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Article

Achieving sustainable development goal 6 through improved access to clean water and sanitation in Nigerian rural areas

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Abstract: Access to clean water and improved sanitation are basic elements of any meaningful discourse in rural development. They are critical challenges for achieving sustainable development over the next decade. This paper seeks to examine the strategies for improving access to clean water and sanitation in Nigerian rural communities. Hypothetically, the paper states that there is no significant relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Nigeria. The paper leverages Resilience Theory. The survey research design was adopted, and primary data was obtained from a sample size of 250 respondents, proportionally drawn from the 10 wards in Obanliku local government area of Cross River State. The chi-square statistical technique was to test the hypothesis. The result shows that the calculated value of Chi-square (X^2) is 24.4. Since the *P*-value of 21.03 is less than the level of significance (0.05), the null hypothesis was rejected and the alternate accepted. The study concludes that there is a significant relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Cross River State, Nigeria. it recommends the need for more commitment on the part of government and international donor agencies in expanding access to clean water and improved sanitation in Nigeria.

Keywords: sustainable development goal; clean water; sanitation; rural communities

1. Introduction

Access to clean water supply is an important feature of rural development. Sanitation is necessary for good health and dignity. “Access to clean water and sanitation (Sustainable Development Goal 6) is a basic human right that is still a challenge for millions worldwide. As of 2020, approximately 2 billion people lack access to safely managed drinking water services, and an estimated 4.2 billion people lack access to safe sanitation facilities” (Sustainable Development Goals Report, 2022). Ihezie and Obaniyi (2023) maintained that “the water crisis has severe impacts on health, well-being, and productivity, leading to millions of deaths each year from

waterborne diseases like cholera, diarrhea, and typhoid fever. Women and girls are disproportionately affected. They spend hours collecting water and facing risks of violence and harassment due to inadequate sanitation facilities". The consequences are far-reaching on the social and economic lifestyle of the people. It affects productivity and increases vulnerability to poverty.

According to Esrey (1996), "the provision of safe drinking water and basic sanitation is among the most critical challenges for achieving sustainable development over the next decade". He added that "Water is intrinsically interconnected with the Sustainable Development Goals (SDGs)". Later sanitation became an additional component at the 2002 World Summit on Sustainable Development in Johannesburg. Water supply and sanitation are critical in enhancing the social and economic well-being of the people, especially the vulnerable population in rural areas. Humphrey (2009) explained that "the provision of safe drinking water and basic sanitation improves the living conditions of the people, especially their health status". He added that "People without access to water supply and sanitation are caught in a vicious cycle in which lack of access leads to poverty which in turn prevents people from having the ability to gain access to services" (Humphrey, 2009). The consequences of lack of access to clean water and basic sanitation affect the health status, and economic and social development experience of rural communities in Nigeria, Africa, and the world at large.

The World Health Organisation (WHO) report (2006) indicated that Africa is faced with several economic and health problems. The report linked the inability of the people to access clean water supply as one of the major factors of poor health. It shows that "only 59% of the world's population had access to adequate sanitation systems, and efforts to achieve the Millennium Development Goal, which is aiming for 75% by the year 2015, will fall short by nearly half a billion people" (WHO, 2006). In addition, WHO stated that, "in 2004, only 16% of people in sub-Saharan Africa had access to drinking water through a household connection (an indoor tap or a tap in the yard). Not only is there poor access to readily accessible drinking water, but even when water is available in these small towns, there are risks of contamination due to several factors" (WHO, 2006). Awuah et al. (2009) attributed some of the problems to the development and maintenance of water sources. They explained that "When wells are built and water sanitation facilities are developed, they are improperly maintained due to limited financial resources. Water quality testing is not performed as often as is necessary, and the lack of education among the people utilizing the water source leads them to believe that if they are getting water from a well, it is safe" (Awuah et al., 2009). The effect of this unhealthy practice affects the quality and quantity of water supply.

The governments of developing countries share the blame for inadequate access to clean water and sanitation. One constraining factor is poor budgetary allocation and investment in the sector. In a recent investigation, Sanitation and Water for All (2011), revealed that in Africa, "both donor aid and developing country national budget allocations in the sector are not well targeted to achieve the MDGs". The report added that "despite significant increases in investments going into the sector, only 42% of sector aid goes to low-income countries, and only 16% is invested in "basic" systems that primarily serve the unserved. The flow of assistance into the sector thus matches

the outcomes—the poorest countries receive little assistance, and the poorest within those countries continue to be excluded". Institutional failure, administrative corruption, and poor monitoring a maintenance of projects are other outcomes of poor governance. The governments of developing countries lack the institutions and political will to make water supply, sanitation, and hygiene a priority. "Sanitation tends to be an institutional orphan, with many ministries (health, rural development, water resources) sharing—and often avoiding—responsibility for a sector many don't like to discuss" Humphrey (2009) stressed. The Nigerian government has made considerate efforts in addressing the process of poor access to water supply and sanitation, but "Nigeria's water and sanitation crisis is severe. It affects millions in urban and rural areas, with flooding, poor management, scarcity, and limited access to sanitation facilities. This emergency has significant public health and economic implications" (Ihezie and Obaniyi, 2023).

According to the World Bank (2021), "In 2018, Nigeria's Water, Sanitation, and Hygiene (WASH) sector was declared to be in a state of emergency and approximately 60 million Nigerians were living without access to basic drinking water". The report added that "Women and girls suffer disproportionately from the lack of adequate WASH services. They bear the burden of water collection over long distances, which has been associated with negative effects on well-being, school attendance, and a higher risk of gender-based violence". As the problem continues, the 2023 World Water Day calls for "collective action to accelerate change, especially in Nigeria where the crisis is critical" (Ihezie and Obaniyi, 2023). Access to clean water and maintaining good sanitation are necessary infrastructures for social and economic development.

