

Research Journal of Applied Sciences, Engineering and Technology 10(7): 776-781, 2015

ISSN: 2040-7459; e-ISSN: 2040-7467

© Maxwell Scientific Organization, 2015

Submitted: February 3, 2015

Accepted: March 11, 2015

Published: July 10, 2015

An Assessment of Water Related Diseases in a Nigerian Community

¹D.O. Omole, ¹C.P. Emenike, ¹I.T. Tenebe, ¹A.O. Akinde and ²A.A. Badejo

¹Department of Civil Engineering, Covenant University, P.M.B. 1023, Ota, Ogun State, Nigeria

²Department of Civil Engineering, Federal University of Agriculture, P.M.B. 2240, Abeokuta, Ogun State, Nigeria

Abstract: Information on the general health problems in Ota was provided while the ailments that are directly related to water were highlighted and discussed. The information was gathered by questionnaire application, using non-quota sampling technique. The target respondents were health care workers such as doctors, nurses and pharmacists who work in hospitals and primary health care centers situated in the municipality. It was observed that out of the top seven diseases that are most frequently reported in Ota, five were water related. These diseases include malaria, typhoid, vital organ failure, cholera and skin disease. Reasons for the high level of water related ailments were explained by poor level of supply of potable water to the municipality, as well as poor sanitation practices by the residents.

Keywords: Disease, health, health care workers, Nigeria, sanitation, water

INTRODUCTION

Earlier studies have established the links between water pollution and health problems (Omole *et al.*, 2015; Johnson and Paull, 2011; Moe and Rheingans, 2006; Griffiths, 2007; Briggs, 2003). The enormity of this problem is underscored by the fact that the leading cause of human mortality all over the world is water related ailments and the fact that in Africa, above 50% of every reported case of hospitalization has been tied to water related problems (Omole and Ndambuki, 2014). Water related health problems are not unique to Africa; however it is pronounced in several parts of Africa (RSC, 2010; Longe *et al.*, 2010). An understanding of how these diseases are spread can provide insight into their reversal. The relation of water diseases is sub-divided into four (Johnson and Paull, 2011; Griffiths, 2007) (Fig. 1). Water-borne-vector related diseases are those diseases that are spread by insects that depend on water for survival and procreation; water-washed (or water scarce) diseases are often communicable diseases which are caused primarily by water scarcity; water-based diseases are those diseases that reside in hosts that live in the water body; while water-borne diseases are spread through the ingestion of polluted water (Johnson and Paull, 2011; Griffiths, 2007).

Nearly all these water-related diseases can be prevented if sufficient potable water can be provided for people. However, this is not the case in reality. In some parts of Africa, women spend as much as a

quarter of their waking hours just to get water for their household (Omole and Ndambuki, 2014). In the effort to get water for immediate domestic use, quality is often compromised or overlooked. Human activities have introduced pollutants into nearly every available freshwater source (including groundwater which is the most subscribed fresh water source) (Longe *et al.*, 2010; IIED, 2010). Leaking septic tanks, leaking underground fuel storage tanks, leached farm chemicals, leached land-fills and direct run-off from industrial activities are some of the polluting activities that have adversely affected the quality groundwater sources (Omole and Isiorho, 2011). Thus, potable water has become a very difficult commodity to have. In Nigeria, the pollution of freshwater sources happens with impunity because the enforcement of applicable laws are often lax (Longe *et al.*, 2010). More than 80% of industrial effluent discharges are carried out without initial treatment processes as required by law (Omole and Isiorho, 2011). Thus, freshwater sources suffer as a direct result of human activities. Ado-Odo/Ota Local Government Area (LGA) of Ogun State, being one of the major industrial hubs of Nigeria, hosts hundreds of industrial concerns, several farms and hundreds of thousands of residential institutions and households with attendant pollution activities (Ogbiye, 2011). This study therefore aims to identify the commonly reported water related diseases in Ado-Odo/Ota LGA of Ogun State in Nigeria in order to underscore the perennial problems associated with fresh water shortages in the area.

