

# Sustainable Development Goal-Six (SDG-6) Water and Sanitation, Impact on Nigeria, Assessing the Intersection with Public Health and Globalization: A Systematic Literature Review

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## ABSTRACT

**Aim and scope:** The important developmental encounter in the low-income country such as Nigeria has created challenges to make available and sustain the management of safe water and adequate sanitation for the citizenry. The poor access to portable drinking water, and inadequate sanitation practices poses a huge problems in Nigeria predominantly the public health burden linked with the polluted water and its sources, and poor sanitation practices. In this systematic review, the nature and scale of water availability, contamination and transmission of water borne disease and their intersection with public health in Nigeria were explored. The review further evaluated the effectiveness of global community intervention in addressing the anomalies in relation to the Sustainable Development Goals Six (SDG 6)-water and sanitation, and issues hampering the progress in Nigeria towards the target date of 2030.

**Methods:** I searched through the MEDLINE database to select the research articles associated with water availability, water contamination, water quality, sanitation practices, waterborne disease transmission, water (i.e., WASH-Water Sanitation and Hygiene), public health, portable water and sustainability. An analysis of both observational and interventional studies was undertaken. For each study, content analysis was performed to identify the relevant terms such as portable water availability, WASH, disease transmission, public health related outcomes, and to the key deductions of the study.

**Results:** Strategic themes arising through the search included that about 66.3 million Nigerians lacks access to safe drinking water with no substantial progress in providing portable water for all in Nigeria. Despite various approach by government and other agencies in ensuring water quality and its safety, waterborne disease remains one of the significant public health challenges. Availability of water and the poor sanitation specifically among the rural dwellers are of great importance, being a vital factor in the spread of waterborne disease. The review revealed the common diseases associated with drinking water, and typhoid with the highest occurrence, others are cholera, dracunculiasis, hepatitis and Filariasis. Awareness, adequate funding, infrastructural development and interventions programme are recommended approach to reduce WASH and public health outcomes.

**Conclusions:** Significant water unavailability and poor sanitation practices cumulate as public health burdens, presenting solid evidence that shown water unavailability and sanitation intersecting with public health. Hence, addressing portable water availability and environmental sanitation has a potential of reducing public health diseases with significant impact on SDG achievement.

## INTRODUCTION

Water is essential for life, and for various applied purposes such as in drinking, agriculture, hygiene, sanitation and industrial purposes. As part of the effort to make our world a better place and ensure quality lives for human, the United Nations developed 17 Sustainable Development Goals (SDGs). The focus for this review is the goal number six of the SDGs which addresses the target on clean water, sanitation and its nexus with public health specifically environmental health through infectious disease, in a low-income countries like Nigeria (United Nations, 2020).

The reports by Joint Monitoring Program (JMP) which highlighted the inadequacy of clean water and sanitation in low income country like Nigeria with 35% lacking access to portable water such as treated water, and 65% unable to access basic sanitation facility such as toilet or latrine while 73% unable to access basic hygiene facility such as hand washing facility with soap and water (World Health Organisation, (2011b); United Nations Educational, Scientific and Cultural Organization, (2019b); Pouramin, Nagabhatla and Miletto, (2020). These statistics revealed absence of vital human development with consideration for the susceptible and sidelined populations. The sustainable development goal-six emphasized the importance of accessing clean water and adequate sanitation practices, it suggested frameworks and pointers towards sustainable Water, Sanitation and Hygiene (WASH), and equitable availability of water for all to address the insufficiency that is prevalent in the low-income country such as Nigeria, vis-à-vis vulnerable populations (United Nations Educational, Scientific and Cultural Organization, (2019a); Pouramin, Nagabhatla and Miletto, (2020).

The lack of improved portable water has made the rural dwellers and vulnerable population to resolve to rivers and streams as the main source for drinking and cooking, and consequentially confronted with environmental contamination from effluents or discharges from factories, sewage or abattoirs particularly downstream and other industrial waste channels; Likewise the urban settlement and major cities that predominantly rely on ground water source such as water from boreholes and deep wells as the common source of drinking water and for other utilities, this source are also contaminated through leachates from solid waste dumpsites, industrial discharges with enormous environmental health implication, all these remain a significant public health concern in Nigeria (Bello-Osagie and Omoruyi, (2012); Omole and Longe, (2008);Nwinyiet *al.*,(2020); Aboyeji and Eigbokhan, (2016); Ifelebuegu *et al.*,(2017). The need for exigent intervention cannot be over emphasized to avert the incessant water unavailability in Nigeria where substantial reports of waterborne diseases and infections are prevalent, and adding to public health burdens, diseases such as typhoid, cholera, diarrhea and others which occurs as a result of inadequate sanitation (Igbinoso and Aighewi, (2017); Coleman *et al.*,(2013). Studies revealed that about 66 million Nigerians both in the rural settlement and cities are unable to access supply of portable water for drinking, which has led to rise in the drinking of polluted and contaminated water with grievous and unfavorable public health effects (Beshiru *et al.*,(2018); World Health Organisation,(2015); Ologbushere *et al.*,(2016). It is therefore evidential of the magnitude of water and sanitation adverse impacts on public health, considering the lack of access to safe water, poor sanitation and hygiene practices, Ezehet *al.* (2014) in their research submitted that these factors are responsible for increase mortality and morbidity especially in children and also cumulate to poverty, decreased opportunity and other environmental health concern.

