A Research Proposal to Address the Gap in Knowledge Affiliated to the Sustainable Development Goal Number Six (SDG-6) Interconnection with Public Health and to Proffer Strategy for Dissemination and Implementation of Findings to Improve Public Health Practice in Nigeria.

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ABSTRACT

Background: This research proposal focuses on water, sanitation, and hygiene (WASH) as crucial elements in preventive healthcare. The high prevalence of poor hygiene and sanitation practices in Nigeria, highlighted by its status as the world's open defecation capital, poses significant risks, especially in low-income settings. The research involves a mixed-method approach, including qualitative analysis of existing literature and quantitative data collection through surveys. The ethical considerations include obtaining informed consent from participants. The ultimate goal is to contribute to improving public health outcomesby addressing WASH-related challenges in Nigeria.

Aims: The lack of access to safe water, hygiene and sanitation is a huge concern to public health practices as the insufficient access to safe water, hygiene, and sanitation poses a significant challenge to public health practices, particularly in low-income countries like Nigeria, contributing to environmental health risks and infectious diseases. This study aims to critically appraise the knowledge gaps in the area of SDGs number six (WASH) connection with public health outcomes and to put forward a strategic plans for dissemination of findings vis-a-vis implementation to improve public health practices in Nigeria.

Methods: The research propose a mixed-method approach, combining qualitative and quantitative methods. Qualitative data collection involves in-depth analysis of existing articles, write-ups, ethnography, observations, interviews, documents, and open-ended questionnaires to explore knowledge gaps in SDG-6 and its link to public health practices, especially environmental health and infectious diseases in Nigeria. Qualitative document analysis is proposed to delve into specific topics, themes, and issues. Quantitative data collection will includes surveys and observations in the study area, gathering numerical information represented in tables, graphs, and models. The sample size comprises 120 individuals using a stratified sampling technique. Data analysis will involves Microsoft Excel for interview analysis, incorporating frequencies, pie charts, bar graphs, and percentages. Ethical considerations include informed consent and approvals from the National Health Research Ethics Committee, Nigeria.

Expected Findings: In addition to government and other agencies roles in ensuring safe water, hygiene and sanitation; individuals, private sector and academic institutions at schools, home, religious centers and other public settings also has a responsibility for a clean and hygiene practices as considerable number of people that are unaware of ideal and appropriate way such that meet the standard for safety and hygiene, with Government ignorantly focusing largely on water element and not considering other components of WASH behind. There are needs to monitor pattern, improvement or decline of provision of WASH services and

ensuring the appropriate use of the facilities.

Conclusions: The research findings would be disseminated through the internet and social media, others are one-one meetings, policy briefs, seminars and workshop for public health practitioners, and news media. All these medium will be in addition to the conventional research dissemination approaches such as books, articles and journal publication.

INTRODUCTION

The three identified interdependent foundation and elements of preventive health are Water, sanitation, and hygiene-WASH (Wada *et al,* 2022), and these elements are vital in public healthcare sector with deep insight into the environmental health through infectious disease in a low-income countries like Nigeria. As reported, the high prevalence of poor hygiene and sanitation practices are alarming and evidenced from the country's recent prominence as the world's open defecation capital (Idowu, 2019). The availability of portable water implies the well designed and better quality water source that is free from contamination, while basic sanitation and hygiene services depicts improved sanitary facilities such as sex-classified toilet facilities, functional hand wash stations, running water and others in these categories, they are considered basic human necessity for well-being and survival of human kind without which millions of people will be adversely exposed to environmental health and infectious diseases with children at high risk in low income country like Nigeria (Fatunmibi, 2022; World Health Organization / United Nations International Children's Fund, 2018; International Water Association, 2011; Yaya *et al.,* 2018).

Reports has shown that about 2.3 billion and 844 million people across the globe do not have access to portable water and sanitation facilities respectively leading to about 842,000 deaths every year which unquestionably is a major public health concern (World Health Organization, 2017a; World Health Organization, 2017b). It is pertinent to note that water, sanitation and hygiene are concurrently a means of preventing infectious diseases and same time means of contracting these diseases, hence, the management of these elements are important in the area of public health practices given the projected total 9% of the global burden of disease can be averted through development of sustainable WASH infrastructures (Prüss-Ustün *et al.,* 2019; World Health Organization, 2011a; World Health Organization, 2011b; Yaya *et al.,* 2018).

Non availability of sustainable and functional basic water infrastructure has plunder the rural dwellers and other vulnerable populations in the urban settlement to depend on the rivers and other untreated source of water for drinking and cooking thereby exposing them to environmental contamination from sewage discharges, and effluents from factories with grievous environmental health effect leading to waterborne and infectious diseases such as typhoid, dirahhea, cholera, and public health complexities in Nigeria (Fatunmibi, 2022; Bello-Osagie and Omoruyi, 2012; Omole and Longe, 2008; Nwinyi *et al.,* 2020; Aboyeji and Eigbokhan, 2016; Ifelebuegu *et al.,* 2017; Igbinosa and Aighewi, 2017). The interaction of the public health risk with human in the form of basic means of life such as water, air, food, land and others has further established the inalienable relationship of WASH with public health outcomes especially in the area of environmental and infectious disease, therefore whichever of the direction of the WASH availability and sustainability, it will definitely have an impact on overall public health outcomes of the population in a low income country such as Nigeria (Eneji *et al.,* 2015).

