

AFRICA UNIVERSITY

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EFFECTIVENESS OF WATER SANITATION AND HYGIENE POLICY  
USED TO CONTROL THE SPREAD OF CHOLERA IN KARIM –  
LAMIDO AREA OF TARABA STATE, NIGERIA.

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER IN PUBLIC POLICY AND  
GOVERNANCE IN THE COLLEGE OF BUSINESS AND MANAGEMENT  
SCIENCES

2025

## Abstract

Cholera continues to be one of the most severe waterborne diseases affecting developing nations, particularly in sub-Saharan Africa, where access to clean water and adequate sanitation remains a major challenge. Nigeria has recorded recurrent cholera outbreaks in several regions, and Taraba State has not been exempted. In response, government and health agencies have implemented water sanitation policies designed to mitigate the spread of cholera through improved water supply systems, sanitation infrastructure, and hygiene promotion. This study quantitatively examines the effectiveness of the water sanitation policy in controlling cholera outbreaks within Karim Lamido Local Government Area of Taraba State, with particular emphasis on the Sustainable Development Goals (SDGs)—notably SDG 3 (Good Health and Well-being) and SDG 6 (Clean Water and Sanitation). The study adopted a quantitative research design to measure the relationship between water sanitation policy implementation and the incidence of cholera in the study area. Data were obtained through structured questionnaires administered to community residents, health workers, and local government officials, complemented by secondary data from local health records and public health reports. Descriptive statistics such as frequencies and percentages were used to summarize respondents' demographic characteristics and policy awareness levels, while inferential statistics, including correlation and regression analysis, were employed to determine the strength and significance of the relationship between sanitation policy interventions and cholera incidence. Findings from the study revealed a statistically significant association between effective water sanitation practices and a reduction in cholera cases. Areas with functional boreholes, proper waste disposal systems, and active hygiene education programs recorded fewer cholera outbreaks compared to communities with poor sanitation coverage. However, the research also uncovered several constraints affecting policy implementation, including inadequate funding, poor maintenance of water facilities, weak enforcement mechanisms, and limited public awareness about hygiene practices. These challenges have hindered the full realization of policy goals, thereby sustaining the vulnerability of some communities to cholera transmission. The study concludes that strengthening the implementation of water sanitation policies is crucial for achieving the targets of SDG 3.3 (ending epidemics of waterborne diseases) and SDG 6.1 (ensuring universal access to safe and affordable drinking water). It emphasizes the need for enhanced governmental commitment, community involvement, and sustainable financing to improve water and sanitation infrastructure. Furthermore, regular monitoring, capacity building, and health education should be intensified to sustain behavioral change and ensure the long-term prevention of cholera outbreaks. Ultimately, the effective enforcement of water sanitation policies in Karim Lamido Local Government Area can serve as a model for other regions in Nigeria seeking to achieve sustainable public health outcomes through improved water and sanitation management.

**Keywords:** Water sanitation policy, Quantitative analysis, Cholera control, Sustainable Development Goals (SDGs), Public health, Karim Lamido, Taraba State, Nigeria.

## Declaration

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

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Student's Full Name



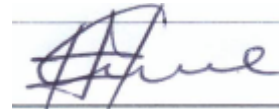
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Main Supervisor's Signature (Date)

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## **Acknowledgements**

I am profoundly grateful to Almighty God for His grace, wisdom, and strength that have sustained me throughout the course of this master's program and the successful completion of this research work.

My sincere appreciation goes to my supervisor, whose invaluable guidance, insightful comments, and constructive criticism contributed immensely to the quality and success of this study. I also wish to extend my gratitude to the Head of Department and all academic staff of the Department of Public Policy and Governance for their intellectual support, encouragement, and mentorship during my period of study.

I am particularly thankful to the management and staff of the Karim-Lamido Local Government Area Health Department for their cooperation and assistance during data collection. My appreciation also goes to all respondents who took part in this research for their time and honest contributions.

Finally, I remain deeply indebted to my family and friends for their prayers, love, and unwavering moral support, which served as a constant source of motivation throughout this academic journey.

## **Dedication**

This work is dedicated to Almighty God for His grace, wisdom, and strength throughout the course of this study.

It is also dedicated to my beloved parents and family, whose love, prayers, and encouragement have been my greatest motivation.