According to scholars in the field of environmental health, dermatology, epidemiology, and sanitation, public health risk interacts with human through the basic means of life such as water, food, air, land and others (Cairncross *et al.*, 2010), these implies that water and sanitation practices has inalienable relationship with public health incidences such as typhoid, cholera, malaria, diarrhea, river blindness, ascaris, bilhazias is and others, hence, the reduction or increase in public health diseases and other complication depends on water and sanitation practices by the population especially in the rural settlement, availability and optimal

utilization of safe water and sanitation facilities will impact on overall public health outcome (Enejiet *al.*, 2015).

## Scope

The scope of this review is to analyze the impact of water and sanitation (SDG-6) on Nigeria and its interconnection with public health and a specific area of public health practice with consideration of the magnitude and probability that the SDG-six target will be met by 2030.

## Research Question

This systematic review intends to interrogate the question, do availability and sustainable management of water and sanitation (SDG-six) impacts on the environmental health of the population in Nigeria? If so, what is the magnitude of this impact on the overall public health?

The use of PEO model was considered in developing the research question, the “P” in the acronym highlights the concern population which is a low-income country such as Nigeria, the “E” in the acronym stands for Exposure to a certain condition which is the availability and sustainability of clean water and sanitation in the question, while the “O” in the acronym stands for outcome expected from the exposure which is the environmental health impact and magnitude of the impact on public health.

## Aim(s) and objectives

To understand the impact, challenges and magnitude of clean water and sanitation on the environmental health of the population in Nigeria by surveying observation and intervention related to water and sanitation, and their implications on public health and the global community; Critically evaluate outcomes and theoretical positions in relation to global public health issues and to demonstrate the interaction and inter dependency of global and local public health issues, and roles of global communities.

## METHODS

### Study design

The systematic review was undertaken using a wide-ranging content analysis adapted from PRISMA flow diagram. The approach was for an examination which focused on salient points acknowledged by each research articles with respect to the clean water and sanitation-public health inter linkages and its impact on the populace in Nigeria.

For each of the paper, the entire population of Nigeria was considered and was further divided into two categories of the urban and rural settings. Clean water and sanitation were categorized with regards to possibility of addressing the water, sanitation, hygiene or sustainability. Public health outcome was categorized based on the disease, magnitude and the impact on the population. For each clean water and sanitation, and public health outcome relating to lack of clean water and sanitation accessibility, or public health were described.

### Search Strategy

The review considered a two-phase strategy in searching the literature for the documents. Phase one approach was to conduct a broad keyword search of the primary literature using the MEDLINE database. In phase two, a comprehensive content analysis was conducted to categorize relevant water and sanitation, and public health data information, all these were after the exclusion of the irrelevant papers in phase one.

To identify researches related to the water and sanitation-public health nexus, a single search approach was

first done to widely identify the concern articles. Afterwards, these articles were evaluated to ascertain whether a public health element was present. Summarily, criterion for selection was drawn and implemented to select the papers.

### Phase One: Search Strategy, Information and Data Aggregation

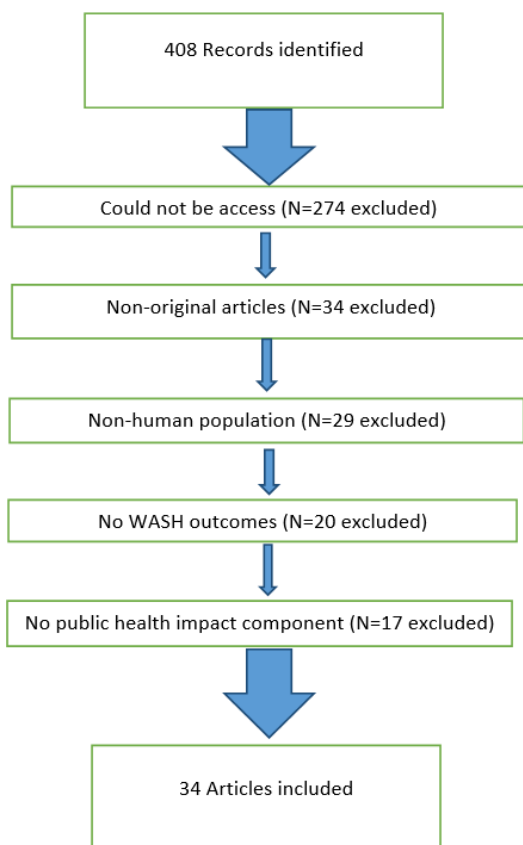
A systematic review of MEDLINE publications through PubMed was carried out. The review incorporated search terms around three categories which are water and sanitation, sustainability and public health. Each category has terms spanning numerous dimensions of that theme and adapted words were searched. In this occasion, the search terms for water and sanitation included; water sanitation and hygiene, WASH, safe water, sanitation, water availability, clean water, hygiene, water access, water security, water quality, drinking water, water collection, water management, fetching water, water fetching, water sources, and water source. Also, the search terms for sustainability included; SDG, sustainable development goal, sustainable, sustainable development goals, sustainable development, sustainability and SDGs. furthermore, the search terms for public health included; environmental health, public health, healthcare, health impact, community health, health effect and health implication.

