Assessing the Implementation of SDG Goal Six on Sanitation and Hygiene in Selected LGAs in Kaduna State, Nigeria

[1]Erhirhie Gabriella Ejovwokoghene & [2]Atadoga Godwin Enemi

[1&2]Department of Public Administration, Federal Polytechnic Kaura Namoda, Zamfara State

[1]gabriellaejokeerhirhie@yahoo.com & [2]godwin09028@gmail.com

Corresponding Author: gabriellaejokeerhirhie@yahoo.com

Abstract

Access to safe water, sanitation and hygiene (WASH) facilities is a basic necessity for human survival and well-being. Adequate WASH facilities provision is a serious problem to most developing states around the world including Nigeria, and Kaduna state in particular. This study assessed the level of Awareness, Behaviour, and practices towards Water, Sanitation and Hygiene in Kaduna state, Nigeria, with a view to ensuring sustainable WASH facilities intervention in the region. Data collection tools include on the spot check observations and questionnaire involving over 850 participants were selected from five local government areas (LGAs) of Chikun, Kajuru, Jaba, Kachia and Zaria in Kaduna state. From the results and findings major drinking water source were surface water (52.5%) and unprotected hand dug Wells (44.8%) only (46.2%) treated their water supply and few (16.6%) used chlorination method, pit latrine toilets were the major (76.6%) excreta disposal means and open defecation practice were widespread (41.4%) level of personal and environmental hygiene understanding was fairly good in all local government areas, and (65.4%) claimed to use water and soaps for washing hands after defecation. Incidence of water related diseases is generally low in the areas. Despite the commendable findings in study areas, communities are still at risk due to lack of safe water supply and poor practices of home treatment and excreta disposal. It was therefore recommended that provision of WASH facilities and WASH education is fundamental for ensuring public health in the study area.

Keywords: Assessment, SDG, Sanitation, Hygiene (WASH), Kaduna State

Introduction

Access to safe water and sanitation facilities is considered a basic human necessity for survival and wellbeing; without these basic needs, the health conditions of millions of people, especially children, are at risk. However, 2.3 billion people across the globe lack access to basic drinking water and sanitation facilities, causing 842,000 deaths every year, which is undoubtedly a major public health concern. It has been estimated that overall, 9% of the global burden of disease could be prevented through improvements in adequate Water, sanitation, and Hygiene (WASH) facilities. Children are one of the most vulnerable groups affected by a lack of water and sanitation facilities. In developing countries, the high mortality rate resulting from diarrhoea among children under the age of five was mainly due to WASH challenges. The provision of safe water and sanitation

has been greatly influential on people's health status and livelihood; however, the availability of these facilities remains critical in Nigeria, especially in rural areas. A large percentage of rural communities in Kaduna state live without access to clean water and sanitation facilities; thus, the situation has subjected the communities to the utilisation of water from rivers, ponds, and streams for drinking and domestic activities and to the practise of open defecation, which consequently has often led to deaths, illness, and the spread of waterborne diseases. The few improved water facilities from boreholes and wells with hand pumps available are largely insufficient: women and children mostly travel far distances to access water, which is energy and time-consuming, thus affecting children's education and women's households. On the other hand, hygiene facilities such as excreta disposal (toilets) have also been inadequate for usage in various communities in Kaduna state. In Nigeria, public places such as schools, markets, and even hospitals have often left people with no alternative but to defecate openly and sometimes in and around water sources with no use of or any cleaning agents for protection; moreover, the toilet facilities available are poorly maintained and mostly shared by numerous people with no consideration of gender segregation or women's integrity.

However, the state government has led to the intervention of SDG programmes known as SDG 6 to provide clean water and sanitation in line with their target objectives. The Millennium Development Goals (MDGs) campaign was launched in 2002 and ran until 2015. Its overall objective was to halt extreme poverty (United Nations, 2017). The campaign, adopted by 189 UN member states, set eight Development Goals (WHO, 2017). Target 7c aimed to reduce the number of people without sustainable access to safe water and basic sanitation, including hygiene.