Finally, I dedicate this research to the people of Karim-Lamido Local Government Area and all communities striving to improve access to clean water and better sanitation for a healthier future

## **List of Acronyms and Abbreviation**

FG	Federal Government
FGN	Federal Government of Nigeria
FMOH	Federal Ministry of Health
HBM	Health Belief Model
LGA	Local Government Area
NCDC	Nigeria Centre for Disease Control
NGO	Non-Governmental Organization
NGOs	Non-Governmental Organizations
PHC	Primary Health Care
SDGs	Sustainable Development Goals
SPSS	Statistical Package for the Social Sciences
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation, and Hygiene
WASHP	Water, Sanitation, and Hygiene Policy
WHO	World Health Organization
WSP	Water Sanitation Policy
WSS	Water Supply and Sanitation

## Definition of Key Terms

**WASH:** refers to the collective policies and practices that ensure access to clean and safe drinking water, adequate sanitation facilities, and proper hygiene behaviors such as handwashing. It is a critical component of public health aimed at preventing diseases like cholera and improving community well-being.

**Cholera:** Cholera is an acute diarrheal disease caused by the bacterium *Vibrio cholerae*, usually transmitted through contaminated water or food. It leads to severe dehydration and can cause death if untreated. Effective WASH practices are essential in preventing and controlling cholera outbreaks.

**Policy effectiveness:** refers to the degree to which a policy achieves its intended goals and objectives. In this study, it measures how well the WASH policy has contributed to reducing and preventing cholera transmission in Karim-Lamido Local Government Area.

**Policy implementation:** is the process of putting government decisions, laws, or plans into action. It includes resource allocation, enforcement, and monitoring to ensure that the WASH policy objectives are achieved effectively.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

Waterborne diseases such as cholera remain a major public health threat in many developing regions, including Nigeria, where access to clean water, proper sanitation, and hygiene remains limited. Cholera, an acute diarrheal illness caused by the ingestion of food or water contaminated with *Vibrio cholerae*, is particularly prevalent in environments where water and sanitation systems are inadequate. Despite the formulation of public health policies and interventions aimed at controlling the spread of such diseases, many communities in rural Nigeria continue to experience recurrent outbreaks.

In recognition of the importance of Water, Sanitation, and Hygiene (WASH) in disease prevention, the Nigerian government has adopted several national policies, including the National Water Policy, the National Environmental Sanitation Policy, and the National Action Plan for the Revitalization of the WASH Sector (2018–2030). These policies aim to strengthen access to potable water, improve sanitation infrastructure, and promote hygiene practices through regulatory, educational, and infrastructural interventions.

However, the successful implementation of these policies depends on more than policy design—it requires effective enforcement, institutional coordination, community participation, and sustained funding. In many rural areas such as Karim-Lamido Local Government Area of Taraba State, these enabling conditions are weak or inconsistently applied. The region has experienced multiple cholera outbreaks in recent years, despite

the presence of formal WASH policy instruments. This raises critical questions about the effectiveness of these instruments in practice.

The gap between policy formulation and implementation has significant implications for public health outcomes. While many studies focus on the medical or epidemiological aspects of cholera, there is a growing need to assess how well WASH-related policy instruments are functioning at the grassroots level. Evaluating their effectiveness in areas like Karim-Lamido can offer valuable insights for improving governance, enhancing compliance, and reducing the burden of cholera and other waterborne diseases.

This study, therefore, seeks to evaluate the effectiveness of water sanitation and hygiene policies as implemented in the Karim-Lamido area. It focuses not only on outcomes such as cholera incidence but also on the mechanisms of policy enforcement, public awareness, infrastructure support, and local compliance. Through this approach, the research aims to identify critical policy gaps and offer evidence-based recommendations for strengthening public health responses.

## **1.2 Background to the Study**

Waterborne diseases, particularly cholera, remain a pressing public health concern in many low- and middle-income countries, including Nigeria. Cholera is primarily linked to poor access to clean water, inadequate sanitation, and unhygienic practices—conditions that persist in many rural communities (WHO, 2017). To mitigate the spread of such diseases, national and sub-national governments have introduced various Water, Sanitation, and Hygiene (WASH) policy instruments designed to regulate behavior, improve infrastructure, and increase access to safe water and sanitation.

Nigeria's response includes frameworks such as the National Water Policy, the National Environmental Sanitation Policy, and the National Action Plan for the Revitalization of the WASH Sector (2018–2030). These policies aim to promote sustainable and equitable access to clean water, improve sanitation services, and encourage hygiene education through multi-level implementation mechanisms (Federal Ministry of Water Resources [FMWR], 2018). These national strategies are also aligned with the Sustainable Development Goals (SDGs), particularly Goal 6, which emphasizes access to clean water and sanitation for all by 2030 (United Nations, 2015).