### Inclusion and exclusion criteria

This review included clinical trials and observational studies as an inclusion criterion, it considered qualitative, quantitative, or mixed-methods templates; researches in English language; water, sanitation and hygiene outcome; clearly considered a public health outcome (i.e., environmental health, health impact and magnitude); studies within, or on Nigeria population. Also, international studies and interventions that includes Nigeria population.

The exclusion criteria comprise of studies not conducted in, or on Nigeria; non-humans concentrated; works that did not present primary data or analysis (i.e., systematic reviews, literature reports, commentaries).

### Flow chart of the methodological approach



## Phase Two: Criteria Based Analysis

This review considered the identified and chosen research paper one after the other, collecting data to describe the population, study design, health outcomes, and location, WASH outcome and the vital highlights. In the case of inter ventional studies, data that describes the intervention were scrutinized.

### Risk of Bias Assessment

The risk of bias in each study was assessed with the help of earlier authenticated version of the Cochrane risk of bias instrument (Aklet *al.*, 2012). Bias is evaluated with respect to the response options “Yes/No” to captions identified distinctly for cross-sectional, cohort and randomized control trials. Summarily, researches such as cross sectional studies with low bias necessitated the use of an acceptable sampling strategy such as random sampling, simple sampling, cluster sampling and others; also, the use of reported missing data; inclusion rate; the addition of related outcome events; and data collection method validation such as earlier validated approach and pilot testing.

In the same vein, researches such as cohort studies with minimal bias presented by evidence that cohort are drawn from, a collective fundamental population; the use of acceptable data gathering modalities for applicable outcomes, confounds and factors; the minimal variance in other confounding variables such as regression or matching; the baselines levels of the outcome of interest are reduced; the required aftermath strategy; the impact by differential exposure to ameliorating strategies.

Ultimately, randomized control trials with low bias guarantee the random distribution of events to the relevant treatment groups such as matched stratification and simple random stratification; conceal the randomization procedure; proper blinding of participants, data collector, outcome assessor, and data analyst; does not selectively withhold analyzed statistics; and ensure conduction of trial in statistically valid, sound and reliable approach.

## FINDINGS

### Synthesized Findings

#### Issues and effects from lack of access to safe water and sanitation in Nigeria.

Basically, the selected observational studies highlighted issues in accessing clean water and sanitation in Nigeria, they also explained that lack of access to safe water and sanitation adversely impacted on environmental health and quality of life in Nigeria (Enejiet *al.*, (2015);Aboyeji and Eigbokhan,(2016); Nwokoro *et al.*, 2020; Lukmanet *al.*,(2016). Studies which considered clean water and sanitation likewise revealed water analysis and assessment of drinking water sources and quality towards attaining the sustainable development goal six (Nwinyiet *al.*,(2020); Beshiruet *al.*,(2018);Igbinoso and Aighewi, (2017); Kumpelet *al.*,(2016); Ighalo and Adeniyi, (2020). Other studies that considered environmental effects, effluent discharge, physico chemical and hydro-biological profile of accessible water from industrial and commercial activities particularly in the urban setting (Ologbushereet *al.*,(2016); Ifelebueguet *al.*, (2017);Bello-Osagie and Omoruyi, (2012);Omole and Longe, (2008). Consequently, lack of access to cleanwater and sanitation at household and industrial level disproportionately impacts on the health of the peoplein Nigeria.

#### Poor access to water and sanitation, and its Impacts on public health in Nigeria.

There are significant evidence of intersection between WASH and public health with all the observational studies assessing waterborne diseases prevalence and other public health component in relation to WASH (Nwaboret *al.*,(2016); Yusuffet *al.*, (2014), few of the observational studies evaluated childhood health and

childhood infectious diseases, with concentration on under-five mortality, diseases such as intestinal parasites/schistosomiasis and child-stunting (Acheampong, Ejiofor and Salinas-Miranda, 2017), evidently, studies revealed that access to clean water by households significantly suppressed the risk of under-five mortality (Ezehet *al.*, (2014); Acheamponget *al.*, (2018), schistosomiasis (Atalabiet *al.*, (2016); Abdulkadiret *al.*, (2017), child stunting (Akombiet *al.*, (2017), and hookworm infections (Babamale and Ugbomoiko, (2016).

### **Water supply and sanitation problems, regulations and solutions in Nigeria**

Effects of implementing and enforcing stringent water regulation and providing adequate water supply are beneficial to Nigeria populace (Balogun and Redina, (2019); Lukman *et al.*, (2016). The challenges faced in public water supply and sanitation problems in most cities and developing countries are increasing population size (Odafivwotu, (2016); Sridhar and Ademola, (1985), poor operational efficiency of existing waterworks, leakages, low reticulation coverage and poor cost-recovery (Balogun, Sojobi and Galkaye, (2017); Oyebode, Adebayo and Oyegoke, (2015), impact of climate change (Odjugo, 2010), while the evidence on water crisis and its solution in Nigeria are important area to explore towards development of a healthy nation (Olalekanet *al.*, 2019).