Corresponding Author: D.O. Omole, Department of Civil Engineering, Covenant University, P.M.B. 1023, Ota, Ogun State, Nigeria

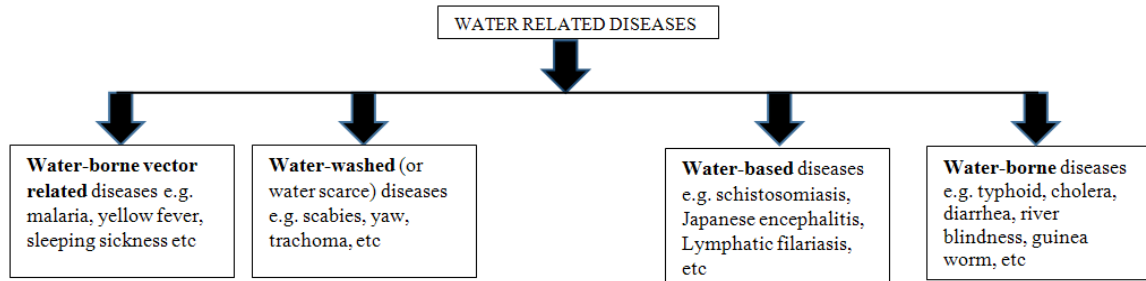


Fig. 1: Classifications of water related diseases



Fig. 2: Map of Ado-Odo/Ota in Ogun State, Nigeria

MATERIALS AND METHODS

Study area: The study area is Ado/Odo-OtaLGA, Ogun State, Nigeria (Fig. 2). With a current estimated population of 669,886 (using the 2006 census data and a growth rate of 3.5%), the LGA is the most populated of the 20 LGAs in the State (FRN, 2007). The LGA is also one of the industrial hubs with the highest concentrations of industries in Nigeria (Ogbiye, 2011; Omole and Isiorho, 2011). It accommodates several hundred industries which include food, beverages and tobacco; pulp and paper products; chemical and pharmaceuticals; metallurgy; gas; plastics; wood processing; and non-metallic mineral products (Ogbiye, 2011).

Data collection and analysis: The central theme for the questionnaire was to source for information on the most commonly reported ailments in the health care

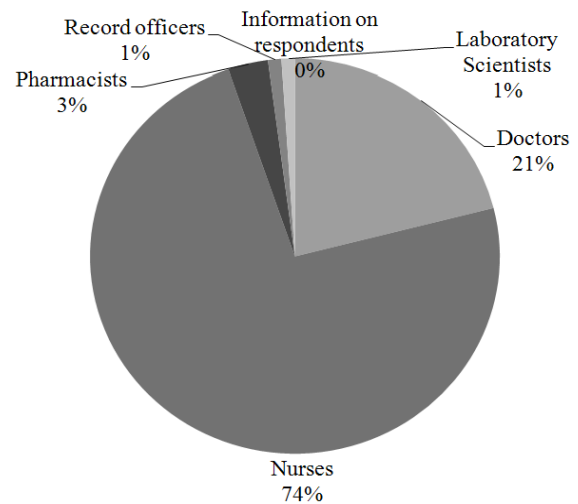


Fig. 3: Distribution of respondents

facilities in the LGA. Specific questions also targeted the cadre of health professional as well as the number of years of experience. A non-proportionate quota sampling technique was used in gathering the needed data. This is because there were no available information on the number and distribution of health care facilities and health workers in the LGA. Thus, it was difficult to determine the exact proportion of professionals to the represented in the design of the sample population. A total of 101 questionnaires were distributed to health workers. Ninety-five questionnaires were completed and returned. This was inclusive of 20 medical doctors, 70 nurses, 3 pharmacists, 1 laboratory scientist and 1 record officer. Seven hospitals were included in this study. This is comprised of one State owned general hospital, three private hospitals and three LGA run Primary Health Care centers (PHC). Subsequently, all the data was entered into the Microsoft excel spreadsheet for storage and analysis.

