Analecta Technica Szegedinensia
Vol. 15, No. 2 ISSN 2064-7964 2021

SIGNIFICANCE OF CLEAN WATER FOR SUSTAINABLE GOOD HEALTH IN NIGERIA

[1]Ayokunle O. FAMILUSI, [2]Adebola A. ADEKUNLE, [3]Adedayo A. BADEJO, [4]Olayemi J. ADEOSUN, [5]Kasali A. MUJEDU, [6]Joel O. OLUSAMI, [7]Babatunde E. ADEWUMI, [8]Damilola A. OGUNDARE

[1,2,3]Department of Civil Engineering: Federal University of Agriculture, Abeokuta, Nigeria,
[4]Department of Agricultural and Bio-Resources Engineering: Federal University of Agriculture, Abeokuta, Nigeria,
[5,6,7,8]Department of Civil Engineering, Federal Polytechnic Ede, Nigeria
(Corresponding author's email: ayomacfamilson@gmail.com)

ABSTRACT

The significance of the impact of water-related diseases on human health has been recognized as a major threat to sustainable human development in some international forums. This study is an investigation into the correlation between unclean water and the outbreak of water-related diseases in Nigeria. It was established from the review of previous researches that the concept of clean water and sanitation is critical to the good health and well-being of all individuals. Nigeria still has a long way to go towards achieving the Sustainable Development Goal number 6 (SDG 6) of the United Nations, hence it is high time government at all levels and individuals embraced Water, Sanitation and Hygiene (WASH) agenda 2030.

Keywords: SDG, WASH, Water-Related Diseases, Well-Being

1. INTRODUCTION

Water is a foundational element of life and is vital to the wellbeing of families [1]. Water makes up more than two-thirds of the human body; in fact it is a vital component to every living organism in the world, especially the human species [2]. Unfortunately for many people in our world there is never enough water; especially clean water [1]. It is estimated that each person on earth requires 20 to 50 liters of clean safe water each and every day. This clean water is to be used for drinking, cooking, simple hygiene, etc. There are a number of different infectious agents detrimental to human health that grow in contaminated/unsanitary water which can cause a number of waterborne illnesses; such as cholera, hepatitis, typhoid, and diarrhea. Take for example, diarrheal diseases from cholera, this agent and illness is responsible for 1.8 million deaths worldwide. These deaths can be preventable with the proper knowledge, education, and infrastructure put in place. The importance of clean water is more often than not neglected in the developing world. Many people understand the importance of water; however these individuals tend to not completely understand the importance of that water being clean. The United Nations has labeled the access to clean water a basic human right [2]. In 2015, 750 million people lacked access to safe, clean drinking water and approximately 2,300 people die every day from diarrhoea. Water is not only an important factor of public health, but also of general livelihoods and development: crop production, livestock production, industry, commerce and daily life depend on access to water. Water-supply and sanitation conditions therefore directly affect health and food security and are key components in the fight against Hunger and Malnutrition (as cited in [3]). Having access to clean water is often neglected and not understood completely. It is crucial that attention is brought to this topic because of how many innocent people are dying every year. Initial goal needs to be implemented by government officials and policy makers to look out for those individuals that lack access to clean water [2]. Nigeria is a country in West Africa. It is the most populous country in Africa; geographically situated between the Sahel to the North, and the Gulf of Guinea to the South in the Atlantic Ocean; covering an area of 923,769 kilometres (574,003 mi), with a population of over 211 million. Nigeria borders Niger in the North, Chad in the North-East, Cameroon in the East, and Benin in the West. Nigeria is a federal republic comprising 36 states and the Federal Capital Territory, where the capital, Abuja, is located as shown in Figure 1. The largest city in Nigeria is Lagos, one of the largest metropolitan areas in the world and second largest in Africa [4]. The

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

aim of this study is to reiterate the significance of clean water for sustainable good health in the nation Nigeria.