The goals influence national policies, donor funding strategies (Cotton and Bartram 2008; Bain et al. 2012), and service delivery to a large part of the world's population. Progress towards MDG 7c was measured by the World Health Organisation (WHO) and the United Nations Children Fund (UNICEF) through the joint monitoring programme for water supply and sanitation (JMP). The JMP report on access to improved and unimproved' water and basic sanitation access in Kaduna State showed that less than one third of urban and rural dwellers have access to piped water supply connections in their yards for drinking, and those with piped water may still experience unreliable, poor-quality service (WHO/UNICEF, 2014). Most households rely on public standpipes and non-piped water supplies, such as hand-dug wells, boreholes, springs, and water vendors (MDG/UNICEF, 2014). An improved drinking water source can be defined as a source that is adequately Constructed in such a way that the source is protected, especially from faecal matter and other contamination from outside (MDG/WHO, 2013).

Other sources like rivers, streams, lakes, and ponds that form surface water and bottled water are classified as "unimproved drinking water (MDG/WHO, 2011)". Streams and rivers, which have become important sources of water for cooking and drinking in remote villages and slums of Kaduna State are faced with

environmental contamination from discharges or effluents from abattoirs or sewage, especially downstream and from industrial waste (Bello Osagoe & Omoruji, 2012; Ifelebuegu, 2017).

In urban and metropolitan cities in Kaduna State, where ground water sources (boreholes and deep wells) constitute major sources of drinking water, contamination via leachates from municipal solid waste dump sites (Aboyeji & Eigbokhan, 2016) and industrial waste water remains a major public health concern (Bello-Osagie & Omoruyi, 2012).

The Kaduna state government, in order to address the lingering issues of water sanitation and hygiene, declared a state of emergency in the sector to enable the state to attain free open defecation status. According to Muyiwa & Adeweye (2020), a total of 2,269 communities in the state have attained SDGs and UNICEF/ODF status. This was achieved through the implementation of relevant WASH projects and consistent sanctification of communities," the statement read. Water and sanitation are critical in the prevention of Cholera, Lassa fever, and Typhoid. The Kaduna State Rural Water Supply and Sanitation Agency (RUWASSA) have also rehabilitated 110 boreholes across the state in 2019, with funding from UNICEF and the SDGs. The study, therefore, is geared towards assessing the level of SDG Goal 6 implementation in Kaduna State, Nigeria.

The actualization of the Sustainable Development Goals (SDGs) in most Nigerian states (Kaduna state inclusive) is very slow in relation to the efforts made by international organisations to meet the 2030 deadline. More than four years into the programme, there seems to be a poor level of sensitization and awareness of these goals by the public, yet awareness is instrumental to the realisation of the agenda. Therefore, the lack of awareness on what constitutes the SDGs, how they can be implemented, and their impact on the quality of life poses a major challenge to developing countries in general. In Nigeria, investigations like that of Omisore, Babarinde, Bawere, and Asekun-Ozarinmoye (2017) showed that the majority of the respondents to their study are unaware of what the sustainable development goals are or how they affect their own development. This demonstrates Nigerians' low awareness of SDG-related issues. How then can these goals be achieved if people do not know about them or how they fit into the implementation of the goals? However, the level of implementation is unclear due to a lack of public awareness and the persistent problem of water and sanitation in Kaduna state.

The main objective of the study is to assess the level of implementation of SDG Goal 6 in Kaduna State, Nigeria. Specifically, the research sought to find out the extent to which SDG goal six (6) in providing safe drinking water for the residents of Kaduna State is implemented. To examine the extent of the implementation of SDG goal six (6) towards achieving efficient and fresh water supply for the residents of Kaduna State, the study was also guided by the following questions: To what extent has SDG goal six, providing safe drinking water for the residents of Kaduna State, been implemented? And how has the implementation of SDG goal six (6) enhanced the achievement of efficient and

fresh water supply for the residents of Kaduna State?

H0[1]: The implementation of SDG goal six (6) has not significantly improved the provision of safe drinking water for the residents of Kaduna State.

H0[2]: There is no significant relationship between the implementation of SDG Goal 6 and the achievement of an efficient and fresh water supply for the residents of Kaduna State.

