Prevalence of Water Borne Diseases in Relation to the Sources of Water in Some Riverine Communities of Bayelsa State

Ebibodere K. Baulch[1]; Ebenezer Amawulu[2]; *Tariwari C.N. Angaye[2]

[1]Department of Haematology and Immunology, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.
[2]Departmentof Biological Sciences, Niger Delta University, Wilberforce Island, Bayelsa State.

ARTICLE INFO	ABSTRACT

The universal importance of water to life cannot be overemphasized. Unfortunately, water have a means of transmitting diseases of public health concern. Consequently, that caution to scrutinize and prioritize the utilization of every drop of water have become a mainstay. This research is concern with the prevalence of some water-borne diseases in some coastal communities along the River Nun axis of Bayelsa State. Data acquisition was through a randomized structured questionnaire, and existing PHC facilities. Based on preferred sources of water, the use of borehole water recorded the highest frequency (45.79%), while shallow-dug pit water recorded the lowest frequency (15.93%) with significance (p<0.05). River (20.52%) and Rain water (18.29%) was statistically related (p>0.05). The Water Borne Diseases (WBDs) were typhoid (37.85%), malaria (32.11%), Cholera (20.56 %) and shigellosis (10.06%). With the exception of malaria and typhoid the prevalence of WBDs was statistically significant (p<0.05). This result is an indication that there is an anthropogenic contamination of community source of water. This is a cause for public health interventions and community-based sensitization on the dangers of this diseases and aseptic use of water.

INTRODUCTION

Due to the multifaceted applications of water as an essential resource to all organisms, human-water consumption has become inevitable. Potable water is essential for total health and survival of humans, especially infants (Ohimain *et al*., 2013). According to Nwabor, (2016), water-borne diseases encompasses all ailments arising from either direct and/or indirect contact of contaminated water, through bathing, consumption, or the aesthetic use of water.

The consumption of contaminated water has become a leading cause of most gastrointestinal illness in all regions of the world (Ahmed *et al*., 2014). Water-borne diseases have caused major health problems across the world (Clasen, *et al*., 2007; WHO, 2010). For instance, survey and estimates of WHO had it that

over 1 million persons dies from water-borne diseases on annual basis (WHO, 2005).

Understanding the pattern of disease spread is a basic pre-requisite for assessing the causes of disease outbreaks (Schuster *et al.*, 2005). Instances of water-borne diseases resulting from the consumption of contaminated water have been documented in literature (Raji *et al.*, 2001; Oguntoke *et al.*, 2009). Raji *et al.* (2010a) reported that potable water samples from two towns in Sokoto metropolis were found to be contaminated with pathogenic microbes like; *E. coli, Salmonella, Shigella* and *Vibrio*.

Besides microbial contamination, potable water was also found to have heavy metal contaminants that exceeded the WHO allowable limits (Raji *et al.*, (2010b). However, there is paucity of information on waterborne diseases in relation to the sources of water in Bayelsa State. Bayelsa is a coastal state with a lot of riverine community settlements having inadequate potable water. Hence, there is need for comparative analysis of water sources and water borne diseases.

MATERIALS AND METHOD

3.1 Study Area

Bayelsa state (N05^o 07$^|$ 13.8$^{||}$ and longitudes E006^o 18$^|$ 04.5) is located in the southernmost part of Nigeria. It is one of the states in the Niger Delta areas with a major central tributary called River Nun. The climatic condition of the area is tropically humid with two prevailing seasons; the rainy season ranging from the months of March to October and the dry seasons spanning from November to February

3.2 Research Design

The study adopted field survey design to collect relevant data on the communal sources of water and water-borne diseases data from individuals and Primary Health Care Facility in some selected coastal communities along the river Nun.

3.3 Population of the Study

The population of the study were riverine communities. The information on the history about the waterborne diseases were collected by questionnaires and health data bank from the PHC in all the study communities.