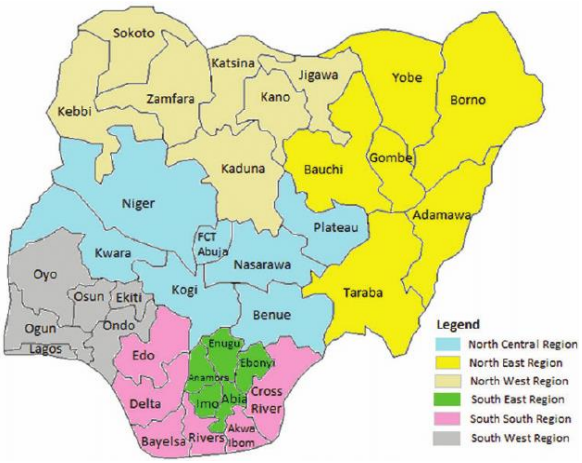

Figure 1: Map of Nigeria

2. METHODOLOGY

Several literatures were consulted and inferences were made from the works.

3. DISCUSSION

3.1. What Makes Water Unsafe?

Water is unsafe when it contains germs, worms, or toxic chemicals. Germs (tiny living things, too small to see, that cause many kinds of illness) and worms, such as whipworm, hookworm, and roundworm, cause many serious illnesses. Germs and worms live in human and animal waste (urine and faeces) and can cause serious and long-lasting illnesses when:

- there is no good way to get rid of human and animal wastes.
- water supplies are not protected and kept clean.
- there is no enough water to wash [5].

3.2 Water-Related Diseases

The Protocol on Water and Health defines "water-related disease" to mean "any significant adverse effects on human health, such as death, disability, illness or disorders, caused directly or indirectly by the condition, or changes in the quantity or quality, of any waters". "Drinking-water" means "water which is used, or intended to be available for use, by humans for drinking, cooking, food preparation, personal hygiene or similar purposes". Water-associated diseases are classified into five main groups:

- **Waterborne diseases** are caused by the ingestion of faecally contaminated water. Cholera and typhoid fever are classical examples of waterborne diseases, where only a few highly infectious pathogens are needed to cause severe diarrhoea. Shigellosis, hepatitis A, amoebic dysentery and other gastrointestinal diseases can also be waterborne. Examples include river blindness, guinea worm, and so on [6, 7].

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

- **Water-washed (water-hygiene) diseases** occur due to the lack of adequate water supply for washing, bathing and cleaning. Pathogens are transmitted from person to person or by contact with contaminated surfaces. Eye and skin infections as well as diarrhoeal illnesses occur under these circumstances. Waterborne pathogens include bacteria, viruses, protozoa and helminths [6, 7].
- **Water-scarce diseases** occur due to the lack of water available for washing, bathing and cleaning. Hence, pathogens are transmitted from person to person or from contaminated surfaces to a person and are spread by the faecal–oral route. In particular, eye (trachoma), yaw and skin infections (scabies), as well as diarrhoeal diseases occur under those conditions [6, 7].
- **Water-based diseases** are caused by organisms, in particular by different species of worms that spend parts of their life-cycle in different habitats. They have spent one development cycle in aquatic molluscs, and another as fully grown parasites in other animal or human hosts. Because stagnating surface waters, such as reservoirs, are the preferred habitat of parasitic worms, the occurrence of water-based diseases such as dracunculiasis and schistosomiasis can be heavily influenced by anthropogenic activities. Examples of water-based diseases also include kidney or liver diseases [6, 7].
- **Vector-borne diseases** are caused by bites from insects that breed in water. Insect vectors such as mosquitoes transmit diseases such as malaria, Chikungunya and other diseases [6].

3.3 Relationship between Unclean Water and Outbreak of Diseases in Nigeria

The findings from the work of [8] on the morbidity pattern of water-related diseases in some parts of Ibadan City point to the fact that Typhoid fever had the highest occurrence (39.3%) followed by bacillary dysentery and cholera. It was also found out that water sourced from rains and wells for domestic uses in different parts of the study area are not fit for drinking. Moreover, the application of potash alum for domestic water treatment especially, when visible contaminants are observed is quite inadequate as a method of treatment for water that has high coliform and bacteria load. It is therefore recommended, that potable water provision and water sanitation projects should be adopted as a veritable intervention option to solving health problems arising from water contamination rather than increased investment in drugs and building more hospitals. Again, effective and sustainable water treatment methods such as boiling, filtering, hygienic storing and handling, which can be managed at the household level, should be disseminated to households. On the other hand the ineffectiveness of alum application as a method of water treatment for drinking purposes should be discouraged. Agencies that oversee public hygiene and health issues in the urban centres should be empowered to provide and enforce management guidelines for private wells, while conducting routine assessment [8].