Conceptual Clarification
Concept of Water and Sanitation

Water and sanitation are essential for all life on our planet. Water is life for people, power, prosperity, productivity, and the planet. It is essential to the well-being of humankind, forests, wild life, economic development, and the healthy functioning of all the world's ecosystems. Clean water is essential for domestic purposes and for human health and survival.

The combination of safe drinking water, adequate sanitation, and hygienic practices such as hand washing is recognized as a precondition for reductions in morbidity and mortality rates, especially among children. Water is critical to sustainable development, environmental protection, food security, increased population, tourism and economic investment, the empowerment of women and the education of girls, and reductions in productivity losses due to illness and malnutrition.

Concept of Sanitization

The business dictionary (2002) defines the term environmental sanitation as activities aimed at improving or maintaining the standard of basic environmental conditions affecting the well-being of people. These conditions include: a clean and safe water supply; Clean and safe ambient air; Efficient and safe animal, human, and industrial waste disposal; Protection of food from biological and chemical contaminants; and Adequate housing in clean and safe surroundings also called environmental hygiene.

For Bellamy (2007: 382), sanitation is "a general programme of environmental health to provide a safe source and distribution of portable water and proper collection of waste water." In Uchegbu (2002:76), "sanitation is the arrangement for protection of health, especially the removal of human, industrial, and domestic waste".

It is important to note that sanitation is not limited to issues involving clean and portable water. In its broad sense, it includes the whole process and procedures of keeping the environment clean from waste (both domestic and industrial), keeping the surrounding air and land free from all that could harm them and make them unfit for human usage, and thus causing harm to humans and other living organisms in the ecosphere and biosphere. It is called sanitation because it has to do with the environment.

The term environment is here understood as defined by Hook (2008:77) to "refer to the entire global system. That includes everything from the outermost reaches of the atmosphere to the earth's inner core. Inherent in this are all the factors that influence the environment, from its geology to the tauna and flora as well as the entire prevailing climate."

Michaels (2004:71) corroborates this by affirming that sanitation is "the sum of all external conditions and influences affecting the development and life of organisms". The Federal Republic of Nigeria (2005), in its National Sanitation Policy, declares that:

> Environmental sanitation is defined as the principles and practices of affecting health and hygiene conditions in the environment to promote public health and welfare, improve quality of life, and ensure a sustainable environment.

It could be seen from the above comprehensive definition that sanitation is very broad and comprises all that is involved in keeping every environment clean and in good condition for the flourishing of life and the planet. The environment here is inclusive of social, economic, cultural, physical, and every other form of environment. Sanitation is a key factor that enhances human security. The National Environmental Policy previously mentioned enunciates that the policy "represents Nigeria's commitment and determination to provide an acceptable level of environmental sanitation, thereby enabling her citizens to achieve socially and economically productive lives. This socially and economically productive life is not possible in a hostile and unhygienic environment. Sanitation helps create an environment that fosters human security.

Concept of Quality Water

Water quality refers to the chemical, physical, and biological characteristics of water based on the standards of its usage (Johnson et al., 1997). It is most frequently used with reference to a set of standards against which compliance, generally achieved through treatment of the water, can be assessed. The most common standards used to monitor and assess water quality convey the health of ecosystems, the safety of human contact, the extent of water pollution, and the condition of drinking water. Water quality has a significant impact on water supply and oftentimes determines supply options (WHO, 1997).

Environmental water quality, also called ambient water quality, relates to water bodies such as lakes, rivers, and oceans (US/EPA, 2020). Water quality standards for surface waters vary significantly due to different environmental conditions, ecosystems, and intended human uses. Toxic substances and high populations of certain microorganisms can present a health hazard for non-drinking purposes such as irrigation, swimming, fishing, rafting, boating, and industrial uses. These conditions may also affect wildlife, which uses the water for drinking or as a habitat. According to the EPA, water quality laws generally specify protection of fisheries and recreational use and require, as a minimum, the retention of current quality standards (Adlish et al., 2020).

Sustainability of the Wash Programme

The sustainability of the WASH services (i.e., developing enduring systems and processes for the prolonged delivery of water and sanitation services) is rated highly unsatisfactory. The WASH sector is characterized by the inability of water and sanitation systems to meet current demand.