### **SDG-six, health outcome, global health, public health practice and global community interconnection.**

The public health outcomes in Nigeria evidently has a vast influence on global health and governance (Chima and Homedes, 2015), and thus inspiring participation in the political process in Nigeria especially from female gender that are more affected by the outcomes (Kolawoleet *al.*, 2013), and the need for global community to scale-up efforts and facilitate interactions among SDG-six targets, global health initiatives, and Nigeria health systems through international agencies supervision, research, funding, advisory and programmes (Sambet *al.*, (2009); Nilsson, Griggs and Visbeck, (2016).

## **DISCUSSION**

### **Summary of the Main Findings**

This systematic review focused on water and sanitation related challenges faced by Nigerian populace and further established an obvious connection whereby lack of access to safe water and proper sanitation interconnects with environmental health and with adverse public health outcomes in Nigeria, thereby establishing the “water and sanitation- public health” nexus.

There are indications that shown that unhindered access to safe water in Nigeria are dependent on many factors such as the location (hydro logical area or geopolitical zone), duration of existence of the state and population (Lukmanet *al.*, 2016). in the same vein, other factors that are responsible for unhindered access to safe water towards actualization of the sustainable development goal-six that centers on “ensuring availability and sustainable management of water and sanitation for all by 2030” are institutional and governance constraints, poor water service delivery, gender inequality, weather and water-related risks (Kolawoleet *al.*, (2013); Nwinyietal., (2020); United Nations, (2021).

Poor water and sanitation, in general, was connected to a vast records of public health burdens in Nigeria, among the water related diseases recorded are typhoid, cholera, hepatitis and dracunculiasis (Yusuffet *al.*, 2014), and mostly childhood diseases, including under-5 mortality, schistosomiasis, and child-stunting (Atalabiet *al.*, (2016); Acheamponget *al.*, (2018); Akombiet *al.*, (2017); Acheampong, Ejiofor and Salinas-Miranda, (2017). Water and sanitation infrastructure and educational interventions collectively shown promises in reducing unavailability of safe water, poor sanitation and associated public health outcome

(Olalekanet al., (2019); Nwaboret al., (2016);Balogun, Sojobi and Galkaye, (2017); Balogun and Redina, (2019).

### **Strengths and Limitations of the Systematic Review**

This review generally put together qualitative investigation on water and sanitation (SDG-six) and its interconnection with public health in Nigeria. Whereas this presented an opportunity to have a wide-range perspective of the public health impact and extent of the water and sanitation deficiency in Nigeria. As well, studies with high bias were not excluded, this limits the generalizability of the findings. The review search strategy did not explicitly include keywords for health, this was a prevalence calculation as such, to supports wide inter linkages within the literatures between water, sanitation and public health in Nigeria, which may streamline the number of public health concentrated studies identified in Nigeria. On the other hand, the use of the MEDLINE database possibly includes a bias towards journal articles which reflect public health outcome. Hence, the findings should be viewed as an approach to improve the understanding of the water and sanitation-public health nexus, with special interest on specific area of public health practice. Lastly, the search method was restricted to English, hence, this is admitted as a limitation.

### **Nigeria health issues and public health practices influence on global health issues.**

The influence of healthcare issues and public health challenges in Nigeria on global health and globalization in general are enormous and requires the attention of the Nigeria government and the global community at large. The united nation universal values under principle number two termed “Leave No One Behind (LNOB)”, highlighted the commitment and central promise towards the 2030 agenda for Sustainable Development and its Sustainable Development Goals (SDGs), “It represents the unequivocal commitment of all UN Member States to eradicate poverty in all its forms, end discrimination and exclusion, and reduce the inequalities and vulnerabilities that leave people behind and undermine the potential of individuals and of humanity as a whole” (United Nations Sustainable Development Group, 2022). This commitment of “leave no one behind” has birthed several international interventions, programmes in public health and also led to the emergence of several Global Health Initiative (GHIs) in response to the public health menace caused by the lack of water and sanitation in Nigeria. These GIHs has brought concentration and massive resources to Nigeria public health sector thereby lightening the purse of the global health community, for example, about 85% of the spending on public health issues are usually international donor funded, although donor funding generally constitutes less than 10% of total health care expenditures in Nigeria (Sambet *al.*, (2009);Chima and Homedes, (2015).

### **Sustainable Development Goal-Six target date of 2030.**

The likelihood that the Sustainable Development Goal-six “Ensure availability and sustainable management of water and sanitation for all” will be met by the target date of 2030 is very low and uncertain considering that water and sanitation is a reflection of human development in Nigeria. As of year 2017, 40% of the Nigerian population (about 77 million people) had no access to improved sanitation, and almost 50% of those without access to improved sanitation practiced open defecation (Water Aid, 2019).As regards availability and sustainability of safe water, those with access to safely managed water grew from 15% to 20% from 2000 to 2017, leaving about 153 million people yet to have access in Nigeria (Water Aid, 2019). Furthermore, less than one-third of urban and rural dwellers have access to safe and piped water supply to their home (World Health Organisation,2014 b), for drinking, and these set of people in this category may possibly still experience poor, epileptic and unreliable water supply (Kumpelet *al.*, 2016).