RESULTS

Information on respondents: The distribution of the targeted Health Care Workers (HCW) are presented in Fig. 3. When patients report to the hospital, the first

Table 1: Cadre of HCW and level of experience

s/n	Years of experience	Health care worker				
		Nurses	Doctors	Pharmacists	Record officer	Laboratory scientist
1	< 2	18	8	0	0	0
2	2-5	38	6	2	1	1
3	5-10	9	5	0	0	0
4	>10	5	1	2	0	0

Table 2: Water related diseases

s/n	Relation of disease to water	Identified from questionnaire	Frequency of report by 95 respondents
1	Water-related-vector borne disease	Malaria	50
2	Water-borne disease	Typhoid, cholera (with attendant dysentery and vomiting) and diarrhea	11
3	Water based disease	Kidney or liver disease	5
4	Water washed disease	Skin disease (e.g., scabies, yaw)	3

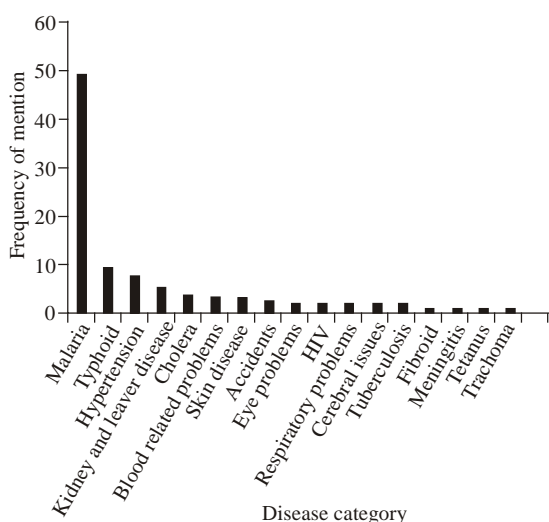
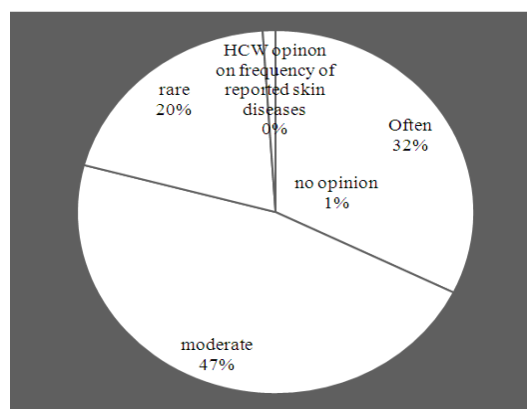


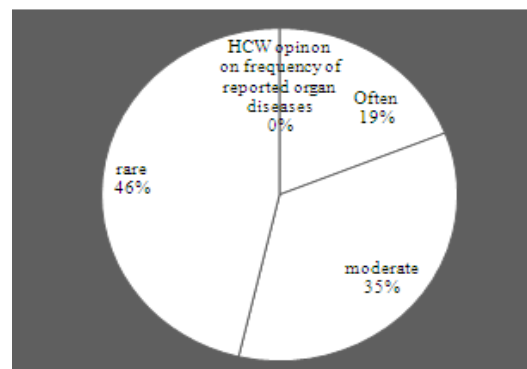
Fig. 4: Frequency of reported diseases

HCW they typically have contact with are the record officers who register them and direct them to nurses. The nurses measure and record their vital signs before referring them to the doctors. In the primary health care centers, the ultimate HCW that attend to patients are often Nurses as medical doctors are in short supply (Mba and Ekeopara, 2012). Also, most hospitals have just one or two record officers on duty at any given time, depending on the size of the hospital. Thus, the distributions shows that the larger percentage of respondents were nurses, followed by medical doctors and pharmacists, respectively.

Among the HCW, information was collected regarding their years of experience (Table 1). Information shows that most of the respondents had between 2-5 years of experience, followed by those with less than two years' experience. The situation can be explained by the fact that the more experienced HCW often migrate to more lucrative countries or locations in search of better opportunities (Mba and Ekeopara, 2012; Uneke *et al.*, 2007).



(a)



(b)

Fig. 5: (a) HCW opinion on frequency of reported skin diseases, (b) HCW opinion on frequency of reported organ diseases

Information on frequently reported diseases: The opinion of each health worker was sought on the five most reported ailments at the health care facility where they worked. Thus, the list of identified diseases reported in this research were provided by the health care workers themselves. The summary of the identified diseases and the frequency of mention are illustrated in Fig. 4.