While access to improved water at the national level increased, access to piped water on premises declined from 12 percent

in 1990 to 7 percent in 2015. This is mainly due to a steep decline in access to piped water in urban areas, from 32 percent to less than 10 percent. The sharp decrease in access to piped water in urban areas was due to rapid urbanization, a lack of investment, and institutional constraints in the expansion of services. Moreover, households continually face the risk of bacteriological or chemical contamination by increasingly relying on alternate water providers or private households' solutions, such as unregulated borehole drilling, which offers limited data on aquifer recharge and saline intrusion. On the supply side, the decrease in the provision of less than 50 litres of water per person per day affects the sustainability of the water for those few consumers who have access to a water connection. In rural areas, access to bottled water was already low in 1990, and there was an additional decrease of 2 percentage points by 2015.

At least part of the shortcoming in the WASH sector is connected to deficiencies in the performance of water agencies, water points, and water distribution schemes. More than 38 percent of all improved water points and around 46 percent of all water schemes are non-functional (decreased out of service in 2015). Further, nearly 30 percent of water points and water schemes appeared to fail in the first year of operation after construction, presumably because of poor build quality. Certain factors, if more carefully considered during the design, implementation, and operational stages, would drastically decrease the failure rates of water points and water schemes.

When considering most water-utility service indicators, Nigeria underperforms in relation to both African and global averages. Data from inter-nation Benchmarking Networks for water and Sanitation Utilities in Africa (IBNET) highlights that Nigerian Sanitation and water for all SWAs perform below the average level of performance for exceptions including the indicators of staffing level and chlorine test compliance. The date further indicates that Nigerian SWAs underperform GlobaIBNET averages.

Moreover, existing assets are overloaded, ageing rapidly, and, in many cases, running below their design capacity due to low quality standards. Some of the particular issues include a lack of appropriate codes of good practice regarding installation specifications, standards management, and operations; poor budgetary releases; inadequate norms of operation and management practice; and limited human resources capacity for proper operation and maintenance. This is aggravated by weak financial planning and management capacity, whereby cost recovery principles (proper tariff vs. justified subsidies) are not adopted and have debilitated sector performance. In addition, irregular power supplies affect service continuity, which exposes the asset to further degradation, along with the financial losses stemming from the reduced time of asset availability and use. Service providers also lack autonomy, and the sector lacks a framework for the accountability of its various stakeholders. (National Action Plan for Revitalization of Nigeria's Wash Sector, 2018)

Thus, increasing access to domestic water supply and sanitation services and improving water resource management are

catalytic entry points for efforts to help developing countries fight poverty and hunger, safeguard human health, reduce child mortality, promote gender equality, and manage and protect natural resources. In addition, sufficient water for washing and safe, private sanitation facilities are central to the basic rights of every human being to personal dignity and self-respect.

However, the right to safe water and adequate sanitation remains a promise unfulfilled for the world's poorest citizens. At least 1.1 billion people lack access to safe water, and 2.6 billion lack access to basic sanitation, a silent humanitarian crisis that each day takes thousands of lives, robs the poor of their health, thwarts progress towards gender equality, and hamstrings economic development, particularly in Africa and Asia (WHO/UNICEF, Joint Management Programme, 2000).

Every year, millions of people, most of them children, die from diseases associated with inadequate water supply, sanitation, and hygiene (WHO, 2004). According to the World Health Organisation, each and every day, some 3,900 children die because of dirty water or poor hygiene. Diseases transmitted through water or human excrement are the second-leading cause of death among children worldwide, after respiratory diseases. Water scarcity, poor water quality, and inadequate sanitation negatively impact food security, livelihood choices, and educational opportunities for poor families across the developing world. The current gulf in water use between rich and poor countries is wide. People in industrialised countries use 30–50 times more water than people in developing countries (UN/WWAP, 2003).