Scope of the research proposal

The scope of this research proposal is to analyze and address the knowledge gap highlighted as regards the number six of the SDGs that hinge on clean water, sanitation and its interconnection with public health practices specifically environmental health through infectious disease in a low-income countries like Nigeria, this proposal will also proffer strategy for dissemination and implementation of findings to improve public health practices (Fatunmibi, 2022). And also for the attention of the Nigeria's administration in order

to have a framework for executing key policies that reevaluate the availability of clean water and proper sanitation to guarantee the implementation of SDG number six (Shehu and Nazim, 2022).

LITERATURE REVIEW

The challenges and aftermath of non-availability of safe water and sanitation has been explored in previously reviewed observational studies which revealed a huge adverse impact on quality of life, environmental health and public health practices in Nigeria (Fatunmibi, 2022; Eneji *et al.,* 2015; Aboyeji and Eigbokhan, 2016; Nwokoro *et al.*, 2020; Lukman *et al.*, 2016). Actualizing the water element of the sustainable development goal six calls for numerous analysis of the component of water such as having water chemical analysis, assessment of drinking water sources, environmental effects, effluent discharge, physicochemical and hydro-biological profile of accessible water from commercial and industrial activities which consequently and disproportionately impacts on the public health of Nigerians (Fatunmibi, 2022; Ologbushere *et al.,* 2016; Ifelebuegu *et al.,* 2017; Nwinyi *et al.,* 2020; Beshiru *et al.,* 2018; Igbinosa and Aighewi, 2017; Ighalo and Adeniyi, 2020).

The waterborne diseases prevalence and other public health component in relation to WASH as evidential in the childhood health infectious diseases showing concentration of age under-five mortality, diseases such as intestinal parasites/schistosomiasis, child-stunting and hookworm infections further established the intersection WASH And public health outcomes especially in the area of environmental and infectious disease (Fatunmibi, 2022; Nwabor *et al.,* 2016; Yusuff *et al.,* 2014; Ezeh *et al.,* 2014; Acheampong *et al.,* 2018; Atalabi *et al.,* 2016; Abdulkadir *et al.,* 2017). Importantly, one of the key challenges in actualizing safe water and sanitation in Nigeria is regulations and infrastructural decadence where the obsolete infrastructure cannot cater for the ever increasing population in the city and the rural area yet to witness any of these WASH infrastructure cumulating to adverse public health outcomes and by implication influencing the global community health and governance (Fatunmibi, 2022; Balogun and Redina, 2019; Lukman *et al.*, 2016; Odafivwotu, 2016; Chima and Homedes, 2015).

The rationale for this proposal is to address the knowledge gaps identified in the previous study having evaluated the achievements, challenges and the opportunities toward actualizing the sustainable development goal six in Nigeria by 2030 and beyond, as it stands now with about eight years left to 2030, the government of Nigeria is yet to clearly address the public health concerns as it relates to environmental and infectious disease through closing the identified gaps of safe water, hygiene and sanitation as shown in the released report 'Nigeria's 2020 Voluntary National Review (VNR) on SDGs', inferences from this report revealed that the development and funding priorities of the Federal Government of Nigeria did not sufficiently demonstrate priorities to WASH services and other associated targets that can achieve clean water, hygiene and sanitation with respect to SDG-6 (Office of the Second Special Adviser to the President on Sustainable development Goals, 2020; Ogbodo *et al.,* 2021).

Water as an elementary necessity for life is not safely available for human consumption and the limited available are contaminated from its sources leading to several environmental health illnesses, infectious diseases and untimely death, this condition is alarming in Nigeria due to financial constraint and lack of infrastructural development across the country (Fatunmibi, 2022). Similarly, there was a suggestion for a National Development Plan between 2021 and 2030 that would be central and strategic in achieving the SDGs in Nigeria, unfortunately realizable WASH-related targets are yet to be prioritized, hence, the neglects of the SDG-6 will further compound the environmental related SDGs due to effects of the ravaging covid-19 pandemic and actualization of goals 2030 may be mirage, it is therefore important to develop and disseminate a proposal to address the gap that between policy-making and implementation of WASH with public health outcomes in area of environmental health and infectious disease in Nigeria (Office of the Second Special Adviser to the President on Sustainable development Goals, 2020; Ogbodo *et al.,* 2021).