Results show that out of 17 categories of the most frequently reported ailments, malaria and typhoid, which are water related diseases, topped the list. The relation of the reported diseases to water and the frequency of mention are shown in Table 2.

Furthermore, the opinion of the HCW was sought on the frequency of report of skin diseases and the report of organ based diseases. The results are shown in Fig. 5a and b.

Most of the HCW believe that skin diseases are reported in the health care facilities but not often. The same HCW believe that the report of diseases of vital organs such as kidney and liver are rare. However, 35% of the respondents indicated that they received complaints from patients which after medical tests confirmed that the patients had kidney or liver related problems.

DISCUSSION

Malaria, a tropical disease, is caused by the anopheles mosquitoes (Lehrer, 2010). These flies breed and multiply in stagnant water. Thus, removing their habitat is a strong means of controlling the disease. Stagnant water is related to sanitation problems which is a global problem. UNICEF/WHO (2012) postulates that the world is not likely to meet the Millennium Development Goal (MDG) on sanitation as more than 2.5 billion people out of an estimated 7 billion still lack access to sanitation. Similarly, typhoid, cholera and diarrhea are water borne diseases which have claimed several million lives globally. These diseases are contracted because of consumption of polluted water. This is equally a sanitation problem. Diarrhea kills as many as 3 million people (especially children under the age of five) annually; typhoid kills 600,000 annually while cholera is estimated to claim 120,000 lives annually (Demena *et al.*, 2003). The direct correlation between sanitation and poverty, therefore, is confirmed by earlier research stating that 80% of the cases of water borne diseases occur in developing countries (Omole and Ndambuki, 2014; Demena *et al.*, 2003).

While kidney or liver disease may develop as a result of several factors, studies also show that when heavy metals are ingested, it leads to several health problems such as kidney, liver and cerebral problems (Omole *et al.*, 2014; Mudgal *et al.*, 2010). One of the ways by which heavy metals get ingested by humans is through direct consumption of polluted water, plants or animals. Some of the plants that were affected by heavy-metal became affected by adsorbing metals from polluted soils while affected animals may have ingested the heavy metals by drinking from polluted water or eating affected plants (Omole *et al.*, 2014). In this study, reports of kidney and liver problems are the fourth most reported cases of health problems in Ota.

Other water related diseases reported by the HCW include typhoid, cholera and skin diseases. While typhoid and cholera are water borne diseases which may be contracted through direct ingestion of polluted water, skin diseases are classified as water washed diseases caused either by the use of polluted water or the absence of sufficient water for sanitation purposes (UNICEF/WHO, 2012; Demena *et al.*, 2003). The incidence of typhoid and cholera are the second and fifth most reported health problems respectively in Ota, while the incidence of skin diseases are the seventh most reported health challenges.

The high incidence of water related problems in Ota is not isolated from the general water and sanitation problems in Nigeria. Nigeria has been identified as one of few countries that would not meet the MDG for water even though the world, as a whole, met this goal since 2010 (Omole, 2013). Public piped potable water supply reaches just about 24% of the population while an additional 42% make private arrangements to be supplied with potable water from hand dug wells, boreholes and vendors (Longe *et al.*, 2010). As many as 34% of the population rely on surface water and other forms of exposed and unsanitary water to meet their daily needs (Longe *et al.*, 2010; Omole and Ndambuki, 2015, 2014). Some of the reasons for failing to meet the MDG on water in Nigeria include weak water governing institutions, graft, poor enforcement of standing regulations, vandalism of existing water infrastructure, inadequate planning and projections, low human capacity and low financing (Omole and Ndambuki, 2015). Aside from poor supply of potable water to households, unsanitary practices by residents could also contribute to the high incidents of diseases. Although it is common knowledge that the primary means of spread of malaria is the mosquito which breeds in stagnant water accumulated on weeds and soils, studies show that many residents allow these kinds of environment to fester (Lehrer, 2010; Omole and Longe, 2008). Thus, the malaria epidemic is part self-inflicted and partly blamed on systemic failure pervasive in the entire country (Omole and Ndambuki, 2015).