In Karim-Lamido Local Government Area of Taraba State, persistent cholera outbreaks in recent years have raised concerns about the effectiveness of these policy instruments. Recurring epidemics suggest that existing policies may not be adequately implemented or enforced at the community level. Rural settings like Karim-Lamido often suffer from limited WASH infrastructure, weak institutional coordination, low community engagement, and enforcement challenges (UNICEF, 2021). These limitations underscore the need to assess whether policy instruments—such as water quality regulations, hygiene promotion programs, and sanitation infrastructure guidelines—are achieving their intended impact.

While WASH policies provide a framework for addressing public health threats, their success relies heavily on local adaptation, funding, political will, and the capacity of relevant authorities to implement and monitor interventions (Ajayi et al., 2020). The Federal Ministry of Health (FMOH) have also emphasize the importance of water, sanitation, and hygiene (WASH) interventions, vaccination programs, and emergency response measures in combating cholera (WHO, 2021). In line with this, Nigeria has also

developed another several policies, including the National Health Policy (2016) and the NAPHS (2018-2023), to strengthen disease surveillance, improve sanitation, and enhance community engagement in disease prevention (NCDC, 2023).

Despite these efforts, cholera outbreaks persist in Karim Lamido, suggesting weaknesses in policy implementation. In December 2023, a cholera outbreak in Didango, Karim Lamido, resulted in six deaths and over 40 hospitalizations (NCDC, 2023). Similarly, in November 2021, another outbreak in Jen-Ardido led to one fatality and 13 hospitalizations (FMOH, 2022). These outbreaks indicate gaps in public health policy execution, enforcement, and community compliance, warranting a comprehensive evaluation of the effectiveness of these interventions. In addition, limited financial resources, inadequate public health infrastructure, and low awareness levels among the population contribute to the ongoing cholera crisis (UNICEF, 2022). Evaluating the effectiveness of these instruments in Karim-Lamido is essential for identifying gaps in implementation and proposing actionable recommendations for improved disease control and prevention.

### **1.3 Statement of the Problem**

Cholera remains a significant public health challenge in many regions, including Karim-Lamido Local Government Area (LGA) of Taraba State, Nigeria. According to the LGA Ministry of Health (MoH) data reports, the number of reported cholera cases has shown a concerning upward trend over the recent years. Specifically, there were 32 cases hospitalized in 2021, which increased to 43 cases in 2022, and further escalated to 77 cases in 2023 as illustrated in Table 1. This pattern indicates a troubling rise in cholera occurrence within the community, reflecting potential gaps in sanitation, access to clean water, health education, and disease control measures.

Despite the establishment of several national and subnational water, sanitation, and hygiene (WASH) policies and initiatives in Nigeria aimed at improving hygiene standards and access to safe water, cholera cases continue to rise. This suggests that current policies and interventions may not be fully effective or properly implemented at the community level, or that other socio-environmental factors are contributing to the persistent occurrence of cholera.

The increasing trend of cholera cases poses a serious threat to public health, as it can lead to outbreaks, increased morbidity and mortality, and strain on healthcare resources. This study is therefore necessary to critically evaluate the effectiveness of WASH policies as tools for controlling cholera in the Karim-Lamido area. By identifying how well these instruments function in practice, and what barriers may hinder their success, the research aims to provide informed recommendations for improving disease control efforts and enhancing public health policy implementation in similar rural contexts.

**Table 1:** Distribution of cholera outbreak cases across Karim-Lamido LGA – 2021-2023

<b>Distribution of Cholera Outbreak Cases across Karim-Lamido: Period - 2021 - 2023</b>					
<b>Community</b>	<b>Year</b>	<b>Hospitalised</b>	<b>Treated</b>	<b>Referral</b>	<b>Deaths</b>
Amar	2023	22	22	5	4
Andamin	2023	15	15	0	0
Didango	2023	40	40	11	6
Bachama	2022	7	7	0	1
Bikwin	2022	10	10	0	5
Jen kaigama	2022	17	17	5	0
Karim A.	2022	9	9	0	0
Darofai	2021	11	11	0	0
Jen Ardi-do	2021	13	10	3	1
Karim B.	2021	8	8	0	3
<b>Total</b>		<b>152</b>	<b>149</b>	<b>24</b>	<b>20</b>

## **1.4 Research Objectives**

To assess the effectiveness of water, sanitation, and Hygiene policy used to control the spread of cholera outbreaks in Karim-Lamido Local Government Area of Taraba State, Nigeria.