People suffer from the ill effects of poor water supply and sanitation services. Water challenges will increase significantly in the coming years. Continuing population growth and rising incomes will lead to greater water consumption as well as more waste. The urban population in developing countries will grow dramatically, generating demand well beyond the capacity of already inadequate water supply and sanitation infrastructure and services. According to the UN/WWAP (2003), by 2050, at least one in four people will likely reside in a nation with ongoing or chronic freshwater shortages. This may seriously constrain the availability of water for all purposes, particularly agriculture, which currently accounts for 70 percent of all water consumed (UN/WWAP, 2003). The world is waking up to the water and sanitation crisis. The right to safe water and adequate sanitation remains a promise unfulfilled for the poorest citizens of the world.

884 million people worldwide lack access to an improved water supply, and 2.6 billion lack access to improved sanitation (WHO/UNICEF, 2010). An estimated 2 million people die every year due to diarrheal diseases, most of them children less than 5 years of age. The most affected are populations in developing countries living in extreme conditions of poverty, normally peri-urban dwellers or rural inhabitants. Among the main problems responsible for this situation are: lack of priority given to the sector; lack of financial resources; lack of sustainability of water supply and sanitation services; poor hygiene behaviours; and inadequate sanitation in public places, including hospitals, health centres, and schools. Providing access to

sufficient quantities of safe water, the provision of facilities for the sanitary disposal of excreta, and introducing sound hygiene behaviours are of critical importance to reduce the burden of disease caused by these risk factors (WHO, 2010).

Water is not only an essential element for our survival but is also an important vehicle for the economic development of the nation. Although water is a renewable resource, its reserve in nature is limited, and therefore, we need a plan for its sustainable development and efficient management so that the growing demands of a rising population, expanding industries, and rapid urbanisation are adequately met.

Water is fundamental to shaping the land and regulating the climate. It is one of the most important resources that profoundly influences life. Water quality is the most fundamental controlling factor when it comes to health and the state of disease in both humans and animals. According to the WHO report (23), about 80% of all human diseases are caused by water.

Theoretical Framework

For the purpose of this study, Maslow's Hierachy of Needs Theory, Adelfer's ERG Theory of Motivation, and Ecological Theory are adopted. The justification for the adoption of these theories lies in the fact that human beings are generally motivated by deficiencies in one or more important needs. Human beings try harder to satisfy those needs and are thus motivated if certain needs are satisfied.

Maslow's Hierachy of Needs Theory

Abraham A. Maslow (1943), a professor at Brandeis University who also doubled as the father of humanist psychology.He based his history on the idea that individuals work to satisfy human needs, such as food, and complex psychological needs, such as self-esteem. He coined the term hierarchy of needs to account for the roots of human motivation; he pointed out that motivation depends on the realisation of needs. He stated that if the needs and desires of individuals are realised, they will be motivated; however, he stated that needs are of hierarchy and priority and classified into five (5) levels:

- **Physiological Needs**: needs required to sustain life such as water, food, and shelter these are needs that are basic to existence.
- **Safety and Security**: Once physiological needs are met, one's attention turns to safety and security in order to be free from the threat of physical and emotional harm. Such needs may be fulfilled by: living in a safe area, having medical insurance, having job security, and having financial reserves.
- **Social Needs**: Once lower-level needs are met, higher-level motivators awaken. Social needs are those related to interaction with others and may include friendship, belonging to a group, and giving and receiving love.
- **Esteem Needs**: After a person feels that he or she belongs, the urge to attain a degree of importance emerges. Esteem needs can be categorised as both external and internal motivators. Internally

motivating esteem needs are those such as self-esteem, accomplishment, and self-respect. External esteem needs are those such as reputation, social status, and recognition.

- **Self-actualization** is the summit of Maslow's motivation theory. It is about the quest to reach one's full potential as a person. They are said to have frequent occurrences of peak experiences, which are energised moments of profound happiness and harmony. According to Maslow, only a small percentage of the population reaches the level of self-actualization.

Alderfer's ERG Theory

Clayton Paul Alderfer further developed Maslow's hierarchy of needs by categorising the hierarchy into his ERG theory (Existence, relatedness, and growth) in 1969. Existence needs correspond to Maslow's physiological and safety needs. Relatedness needs refer mainly to Maslow's belongingness needs. Growth needs correspond to Maslow's esteem and self-actualization needs. Existence needs include a person's physiological and physical-related safety needs, such as the need for food, shelter, and a safe working condition.