3.4 Research Instrument

The instrument used for this research was a designed questionnaire titled: Prevalence of water borne diseases in some coastal communities of Bayelsa State (PWBDISCCOBS). The questionnaire was structured into two parts. The Part A contains items on the community sources of water, while Part B contains

items on the awareness of the health impacts of water-borne diseases.

3.6 Validity and Reliability of instrument

The questionnaire was verified by experts and certified okay by an expert in the field of public health. The questionnaires were first tested on a pilot scale around some households 1 km adjacent to the study area. The scores were analysed using t-test. The data was significant at p = 0.05 and confirmed the instrument to be reliable.

3.8 Method of Data Collection

Five (5) communities were selected for the study based on accessibility. The communities are; (Gbarantoru, Ogobiri, Tombia, Ikibiri, and Amasoma), Two hundred and fifty (250) households was randomly selected; 50 from each community. From each household, the head was presented with the copy of the questionnaire to fill. In any household where the head was not literate, the content of the questions was read and the respondent was guided. This continued until a sample size was obtained. Sample size was determined as per Daniel (cited in Ebenezer et al, 2015). In the same community, the health data on water borne diseases were sought from the existing PHC facility data bank through the permission of the Medical director.

3.9 Method of Data Analysis

Data arising from the study was verified for accuracy using the 2016 version of Microsoft office excel. Thereafter, it was subjected to SPSS (version 20.0) for descriptive and analytical statistic. Descriptive statistics like percentage was use to express the frequency occurrence of an event. Significant differences between variables were determined in ANOVAs at a confident level of 0.05.

RESULT

The sources and utilization of water in the coastal communities in this present study is presented in Figure 1. Base on the preferred source of water, the use of borehole recorded the highest frequency (45.79%) and the lowest frequency (15.93%) was recorded in well water. Other sources of water were River (20.52%) and Rain water (18.29%) respectively. With the exception of river and rain water (p>0.05), every other sources of water showed significant difference (p<0.05). The communal sources of water in order of increasing frequency are; Ikibiri:(borehole>river>rain>well);Amasoma:(borehole> well>river>rain);Tombia:(borehole>river>rain>well); Ogobiri (borehole> river>rain> well) and Gbarantoru (borehole>rain> river> well) respectively. Details are shown in Figure 1.
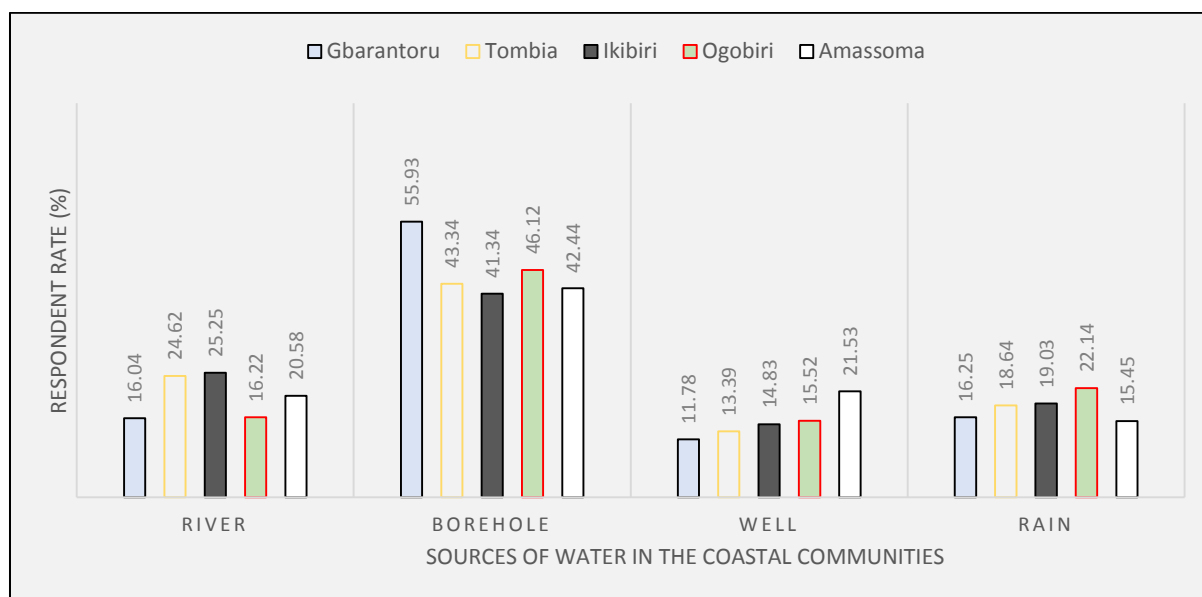
Figure 1: Sources of water from the Coastal Communities