In addition to households’ supply, there are also major challenges in order to deliver safe water and sanitation services to other facilities, hospitals and schools with only 15.7% that have access to safe water and sanitation facilities. Similar situation exist in public health facilities, where only 5.2% of healthcare

facilities having minimum and gender-sensitive resources, In addition to water and sanitation, no significant progress has been recorded on hygiene, with those having access to a hand washing facility including water and soap increasing only very marginally from 74.2% in 2011 to 74.5% in 2017, the Nigeria government realizing the enormous gap towards achieving the goal at the targeted date, consequently, declared a state of emergency on WASH in November 2018 (Water Aid, (2019); Clean Nigeria, (2019); Water Aid, (2018). Unfortunately, minimal or insignificant progress has been made till date due to the advent of the covid-19 pandemic that is ravaging the country and her dwindling resource.

Lastly, according to Odjugo (2010) the challenge posed by climate change in recent year has made the task to meet up with the target date of 2030 become even more daunting, as the emphasis on water quality and the crucial role of regulation has become even more relevant and inevitable.

### **Issues hampering access to safe water and sanitation in Nigeria towards SDGs target 2030.**

The government of Nigeria after strengthened its commitment towards achieving the SDG-six by 2030 by declaring state of emergency on water and sanitation in year 2018, they also launched a “National Action Plan (NAP), a 13-year strategy for the revitalization of Nigeria’s Water Supply, Sanitation, and Hygiene (WASH) sector aimed at ensuring universal access to sustainable and safely managed WASH services by 2030” (The World Bank, 2021).

However, in spite of all these efforts, the depth of the menace of public safe water supply coverage seems to be increasing and the facilities deteriorating making the provision of safe water in Nigeria more challenging, some of the key issues hampering the progress of meeting the 2030 targets of SDG-six in Nigeria are the inadequate water supply policy of government regulators; others are lack of autonomy for the various State Water Agencies (SWAs); lack of adequate funding of the sector; poor existing pipe distribution network; chronic corruption in the water sector; epileptic power supply to energize the equipment; inadequate infrastructure; poor investment in the sector; lack of maintenance culture and required human capital (Odafivwotu, (2016); The World Bank, (2021).

### **SDG-six and other SDGs influence on global health and public health practice.**

Critical reflection on the sustainable development goal-six and other 16 associated SDGs and their targets with consideration of their influence on global health and public health practices revealed an important effect, as global health is at the center of most of the agenda through the SDG-three, and is closely connected to several targets in other goals related to public health, equal access to healthcare and treatments, and non-communicable diseases, among others (Nilsson, Griggs and Visbeck, (2016);World Health Organisation,(2021).

Summarily, the SDGs coincidentally present a distinctive prospect to promote global and public health practice via an integrated approach to global public policies and interventions across different sectors in nations of the world, this fall in line with the Health in All Policies (HiAP) approach introduced by WHO, it advocates implementing public policies across relevant or all sectors of governance that systematically considered the public health implications of regulations, decisions taking, seeks synergies, and avoids harmful public health impacts in order to improve population health and health equity(World Health Organisation, 2014 a).

For example, the provision of quality education for girls (SDG, target 4.1) in southern Africa would improve maternal health (SDG, target 3.1); addressing child malnourishment (SDG, target 2.2) would impact greatly on child health (SDG, target 3.2); and tackling availability and access to safe water (SDG, target 6.1) or confronting ambient air pollution (SDG, target 11.6) will markedly have a direct impact on several SDGs 2030 targets. (Nilsson, Griggsand Visbeck, (2016);World Health Organisation, (2014a); The World Bank,



(2021);World Health Organisation, (2021).

### **Recommendations to address the issues hampering SDG – six progress in Nigeria by local and global community towards SDGs 2030 target.**

Measures to address the identified issues hampering the progress of 2030 target of SDG –six in Nigeria, are to improve the maintenance, operation and sustainability of the state wide water authorities where state government will be autonomous and completely responsible for the provision safe water for the people of her respective state, such approach includes the scheduling of routine preventive and swift corrective maintenance such as leak detection and repairs among others; other recommendations are, increased funding by government, and donations from both local and international community through suitable infrastructural investment, confronting corruption and the legislation of true autonomy to the state water authorities in tariff management, workforce recruitment and discipline, and improvement of power supply to the various state water authorities in Nigeria. These approaches could place public water sector and her services on a sustainable track which will leads to reduction in health burden from waterborne diseases in Nigeria towards achieving the SDG-six.

The global community through various international agencies can also better address and support the government of Nigeria through technology and technical know-how to strengthen the knowledge and innovation in the implementation of the SDG-six targets, Other areas of contribution in this regards is through advisory role to the government, local agencies, local administrations, political parties, and private companies on how they can contribute immensely to the full implementation of the SDG- six towards achieving the 2030 target in Nigeria(Nilsson, Griggs and Vis beck, (2016);World Health Organisation, (2014 a); The World Bank, (2021);World Health Organisation, (2021).