The Nigerian government has made a considerate effort in providing this important social amenity to citizens. This is an improvement in the budgetary allocation in the Federal Ministry of Water Resources the aim is to ensure, among other things equitable access to clean water and improved sanitation in the country. The objective of the 2004 Sanitation Policy is for all Nigerians to have access to adequate, affordable, and sustainable sanitation through the active participation of Federal, State, and Local Governments, NGOs, development partners, private sector, communities, households, and individuals. The policy sets the following milestones/targets (**Table 1**).

Table 1. Nigeria's Sanitation Target (2007–2025) (Adeoti, 2007).

Year	Target
2007	Improve coverage of sanitation to 60% of the population
2010	Extension of sanitation coverage to 65% of the population
2015	Extension of sanitation coverage to 80% of the population
2020	Extension of sanitation coverage to 90% of the population
2025	Achieve and sustain 100% sanitation coverage of the population

This policy has been translated into yearly funding. Compared to previous years, Ewepu (2024) stated that "The Federal Ministry of Water Resources will spend N12,905,656 on implementation of Water Resource Master Plan out of

N179,873,461,012 allocated to the Ministry's headquarters from the 2023 budgetary allocation of N242,221,862,674 for the entire Ministry, Departments and Agencies, MDAs". This is a significant step in improving access to clean water and sanitation in the country. Beyond the efforts of the federal government, international donor agencies have also contributed significantly to this respect. Among the benefiting local government areas in the country is Obanliku in Cross River State. According to United Purpose (2023), Obanliku "is one of the benefiting communities from the UK-based international development charity to end poverty and inequality and move people beyond aid". The specific report of the agency focused on "the adaptations made to implementation approaches that ensured the inclusion of the remote village of Belegete in Becheve Council ward of Obanliku Local Government Area (LGA), Cross River State, Nigeria in community-led total sanitation programming". The report added that, "during more than a decade of work in Nigeria's sanitation and hygiene sector using community-driven and behaviour change approaches, such as community-led total sanitation (CLTS), UP has worked with fragile communities, communities with entrenched cultural beliefs and hard-to-reach communities. This is partly due to the organisation's focus on area-wide sanitation" (United Purpose, 2023).

While this is an action in the right direction, the Federal Ministry of Water Resources (FMWR) (2000) reported that there is still a "low level of sanitation, especially in urban centres and peri-urban slums, as a critical issue in this sector". These emerging concerns in rural areas across the country call for the need to develop a long-term strategic development plan, especially within the context of achieving the Sustainable Development Goals 6. This paper seeks to examine the strategies for improving access to clean water and sanitation in Nigerian rural communities. Hypothetically, the paper states that there is no significant relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Nigeria.

The objective of the paper

The objective of the paper is to examine the relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Nigerian rural communities. Specifically, the study will examine,

- The framework and rationale for the sustainable development goals.
- Global challenges affecting access to clean water and sanitation.
- Extent of access to water and rural sanitation among rural communities in Nigeria.
- Efforts to improve access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Nigerian rural communities.

2. Literature review

2.1. Conceptual literature

2.1.1. Sustainable development goals

Sustainable Development Goals are a set of 17 goals taken to address the problems of development globally. The goals were adopted as a global partnership by all United Nations Member States in 2015 to provide a shared blueprint for peace and

prosperity for people and the planet, now and into the future (The UN 17 Sustainable Development Goals, 2022). Schleicher et al. (2018), disclosed that the SDGs are "no poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation, and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice, and strong institutions; and partnerships for the goals" (Schleicher et al., 2018). The policy emphasizes the "interconnectedness of environmental, social, and economic aspects of sustainable development by putting sustainability at their center. It sought to create a future global development framework to succeed the Millennium Development Goals, which ended that year. They were formally articulated and adopted in a UNGA resolution called the 2030 Agenda, known colloquially as Agenda 2030" (Schleicher et al., 2018).

2.1.2. Access to clean water

Access to safe drinking water is defined as the percentage of the population having access to and using improved drinking water sources (Centers for Disease Control and Prevention, 2022). This means that a greater percentage of the population have improved sources that are accessible at home, available when needed, and free from fecal and priority chemical contamination" (CDCP, 2022). In addition, International Water Association (IWA, 2004), explained that "access to good, safe and reliable drinking water is one of the most basic needs of human society and as such requires an integrated approach, close cooperation and partnership between all stakeholders".

Owolabi (2017) asserts that "A household is considered to have access to an improved water source if it gets drinking water primarily from a pipe borne water supply system, a public standpipe, borehole and dug well with pump, a protected spring, a well-developed rainwater harvesting system, a reliable water vendor or water tank truck. Sources such as direct from surface waters, i.e., rivers, lakes, ponds, etc. and unprotected wells and springs are regarded as unimproved water sources".

2.1.3. Sanitation

UNICEF/WHO (2015), asserts that improved sanitation is defined "as a system that promotes proper disposal of human and animal waste for improving and protecting public and environmental health. An improved sanitation facility is that which hygienically separates excreta from human contact and is used by only members of one household: toilets flushing to sewer systems or septic tanks, ventilated improved pit (VIP) latrines, pit latrines with a slab, and composting toilets" (UNICEF/WHO, 2015). Access to clean water and sanitation has a significant effect on economic activities. Both factors contribute to hygiene, reduced vulnerability to disease, improved productivity, economic development, and growth in Nigeria.