Four water-borne diseases were predominant in the study locations (Figure 2). When the disease burdens were pooled across community, their increasing order of prevalence were; typhoid (37.85%) malaria (32.11%), Cholera (20.56%) and shigellosis (10.06%). There were significant differences amongst the prevalent diseases (p<0.05). Detail of the result is presented in Figure 2.
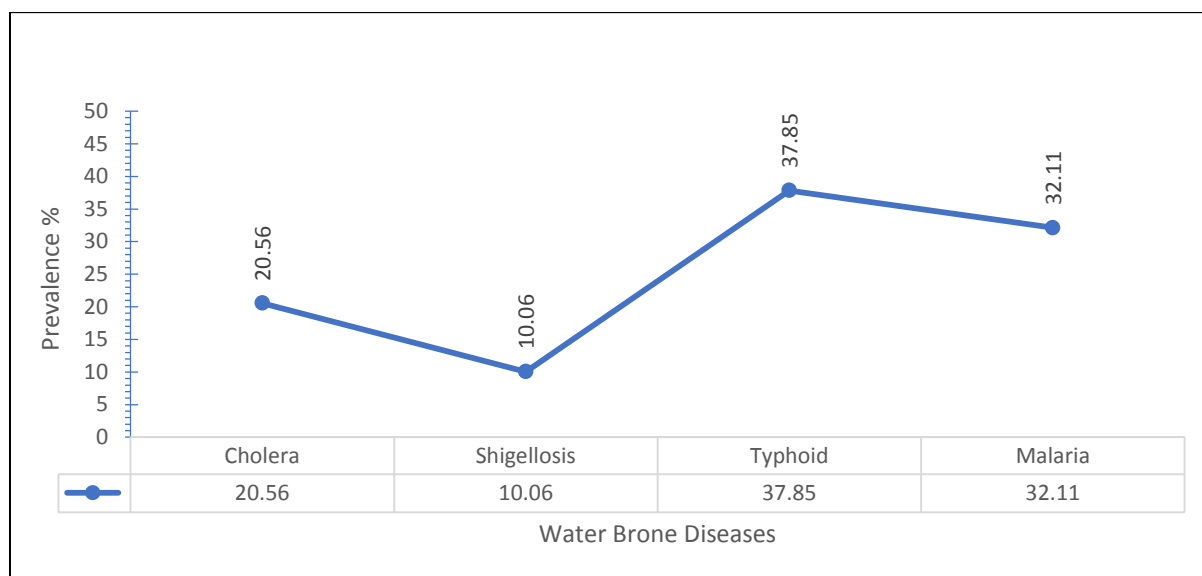

Figure 2: Results on the prevalence of water-borne diseases in the coastal communities

DISCUSSION

The sources of water observed in this present study have been reported elsewhere (Oguntoke et al., 2009, Raji and Ibrahim, 2011). Borehole was the most preferred sources of water and accounted for 45.79% of all the water sources used. This result is moderately high and indicate that community enlightenments on the safe source of water is ongoing. However, the use of other sources of water put together in the study location was 54.91% higher than borehole. Similar study by Temitayo and Bolarinwa, (2017) reported that 66.82% of the households in rural communities in Nigeria, drinks water from unprotected sources such as open wells, springs and streams. However, the present observation contradicts the result of Olowe et al., (2016), who reported that the predominant source of water in Addo Ekiti was well. The observation in this present study highlights that majority of the inhabitants in the study location are still depending on unsafe water for consumption. Nevertheless, the reason for their dependence on unsafe water for consumption is yet uncertain at this time.