### **Specific Objectives includes:**

1. To assess the level of knowledge and awareness of cholera among residents of Karim-Lamido Local Government Area, Taraba State, Nigeria.
2. To examine the perception of the Water, Sanitation and Hygiene (WASH) policy among residents and stakeholders in Karim-Lamido Local Government Area, Taraba State.
3. To evaluate the level of compliance with sanitation and preventive practices related to cholera control among households in Karim-Lamido Local Government Area.
4. To identify the major challenges affecting the effective implementation of WASH and other cholera control policies in Karim-Lamido Local Government Area, Taraba State.

## **1.5 Research Questions**

The study will address the following research questions:

1. What is the level of knowledge and awareness of cholera among residents of Karim-Lamido Local Government Area, Taraba State?
2. How do residents and local stakeholders perceive the Water, Sanitation and Hygiene (WASH) policy in Karim-Lamido Local Government Area?
3. To what extent do residents comply with sanitation and preventive practices aimed at controlling cholera in Karim-Lamido Local Government Area?

4. What are the major challenges affecting the effective implementation of WASH and other cholera control policies in Karim-Lamido Local Government Area?

### **1.6 Assumptions of the Study**

This study is anchored on the assumption that:

1. There is no significant relationship between the level of knowledge and awareness of cholera and the occurrence of cholera cases among residents of Karim-Lamido Local Government Area.
2. There is no significant relationship between residents' perception of the WASH policy and the effectiveness of cholera control measures in Karim-Lamido Local Government Area.
3. There is no significant relationship between compliance with sanitation and preventive practices and the reduction of cholera outbreaks in Karim-Lamido Local Government Area.
4. There is no significant effect of challenges in policy implementation on the effectiveness of cholera control strategies in Karim-Lamido Local Government Area.

### **1.7 Significance of the Study**

This study is significant for several reasons. It provides an assessment of the effectiveness of existing public health policies in controlling Cholera disease outbreak in Karim-Lamido Area of Taraba State, Nigeria, offering valuable insights for policy evaluation. The findings will assist policymakers and health agencies in improving disease control strategies, ultimately enhancing public health in the region. Additionally, the study

contributes to academic knowledge on infectious disease control and public health policy implementation in Nigeria. Furthermore, the research findings can help local authorities and health organizations design better interventions to protect the health of residents in Karim Lamido, fostering a more resilient and responsive healthcare system.

### **1.8 Delimitations of the Study**

This research is limited to Karim Lamido Area of Taraba State, focusing specifically on cholera as the primary infectious disease under investigation. It assesses the effectiveness of policy instruments such as the National Action Plan for Health Security (NAPHS) and relevant Water, Sanitation, and Hygiene (WASH) policies in disease control. The study targets a well-defined population, including local health authorities, policymakers, and community residents in Karim Lamido, to provide a comprehensive evaluation of policy implementation and its impact on public health.

### **1.9 Limitations of the Study**

This study aims to provide a comprehensive assessment of policy effectiveness in controlling cholera infectious, which limited access to government records and official reports on policy implementation may affect data collection. Additionally, some residents may be unwilling to provide accurate information due to fear of repercussions or lack of awareness, which could impact the reliability of community-based data. To overcome these challenges, the study will utilize multiple data sources, including publicly available reports from the Nigeria Centre for Disease Control (NCDC), the State and Federal Ministry of Health (FMOH), and relevant non-governmental organizations. Key informant interviews with policymakers and healthcare officials will also supplement

available data. Furthermore, to enhance community participation, trusted community leaders and health workers will be engaged to facilitate trust-building, and participants will be assured of confidentiality. Additionally, historical data from previous cholera outbreaks and policy responses will be used to evaluate longer-term trends, ensuring a more comprehensive analysis.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.1 Introduction**

This section provided a review of literature related to the key areas of the study. The section structurally explores and describe the effectiveness of the water sanitation on hygiene policy used to control the spread of cholera outbreaks in Karim Lamido area of Taraba State, Nigeria. Particularly attention was focused on the theoretical framework to the study exposing the condition of effectiveness of cholera outbreaks in Karim Lamido Area of Taraba State, Nigeria. Bench making with global trend of effectiveness of cholera outbreak. Identify literature on control cholera policies exposing gaps in the study of effectiveness. The discussion on the theoretical framework place the research in perspective as it highlighted an ideal reality vis-à-vis what is obtaining.

