile				
Lowest	17.6	14.8	5634	6636
Second	15.9	14.2	5566	6483
Middle	10.8	11.6	4787	5534
Fourth	8.9	9.3	4533	5243
Highest	5.3	7.7	4455	5053
Total	12.1	11.8	24975	28950

Source: Demographic Health Survey (2008 & 2013)

The type of toilet facility and stool disposal schemes might reflect the household sanitary conditions and as such on the possibility of the transmission of diarrheal pathogens through faecal contamination. Place of current residence could also influence diarrhoea diseases as children living in urban areas compared to those in rural areas are less likely to have diarrhoea. In rural areas access to basic needs of life especially access to safe water might be inadequate from unimproved source which makes the children more susceptible to diarrhoea outbreak. This could be heightened during dry season where borehole water level decreases and also natural source of water (Figure 2) dries off.

Zone wise, north east had the highest incidence of diarrhoea. This could be as a result of topography of the area as well as insurgency in the region, as the number of internally displaced persons (IDPs) increases. Camp facilities might be lacking, inadequate for safe and portable water for drinking, food preparation as well as other sanitary practices, improper waste disposal which could result in infection especially among the children. North east zone had the lowest percentage of mother's education. This is in line with educational attainment report by NDHS, 2013 that north east zone had the lowest proportion of educated people especially female. The incidence decrease as mother's educational attainment increases being lower among children of more educated mothers (secondary or higher) than among children of mothers with no or primary education. This is probably because more educational level provides the knowledge of the rules of hygiene, feeding and weaning practices. The interpretation of symptoms often enhances timely action to childhood illness. Similarly, prevalence of diarrhoea decreases as household wealth status increases. Wealthier families can prevent the incidence by sourcing water from improved means or take care of infected children as bills can be paid and drugs purchased.

4. Conclusion

Sustainable access to safe water use is important in the reduction of water related diseases especially diarrhoea among under five children. Diarrhoea has been identified as a major cause of morbidity and mortality among children as a result of inadequate access to safe water use in household caused largely by poor sanitation, contaminated water supply, socioeconomic status and environmental condition of households. To achieve sustainable access to safe water use among households, there is need to identify missing link and more integration of existing relationship between water and sanitation sector as this would reflect in the reduction of water related diseases in the country.

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