2.2. Global challenges affecting access to clean water and sanitation

Owolabi (2017) reported that "more than a billion of people in the developing world lack access to potable water". WHO (1992) disclosed that "access by households to sufficient and safe water combined with adequate sanitation and hygiene could result in a substantial reduction of the 5million deaths due to diarrhoea diseases

that occur each year". In 2008, the organization reported that "88% of the 4 billion annual cases of diarrheal diseases are attributed to unsafe water and inadequate sanitation and hygiene and 1.8 million million people die from diarrhoea disease each year" (WHO, 2008). Mesinzen-Dick and Bakker (2001) admitted that "when water with any resources is abundant, there is relatively little attention to the rights, but with increasing scarcity and competition for water, there has been growing attention to its conservation and the rights in recent years". Owolabi (2017) further reiterated that "In sub-Saharan Africa, the picture is quite gloomy". He added that, "some 700 million people or about 63.6% of the population lacked access to improved sanitation in 2015". UNICEF/WHO (2015) disclosed that "while the region's population has nearly doubled from 1990 to 2015, access to improved sanitation has increased by only six percentage points within the same period, making it the region with the lowest sanitation coverage (37%) on the planet".

CIA (2016) maintained that "Nigeria, a nation of about 186 million people as of 2016, forms Africa's largest economy, with a GDP valued at USD$1.1 trillion in 2015". Its report maintained that in Nigeria, "access to improved sanitation declined from 38% of the population in 1990 to 29% in 2015. Within the same period, the proportion of the population defecating in the open has increased from 24% to 25% UNICEF/WHO (2015), despite increased oil revenues from 2005 to 2012". According to the 2013 Demographic and Health Surveys (DHS), "30.1% of Nigerian households used improved sanitation facilities that were not shared with other households (25.1% in rural areas and 36.6% in urban areas), while 39.9% and 15.5% of rural and urban households, respectively, lacked access to sanitation facilities and thereby defecated in the open" (NBS, 2013).

The United Nations (2019) believes that "access to safe water, sanitation, and hygiene is the most basic human need for health and well-being… Water is essential not only to health, but also to poverty reduction, food security, peace and human rights, ecosystems, and education". A report published by UN-Water (2009) disclosed that "there are limited sources of water available to provide clean drinking water to the entire population of Africa and Nigeria in particular". It added that "Surface water sources are often highly polluted, and infrastructure to pipe water from fresh, clean sources to arid areas is too costly of an endeavor" (UN-Water, 2009). The report stressed that "Groundwater is the best resource to tap to provide clean water to most areas in Africa, especially rural Africa, and groundwater has the benefit of being naturally protected from bacterial contamination and is a reliable source during droughts" (UN-Water, 2009). Several factors are responsible for this problem. However, Awuah et al. (2009) explained that "the high costs associated with drilling for water, and the technical challenges in finding sources that are large enough to serve the population in need, present challenges that limit tapping the resource". There is the associated problem of cost, and this they maintain affects the ability of poor households to have access to clean water.

The consequences of a lack of clean water and access to proper sanitation are widespread. "Young children die from dehydration and malnutrition, results of suffering from diarrheal illnesses that could be prevented by clean water and good hygiene" (Metwally et al., 2006). They explained that "Diseases such as cholera are spread rampantly during the wet season. Women and young girls, who are the major

role players in accessing and carrying water, are prevented from doing income-generating work or attending school, as most of their day is often spent walking miles for their daily water needs. They are also at an increased risk for violence since they travel such great distances from their villages daily and are even at risk when they must go to the edge of the village to find a private place to relieve themselves" (Metwally et al., 2006). These challenges affect productivity and other economic activities in the community.

The Nigerian rural sector is faced with the problem of lack of access to clean water and sanitation. The problem is one of the indicators of underdevelopment and protracted poverty in the area, and the inability of the country to achieve the objective of the Sustainable Development Goal 6. "Despite great progress, billions of people still lack access to safe drinking water, sanitation, and hygiene. Achieving universal coverage by 2030 will require a substantial increase in current global rates of progress: sixfold for drinking water, fivefold for sanitation, and threefold for hygiene" (United Nations, 2023). The report further reveals that "Water use efficiency has risen by 9 percent, but water stress and water scarcity remain a concern in many parts of the world. In 2020, 2.4 billion people lived in water-stressed countries" (United Nations, 2023).

Table 2 presents the true state of inadequate access to water and sanitation globally. This situation affects economic activities, gender equality, and improvement of livelihoods. In most households, "women and girls are the primary carriers of water and often need to travel more than 30 min round trip to collect water. "This is particularly true in Sub-Saharan Africa" (Esrey, 1996). Fotso et al. (2007) affirm that "the resultant 'time-poverty' of women and girls reinforces inequalities within households and communities; creating barriers for women and girls in terms of schooling, time to care for young children, literacy, rest, leisure, and opportunities to participate in the development of their communities". The distribution of those in the household who usually collect drinking water, from surveys in 45 developing countries, 2005–2008 is shown in **Figures 1** and **2**, below.

Table 2. Impact of Water, Sanitation and Hygiene (WASH) on development goals (United Nations, 2023).