One of the important approaches by the global community to address issues on ground is through international funding and grants, for example, the World Bank and other development partners recently supported the government of Nigeria in order to develop initiatives intended to address the already listed gaps which have restricted Nigerians from free access to safe drinking water. One of the many initiatives rolled out was the National Urban Water Sector Reform Program (NUWSRP) (The World Bank, 2021).

Another of this approach from the global community through prominent international organization is the plan for the world bank group to continue its support to the government of Nigeria through the Nigeria Sustainable Urban and Rural Water Supply, Sanitation And Hygiene (SURWASH) programme, with funds of about US\$700 Million which has activities designed to enact necessary policy reforms and enhance the capacity of institutions required for effective and sustainable service delivery. The SURWASH program is projected to provide 6 million Nigerians with basic drinking water services, support 1.4 million in accessing improved sanitation services, develop improved WASH services in 2,000 schools and health care facilities, and assist 500 communities, this programme will support an integrated investments to expand access to and increase the use of WASH services in urban and rural areas, and small towns. This includes the development of priority infrastructure to improve water supply service delivery and WASH infrastructure in institutions (schools and healthcare facilities) and public places such as markets and motor parks (The World Bank, 2022).

Ultimately, global community through international agencies such as WHO, UNICEF and others should partner to support government of Nigeria efforts to achieve SDG-six through setting guidelines and other global norms and standards; providing technical support to implement giving guidelines; analysing social and economic factors; highlighting the broader risks and opportunities for health; research and disseminating of data and information to plan and track progress.

## CONCLUSION

The lack of access to portable and safe drinking water and adequate sanitation is a huge challenge confronting low-income country like Nigeria, especially the health burden associated with polluted water and its sources. The review analyzed the impact of water and sanitation (SDG-6) on Nigeria and its interconnection with public health and a specific area of public health practice. Waterborne and infectious disease such as typhoid, cholera, hepatitis, dysentery and others remain part of the major public and environmental health concerns. The lack of access to pipe-borne water and usage of surface water by the rural dwellers cumulated to the increasing prevalence of these waterborne diseases, also, inadequate sanitation and poor hygienic practices undoubtedly contributed to the spread of waterborne diseases. The study established the influence of Nigeria health issues and public health practices on global health, and in the same vein, reflected and concluded that sustainable development goal-six and other 16 associated SDGs has an enormous influence on global health and public health practices.

Summarily, there are strong intersection between water and sanitation, and public health outcome in Nigeria and the level of commitment in meeting the sustainable development goal number-six “to ensure availability and sustainable management of water and sanitation for all” target of 2030 was evaluated and became clear that no significant progress has been made towards achieving the target in Nigeria. Factors hampering the progress of the SDG-six were highlighted and recommendations suggested, including the role of global community in addressing the identified issues on the way of SDG-six actualization in Nigeria

## REFERENCE

1. Abdulkadir, A. et al. (2017) ‘Prevalence of urinary schistosomiasis in Nigeria,1994–2015’, *African Journal of Urology*, 23(1), pp. 228–239.
2. Aboyeji, O. and Eigbokhan, S. (2016) ‘Evaluations of groundwater contamination by leachates around Olusosun open dumpsite in Lagos metropolis, southwest Nigeria’, *Journal of Environmental Management*, 183(1), pp. 333-341.
3. Acheampong, M. et al. (2018) ‘Bridging the under-five mortality gap for Africa in the era of sustainable development goals: an ordinary least squares (OLS) analysis’, *Ann. Glob. Heal*, 84(1), pp. 110–120. doi: 10.29024/aogh.9.
4. Acheampong, M., Ejiofor, C. and Salinas-Miranda, A. (2017) ‘An analysis of determinants of under-5 mortality across countries: defining priorities to achieve targets in sustainable developmental goals’, *Maternal Child Health Journal*, 21(1), pp.1428–1447.doi: 10.1007/s10995-017-2260-9.
5. Akl, E. et al. (2012) ‘Specific instructions for estimating unclearly reported blinding status in randomized trials were reliable and valid’, *J. Clin. Epidemiol*, 65(1), pp. 262–267. doi: 10.1016/j.jclinepi.2011.04.015.
6. Akombi, B. et al. (2017) ‘Stunting and severe stunting among children under-5 years in Nigeria: a multilevel analysis’, *BMC Pediatr*, 17(15), pp. 1-16. doi: 10.1186/s12887-016-0770-z.
7. Atalabi, T. E., Lawal, U. and Ipinlaye, S. (2016) ‘Prevalence and intensity of genito-urinary schistosomiasis and associated risk factors among junior high school students in two local government areas around Zobe Dam in Katsina State, Nigeria’, *Parasite & Vectors*, 9(1), pp. 388. doi: 10.1186/s13071-016-1672-5.
8. Babamale, O. and Ugbomoiko, U. (2016) ‘Hookworm infection: A severe health problem in periurban community of North central, Nigeria’, *Tropical Biomedicine*, 33(1), pp. 8-13.
9. Balogun, I., Sojobi, A. and Galkaye, E. (2017) ‘Public water supply in Lagos State, Nigeria: Review of importance and challenges, status and concerns and pragmatic solutions’, *Cogent Engineering*, 4(1), pp. 1-21. doi:10.1080/23311916.2017.1329776.
10. Balogun, O. and Redina, M. (2019) ‘Water supply regulation in Nigeria: problems, challenges, solutions and benefits’, *RUDN Journal of Ecology and Life Safety*, 27(1), pp. 65-81.