Five water-borne diseases in an increasing order of prevalence in the study locations were; typhoid (37.85%) malaria (32.11%), Cholera (20.56%) and shigellosis (10.06%). This result agrees with the similar

study conducted in North-western Nigeria (Raji and Ibrahim, 2011 but contrasted the result of Temitayo and Bolarinwa , (2017), who reported the following water related diseases in the rural communities of Nigeria, such as river blindness, (61.97%), schistosomiasis (22.34%), elephantiasis (13.12%) and guinea worm (about 3%). The higher prevalence of typhoid reported in this present study contradicts the result of Olowe et al. (2016) and Raji and Ibrahim, (2011). Both reported that diarrhoea was the most predominant water borne diseases recorded in South western and North-western of Nigeria. Raji and Ibrahim, (2011) emphasized further that the diarrhoea cases increased from 6.23% in 2004 to 10.04% in 2005.

The prevalence of typhoid, Cholera and shigellosis in the present study is an indication that the sources of water in the study location is highly contaminated with several disease pathogens. Typhoid is caused by *Salmonella* serotypes such as *Salmonella typhi, S. paratyphi A, S. paratyphi B* and *S. paratyphi C.* (Crump *et al.*, 2004), and is transmitted through the ingestion of water or food that has been contaminated by faeces in a crowded and impoverished environment, where the populations has little or no access to sanitation facilities (Eba and Bekele, 2019). The prevalence of typhoid in this present study is an indication that the table water level in the environment is high, which may have easily contaminated the sources of water supply with pathogenic agents.

Cholera is caused by a strain of bacteria species called *Vibrio cholera.* It strives where there is lack of social amenities and poor environmental sanitation. Shigellosis is a bacterial infection caused by *Shigella* species. It is considered as a potential factor in infectious diarrhoeas (Sousa et al., 2013). Their presence in this study is an indication that the locations where sources of water is sited may be exposed to the bacterial contaminations.

Malaria is a water wash disease caused by a protozoan parasite of the genus *Plasmodium*. It is predominant where there are several stagnant water bodies. Such environment encourages the breeding of mosquito and the emergence of adults. Their presence in this present study is not surprising, because malaria is endemic in the Niger Delta area and its prevalence has been reported (Abah and Temple, 2015; Ezenwaka, and Ivoh, 2018).

CONCLUSION

It is apparent from the results of this study that most locations in the study area lack safe and portable drinking water. This have translated to the prevalence of four water-borne diseases in rural communities of Bayelsa State. The frequencies of the water-borne diseases were; typhoid> malaria > Cholera >shigellosis. This result is a cause for public attention. It is therefore recommended government should provide portable drinking water to the community and sensitize rural communities on the need to improve community base environmental sanitation.

REFERENCES

Abah, A. E., and Temple, B. (2015). Prevalence of Malaria Parasite among Asymptomatic Primary School Children in Angiama Community, Bayelsa State, Nigeria. *Trop Med Surg*, 4(1). http://dx.doi.org/10.4172/2329-9088.1000203

Ahmed, S. M, Hall, A. J, Robinson, A. E., Verhoef, L., Premkumar, P., and Parashar U. D. (2014). Global prevalence of norovirus in cases of gastroenteritis: A systematic review and meta-analysis. *Lancet Infect Dis.*, 14(8), 725 – 30.