Sector	Impact of Water, Sanitation and Hygiene (WASH)
Health, Nutrition, HIV/AIDS (SDG 3)	88% of diarrheal deaths are attributable to poor WASH (WHO, 2002, UNICEF, 2006).
	Nutritional status is compromised by frequent episodes of diarrhea and intestinal worm infestations.
	Handwashing is linked to reductions in acute respiratory infections (Ensink, 2007; Jefferson et al., 2009; Luby et al., 2005) and reduced infant mortality (Rhee et al., 2008).
	Improved WASH helps reduce helminths, guinea worm, fluorisis and arsenicosis (Fewtrell et al., 2007).
	Good hygiene helps people living with HIV/AIDS avoid opportunistic infections.
Quality Education (SDG 4)	It is estimated that 443 million school days are lost every year due to water and sanitation related diseases (UNDP, 2006).
	Improving WASH in schools has an impact on enrolment and retention, especially for girls (IRC, 2007; UN Water, 2009; Njuguna et al., 2008).
No Poverty (SDG 1)	5.5 billion productive days per year are lost due to diarrhea and the burden of water collection (Fewtrell et al., 2007).
	Household water is required for small-scale productive activities.
Gender Equity (MDG 3)	Women and girls bear the brunt of water collection burden (WHO/UNICEF, 2010).
	Lack of sanitation in schools is a barrier to girls' attendance.

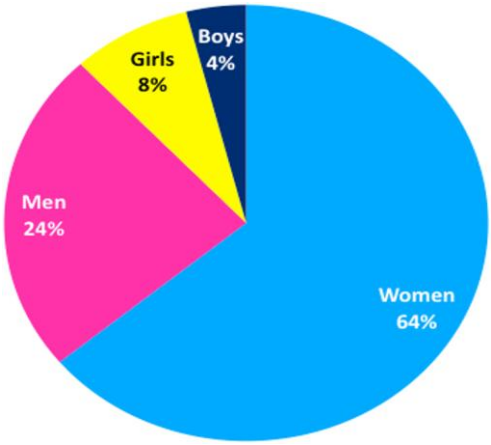

Figure 1. Distribution of those in the household who usually collect drinking-water, from surveys in 45 developing countries, 2005–2008 (WHO and UNICEF, 2010).

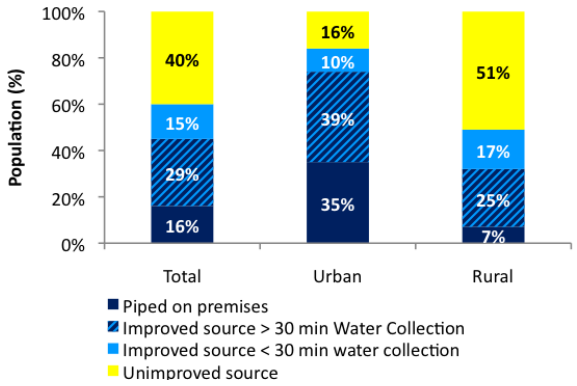

Figure 2. In Sub-Saharan Africa, one-third of the improved drinking water sources that are not piped on premises need a collection time of more than 30 min (WHO & UNICEF, 2010).

There are several reactions to this unhealthy situation. Redhouse (2004) maintained that "Girl children risk being deprived of the opportunity to attend school because of their water collection responsibilities. Girls are also more likely to drop out of school, and their parents are more likely to withdraw them if schools lack appropriate sanitation facilities which offer privacy and dignity" (Redhouse, 2004). UNGEI (2003) says, "the barrier to girls' education created by a lack of safe and private school toilets is particularly tragic considering the enormous developmental impact educating girls has been shown to have". Esrey (1996) purported that, "investments in sanitation and drinking water led to increased economic productivity, and underinvestment is a drag on progress". Water and Sanitation Program Nigeria (2011) revealed that, "inadequate sanitation imposes a high economic cost through impacts on health and tourism, and the time and treatment costs because of distant access to facilities and poor water quality". The literature cited India and reiterated that, "it has been estimated that inadequate sanitation has an economic impact of a staggering $53.8 billion per year—equivalent to 6.4 percent of India's GDP in 2006. It is estimated that for every $1 invested in sanitation, an average of $9 is returned in increased economic development" (Water and Sanitation Program Nigeria, 2011). Hutton et al. (2007) shared the concern that "Meeting the sanitation and drinking water

targets by 2015 (which would still leave millions un-served) would have an annual economic benefit of $38 billion to developing countries".

Checkley (2008) said, "What constitutes a perfectly satisfactory water supply to some consumers leaves others, even in developing countries, considering themselves unserved. In much of rural Africa, a hand pump 500 meters from the household is a luxury, but most residents in urban Latin America would not consider themselves served by a water supply unless they had a house connection". In Asia Humphrey (2009) stated that "urban planners would consider a community served if there were sufficient signposts on the street corner; however, if the water only flows for a few hours per week, producing lengthy nighttime queues, the residents may regard this situation as a lack of service and opt to buy water expensively from itinerant vendors". This affects their economic activity and productivity.

The World Health Organisation (WHO) (2000) reported that "many public health workers unfamiliar with the water sector assume that the most important characteristic of a water supply is its improved quality. However, most of the benefit is attributable to improved convenience of access to water in quantity". The report added that "global statistics are not available on the coverage and costs of the provision of water in terms of its quality". The Global Water Supply and Sanitation Assessment 2000 Report maintained that "the most recent compilation of global statistics on water supply, changed the way such data are compiled, from the previous unreliable estimates by provider agencies to consumers' responses in population-based surveys" (WHO, 2000). The report also "treated the following technologies as improved: household connection, public standpipe, borehole, protected (lined) dug well, protected spring, and rainwater collection". It stressed that, "Unprotected wells and springs, vendors, and tanker trucks were considered unimproved. Bottled water was also considered unimproved because of concerns about the quantity of water supplied, not because of concerns over the water quality" (WHO, 2000).