The advent of COVID-19 has strengthened the importance of sufficient and clean water, sanitation and appropriate hygiene practices in addressing the WASH related disease but the alarming increase of diarrheal morbidity and mortality in Nigeria, having about 70,000 death in children of age under five each year has been reported to be from poor WASH services (Akombi *et al.,* 2017; Babamale and Ugbomoiko, 2016). But beyond governmental policies, regulations and actions, there are more expected from individuals to back the government's efforts in order to advance the achievement of the SDGs on safe water, hygiene and sanitation, these are appropriate hand washing, good toilet usage and cleaning, individuals observing these with discipline in their personal capacity would prevent quite number of health crisis, reduces cost for projects development and therefore boost the economy.

UNICEF reported that about 94 percent of Nigerians do not wash their hands properly, while lack of access to water has becomes a major hitch to fulfilling hand washing precautions, report says that those with access to adequate water are equally guilty (United Nations International Children's Fund, 2021). Asides from government roles, the responsibility of a clean and hygiene toilet rests on individuals at home, schools, church and every other public place where government policy does not directly interfere, and just like hand washing, it is on record that many who have access to a toilet facility do not know the proper and ideal way to clean the toilet, such that meet the standard for safety and hygiene, this knowledge gap alone has cost Nigeria up to 455 billion Naira and 70 million Nigerians live in pitiable sanitary conditions (Water Aid, 2021).

Bridging the knowledge gaps in clean water, sanitation and hygiene practices calls for government at all levels to complement policies and initiatives with constant enlightenment on safe practices to facilitate the attainment of SDG six, as it is not enough to drive an initiatives when the a larger percentage of the beneficiaries are unaware of the right actions, hence, dissemination of research findings and knowledge gaps to the concern audience is of great importance to improve public health practices in Nigeria. Similarly, the call for behavioral change in public health practices is advice as a result of observation of gaps between knowledge and attitude in sanitation and hygiene management, this advocacy can be achieved through proper hygiene and sanitation promotional messages and also intensifying WASH promotion strategies to enable it become a social norm in the society (Fatunmibi, 2022).

Furthermore, the organized private sector and academic institutions needs to make available their platforms to promote safe hygiene messages and support WASH interventions in underserved communities, while we need to speed up to meet the target of 2030 and leave no one behind, it is imperative that we shift quickly from policy drafting to full practices and action, access to WASH services is necessary but not the only step, the reason that necessitated this research proposal is to address that gaps in knowledge highlighted in the review of the WASH and relationship with environmental and infectious disease in Nigeria, in order to discuss, analyze and proffer workable findings for implementation to improve the public health practices in Nigeria (Fatunmibi, 2022).,

AIMS, RESEARCH OBJECTIVES AND RESEARCH QUESTIONS

Aims of the research

The aim of this research proposal is to identify and critically appraise the knowledge gaps in the area of WASH leading to environmental health and infectious disease burden in order to articulate a workable strategy, dissemination of findings and implementation of plans to improve public health practices, also, the research tends to analyses the water, hygiene and sanitation factors and its effects on public health practices in a low income country such as Nigeria.

Research Objectives

1. To critically analyze and disseminate research knowledge gaps and findings to the appropriate audience for implementation in order to improve public health practices.
2. To improve the awareness of and the public health practices related to WASH services by the public in order to break the waterborne disease chain, sanitation and hygiene complexities in Nigeria.
3. To review, analyze and develop on the economic and socio-political effects and causes of sustainable development goal number six, safe water, hygiene and sanitation in Nigeria and its impact on public health practices.

Research Questions

1. How do government policies and regulations impact access to water, hygiene, and sanitation?
2. How does the lack of access to clean water and sanitation facilities affect the economy in Nigeria?
3. What is the economic cost of waterborne diseases and poor sanitation practices?
4. Are there specific social inequalities or power dynamics that affect access to water and sanitation?
5. What economic factors, such as poverty or lack of infrastructure investment, contribute to water and sanitation challenges?
6. How do economic policies and priorities impact the availability and quality of water and sanitationservices?
7. What are the role of public health practices in curbing the environmental health and infectiousdiseases arising from of lack of safe water, sanitation and good hygiene?
8. How can the knowledge gap and research findings be effectively disseminated to the targetedaudience for implementation to improve public health practices?

METHODOLOGY AND METHODS

Study Design

The study design to be used will be mixed method approach through integration of available data, in-depth knowledge, and better understanding will be guaranteed through this method. According to Food Risc(2016) a mixed method approach is “a methodology for conducting research that involves collecting, analyzing and integrating quantitative (e.g., experiments, surveys) and qualitative (e.g., focus groups, interviews) research”. Using the qualitative approach, the method will analyze the existing articles and write ups on the knowledge gap that exist in the SDG-6 water, sanitation and hygiene and the connection with the public health practices particularly with environmental health and infectious diseases in Nigeria, other qualitative approach methods to be used are participants ethnography, observation, interviews, documents and open-ended questionnaires. Also this study will include qualitative document analysis. “In QDA, researchers analyse document content, analyzing the meaning and implications of text, which distinguishesit from quantitative word analysis” (Le Gouais and Wach, 2013, p. 441). Le Gouais and Wach (2013, p.442) further explained qualitative document analysis to be a careful and detailed method to evaluate particular topics in themes and issues. While in the use of quantitative approach, the method will tends to gather information as regards the study area through generalized surveys and observations, numerical data collected will be represented into numbers and displayed in tables, graphs and models. According to Food Risc (2016) “when little is known about a topic and it is necessary to first learn about what variables tostudy through qualitative research, and then study those variables with a large sample of individuals using quantitative research” . Hence the importance of this mixed method in order to consolidate limited information available on the research topic.