CONCLUSION

While the poor supply of potable water to Nigerian communities has been identified as a primary factor in the prevalence of preventable diseases among citizens, it can also be seen that a lot of improvement has to be made with respect to personal hygiene and environmental sanitation by the citizens themselves. The Ogun State government and many other Nigerian State governments make efforts in this regard by enforcing a monthly environmental sanitation program, which requires that all residents of the State spend one

day per month in cleaning their environment (Stock, 2010; Adedayo, 2000). However, this is not sufficient. Sanitation should be a daily and continuous exercise. This will go a long way in solving the water-related-vector borne diseases. Furthermore, the consumption of polluted water (by ingestion or bathing) which is the main cause of water-borne, water-based and water-washed diseases can only be ended with the provision of potable water supply at short distances (defined as 100 m or total walking time of 5 min) to every household (UN-Women, 2012; Omole, 2010; WHO, 2003). This is achievable with prudent financial management principles, committed leadership and the proper enforcement of existing policies and regulations on the part of government at the local, State and Federal levels. Prevention can be a cheaper option than remediation in this regard. The Nigerian health sector is also affected (like the water and most other sectors) by the same set of limitations (Uneke *et al.*, 2007). The resultant effect of this on the health sector include sub-standard equipping and staffing of health care centers (Mba and Ekeopara, 2012), as well as low ratio of experienced to relatively new personnel in the health care facilities as demonstrated in this research. It is also the reason why complicated health problems are being referred to other hospitals and, in many cases, outside the country (Mba and Ekeopara, 2012; Uneke *et al.*, 2007). In a country where 54% of its citizens live on less than \$1 USD/day (Omole, 2013; USAID, 2010), it will amount to a death sentence for people living in such poverty to get referred to foreign hospitals for treatment. Therefore, the prevention of water related diseases should take precedence over the cure of the same. Detailed environmental epidemiology of water related diseases in Ota and other parts of Nigeria should be embarked upon in order to establish the extent of this problem. This will be a first step in the right direction in addressing the problems identified in this pilot study.