The Sustainable Development Goals Report (2023) reiterated that "despite progress, 2.2 billion people still lacked safely managed drinking water services, 3.5 billion lacked safely managed sanitation services, and 2.0 billion lacked basic hygiene services in 2022. Surface water bodies, such as lakes, rivers, and reservoirs, are undergoing rapid global changes, with one in five river basins showing high fluctuations in surface water levels in the past 5 years". Water pollution and poor sanitation pose challenges to human health, the environment, and economic activities, globally and in Nigeria in particular.

2.3. Extent of access to water and rural sanitation among rural communities in Nigeria

According to Shehu and Nazim (2022), "Nigeria has gained critical headway in working on families' access to safe drinking water with an end-point status in 2015 at 67.0% access. The nation is likewise considered to have excelled in this indicator from the statistics of the Joint Monitoring Programme (JMP)/United Nations Children's Fund (UNICEF) and World Health Organization (WHO) showing a recorded end-point status of 69% in 2015". While this is commendable, experts admit that access to clean water and sanitation remains a challenge in Nigeria. Akpabio (2012) says,

"Nigeria is one of the nations in sub-Sahara Africa whose records on broad access to water supply and sanitation facilities by the citizens remain exceptionally poor". Okuku (2020) mentioned that unhealthy practices, such as "open excretion, are normal in Nigeria. The absence of knowledge on the dangers of open excretion was observed as a reason for the commonness of open excretion in Nigeria." He explained that "Open excretion prompts a flare-up of diseases that the public authority needs to contain to forestall the loss of lives" (Okuku, 2020).

The Water and Sanitation Program (WSP) Nigeria (2021) detailed that, "because of poor sanitation, NGN 455 billion is lost every year by the Nigerian government". Worried about the above situation, Nwankwoala (2011) said, "Nigeria is as yet recording under half accessibility to safe water and hygienic method for feces disposal". Kumwenda (2019) reported that "Tainting of the hands during exercises like excreting and changing/washing of a child's bottom aids in the transmission of diseases". Matto and Singhal (2021) added that "without hand washing amenities, both the mother and the kid are continually at risk for a disease". For them, "handwashing and good cleanliness routine avails the benefit of water and sanitation services" (Matto and Singhal, 2021). The inability to afford soap for hand washing is associated with poverty.

Sesay (2007) stated that "poor sanitation which has always been associated with Africa, has significant negative effects on the national economy". Lack of access to clean water and adequate sanitation is a major threat to healthy living and the environment. This problem extends to "the degradation of the urban environment by the indiscriminate disposal of solid and liquid waste and the pollution of fresh water and lakes by untreated human waste, the result being smaller, contaminated fish catches" (Payment and Hunter, 2001). Sesay (2007) disclosed that "the cost of environmental damage includes discouragement of the tourist trade, reduced overseas markets and revenue for fish products, reduced production from fisheries, and increased purchase costs for chemical and mechanical clean-up operations. The cause of this is all sanitation-related, either from poor lake water quality or poor hygiene during the catching process. From the 90s down to 2000, there were more government-aided primary schools for students; of these schools, 44.5% had a water supply" (Sesay, 2007).

Payment and Hunter (2021) explained that "following the recent implementation of the policy for universal primary education, the ratio of pupils to latrines may now exceed and may encourage further dropout, especially among adolescent girls". They observed that "Morbidity figures available according to outpatient diagnoses shows that diarrhea, worm infections, eye infections, and skin disease accounted for 25.5% of all outpatient health visits, while malaria (another disease related to poor sanitation) accounted for further another 35.5% (i.e., a total of 59% of all outpatient visit are accounted for by poor sanitation)". From their report, "the level of nutritional stunting in the country is still among the worst rates of nutritional stunting in Africa and is partly attributed to the high incidence of diarrhea, an average of 5.2 episodes a year for children under fire. By the end of April, many people had been taken ill with a total of more deaths" (Payment and Hunter, 2001). They revealed that, "This gives a case fatality rate of 4.3%, causes identified for the diarrhea outbreaks included overcrowding, lack of sanitary excreta disposal facilities, high water tables, lack of

safe drinking water, poor food hygiene in markets (vendors and purchases), and inadequate solid waste disposal. Along with a higher incidence of diarrhea, slum dwellers in swampy areas suffer a greater incidence of malaria special gender needs. Women and girls are the caretakers of the home charged with the responsibility of cooking (86%) water collection (70%) and firewood collection (73%) childcare (62%) and (88%) care for the sick and elderly" (Payment and Hunter, 2001). Nigeria is yet to attain the basic standard in clean water and sanitation. At schools, in homes, and with the public, providing sustainable access to clean water and sanitation is necessary.

2.4. Efforts to improve access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Nigerian rural communities

In recent years, the Nigerian government has been committed to improving access to Water, Sanitation, and Hygiene (WASH) services in the country. The aim has been to provide access "to clean water, basic toilets, and good hygiene practices not only keeps children thriving but also gives them a healthier start in life" (UNICEF, 2022). The project is premised on the fact that "Worldwide, 2.2 billion people still lack access to safe drinking water. Nearly half of the global population does not have access to safe sanitation. Two billion people do not have access to handwashing facilities with soap. Still, 419 million people practice open defecation" (UNICEF, 2022). In line with its concern, in 2018 "President Muhammadu Buhari, declared a state of emergency in Nigeria's WASH sector and flagged off the National Action Plan (NAP) to restore Nigeria's WASH sector. The principal objective of NAP is to guarantee that sustainable and safely managed WASH services are available to all Nigerians by 2030, consistent with the Sustainable Development Goals (SDGs) for water (Goal 6.1) and sanitation (Goal 6.2)" (Nwankwoala, 2011).