- doi:10.22363/2313-2310-2019-27-1-65-81.
11. Bello-Osagie, O. and Omoruyi, I. (2012) 'Effects of brewery effluents on the bacteriological and physiochemical properties of Ikpoba- River, Nigeria', *Journal of Applied Technology in Environmental Sanitation*, 2(1), pp. 197-204.
  12. Beshiru, A. et al. (2018) 'Assessment of water quality of rivers that serve as water sources for drinking and domestic functions in rural and pre-urban communities in Edo North, Nigeria', *Environmental Monitoring and Assessment*, 190(1), pp. 387-398.
  13. Cairncross, S. et al. (2010) 'Water, sanitation and hygiene for the prevention of diarrhoea', *International Journal of Epidemiology*, 39(1), pp. 193-205.
  14. Chima, C. and Homedes, N. (2015) 'Impact of global health governance on country health systems: The case of HIV initiatives in Nigeria', *Journal of Global Health*, 5(1), pp. 1-13. doi:10.7189/jogh.05.010407.
  15. Clean Nigeria (2019) Summary of findings of wash norm. Available at: [https://www.cleannigeria.ng/wp-content/uploads/2019/03/SUMMARY-OF-FINDINGS-WASH-NORM\\_SURVEY\\_PL2\\_0119.pdf](https://www.cleannigeria.ng/wp-content/uploads/2019/03/SUMMARY-OF-FINDINGS-WASH-NORM_SURVEY_PL2_0119.pdf) (Accessed: 28 January 2022).
  16. Coleman, B. et al. (2013) 'Contamination of Canadian private drinking water sources with antimicrobial resistant *Escherichia coli*', *Water Research*, 47(1), pp. 3026–3036.
  17. Eneji, C. et al. (2015) 'Water, Sanitation and Hygiene (WASH) in community disease control in Cross River State, Nigeria', *International Journal of Environmental Science and Toxicology Research*, 3(1), pp. 2408-7262.
  18. Ezeh, O. et al. (2014) 'The impact of water and sanitation on childhood mortality in Nigeria: evidence from demographic and health surveys, 2003-2013', *International journal of environmental research and public health*, 11(9), pp. pp. 1-17. doi:10.3390/ijerph110909256.
  19. Ifelebuegu, A. et al. (2017) 'Environmental effects of crude oil spill on the physicochemical and hydrobiological characteristics of the Nun River, Niger Delta', *Environmental Monitoring and Assessment*, 189(1), pp. 173-184.
  20. Igbinsola, I. and Aighewi, I. (2017) 'Quality assessment and public health status of harvested rainwater in a peri-urban community in Edo State of Nigeria', *Environmental Monitoring and Assessment*, 189(8), pp. 405-413.
  21. Ighalo, J. and Adeniyi, A. (2020) 'A comprehensive review of water quality monitoring and assessment in Nigeria', *Chemosphere*, 260(1), doi:10.1016/j.chemosphere.2020.127569.
  22. Kolawole, O. et al. (2013) 'Women participation in the political process in Nigeria', *Centre point Journal(Humanities Edition)*, 2(15), pp. 17-31.
  23. Kumpel, E. et al. (2016) 'Urban water services in fragile states: an analysis of drinking water sources and quality in Port Harcourt, Nigeria, and Monrovia, Liberia', *The American Journal of Tropical Medicine and Hygiene*, 95(1), pp. 229–238.
  24. Lukman, et al. (2016) 'Effect of selected factors on water supply and access to safe water in Nigeria', *Ife Journal of Science*, 8(3), pp. 623-638.
  25. Nilsson, M., Griggs, D. and Visbeck, M. (2016) 'Policy: map the interactions between sustainable development goals', *Nature*, 534 (1),320–322. doi:10.1038/534320a.
  26. Nwabor, et al. (2016) 'Water and waterborne diseases: A Review' *International Journal of Tropical Disease & Health*, 12(4), pp. 1-14. doi:10.9734/IJTDH/2016/21895.
  27. Nwinyi, O. (2020) 'Review of drinking water quality in Nigeria: towards attaining the sustainable development goal six, *Annals of Science and Technology*', 5(1), pp. 58 – 77.
  28. Nwokoro, U. et al.(2020)'Water, sanitation and hygiene risk factors associated with diarrhoea morbidity in a rural community of Enugu, South East Nigeria',*The Pan African medical journal*, 37(115), pp. 1-12. doi:10.11604/pamj.2020.37.115.17735.
  29. Odafivwotu, O. (2016) 'Challenges of public water provision in Nigerian cities: a review', *Journal of Water, Sanitation and Hygiene for Development*, 6(1), pp. 1–12. doi:10.2166/washdev.2016.07.
  30. Odjugo, P. (2010)'The impact of climate change on water resources: global and Nigerian analysis', *FUTY Journal of the Environment*, 4(1),pp. 59-77. doi:10.4314/fje.v4i1.48005.