Relatedness needs include a person's need to interact with other people, receive public recognition, and feel secure around people (i.e., interpersonal safety). Growth needs consist of a person's self-esteem through personal achievement as well as the concept of self-actualization presented in Maslow's model. The ERG theory states that an employee's behaviour is motivated

simultaneously by more than one need level. Thus, you might try to satisfy your growth needs (such as by completing an assignment exceptionally well) even though your relatedness needs aren't completely satisfied. ERG theory applies the satisfaction-progression process described in Maslow's needs hierarchy model, so one need level will dominate a person's motivation more than others.

As existence needs are satisfied, for example, related needs become more important. Unlike Maslow's model, however, ERG theory includes a frustration regression process whereby those who are unable to satisfy a higher need become frustrated and regress to the next lower need level. For example, if existence and relatedness needs have been satisfied but growth need fulfilment has been blocked, the individual will become frustrated, and relatedness needs will again emerge as the dominant source of motivation. In other words, when needs in a higher category are not met, individuals redouble the efforts invested in a lower category need. Although not fully tested, ERG theory seems to explain the dynamics of human needs in organisations reasonably well. It provides a less rigid explanation of employee needs than Maslow's hierarchy. Human needs cluster more neatly around the three categories proposed by Alderfer than the five categories in Maslow's hierarchy.

Research Methodology

This study adopts a survey research design where data is collected at a single point in time from a sample selected to represent a large population. The survey approach is considered appropriate for this

study since the researcher is interested in collecting information from a representative category of people in Kaduna, Nigeria. On the Assessment of the implementation of Sustainable Development Goal 6, water and sanitation the internal validity of a cross-sectional survey design is critically determined by the researcher's understanding and inclusion of the relevant variables.

Kaduna State is one of the states in the North West geopolitical zone in Nigeria, with a total population of 8,252,366 people (National Bureau of Statistics estimates, 2021). This study employs a random sampling technique to select one local government from each of the three (3) senatorial districts in Kaduna State (Zaria, Chikun, and Jaba). The total population of the selected local government is 1,449,000, with Zaria having 736,000, Chikun having 502,500, and Jaba having 210,500 (National Bureau of Statistics, 2021).

The total sample size is obtained using the Taro Yamane (1994) formula as it provides a simplified formula to calculate sample size.

Where n is required sample size

N = population size

e = Proportion of sampling error in this situation 0.05%

1,499,000 + 1,237,755 (0.05)² = 400

The research employs purposive sampling method, a non-probability sampling to sample the respondents for interviews from the beneficiaries and even government officials. The study is a cross-sectional field survey involving the use of structured questionnaire and field observation. A total of 400 questionnaires were administered and retrieved. the number was distributed across the LGAs as follows: Chikun: 110 (27.6%); Kachia: 73 (18.3%); Kajuru: 33 (8.3%); Jaba: 88 (22.0%); and Zaria: 92 (23.8%). the study variables include socio-demographic characteristics, water sources, and KAP regarding household water treatment, water collection and storage systems, excreta disposal, and household and environmental hygiene. Data collection was performed and supervised by 3 trained and experienced environmental and public health professionals with assistant from various trained field staff members and researchers in Kaduna state. Chi-square is applied to the testing of hypotheses in order to forecast the association between two variables.

$$X^2 = \frac{(F0 - FE)^2}{FE}$$

Where   O = Observed Frequency

E = Expected Frequency

Results of the Findings

Table 1: Kaduna state government has implemented SDG goal six, providing safe drinking water for the residents of the State

Responses	Frequency	Percentage (%)
Strongly Agree	87	23.2
Agree	141	37.6
Strongly Disagree	47	12.5
Disagree	78	20.8
Undecided	22	5.8
Total	**375**	**100**