REFERENCES

- Adedayo, A., 2000. Environmental sanitation and waste management policies at the local level in Nigeria. *Geo Stud. Forum*, 1(1): 29-37.
- Briggs, D., 2003. Environmental pollution and the global burden of disease. *Brit. Med. Bull.*, 68: 1-24.
- Demena, M., A. Workie, E. Tadesse, S. Mohammed and T. Gebru, 2003. Water Borne Disease for the Ethiopian Health Center Team. Ethiopia Public Health Training Initiative, Addis Ababa. Retrieved from: <http://ocw.tufts.edu/data/55/703050.pdf> (Accessed on: January 27, 2015).
- FRN, 2007. Legal notice on publication of the 2006 census report. Federal Republic of Nigeria Official Gazette, 4(94): 1-8.
- Griffiths, J.K., 2007. Water-borne and Water Related Diseases: Role of Water Treatment and Sanitation, Syndromes. Retrieved from: ocw.tufts.edu/data/55/703050.pdf (Accessed on: January 31, 2015).
- IIED, 2010. Ground Water, Self-supply and Poor Urban Dwellers: A Review with Case Studies of Bangalore and Lusaka. In: Gronwall, J.T. Mulenga and G. McGranahan (Eds.), International Institute for Environment and Development, London, ISBN: 978-1-84369-770-1.
- Johnson, P.T.J. and S.H. Paull, 2011. The ecology and emergence of diseases in fresh waters. *Freshwater Biol.*, 56: 638-657.
- Lehrer, S., 2010. Anopheles mosquito transmission of brain tumor. *Med. Hypotheses*, 74(1): 167-168.
- Longe, E.O., D.O. Omole, I.K. Adewumi and A.S. Ogbiye, 2010. Water resources use, abuse and regulations in Nigeria. *J. Sustain. Dev. Afr.*, 12(2): 35-44.
- Mba, P.N. and C. Ekeopara, 2012. "BRAIN DRAIN": Implication for economic growth in Nigeria. *Am. J. Soc. Iss. Hum.*, 2(2): 41-47.
- Moe, C.L. and R.D. Rheingans, 2006. Global challenges in water, sanitation and health. *J. Water Health*, 4: 41-57.
- Mudgal, V., N. Madaan, A. Mudgal, R.B. Singh and S. Sanjay-Mishra, 2010. Effect of toxic metals on human health. *Open Nutraceut. J.*, 3: 94-99.
- Ogbiye, A.S., 2011. Pollution problems and an engineering approach to the management and control of industrial effluents in Ota, Nigeria. Ph.D. Thesis, Department of Civil Engineering, Covenant University, Ota, Ogun State, Nigeria.
- Omole, D.O., 2010. Water Quality Modelling: Case Study of the Impact of Abattoir Effluent on River Illo, Ota, Nigeria. LAP Lambert Academic Publishing GmbH and Co., KG, Saarbrücken, Germany.
- Omole, D.O., 2013. Sustainable groundwater exploitation in Nigeria. *J. Water Resour. Ocean Sci.*, 2(2): 9-14.
- Omole, D.O. and E.O. Longe, 2008. An assessment of the impact of abattoir effluents on River Illo, Ota, Nigeria. *J. Environ. Sci. Technol.*, 1 (2): 56-64.
- Omole, D.O. and S.A. Isiorho, 2011. Waste management and water quality issues in coastal states of Nigeria: The Ogun state experience. *J. Sustain. Dev. Afr.*, 13(6): 207-217.
- Omole, D.O. and J.M. Ndambuki, 2014. Sustainable living in Africa: Case of water, sanitation, air pollution and energy. *Sustainability*, 6(8): 5187-5202.
- Omole, D.O. and J.M. Ndambuki, 2015. Nigeria's Legal Instruments for Land and Water Use: Implications for National Development. In: Evans, O. (Ed.), In-Country Determinants and Implications of Foreign Land Acquisitions. Business Science Reference, 1. Hershey, PA, USA, pp: 354-373.

- Omole, D.O., J.M. Ndambuki and K.O. Balogun, 2015. Consumption of sachet water in Nigeria: Quality, public health and economic perspectives. *Afr. J. Sci. Technol. Innov. Dev.*, 7(1): 45-51.
- Omole, D.O., J.M. Ndambuki, C.A. Nwafor-Oritzu and C.E. Obata, 2014. Development of a water treatment plant for heavy metal adsorption. Proceeding of the 5th IASTED African Conference on Environment and Water Resource Management (AfricaEWRM'2014). Gaborone, Botswana, 812: 1-5.
- RSC, 2010. Africa's Water Quality: A Chemical Science Perspective. A Report by the Pan Africa Chemistry Network. Retrieved from: http://www.rsc.org/images/RSC_AWQ_PACN_Flyer_tcm18-176916.pdf (Accessed on: January 30, 2015).
- Stock, R., 2010. Environmental sanitation in Nigeria: Colonial and Contemporary. Retrieved from: www.roape.org/pdf/4203.pdf (Accessed on: January 30, 2015).
- Uneke, C., A. Ogbonna, A. Ezeoha, P. Oyibo, F. Onwe and B. Ngwu, 2007. The Nigeria health sector and human resource challenges. *Internet J. Health.*, 8(1): 1-8.
- UNICEF/WHO, 2012. Progress on Drinking Water and Sanitation: 2012 Update. UNICEF and World Health Organization. ISBN: 978-92-806-4632-0.
- UN-WOMEN, 2012. Facts and Figures. Retrieved from: <http://www.unwomen.org/en/news/in-focus/commission-on-the-status-of-women-2012/facts-and-figures> (Accessed on: July 30, 2014).
- USAID, 2010. NIGERIA Water and Sanitation Profile. Retrieved from: <http://www.washplus.org/sites/default/files/nigeria.pdf> (Accessed on: January 31, 2015).
- WHO, 2003. Domestic Water Quantity, Service, Level and Health. WHO Document Production Services, Geneva, Switzerland.