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Sample Size

The population of Nigeria stands at 200 million with over 70% of Nigerian living in the rural areas, the study area shall be a rural area within the Federal Capital Territory of Nigeria having about 776,298 population. The population of target are the residents in the informal area of the Federal Capital Territory of Nigeria. These set of people make up the low-income earners with regards to the average wage. The sample size will comprise 6 clusters from 6 diverse study areas within the casual area that comprise of 20 individuals totaling 120 individuals as the sample size. The focus will be individuals with age range of 20-50 years old who has functional household responsibilities. This study will aim to use a probability sampling method, "Probability sampling means that every member of the population has a chance of being selected" (McCombes, 2019). It is a system of random selection to collect data and the types available are cluster sampling, simple random sampling, stratified sampling and systematic sampling, this study will use the technique of stratified sampling, dividing the population into strata based on features such as income and age, after which data will be collected (Johnson and Ifeoma, 2018; Denisha, 2020).

Data Collection

This research propose data collection approach in the form of first-hand primary observation, an approach that will help to observe the day to day activities in the study area and the distribution of the WASH facilities. Also, collection of data will be with regards to number of households that have access to safe water, sanitation and hygiene and otherwise. For primary data collection, first-hand observations, questionnaires and interviews will be used for easy access to the individuals living in the study area. In gathering of information, questionnaires with open and closed ended question will be deployed. Each household's heads will be presented with set of questions to answer and the interview will be randomly carried out among the individual and groups. Secondary data that has already been collected and evaluated will also be considered and various sources will be cross checked and analyzed in order to ensure the data are accurate and without error, also, Literature review as a source of qualitative data for collecting secondary data which will include journals, articles and dissertations about the research and integrating them with the first hand observations (Denisha, 2020).

Data Analysis

According to Jena (2012) data analysis is the base on which the entire study will rely upon, it is the most vital aspect of any research paper after data collection. During the analyses of the literature review, summary of the data collected and gaps identified between information and text will be integrated, also, there will be evaluation and comparison of global and local information collected, this will afford an opportunity for new findings addition to the existing data, therefore improving the development of the topic on hand for researchers use in the future, Microsoft excel will be used for the interview analysis, using appropriate categories and headings, data will be stored in a data model and will possibly be represented as frequencies in pie chart or bar graphs for precise visualization and also in percentages (Denisha, 2020).

The researcher's experiences will be put into context as part of observation analysis, from these analyses, conclusions about the knowledge gaps in WASH services and the nexus with environmental health and infectious disease as it relates to public health practices in Nigeria will be drawn.

Ethical considerations

Health volunteers will explain the purpose and the objective of the study using the information sheet, and an informed consent sheet will be distributed. Written permission for involvement in the study will be gotten from participants after verbal clarification of the study. Ethical approvals will be obtained from the National Health Research Ethics Committee, Nigeria.

DISCUSSION

Safe water, hygiene and sanitation goes hand in hand and it also includes the controlling of animal and solid waste. According to world health organization (2020) "the provision of facilities and services for the safe management of human excreta from the toilet to containment and storage and treatment onsite or conveyance, treatment and eventual safe end use or disposal" (World Health Organization, 2020). The provision of adequate and sustainable WASH services are admitted as vital to ensure desirable public health outcomes especially during childbirth, hence, efforts and strategies are being launch both global and at national levels to evaluates and consider WASH services across facilities for policies and strategies integration (Campbell, 2015; Mrisho *et al.*, 2008).

Public health facilities such as primary health centers and birth homes are reported operating under poor WASH condition and not meeting up with minimum standards for environmental health condition set by WHO specifically as it relates to safe water, sanitation and hygiene facilities (World Health Organization, 2008; Arowosegbe *et al.*, 2021). There is worrisome non availability and unreliable water supply with vast of the population having no access to improved water sources, no adherence to standard protocols on healthcare waste disposal and decontamination, serviceable hand washing facilities not available in public healthcare facilities such as birth homes (Arowosegbe *et al*., 2021).