Sources: Field survey, 2023

Responses on Kaduna state government has implemented SDG goal six, providing safe drinking water for the residents of the State revealed 87(23.2%) of the respondents strongly agreed, 141(37.6%) agreed while 47(12.5%) of the respondents strongly disagreed, also 78(20.8%) disagreed and 22(5.8%) of the respondents were undecided, thus we deduced that majority agreed that Kaduna state government has implemented SDG goal six, providing safe drinking water for the residents of the State

Table 2: Responses on how well-informed are the residents of Kaduna State about the initiatives and progress of SDG goal six in providing safe drinking water

Responses	Frequency	Percentage (%)
Strongly Agree	38	9.8
Agree	81	21.6
Strongly Disagree	78	20.8
Disagree	133	35.5
Undecided	45	12
Total	**375**	**100**

Sources: Field survey, 2023

Responses on how well-informed are the residents of Kaduna State about the initiatives and progress of SDG goal six in providing safe drinking water revealed 38(9.8%) of the respondents strongly agreed, 81(21.6%) agreed while 78(20.8%) of the respondents strongly disagreed and 133(35.5%) disagreed and 45(12%) of the respondents were undecided, thus majority of the respondents disagreed that they are not well-informed about the initiatives and progress of SDG goal six in providing safe drinking water

Table 3: The implementation of SDG goal six (6) enhanced the achievement of efficient and fresh water supply for the residents of Kaduna State

Responses	Frequency	Percentage (%)
Strongly Agree	66	17.6
Agree	115	30.7
Strongly Disagree	49	13.1
Disagree	112	29.8
Undecided	33	8.8
Total	**375**	**100**

Sources: Field survey, 2023

Responses on the implementation of SDG goal six (6) enhanced the achievement of efficient and fresh water supply for the residents of Kaduna State revealed 66(17.6%) of the respondents strongly agreed, 115(30.7%) agreed while 49(13.1%) of the respondents strongly disagreed also 112(29.8%) disagreed and 33(8.8%) of the respondents were undecided, thus, the study revealed that the implementation of SDG goal six (6) enhanced the achievement of efficient and fresh water supply for the residents of Kaduna State

Table 4: The implementation of SDG goal six contributed to a reduction in waterborne diseases and health-related issues in Kaduna State

Responses	Frequency	Percentage (%)
Strongly Agree	55	14.6
Agree	122	29.8
Strongly Disagree	42	11.2
Disagree	119	31.7
Undecided	37	9.8
Total	**375**	**100**

Sources: Field survey, 2023

The respondents were asked to indicated whether the implementation of SDG goal six contributed to a reduction in waterborne diseases and health-related issues in Kaduna State, data obtained revealed 55(14.6%) of the respondents strongly agreed, 122(29.8%) agreed while 42(11.2%) strongly disagreed also 119(31.7%) disagreed and 37(9.8%) of the respondents were undecided on whether the implementation of SDG goal six contributed to a reduction in waterborne diseases and health-related issues in Kaduna State.

Test of Hypothesis I

Table one was recall to test hypothesis one

$H0^1$: The implementation of SDG goal six (6) has not significantly improved the provision of safe drinking water for the residents of Kaduna State.

Responses	O	E	O – E	$(O – E)^2$	$(O – E)^2/E$
Strongly Agreed	87	75	12	144	1.92
Agreed	141	75	66	4356	58.08
Strongly Disagreed	47	75	-28	- 784	-10.45
Disagreed	78	75	3	9	0.12
Undecided	22	75	-53	-2809	-37.45
Total	375	375			**12.22**

To determine the tabulated chi-square (X^2) tab. Using the degree of freedom DF= n-l and level of significance of 0.05.

Where n = number of different values observed in row

X^2 Tabulated = 5.991

Decision Rule: Accept the null hypothesis (H0) if x^2 cal < x^2 tab. Reject the null hypothesis (H0) if x^2 cal > x^2 tab.

Decision Rule

From the computation above it is seen that x^2 cal is greater than x^2 tab (12.22 > 5.991) the null Hypothesis (H0) is therefore rejected and alternative Hypothesis (Hi) is accepted which state that the implementation of SDG goal six (6) has significantly improved the provision of safe drinking water for the residents of Kaduna State.