Clasen, T., Schmidt, W., Rabie, T., Roberts, I., and Cairncross, S. (2007). Interventions to improve water quality for preventing diarrhoea: systematic review and meta-analysis. *British Medical Journal*, 1-10.

Crump, J. A, Luby, S. P and Mintz, E. D. (2004). The global burden of typhoid fever. *Bull World Health Organ*.;82(5), 346–353.

Daniel, W. W, (in Ebenezer et al., 2006): Practical issues in calculating the sample size for prevalence studies. *Medical Statistics*, 1, 9-14.

Eba, K, and Bekele, D. (2019). Prevalence of Typhoid Fever and its Risk Factors in Lalo Assabi District, West Wollega, Oromiya. *Ethiopia. J Bacteriol Parasitol.*, 10, 365. DOI: 10.35248/2155-9597.19.10.365

Ezenwaka, C. O. and 2 Ivoh, C. J. (2018). Prevalence of Malaria Infection among Students Attending Federal University Otuoke Health Centre, Bayelsa State, Nigeria. *Int. Journal of Basic Science and Technology*, 4(1), 17-22.

Ibrahim, M., Odoemena, D. I., and Ibrahim, M. T. (2000). Intestinal Helminthic infestations among primary school children in Sokoto. *Sahel. Med. J.*, 3(2), 65 - 68.

Nwabor, O. F., Nnamonu, E. I., Martins, P. E., and Ani, O. C. (2016). Water and Waterborne Diseases: A Review. *International Journal of Tropical Disease & Health,* 12(4), 1-14.

Oguntoke, O., Aboderin, O.J. and Bankole, A.M. (2009). Association of water-borne diseases morbidity pattern and water quality in parts of Ibadan City, Nigeria. *Tanzania Journal of Health Research,* 11(4).189-195.

Ohimain, E. I., Angaye, TCN., and Okiongbo, K. (2013). Removal of Iron, Coliforms and Acidity from Ground Water Obtained from Shallow Aquifer Using Trickling Filter Method. *Journal of Environmental Science and Engineering*, 2, 549 - 555.

Raji, M. I. O, Ibrahim Y. K. E, and Ehinmidu, J. O. (2010b). Physico-chemical characteristics and heavy metal levels in drinking water sources in Sokoto metropolis in North-western Nigeria. *J. Appl. Sci. Environ. Manage.*,14(3), 81 - 85.

Raji, M. I. O., Ibrahim, Y. K. E., and Ehinmidu, J. O. (2010). Bacteriological quality of public water sources in Shuni, Tambuwal and Sokoto towns in North-Western Nigeria. *J. Pharm. Biores*., 7(2), 55-64.

Schuster, C. J., Ellis, A. G., Robertson, W. J., Charron, D. F., Aramini, J. J., Marshall, B. J. (2005). Infectious disease outbreaks related to drinking water in Canada, 1974–2001. *Can J Public Health*, 96(4), 254–8.

Sousa MÂB, Mendes EN, Collares GB, Péret-Filho LA, Penna FJ, Magalhães PP(2013). *Shigella* in Brazilian children with acute diarrhoea: prevalence, antimicrobial resistance and virulence genes. Mem Inst Oswaldo Cruz; 108(1):30–35

Temitayo A. A., Bolarinwa T. O, (2017). Estimating the Incidence of Water Related Diseases: the case of Neglected Tropical Diseases in Rural Nigeria , *Journal of Agriculture and Veterinary Science*, 10(7): 49-57 DOI: 10.9790/2380-1007014957

World Health Organisation (2005). Guidelines for Laboratory and Field Testing of Mosquito Larvicides. WHO communicable disease control, prevention and eradication. WHO pesticide evaluation scheme, WHO/CDS/WHOPES/GCDPP/2005.13.

WHO/UNICEF. (2000). Global Water supply and sanitation assessment report. Geneva and New York: WHO and UNICEF; 2000.