Study conducted for assessment of 242 public health facilities revealed that 22 % had no toilet facility, 7.85 % have no form of water source and 54.9 % were hand washing facilities available at the assessed primary health centre, another study shown poor hand hygiene as a barrier to safe delivering in the public healthcare facilities (Buxton *et al*., 2019; Arowosegbe *et al*., 2021). Unfortunately, insignificant progress is being recorded in improving these conditions in Nigeria, while findings from the research are anticipated to limited resource and lack of access in low-income settings such as Nigeria, attention and strategies should be geared towards seeking to improve newborn, maternal health and primary health care center at community level (Arowosegbe *et al*., 2021).

The Nigeria government has launch many programmes, national plans and approaches that hinges on WASH development strategies to make available WASH services for the population, unfortunately, little or no significant progress has been recorded as many of these strategies and programme were futile in translating into actionable plans (United States Agency for International Development, 2014). Furthermore, the focus of Nigeria Government was largely on water and leaving other components of WASH behind, it is important to close the gaps between WASH strategies with its attendant environmental health issues in the public healthcare sectors, the federal ministry of water resources and state water boards as the leading governmental organization responsible for the WASH related services at national and state levels should live up to expectations as WASH services has direct impact on public healthcare practices (Arowosegbe *et al.*, 2021).

Public health practices play a pivotal role in mitigating the environmental health risks and infectious diseases stemming from the absence of safe water, inadequate sanitation, and poor hygiene (World Health Organization, 2020). Achieving Sustainable Development Goal 6 (SDG-6), which focuses on Water, Sanitation, and Hygiene (WASH), is critical for ensuring a healthier and more sustainable future (United Nations, 2015). Public health interventions contribute significantly to environmental health by implementing measures to ensure access to safe water. Proper water quality monitoring, pollution control, and the establishment of safe water sources are integral components of effective public health strategies (Bartram & Cairncross, 2010).

The practice of good hygiene, including hand washing and proper sanitation facilities, is fundamental in preventing the spread of infectious diseases (Cairncross *et al.*, 2010). Public health initiatives promote

behavioral changes and education to enhance hygiene practices, thereby reducing the incidence of waterborne and sanitation-related diseases (Prüss-Ustün *et al.,* 2014).

Public health agencies and professionals play a critical role in designing and implementing policies that address the root causes of inadequate water, sanitation, and hygiene. This includes developing infrastructure, promoting community awareness, and fostering sustainable practices (World Health Organization, 2019). Public health practices are indispensable in addressing the environmental health challenges and infectious diseases associated with the lack of safe water, sanitation, and hygiene. Achieving SDG-6 requires a concerted effort from the public health sector to implement effective strategies that safeguard both the environment and public health.

The knowledge gap discovered with regards to household WASH circumstance is unquestionably a plus to the public health practices as many of the informal settings child birth takes place in the home environment, development of sustainable WASH services in communities will directly impact these births, as safe and infection free childbirths can be guaranteed in an environment with improved water, sanitation and hygiene services are in place, otherwise, all efforts on WASH that is centered solely on public health facilities will be rendered unproductive by gaps inherent in the community (Benova, Cumming, and Campbell, 2014; Arowosegbe *et al.,* 2021).

The impact of Sustainable Development Goal-six WASH and the intersection with the public health practices needs to be continuously monitored to track the pattern, improvement or decline, provision of WASH services are not all that is needed but additional efforts to ensure the appropriate and correct use of the facilities such as compliance assessment, orientation, awareness, trainings and others (Buxton *et al*., 2019; Arowosegbe *et al*., 2021).

The findings from the proposed research will be disseminated and made available through various means in order to improve public health practice, approaches such as social media, issue or policy briefs, news media, one-one meetings, publishing on internet, workshop and seminars, all these of course will be in addition to the conventional research dissemination practices which are through books, articles and journal publications.

According to Brownson *et al.* (2018) "Dissemination is the targeted distribution of information and intervention materials to a specific public health or clinical practice audience". It is an intentional approach to share and spread knowledge, information and the related evidence-based interventions to stakeholders to improve the public health practices (Lomas, 1993; National Institutes of Health, 2007). The news media which is the traditional medium, having the radio, newspapers and television as an important channel for getting to the policy makers and healthcare practitioners, this media tends to sets the agenda and strategically frames the public health issues by emphasizing particular headlines or topics that are newsworthy within the specified period of time (Nelson, Hesse and Croyle, 2009; Brownson *et al.,* 2018; Lancaster *et al.,* 2011).

Also, through the use of internet and social media platform. There were 109.2 million internet users in Nigeria, with the internet penetration rate standing at 51.0 percent of the total population at the start of 2022, similarly, there were about 32.90 million social media users in Nigeria and there is little or no difference in the use of social media as regards education level, income, and race/ethnicity, sex, or community type as the number of social media users was equivalent to 15.4 percent of the total population, but it's important to note that social media users may not represent unique individuals (Data Reporter, 2022). Researchers and publishers of articles are beginning to identify the prospect of the social media for disseminating research knowledge and discoveries to the public, stakeholders and policy makers for improvement of public health practices (Nature Publishing Group, 2017; Tunnecliff *et al.,* 2015).