It was demonstrated in the survey by [9] with respect to the prevalence of water related diseases in all the local government areas (LGAs) of Benue State, Nigeria that malaria cases ranked the highest, followed by diarrhoea, dysentery, onchercias, filariasis, schistosomiasis, typhoid and cholera. The incidence of these water related diseases is reflection of the problems of water scarcity faced by the inhabitants living especially in rural areas. These people search for drinking water from all sorts of unprotected water sources. Consequently, they are exposed to all kinds of risks linked with drinking of polluted or unsafe water. Public education on personal hygiene, safe drinking water, and intervention by governments and non-governmental organization will go a long way in remedying the situation [9].

The work of [7] affirms that out of the top seven diseases that are most frequently reported in Ota Ogun State Nigeria, 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. 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 [7].

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

The research work of [10] explored the incidence of water-related neglected tropical diseases (NTDs) in rural Nigeria, using data from the demographic and health survey of 2008 for Nigeria. The study found incidence of occurrence of four water-related NTDs (river blindness, elephantiasis, Guinea Worm, Schistosomiasis) in rural Nigeria. These NTDs were highly correlated with low educational status of head of households as well as poverty. Also, in light of the above, the study found that lack of access to potable water supply and sanitation was correlated with the incidences of occurrence of four water-related NTDs in rural Nigeria. Recognising the importance of wholesome water is very important in developing appropriate interventions towards eliminating the NTDs. The study concludes that water-related NTDs in rural Nigeria thrive in the presence of inadequate access to potable water for household use [10].

3.4 Goal Number 6 of United Nations' SDGs - Clean Water and Sanitation

In 2015, the world leaders adopted the 2030 Agenda for Sustainable Development. The results' framework of the 2030 Agenda comprises 17 Sustainable Development Goals (SDGs). The SDGs are described in the 2030 Agenda as indivisible and integrated, balancing the economic, social and environmental dimensions of sustainable development [11]. Water is key to sustainable development. It supports industry, agriculture and ecosystems, and is essential for human life and livelihoods. Therefore, water will serve as a foundation for the achievement of many of the SDGs, including SDG 6, the dedicated water goal: 'To ensure availability and sustainable management of water and sanitation for all' [12]. Should the global population reach 9.6 billion by 2050, better management of water and sanitation is needed to sustain human wellbeing, while preserving the resilience of the ecosystem. Significant progress has been attained between 1990 and 2015, as the proportion of global population with access to improved drinking water sources has increased from 76 to 91 percent. Nevertheless, over 2.5 billion people still do not have access to basic sanitation facilities globally, and the access to water supply is unevenly distributed across the world.

Poor sanitation, combined with irregular water supply, hinders development and claims the lives of countless of people, especially those living in informal settlements, often also referred to as "slums" in urban areas. These challenges are likely to magnify in the future due to an ever growing city population needing to share already inadequate and often badly managed resources. Being the primary factor that increases water, air, soil and food contamination, lack of proper access to water in dense urban areas exponentially increases local pollution problems. In most countries, local governments are providers of water and sanitation facilities. In some, they serve as the supervisor of private provision. However, their responsibilities go beyond simple provision of clean water and sanitation services and include:

- Maintaining existing and designing new water supply systems with a long-term perspective and dealing with cross-cutting regional problems, such as industrial development or resource scarcity impact urban water supply.
- Supervising water quality and implementing regulations regarding pollution, discharge of waste water and spread of hazardous substances.
- Monitoring and ensuring that water resources are accessible and shared fairly.
- Setting incentives to the private sector for collecting, recycling, reuse, as well as desalination technologies for water (where water provision is privately owned).
- Supporting horizontal cooperation in planning and environmental policy between municipalities and regions across borders.
- Adapting to new challenges, such as European cities adapting to the demands that heavy rains pose to sanitation systems and infrastructural planning [13].

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

3.5 Vision and Objectives of WASH (2016-2030)

According to [14], the vision of United Nations International Children Emergency Fund (UNICEF) for Water, Sanitation and Hygiene (WASH) is the realization of the human rights to water and sanitation for all.

The WASH Strategy's objectives are:

1. To achieve universal and equitable access to safe and affordable drinking water for all by 2030;

2. To achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations by 2030.

These objectives align with the SDG 6 targets for drinking water, sanitation and hygiene and will contribute to the broader 2030 Agenda for Sustainable Development that is critical for children.