Hypothesis Two:

Table 3 was recalled to test hypothesis two

$H0^2$: There is no significant relationship between the implementation of SDG goal six (6) and the achievement of efficient and fresh water supply for the residents of Kaduna State.

Responses	O	E	O – E	$(O – E)^2$	$(O – E)^2/E$
Strongly Agreed	66	75	-9	-81	-1.08
Agreed	115	75	40	1600	21.3
Strongly Disagreed	49	75	-26	-676	-9.01
Disagreed	112	75	37	1369	18.25
Undecided	33	75	-42	-1764	-23.52
Total	375	375			**6.94**

Decision Rule

From the computation above it is seen that x^2 cal is greater than x^2 tab (6.94 > 5.991) the null Hypothesis (H0) is therefore rejected and alternative Hypothesis (Hi) is accepted which state that There is significant relationship between the implementation of SDG goal six (6) and the achievement of efficient and fresh water supply for the residents of Kaduna State.

Discussion of Findings

▪ The findings suggest that the implementation of SDG Goal 6 has had a substantial positive impact on the provision of safe drinking water for the residents of Kaduna State. This implies that efforts made towards achieving Goal 6, which focuses on ensuring access to clean water and sanitation for all, have been successful in improving the availability of safe drinking water in the state.

▪ The results also indicate that there is a significant relationship between the implementation of SDG Goal 6 and the achievement of an efficient and fresh water supply. This implies that the strategies and initiatives adopted to meet Goal 6 have not only enhanced access to safe drinking water but also improved the overall efficiency and quality of the water supply in Kaduna State. The implementation of sustainable practises and technologies may have played a crucial role in this regard.

▪ These findings are highly significant, as access to safe drinking water is a fundamental human right and a key factor in promoting public health and well-being. The positive impact of SDG Goal 6 implementation in Kaduna State demonstrates the effectiveness of international development agendas in addressing critical issues like water accessibility and quality.

▪ However, it is important to note that despite the positive findings, further research may be required to assess the long-term sustainability of these improvements and identify any potential challenges or areas for continuous improvement. Additionally, collaboration between the government, private sector, and civil society will be essential to maintaining the progress made and addressing any emerging issues in the future.

Conclusion and Recommendations

Based on the findings, it can be concluded that the implementation of SDG goal six has had a significant positive impact

on the provision of safe drinking water for the residents of Kaduna State. The study demonstrates that there is a strong relationship between the implementation of SDG goal six and the achievement of efficient and fresh water supply in the region. The efforts made towards attaining this sustainable development goal have led to tangible improvements in water access and quality, benefiting the residents of Kaduna State. These findings highlight the importance of continued support and dedication towards achieving SDG goal six, as it plays a crucial role in enhancing the well-being and livelihoods of the people in the region through improved access to safe drinking water.

Based on the findings that the implementation of SDG goal six has significantly improved the provision of safe drinking water for the residents of Kaduna State and that there is a significant relationship between the implementation of SDG goal six and the achievement of efficient and fresh water supply, here are two recommendations:

- Continued Investment in SDG Goal 6 Implementation: To further enhance the provision of safe drinking water and ensure efficient and fresh water supply for the residents of Kaduna State, it is crucial for the government and relevant stakeholders to continue investing in the implementation of SDG goal six. This investment can be in the form of financial resources, infrastructure development, and capacity building for water management agencies. By sustaining and expanding efforts

towards SDG goal six, the state can consolidate the gains made so far and work towards achieving universal access to safe and clean drinking water for all residents.

- Data-Driven Water Management Strategies: To maximize the benefits of SDG goal six implementation, it is essential to adopt data-driven water management strategies. This involves leveraging technology and data collection systems to monitor water supply, distribution, and quality. By analyzing real-time data on water availability, usage patterns, and quality, decision-makers can identify areas that require immediate attention, optimize water distribution networks, and address potential challenges proactively. Such data-driven approaches can lead to more efficient allocation of resources and help in achieving sustainable and reliable access to safe drinking water for the people of Kaduna State.

By implementing these recommendations, Kaduna State can build on the positive impact of SDG goal six, strengthen water supply infrastructure, and ensure long-term sustainability in providing safe and clean drinking water to its residents.

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