According to study by Tunnecliff et al. (2015) about 15% of health researchers was discovered using social media tools for research dissemination. In 2016 alone, Of the 100 most-covered journal articles on social

media, health researches were area of discussion more than any other science topic., twitter was reported as the most active platform of the social media for disseminating popular articles with over 1000 tweets per article, others are facebook, online news stories and blogs and this means of research dissemination has shown significant and positive correlation through increase downloads and eventual citations (Hitlin, 2016; Allen, *et al.,* 2013; Eysenbach, 2011; Tunnecliff *et al*., 2015).

Furthermore, issue or policy briefs will also be used to disseminate the research finding to improve public health practices, a brief is a summary of research information in an abbreviated format, usually enhanced with charts, tables, infographics, or some kind of data visualization that is targeted toward a specific audience and desired action (Ottoson *et al.,* 2009; Stamatakis, McBride and Brownson, 2010). Visual parameter such as charts, tables or graphs to present data to heighten understanding and interpretation particularly data visualization approaches such as infographics to present data in an accessible and interesting format to public health practitioners, stakeholders and policy makers to make a well informed decision-taking as regards WASH services in Nigeria (Kwon and Nelson, 2016).

Another important and effective means for dissemination is one-on-one meetings particularly with policy makers such as the politicians and elective office holders to communicate ideas, findings and the knowledge gaps to improve public health practices as elected officials tends to remember individual meetings and give utmost reflection on issues discuss during this meeting especially in the electioneering year or election season when they seek peoples votes and support. These officials are not easily accessible, however, the strategy is to develop a positive, cordial and working relationship with the office staff, they have a way of influencing and shaping the activities of the elected officials (Brownson *et al.*, 2018).

Finally, the research will be disseminated through seminars and workshops particularly targeting the public health professionals. One of the vital avenues for public health practitioners to learn about new research and have updated information on the new practices is through workshop, short courses, seminars and webinars. Studies have shown that foremost method of teaching healthcare professional about new ideas, knowledge, practices and new research is through workshop and seminars taking in various format from week-long in person training to short webinars (Fields *et al.,* 2015; Brownson *et al*., 2018).

CONCLUSION

Water, sanitation and hygiene is an important elements and vital in public healthcare sector and as highlighted in the SDGs number six, the impact on low income countries such as Nigeria cannot be over emphasized with alarming prevalence of environmental health issues and infectious disease especially mortality and morbidity in children, the interaction of human with public health risk in the form of water, air, food, land and others established the inalienable relationship of WASH with public health outcomes. The scope, aims and objectives of this proposal is to analyze and address the knowledge gap presented in the SDGs-six and its interconnection with public health practices specifically environmental health and infectious disease, and ultimately devising strategy for dissemination and implementation of plans to improve public health practices.

Mixed method approach and probability sampling method will be used for this research with average of 120 participant as the sample size, while Microsoft excel will be used for the interview analysis. The research findings would be disseminated in order to improve public health practice through various medium and approaches, one of them is the news media such as the radio, newspapers and television. Another means is through the internet and social media platform which is gaining more attention of researchers and publishers with increasing evidence of social media user such as twitter, facebook, online news stories and blogs. Researchers and publishers of articles are beginning to identify the prospect of the social media for disseminating research knowledge and discoveries to the public. In addition, the use of issue or policy briefs in the form of charts, tables, infographics, or some kind of data visualization. Another effective means to

disseminate the research is one-on-one meetings with politicians and elective office holders to communicate ideas, findings and the knowledge gap and finally through seminars and workshops targeting the public health professionals, all mentioned approaches are in addition to the conventional research dissemination practices which are through books, articles and journal publication.

REFERENCES

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. 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.
5. Allen, H.G. *et al.* (2013) 'Social media release increases dissemination of original articles in the clinical pain sciences', *PLoS One*, 8(7), pp. 68-91.
6. Arowosegbe, A. O. *et al*. (2021) 'Water, sanitation, and hygiene (WASH) facilities and infection control/prevention practices in traditional birth homes in Southwest Nigeria', *BMC health services research,* 21(1), pp. 1-12. doi:10.1186/s12913-021-06911-5.
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, 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.
10. Bartram, J. and Cairncross, S. (2010) 'Hygiene, sanitation, and water: Forgotten foundations of health', *PLoS Medicine*, 7(11), e1000367.
11. Benova, L., Cumming, O. and Campbell, O.M. (2014) 'Systematic review and meta-analysis: association between water and sanitation environment and maternal mortality', *Trop Med Int Health,* 19(4), pp. 368–387. doi: 10.1111/tmi.12275.
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. Brownson, R. C. *et al*. (2018) 'Getting the Word Out: New Approaches for Disseminating Public Health Science', *Journal of public health management and practice,* 24(2), pp. 102–111. doi:10.1097/PHH.0000000000000673.
14. Buxton, H. *et al.* (2019) 'Hygiene during childbirth: an observational study to understand infection risk in healthcare facilities in Kogi and Ebonyi states, Nigeria', *Int J Environ Res Public Health,* 16(7).
15. Cairncross, S. *et al.* (2010) 'Water, sanitation and hygiene for the prevention of diarrhoea', *International Journal of Epidemiology*, 39(1), i193-i205.
16. Campbell, O.M. *et al*. (2015) 'Getting the basic rights – the role of water, sanitation and hygiene in

maternal and reproductive health: a conceptual framework', *Trop Med Int Health*, 20(3), pp. 252–267. doi: 10.1111/tmi.12439.