Like most development goals in Nigeria, Shehu and Nazim (2022) acknowledged the success of the project but stated that "there is a notable part of the populace that is as yet attempting to accomplish universal access to water in both urban and rural regions. While there are plans set up to guarantee fast execution of SDG 6, with the development of the pandemic, it appears that there is still a significant step to be taken". Adesogan (2018) added that "a significant framework expected to improve the water availability and sanitation accessibility presently is yet to be made. Recent assessments have shown that only 33% of the complete populace of Nigeria has access to essential sanitation". Carter et al. (1999) argued that "that is a very unsettling number. Various sanitation projects have become unreasonable because of funds, insufficient technical know-how for tasks and maintenance, the absence of capacity, the inappropriate utilization of new facilities and poor ways of behaving, and an absence of community cooperation and proprietorship". These are some limiting factors to the successful implementation of the WASH project.

The federal government is partnering with international organizations to actualize Sustainable Development Goal 6. The World Bank, the African Development Bank, the United States Agency for International Development (USAID), and the French Development Bank are the principal institutions in the support effort. USAID (2015) report shows that the organization has donated "more than USD 2 billion of

concessional credits to Nigeria beginning around 1979". Root (2021) disclosed that UNICEF, "has given direct help to 100 LGAs across 21 states. Essentially, WaterAid has signed a memorandum of understanding with the Federal Government of Nigeria, pointed toward offering technical support, capacity development, and policy and strategy development". USAID, on the other hand, "is supporting Nigeria to further develop health results through the supply of sustainable WASH services by improving the urban water service conveyance through reinforcing the administration, monetary and technical viability of some State Water Boards (SWBs)" (USAID, 2015).

The United Nations Sustainable Development Goal Report (2023) disclosed that "With the support of the World Bank and other development partners, the Federal Government of Nigeria has developed initiatives designed to fill identified gaps which have limited citizens' ability to have access to safe and potable water. One of these initiatives was the National Urban Water Sector Reform Program (NUWSRP)". It added that, "The NUWSRP outlined several objectives including sector reform, water utility sustainability and commercial viability, infrastructure improvement, service reliability, and performance enhancement, and increased access to quality piped water networks in urban areas nationwide". Especially, the project has achieved some results. This includes, "the construction of over 2300 additional Water Points, and 6546 sanitation compartments and hygiene facilities across the country; the creation of 12,435 direct and 24,870 indirect jobs since 2015; and the certification of a total of 33 Local Government Areas within nine States as Open Defecation Free (ODF)".

A report from Nigeria National Urban Water Sector Reform Program (NUWSRP) (2021) disclosed that "the World Bank Group will continue its support to the Government of Nigeria through the Nigeria Sustainable Urban And Rural Water Supply, Sanitation And Hygiene (SURWASH) Program with activities designed to enact necessary policy reforms and enhance the capacity of institutions required for effective and sustainable service delivery". This project will be benefited across the country. In addition, "It will support an integrated package of 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" (Nigeria National Urban Water Sector Reform Program, 2021). It stressed that "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 2000 schools and Health Care Facilities, and assist 500 communities in achieving ODF status". This outlook is impressive and can reduce the current state of vulnerability of rural dwellers to poor access to water supply and sanitation.

The Cross River State government has shown a strong commitment to the implementation of WASH projects. The project has been implemented across the 18 local government areas of the State. a report by UNICEF (2021) shows that "Obanliku local government was the first to be certified open defecation-free in Nigeria, six other LGAs in Cross River have followed suit, contributing to Nigeria's total number of 57 LGAs with open defecation-free status". The reported added that, "through strong commitment from UNICEF, the Nigerian Government, community WASH

committees, and NGOs such as United Purpose, progress has been made toward the state becoming completely open defecation-free by 2025. However, it is clear there is much work still to do". The improvement is remarkable, as Mamita Bora Thakkar, UNICEF Nigeria's WASH Manager retorted, "In Cross River today, more than half a million people are still defecating in the open, while only 31 percent of schools have basic sanitation facilities". See added that "through the efforts of the government, UNICEF, European Union Water Supply and Sanitation Sector Reform Programme, United Purpose and community-led institutions, eight LGAs are already open defecation-free, which is remarkable" (Onuoha-Ogwe, 2021). Equally, she explained that "it is also a reminder to speed up action to implement policies and make use of the enabling environment in the state to end open defecation, thus reducing the burden of disease" (Onuoha-Ogwe, 2021).

Theoretical framework: The study leverages Resilience Theory (Anderies, 2011). Resilience is the ability of an individual, a group, and/ or a leader to adjust to changing situations ((Ackerman and Maslin-Ostrowski, 2002). The theory is premised on the fact that society is dynamic, and people are faced with a lot of issues, and they must adapt to challenging things like adversity, change, loss, and risk. To survive changing times, people must be flexible, adapt to changes, and preserve by changing certain thoughts and behaviors. According to Anderies (2011), "Like hunger, deprivation in access to improved water and sanitation is a silent crisis experienced by the poor and tolerated by those endowed with resources, the technology, and the political power to end it". This crisis can affect the living conditions and social and economic activities of the people. To survive, there is a need to build resilience, adjust, and take the necessary action required to improve the situation.