Why WASH

In 2010, the United Nations General Assembly explicitly recognized water and sanitation as human rights that are "essential for the full enjoyment of life and all human rights [14].

Water Pollution

Water pollution is a global challenge that has increased in both developed and developing countries, undermining economic growth as well as the physical and environmental health of billions of people [15]. The 2030 Agenda for Sustainable Development acknowledges the importance of water quality and includes a specific water quality target in Sustainable Development Goal (SDG) 6.2. The 2030 Agenda for Sustainable Development is expected to strongly influence future policies and strategies and to ensure that the control of water pollution is elevated in international and national priorities. Human settlements, industries and agriculture are the major sources of water pollution. Globally, 80 percent of municipal wastewater is discharged into water bodies untreated, and industry is responsible for dumping millions of tonnes of heavy metals, solvents, toxic sludge and other wastes into water bodies each year (as cited in [15]). Agriculture, which accounts for 70 percent of water abstractions worldwide, plays a major role in water pollution. Farms discharge large quantities of agrochemicals, organic matter, drug residues, sediments and saline drainage into water bodies. The resultant water pollution poses demonstrated risks to aquatic ecosystems, human health and productive activities (as cited in [15]). A typical source of water pollution in Nigeria is eutrophication, in which detergents, cow manure, agricultural fertiliser and other human wastes would be forced to go into the water bodies as shown in Figure 2. Eutrophication blocks sunlight from penetrating the water bodies, thus reducing oxygen and making them inhabitable.

Figure 2: Pollution of River Water Through Eutrophication

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

WASH and diarrhoea

Diarrhoea is simply referred to as the passage of three or more loose or liquid stools per day. However globally, diarrhoeal diseases are caused by infectious agents such as bacteria (e.g. E. coli, salmonella, shigella, campylobacter), viruses (e.g. rotaviruses, noroviruses and adenoviruses), and protozoa (e.g. cryptosporidium, amoeba and giardia). However, the aetiology of diarrhoeal diseases varies from region to region. Rotavirus is the main cause of severe and moderate diarrhoea. Only a small proportion of diarrhoea cases result from non-infectious conditions (such as intoxication or non-infectious inflammatory diseases). Diarrhoeal diseases are characteristically transmitted via the faecal-oral route. Poor WASH increases an individual's exposure to faecal pathogens through multiple pathways, as demonstrated in the 'F-diagram' shown below [16] in Figure 3. The figure outlines five major ways through which the susceptible can contract disease(s) from the host. The ways include flies, fields (soils), food, fluids (water) and fingers (hand).

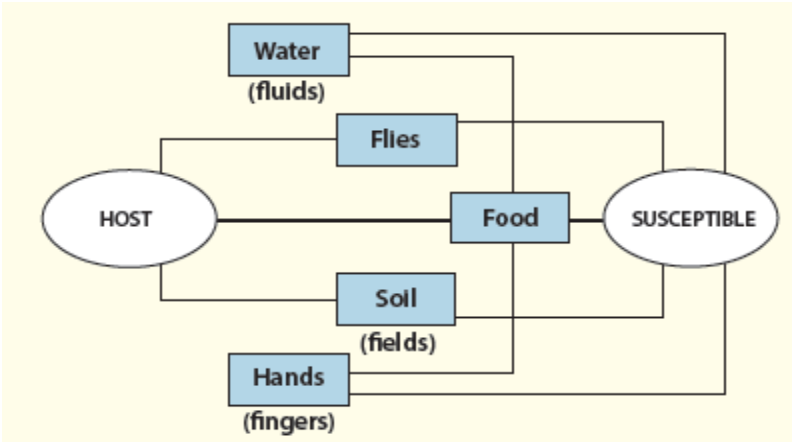

Figure 3: The F-diagram Detailing Individual's Exposure to Faecal Pathogens [16]

It has been estimated that in 2012, a total of 842,000 diarrhoea deaths were caused by inadequate WASH (502,000 from water, 280,000 from sanitation and 297,000 from hand hygiene). This represents over half of diarrhoeal diseases, or an estimated 1.5% of the total disease burden (as cited in [16]). There is little doubt, however, that improving access to adequate amounts of water from an adequately distanced source, hygienic sanitation facilities and promotion of handwashing with soap should be the cornerstones of integrated WASH campaigns (as cited in [16]). Sanitation and hygiene promotion are still the two most effective interventions for controlling endemic diarrhoea (as cited in [16]).