17. 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.
18. Data Reporter (2022) *Digital 2022: Nigeria*. Available at: https://datareportal.com/reports/digital-2022nigeria#:~:text=There%20were%2032.90%20million%20social%20media%20users%20in%20igeria%20in%20January%202022. (Accessed: 27 April 2022).
19. Denisha, P. (2020) 'Rural water and Sanitation in Shallcross: A growing issue', *Research proposal for the degree of Bachelor of Social Sciences: Geography and Environmental management At the University of Kwa-Zulu Natal: Howard*, pp. 1-21.
20. 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.
21. Eysenbach, G. (2011) 'Can tweets predict citations? Metrics of social impact based on Twitter and correlation with traditional metrics of scientific impact', *J Med Internet Res*, 13(4), pp. 123.
22. 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.
23. Fatunmibi, I. (2022) 'Sustainable Development Goal-Six (SDG-6) water and sanitation, impact on Nigeria, assessing the intersection with public health and globalization: a systematic literature review', *UPGPBHM08 (Research Project 1: Global Health)*, pp. 1-27.
24. Fields, R. *et al.* (2015) 'Importance of scientific resources among local public health practitioners', *Am J Public Health*, 105(2), pp. 288–294.
25. Food Risc (2016) *Mixed methods research*. Available at: http://resourcecentre.foodrisc.org/mixed-methods-research_185.html. (Accessed: 27 April 2022).
26. Hitlin, P. (2016) *Health issues topped the list of scientific studies reaching wide audiences in 2016.* Available at: http://www.pewresearch.org/fact-tank/2016/12/28/health-issues-topped-the-list-of-scientific-studies-reaching-wide-audiences-in-2016/. (Accessed: 27 April 2022).
27. Idowu, G. (2019) *Nigeria as open defecation capital of the world.* Available at: https://punchng.com/nigeria-as-open-defecation-capital-of-the-world/ (Accessed: 27 April 2022).
28. 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.
29. Igbinosa, 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.
30. 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.
31. International Water Association (2011) *Promotion of Tap Water Drinking and Public Relation Practices in Water Utilities Water Safety Plans*. 6th edn. Beijing, China: IWA-JWWA.
32. Jacob, R. *et al.* (2017) 'Learning about and using research evidence among public health practitioners', *Am J Prev Med*, 52(3), pp. 304–308.
33. Jena, J. (2012) *How important is data analysis in a research paper.* Available at: https://www.projectguru.in/important-data-analysis-research/ (Accessed: 27 April 2022).
34. Johnson, K. E. and Ifeoma, U. (2018) 'Rural development as a panacea for rural–urban migration in Nigeria', *Art Human Open Acc J*, 2(5), pp. 241-244. doi:10.15406/ahoaj.2018.02.00065.
35. Kwon, H. and Nelson, D. (2016) 'Communicating research to help influence policy and practice', in Eyler, A. et al. (eds) Prevention, Policy, and Public Health. New York, NY: Oxford University Press, pp. 303–327.
36. Lancaster, K. *et al.* (2011) 'Illicit drugs and the media: models of media effects for use in drug policy