31. Olalekan, R. et al. (2019) ‘Digging deeper’ evidence on water crisis and its solution in Nigeria for Bayelsa state: a study of current scenario’, *International Journal Hydro*, 3(4), pp. 244-257. doi: 10.15406/ijh.2019.03.00187
32. Ologbushere, O. et al. (2016) ‘Physico-chemical and microbiological profile of bacterial and fungal isolates of Ikpoba River in Benin City: Public health implications’, *African Journal of Environmental Science and Technology*, 10(3), pp. 67–76.
33. Omole, D. and Longe, E. (2008) ‘An assessment of the impact of abattoir effluents on river illo, Ota, Nigeria’, *Journal of Environmental Science and Technology*, 1(2), pp. 56-64.
34. Oyebode, O., Adebayo, V. and Oyegoke, S. (2015) ‘Water and development challenges in Nigeria’, *International Journal of Scientific & Engineering Research*, 6(8), pp.1145-1160.
35. Pouramin, P., Nagabhatla, N. and Miletto, M. (2020) ‘A Systematic Review of Water and Gender Interlinkages: Assessing the Intersection with Health’, *Front Water*, 2(6), pp.1-25. doi:10.3389/frwa.2020.00006.
36. Samb, B. et al. (2009) ‘World health organization maximizing positive synergies collaborative group, an assessment of interactions between global health initiatives and country health systems’, *Lancet*, 373(1), pp. 2137-69. doi:10.1016/S0140-6736(09)60919-3.
37. The World Bank (2021) Nigeria: Ensuring Water, Sanitation and Hygiene for All. Available at: <https://www.worldbank.org/en/news/feature/2021/05/26/nigeria-ensuring-water-sanitation-and-hygiene-forall#:~:text=In%202019%2C%20a%20combination%20of,access%20to%20basic%20drinking%20water> (Accessed: 28 January 2022).
38. The World Bank (2022) Nigeria Sustainable Urban and Rural Water Supply, Sanitation and Hygiene Program-for-Results. Available at: <https://projects.worldbank.org/en/projects-operations/project-detail/P170734> (Accessed: 28 January 2022).
39. United Nations (2020) Sustainable Development Goals. Available at: <http://www.undp.org> (Accessed: 28 January 2022).
40. United Nations (2021) Ensure availability and sustainable management of water and sanitation for all. Available at: <https://unstats.un.org/sdgs/report/2021/goal-06/> (Accessed: 28 January 2022).
41. United Nations Educational, Scientific and Cultural Organization (2019a) World Water Assessment Programme, The United Nations World Water Development Report 2019: Leaving No One Behind. Paris: UNESCO.
42. United Nations Educational, Scientific and Cultural Organization (2019 b) Toolkit on Sex-disaggregated Water Data. Available at: <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/water-and-gender/methodology-indicators-and-toolkit/> (Accessed: 28 January 2022).
43. United Nations Sustainable Development Group (2022) Leave No One Behind. Available at: <https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind> (Accessed: 28 January 2022).
44. Water Aid (2018) Nigerian Government action plan on water and sanitation crisis. Available at: <https://www.wateraid.org/uk/media/wateraid-welcomes-nigerian-government-action-plan-on-water-and-sanitation-crisis> (Accessed: 28 January 2022).
45. Water Aid (2019) Equal to the task: financing for a state of emergency in Nigeria’s water, sanitation and hygiene sector. Available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/equal-to-the-task-financing-for-a-state-of-emergency-in-nigerias-water-sanitation-and-hygiene-sector.pdf> (Accessed: 28 January 2022).
46. World Health Organisation (2011 a) Taking Sex and Gender Into Account in Emerging Infectious Disease Programmes: An Analytical Framework. Available at: <http://iris.wpro.who.int/handle/10665.1/7977> (Accessed: 28 January 2022).
47. World Health Organisation (2011 b) Guidelines for drinking water quality. 4 thedn. Geneva: World Health Organization press.
48. World Health Organisation (2013) Water Sanitation Health. Available at: <https://www.who.int/water-sanitation-health/monitoring/jmp-fast-facts/en/> (Accessed: 28 January 2022).

49. World Health Organisation (2014 a) What you need to know about Health in All Policies. Available at: <https://www.who.int/social-determinants/publications/health-policies-manual/key-messages-en.pdf> (Accessed: 28 January 2022).
50. World Health Organisation (2021) Health in the SDG Era. Available at: <https://www.who.int/topics/sustainable-development-goals/test/sdg-banner.jpg> (Accessed: 28 January 2022).
51. World Health Organization (2014 b) Progress on Drinking Water and Sanitation. 2014 Update. Geneva, Switzerland: World Health Organization press.
52. World Health Organization (2015) Progress on drinking water and sanitation. 2012 update. Geneva, Switzerland: World Health Organization press.
53. Yusuff, S. et al. (2014) 'Review on Prevalence of Waterborne Diseases in Nigeria', Journal of Advancement in Medical and Life Sciences', 2(1), pp. 1-3.