Cholera

With regard to cholera, although it is largely perceived to be a waterborne disease, person-to-person transmission, limited access to sanitation, an inadequate water supply and poor hygienic practices may contribute to the rapid progression of an epidemic. The WHO promotes safe drinking water, sanitation, personal hygiene, health education and food safety as specific control measures. Improved sources include piped water to the plot or household, public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, or rainwater. However, these provide varying degrees of safety, according to their differentiated ability to protect from outside contamination. For example, systematically managed piped water from an improved point source of water reduces diarrhoeal disease risk by an estimated 73%, while that same water source is likely only to provide a 28% reduction if treated at point of use and stored in the household [as cited in 16].

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

3.6 Achieving Clean Water, Sanitation and Hygiene for All in Nigeria

Access to water, sanitation and hygiene are human rights and crucial for good outcomes in health, nutrition, education, gender equality, livelihoods and for the socio-economic development of a country. A lack of access to these basic life-saving services impact virtually all aspects of human development, disproportionately affecting the life chances of women and girls. Goal 6 of the United Nations Sustainable Development Goals (SDGs) is focused on ensuring inclusive and equitable access to safe and affordable drinking water, sanitation and hygiene for all. However, in lower and middle-income countries like Nigeria, millions of people are without access to clean water and sanitation. According to the Water, Sanitation and Hygiene National Outcome Routine Mapping (WASHNorm) in 2018, about 55 million Nigerians still do not have access to clean water supply services, 110 million Nigerians lack decent toilets, and over 47 million practice open defecation [17].

Furthermore, some of the conflicts in the North-Central region have been attributed to poor access to water sources. Progress to address this water and sanitation crisis has been accelerated by the declaration of a State of Emergency by the Federal Government in November 2018 and the launch of a National Action Plan for the revitalisation of the sector. The Partnership for Expanded Water Supply, Sanitation and Hygiene (PEWASH), the Open Defecation Free Road Map and the Water Resources Bill all support this drive to ensure universal access for all by 2030 [17]. Delivering SDG 6 is a formidable challenge and can only be achieved by ensuring appropriate governance and coordination structures at all levels of government; improving access and finance data availability and transparency; addressing the problems relating to operations and maintenance (which currently undermine the sustainability of services); strengthening the enabling environment for the public and private sectors; and increasing civil society engagement to strengthen accountability for services and budgets. Additionally, flexible solutions need to be identified to tackle the problems within the sector in order to drive the needed reform [17].

4. CONCLUSION

Studies have shown that improving the microbiological quality of household water by on-site or point-of-use treatment and safe storage in improved vessels reduces diarrhoeal and other waterborne diseases in communities and households of developing and developed countries. Reductions in household diarrhoeal diseases of 6 – 90% have been observed, depending on the technology and the exposed population and local conditions [18]. It is also surprising that differences exist in some of the quality parameters of the water samples taken from the Clearwell of the waterworks and the ones taken from the public tap. These differences are attributable to inadequate sanitary measures in the vicinity of the Waterworks, Public tap and their appurtenances [19]. Over 30 million cases of water-related disease could be avoided globally each year through water and sanitation interventions (as cited in [20]). At current rates, Nigeria is off-track and still a long way from achieving the promise of SDG 6 and ensuring clean water and sanitation for all. The National Action Plan is an excellent opportunity to drive momentum towards universal access in Nigeria by 2030 [17]. With less than a decade to go before this crucial milestone, now is the time to mobilise the resources that are equal to the task. Prevention, they say is better than cure. Spending money on the treatment of water-related diseases is not as economical as putting in place adequate water infrastructure which will enable provision of clean water for all. Therefore, it is high time government at all levels and individuals embraced the WASH agenda.

REFERENCES

[1] World Vision, *The Dangers of Dirty Water, the Power of a Safe, Clean Well*, A Publication of World Vision Australia, Retrieved from: https://www.worldvision.com.au/global-issues/work-we-do/climate-change/dangers-of-dirty-water-power-of-a-safe-well 2021.