However, resilience requires two variables: internal and external. According to Bonanno (2004), "internal variables in resiliency are defined as self-factors, personality factors, or individual resources. These factors appear to have a significant impact on how a person interprets and deals with the crisis at hand". The external factors are supporting structures within the environment that can help the individual recover from the crisis (Bonanno, 2004). The theory explains the need for individuals and communities affected by the problem of lack of access to clean water and improved sanitation to develop resilience in dealing with the situation. Self-help initiatives may be the right step in this direction. On the other hand, the government, donor agencies, and international organizations that represent the external variable must provide the needed support in addressing the problem. Building resilience may therefore require the effort of the external structure in investments and strengthening institutions at the state level, to deliver on its established mandate.

3. Methodology

Research design: The research design adopted for this study is the survey design. The design is adopted because the study uses a quantitative research method used in collecting data from a set of respondents with the use of questionnaires and interviews.

Area of the study: The study area is carried out in Obanliku local government area of Cross River State. according to the Cross River State website, "The Obanliku Local Government Area was created by the Military regime of General Ibrahim

Babangida on 27 August 1991. Its headquarters is located at Sankwala. Obanliku Local Government is in the Northern Senatorial District of Cross River State. It is both an inter-state and international boundary Local Government Area. It is bounded in the North by Kwanda Local Government of Benue State in the East by the Republic of Cameroon, the west by Obudu Local Government Area, and in the South by Boki Local Government Area" (Cross River State Website, 2021). **Figure 3** below shows that location of Boki local Government Area in Cross River State and Nigeria at large.

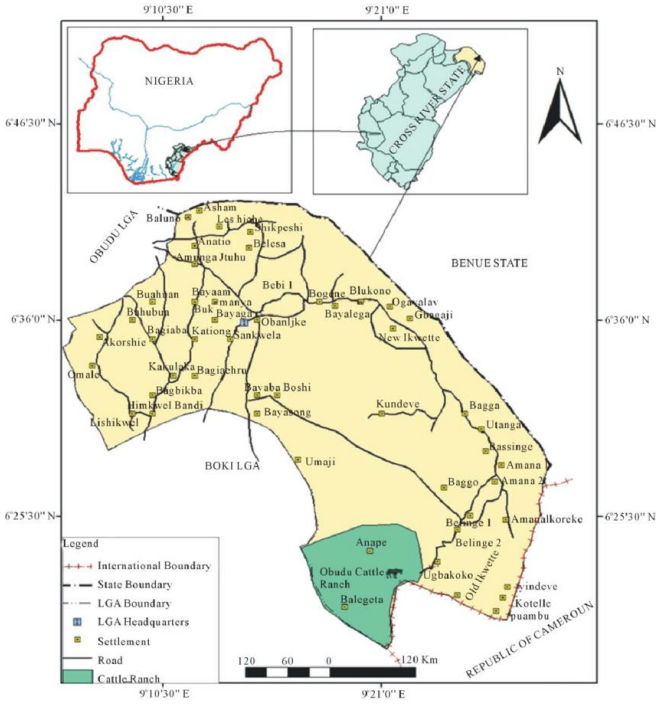

Figure 3. Map of cross river state, showing the location of Boki local government area.

According to Eteng (2023), the local government in Nigeria is to be declared Open Defecation Free (ODF). This was done in "December 2016, when representatives from the Federal Ministry of Health and Water Resources, the Cross River State government, and development partners gathered in Calabar, the state capital, to officially declare Obanliku open defecation free (ODF)" (Eteng, 2023). This success story provides a rationale for researching the impact of this declaration on the health status and economic activities of the rural dwellers in the area.

Sample and sampling technique: Obanliku is made up of ten wards namely: Busi, Basang, Bebi, Bisu, Utanga, Becheve, Bendi 1, Bendi 2, Bishiri North, and Bishiri South (Cross River State Website, 2021). The sample size for the study is two hundred and (250) respondents. The sample size was proportionally selected from 25 households in the ten wards of the Obanliku local government area. Probability sampling was used to select the 10 households in each of the wards. Thus, out of the 250 questionnaires administered, 245 research instruments were successfully retrieved from the respondents. This is the number used for the data analysis. The main instrument for data collection is the questionnaire.

Method of data analysis: The chi-square statistical method of data analysis is adopted to test the formulated hypothesis. Chi-square (x^2) is a non-parameter statistical

tool, which can conveniently be used in testing hypotheses when dealing with discrete or counted data of this nature. The choice of the method is premised on the research need to examine the relationship between access to clean water and sanitation and the socio-economic well-being of the people. This method is adopted because of its suitability for testing statistical discrete or counted data.

Data analysis: The table below is a summary of data obtained and analysis based on the items in the research questionnaire.

Table 3 shows the gender, age, educational status, and length of service of the sample population. It shows that 185 out of the total questionnaires returned were male representing 62% of the total sample size while 95 were female representing 38% of the total sample size. From the above analysis, it can also be inferred that most of the respondents were males. Also, many of the respondents are 30–40 years of age, specifically 100, and this represents 42% of the total sample followed by 75 respondents in the age bracket of 40 and above which represents 31% of the total sample. 70 respondents are in the age bracket of 20–30 years making up a percentage of 29. The table also presents information on the educational status of the respondents. It shows that 45 respondents have FSLC making up 18% of the total respondents. 70 respondents have GCE/SSCE representing 29% of the total respondents. 130 respondents have a diploma and above representing 53% of the total respondents. Majority of the respondents have a diploma and above degree as their highest academic qualification. The implication of this is that the sample population of the study is literate, and their responses are considered valid in testing the research hypothesis.