research', *Drug Alcohol Rev*., 30(4), pp. 397–402.
37. Le Gouais, A. and Wach, E. (2013) 'A qualitative analysis of rural water sector policy documents', *Water Alternatives,* 6(3), pp. 439-461.
38. Lomas, J. (1993) 'Diffusion, dissemination, and implementation: who should do what?', *Ann N Y Acad Sci,* 703(226), pp. 35-37.
39. 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.
40. McCombes, M. (2019) *Understanding different sampling methods.* Available at: https://www.scribbr.com/methodology/sampling-methods/. (Accessed: 27 April 2022).
41. Mrisho, M. *et al.* (2008) 'Understanding home-based neonatal care practice in rural southern Tanzania', *Trans R Soc Trop Med Hygiene,* 102(7), pp. 669–678. doi: 10.1016/j.trstmh.2008.04.029.
42. National Institutes of Health (2007) *Building the science of dissemination and implementation in the Service of public health.* Available at: www.obssr.od.nih.gov/di2007/about.html. (Accessed: 27 April 2022).
43. Nature Publishing Group (2017) *Article level metrics on nature.* Available at: http://www.nature.com/press_releases/article-metrics.html. (Accessed: 27 April 2022).
44. Nelson, D., Hesse, B. and Croyle, R. (2009) *Making data talk communicating public health data to the public, policy makers, and the press*. New York, NY: Oxford University Press.
45. 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.
46. 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.
47. 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.
48. 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.
49. Office of the Second Special Adviser to the President on Sustainable development Goals (2020) *Nigeria's 2020 Voluntary National Review (VNR) on Sustainable Development Goals (SDGs).* Available at: https://sustainabledevel opment.un.org/content/documents/2630 8VNR 2020 Nigeria Report.pdf (Accessed: 27 April 2022).
50. Ogbodo, J. A. *et al.* (2021) 'Analyzing the progress, pitfalls and prospects for attaining environmental-related sustainable development goals in Nigeria', *Animal Research International,* 18(1), pp. 10-15. doi:10-20210506.pdf.
51. 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.
52. Ottoson, J.M. *et al*. (2009) 'Policy-contribution assessment and field-building analysis of the Robert Wood Johnson Foundation's Active Living Research Program', *Am J Prev Med,* 36(2), pp. 34–43.
53. Prüss-Ustün, A. *et al.* (2014). 'Burden of disease from inadequate water, sanitation and hygiene in low- and middle-income settings: a retrospective analysis of data from 145 countries', *Tropical Medicine & International Health,* 19(8), pp. 894-905.
54. Prüss-Ustün, A. *et al.* (2019) 'Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes: an updated analysis with a focus on low- and middle-income countries', *International Journal of Hygiene and Environmental Health,* 222(5), pp. 765–777.
55. Shehu, B. and Nazim, F. (2022) 'Clean Water and Sanitation for All: Study on SDGs 6.1 and 6.2 Targets with State Policies and Interventions in Nigeria', *Environmental Sciences Proceedings,* 15(1), pp. 1-2. doi:10.3390/environsciproc2022015071.
56. Stamatakis, K., McBride, T. and Brownson, R. (2010) 'Communicating prevention messages to policy makers: the role of stories in promoting physical activity', *J Phys Act Health,* 7(1), pp. 100-107.

57. Tunnecliff, J. *et al.* (2015) 'The acceptability among health researchers and clinicians of social media to translate research evidence to clinical practice: mixed-methods survey and interview study', *J Med Internet Res*, 17(5), pp. 1- 19.
58. United Nations (2015) *Transforming our World: The 2030 Agenda for Sustainable Development*. Available at: https://sustainabledevelopment.un.org/post2015/transformingourworld (Accessed: 08 December 2022).
59. United Nations International Children's Fund (2021) *For every child.* Available at: https://www.unicef.org/nigeria/press-releases/global-handwashing-day-unicef-warns-3-5-nigerians-do-not-have-basic-handwashing (Accessed: 27 April 2022).
60. United States Agency for International Development (2014) *USAID water and development country plan for Nigeria*. Available at: https://www.globalwaters.org/sites/default/files/Nigeria%20Country%20Plan%20final.pdf (Accessed: 27 April 2022).
61. Wada, O.Z. *et al.* (2022) 'School water, sanitation, and hygiene inequalities: a bane of sustainable development goal six in Nigeria', *Can J Public Health*, pp. 1-14. doi:10.17269/s41997-022-00633-9.
62. Water Aid (2021) *Clean Nigeria campaign*. Available at: https://www.wateraid.org/ng/get-involved/clean-nigeria-campaign (Accessed: 27 April 2022).
63. World Health Organization (2008) *Essential environmental health standards in health care*. Geneva: WHO.
64. World Health Organization (2011a) '*Valuing water, valuing livelihoods'*, in Jagals, P. *et al.* (eds). London, UK: IWA Publishing.
65. World Health Organization (2011b) *Water safety plans: risk-based preventive management of drinking-water supplies.* 3rd edn. Cape Town, South Africa: WHO.
66. World Health Organization (2017a) *Water, sanitation and hygiene: transforming the regional agenda towards equitable access to safe and sustainable services*. Copenhagen, Denmark:World Health Organization.
67. World Health Organization (2017b) *Progress on Drinking Water, Sanitation and Hygiene—2017 Update and SDG Baselines.* Geneva, Switzerland:WHO Library Cataloguing-in-Publication Data.
68. World Health Organization (2020) *Sanitation.* Available at: https://www.who.int/topics/sanitation/en/. (Accessed: 27 April 2022).
69. World Health Organization / United Nations International Children's Fund (2018) *Core questions and indicators for monitoring WASH in Schools in the Sustainable Development Goals*. Available at: https://washdata.org/report/jmp-core-questions-monitoring-wash-schools-2018 (Accessed: 27 April 2022).
70. Yaya, S. *et al.* (2018) 'Improving water, sanitation and hygiene practices, and housing quality to prevent diarrhea among under-five children in Nigeria', *Tropical Medicine and Infectious Disease*, 3(2), pp. 41.
71. 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.