DOI: https://doi.org/10.14232/analecta.2021.2.1-8

[2] M. Khalifa, S. Bidaisee, The Importance of Clean Water, *Scholar Journal of Applied Sciences and Research, 1* (7), 2018, pp. 17-20.
[3] S. Gomathi, P. L. Theresa, S. J. Debora, WASH (Water, Sanitation and Hygiene*), International Journal of Trend in Scientific Research and Development (IJTSRD), 2* (1), 2017, pp. 575 -579.
[4] Wikipedia, *Nigeria*, A Publication of Wikimedia Foundation Inc., Retrieved from: https://en.wikipedia.org/wiki/Nigeria 2021.
[5] Hesperian, What Makes Water Unsafe? Hesperian Health Guides, Retrieved from: https://en.hesperian.org/hhg/A_Community_Guide_to_Environmental_Health:What_Makes_Water_Unsafe%3F 2020.
[6] F. Dangendorf, D. Schoenen, *Health Risks from Microbial Pathogens*, In: Technical guidance on waterrelated disease surveillance, Eds: E. Funari, T. Kistemann, S. Herbst and A. Rechenburg, A Publication of World Health Organisation, 2011.
[7] D. O. Omole, C. P. Emenike, I. T. Tenebe, A. O. Akinde, A. A. Badejo, An Assessment of Water Related Diseases in a Nigerian Community, *Research Journal of Applied Sciences, Engineering and Technology 10* (7), 2015, pp. 776-781.
[8] O. Oguntoke, O. J. Aboderin, A. M. Bankole, Association of Water-Borne Diseases Morbidity Pattern and Water Quality in Parts of Ibadan City, Nigeria, *Tanzania Journal of Health Research, 11 (4), 2009, pp. 189-194.*
[9] O. Maxwell, A, Oklo, A. Bernard, Profile of Water Related Diseases in Benue State, Nigeria, *American Journal of Human Ecology, 1 (3), 2012, pp. 87-94.*
[10] T. A. Adeyemo, B. T. Omonona, Estimating the Incidence of Water Related Diseases: the case of Neglected Tropical Diseases in Rural Nigeria. *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS), 10 (7), 2017, pp. 49-57,* DOI: 10.9790/2380-1007014957.
[11] United Nations, *Transforming our World: the 2030 Agenda for Sustainable Development*, NY, USA: https://sustainabledevelopment.un.org/post2015/transformingourworld 2015.
[12] L. Guppy, P. Uyttendaele, K. G. Villholth, V. Smakhtin, *Groundwater and Sustainable Development Goals: Analysis of Interlinkages*, UNU-INWEH Report Series, Issue 04, United Nations University Institute for Water, Environment and Health, Hamilton, Canada, 2018.
[13] V. Freyling, *The Importance of All SDGs for Cities*, ICLEI BRIEFING SHEET - Urban Issues, No. 04. 2015.
[14] UNICEF, *Strategy for Water, Sanitation and Hygiene 2016-2030,* A Publication of UNICEF, 2016.
[15] J. Mateo-Sagasta, S. M. Zadeh, H. Turral, *Water Pollution from Agriculture: A Global Review*, A Publication of Food and Agriculture Organization of the United Nations and International Water Management Institute, 2017
[16] J. E. Mills, O. Cumming, *The Impact of Water, Sanitation and Hygiene on Key Health and Social Outcomes:Review of Evidence*, A Publication of London School of Hygiene and Tropical Medicine and UNICEF, 2016.
[17] O. Oraka, *Achieving Clean Water, Sanitation and Hygiene for All in Nigeria*, A Publication of Wateraid. Retrieved from: https://www.wateraid.org/ng/blog/achieving-clean-water-sanitation-and-hygiene-for-all-in-nigeria 2020.
[18] T. Thompson, M. Sobsey, J. Bartram, Providing Clean Water, Keeping Water Clean: An Integrated Approach. *International Journal of Environmental Health Research, 13*, 2003, pp. S89 – S94.
[19] A. O. Familusi, B. E. Adewumi, *Quality-Comparison of Water Samples Collected at the Clearwell of the Waterworks with the Ones Running at the Tap*, A Paper Presented at the 6th National Conference on Sciences, Engineering and Environmental Technology Held at Ede Nigeria, 2011.
[20] M. Exner, *Introduction on Water Related Diseases*, In: Technical Guidance on Water-Related Disease Surveillance, Eds: E. Funari, T. Kistemann, S. Herbst and A. Rechenburg, A Publication of World Health Organisation, 2011.

DOI: https://doi.org/10.14232/analecta.2021.2.1-8