Table 3. Personal biodata of respondents (Field Survey, 2023).

Variables	Category	F	Percent (%)
Gender	Male	150	62
	Female	95	38
	Total	245	100
Age	20–30	70	29%
	30–40	100	40%
	41 and above	75	31%
	Total	245	100
Educational Status	FSLC	45	18%
	GCE/SSCE	70	29%
	Diploma and above	130	53%
	Total	245	100
	Total	245	100

Test of Hypothesis: There is no significant relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Cross River State, Nigeria.

The result in **Table 4** shows that the calculated value of Chi-square (X^2) is 24.4. Conclusion based on decision rule: Since the *P*-Value = 21.03 is less than the level of significance (0.05), we reject the null hypothesis and conclude that there is a

significant relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Cross River State, Nigeria. the findings from the study support the earlier position of Mamita Bora Thakkar, UNICEF Nigeria's WASH Manager retorted, "In Cross River today, more than half a million people are still defecating in the open, while only 31 percent of schools have basic sanitation facilities" (Onuoha-Ogwe, 2021). Esrey (1996) maintained that investments in sanitation and drinking water led to increased economic productivity.

Table 4. Test statistics on access to clean water and sanitation and the attainment of sustainable development Goal 6 in Cross River State, Nigeria.

X^2 table of analysis	
Chi-Square (X^2)	24.4
Table value (*P*. value)	21.03
Df	12

x^2 = 24.4, Table value = 21.03, df. = 12. Source: Authors (2023).

Notwithstanding, there is so much to be desired. Owolabi (2017) stated that "majority of households … lack access to safe drinking water sources and adequate sanitation facilities. The sources of drinking water in the district are mainly from, springs, wells, and rivers". For him, "there has not been a significant effort made by the government to tackle the problem of poor water and sanitation facilities supply in the area, hence making the indigenes resort to alternative water sources. Women and children, especially girls, are the ones who suffer the burden of keeping wake to fetch water from these sources". In a study he conducted in Ese-Odo LGA, Ondo State to investigate the challenges households faced in accessing good drinking water and sanitation facilities, the result showed that "only few 29.9% of the households have access to improved water with greater majority (63%) depending on water from the stream/river for drinking water. The low-income earners spend more of their income on water (30%) than the high-income earners (15%). The results also indicated that only 20% of the households have no access to good sanitation in their homes whereas a greater majority of the households (80%) have no access to improved sanitation, they defecate in the nearby bush outside their homes".

The problem of access to clean water and improved sanitation remains a national problem and mostly affects rural dwellers. Most houses in rural communities do not have toilet facilities, and this puts pressure on the few existing public toilets available. Most take to bushes and streams to defecate. Refuse is dumped indiscriminately, and this can be seen in the few drains available when it rains and around the sources of their drinking water. More than ever, the time to address this problem is now. The government and other stakeholders must show commitment to addressing the problem of poor access to clean water and sanitation.

4. Conclusion

The study aimed to examine the relationship between access to clean water and sanitation and the attainment of Sustainable Development Goal 6 in Nigerian rural communities. The result from data analysis shows that there is a significant

relationship. So far, the huge investments in providing access to water and enhancing sanitation are commendable. However, emerging health challenges show that these are happening too slowly. The provision of access to clean water, sanitation, and hygiene to human life, creating a healthy environment, and promoting economic activities. Developing new strategies that will promote access to water and sanitation will help in achieving sustainable development in Nigeria.

5. Recommendations

The study recommends a long- and short-term strategic development plan for providing clean water and sanitation in Nigeria. The plan is in line with USAID's global Water and Development Strategy designed to refine and focus USAID's approach to water programming. This five-year Strategy provides an increased focus on sustainability, scale, and country selectivity, uses emerging science and technology, and embraces partnerships for long-term impact. Water security for regions, nations, and individuals is a great development challenge confronting the world today.

In the long term, the Nigerian government, through the Federal Ministry of Water Resources and its respective MDAs must set up a Tactical Strategic Team (TST) to ensure the implementation of the SDG 6 framework. The goal of TST is to save lives and advance development through improvements in water supply, sanitation, and hygiene (WASH) programs, and through the sound management and use of water for food security.

In the short term, TST must quarterly work to monitor projects in rural areas to achieve two critical factors needed for rural development.

- A comprehensive programme of Water for Health. The aim is to improve rural health status through the provision of sustainable WASH.
- Manage water for agriculture sustainably and more productively to enhance food security.

Achieving the above long- and short-term plan, will be supported by the following initiatives:

- Governments at all levels need to work with the key stakeholders in WASH to improve local water governance. There is a need to "rank water efficiency as very important across activities by introducing the best practice technologies for water preservation in regions where the water is insufficient" (Shehu and Nazim, 2022). The government should intentionally reach a large population through a community-based participatory approach and change the norms regarding sanitation.
- Community-led initiatives such as water committees can improve access to safe water and sanitation. Advocating for policies that prioritize sustainable water management and ensure access to safe water for vulnerable populations is also essential. "There is the need to reinforce the capacity of the local and national authorities to manage and control sanitation systems, including the improvement of data management frameworks" (Shehu and Nazim, 2022).
- Civil society organizations should work to keep the government accountable in the discharge of its responsibilities. This will lead to responsive governance, which delivers public services, especially, the provision of clean water, sanitation,

and hygiene.

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