#### **2.2 Theoretical Framework**

This study is anchored on the Health Belief Model (HBM). These theories help explain the behavioral, social, and environmental dimensions influencing the effectiveness of Water, Sanitation, and Hygiene (WASH) policies in controlling cholera outbreaks.

The Health Belief Model (HBM), developed by Rosenstock in the 1950s, provides a framework for understanding how individuals' perceptions influence their health-related decisions and actions. The model is based on key constructs such as perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. In the context of this study, the HBM explains how residents' awareness and knowledge of cholera (perceived susceptibility and severity) determine their compliance with sanitation and hygiene practices (perceived benefits and barriers). For

example, individuals who believe they are at high risk of contracting cholera are more likely to engage in preventive behaviors such as treating water, maintaining clean environments, and using toilets. Therefore, public health education that enhances perceived threat and benefits could increase compliance with WASH practices in Karim-Lamido.

### **2.3 Relevance of the theoretical framework**

Ajoke (2021) Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium, *Vibrio cholera*. Cholerae *V. cholera* O1 and O139 are the only causative agents of the disease. The two most distinguishing epidemiologic features of the disease are its tendency to appear in explosive outbreaks and its predisposition to causing pandemics that may progressively affect many countries and spread into continents. Despite efforts to control cholera, the disease continues to occur as a major public health problem in many developing countries. Numerous studies over more than a century have made advances in the understanding of the disease and ways of treating patients, but the mechanism of emergence of new epidemic strains, and the ecosystem supporting regular epidemics, remain challenging to epidemiologists. In Nigeria, since the first appearance of epidemic cholera in 1972, intermittent outbreaks have been occurring. The later part of 2010 was marked with severe outbreak which started from the northern part of Nigeria, spreading to the other parts and involving approximately 3,000 cases and 781 deaths. Sporadic cases have also been reported. Although epidemiologic surveillance constitutes an important component of the public health response, publicly available surveillance data from Nigeria have been relatively

limited to date. Based on existing relevant scientific literature on features of cholera, this paper presents a synopsis of cholera epidemiology emphasising the situation in Nigeria.

Oyekanmi (2022) conducted a study on the factors responsible for the re-emergence of cholera and predicted the future occurrence of Cholera in Lagos State, Nigeria using factor analysis, multiple linear regression analysis and a cellular automata model for the prediction. The study revealed six Local Government Areas (LGAs) under very high threat, nine under low threat, and Surulere and some parts of Amuwo Odofin under medium threat in the near future. These areas have an average population of 200,000 people each with the total tending towards millions of people, all under threat of cholera occurring and re-emerging in their communities. The factors relating to the re-emergence of the disease were discovered to be environmental (rainfall,  $R^2=0.017$ ,  $P<0.05$  and temperature,  $R^2=0.525$ ,  $P>0.05$ ); socio-economic (household size  $R^2=0.816$ ,  $P>0.05$ ; income,  $R^2=0.880$ ,  $P>0.05$ ; and education,  $R^2=0.827$ ,  $P>0.05$ ). The Cellular Automata Markov Prediction model showed that by 2016, Lagos State will experience 79 cholera cases which will increase to 143 in 2020. This prediction model revealed that Ikorodu will record 40 cases, Apapa 12, Ojo 5, Mushin 3, while Amuwo-Odofin, Badagry and Ajeromi-Ifelodun LGAs will each record 2 cases between 2011 and 2016. The study concludes that there is a cholera threat in Lagos State and the factors of vulnerability that predispose people to the disease must be tackled over time and space for effective prevention, control and management of the disease.

Oyekanmi (2022) Analysis of the Re-emergence and Occurrence of Cholera in Lagos State, Nigeria: Human Geography, Regional Geography, Socio-Economic Research

H.O. Adesina (1971) the medical geography of Nigeria in the twentieth century cannot well be written without a full chapter devoted to the cholera epidemics of 1971. Though some medical men had written on the clinical and epidemiological aspects of these epidemics, very little is still known about the prevalence and distribution of the dreadful disease. This paper thus concerns itself with the distribution characteristics of this cholera spread in the largest indigenous city in the country, i.e., Ibadan.

The first stage of the analysis (i.e., the temporal analyses) reveals that the cholera epidemic in Ibadan city in 1971 conformed to the classical epidemic curve of a positively skewed normal distribution with one marked and steep modal peak. The finding is in conformity with that postulated theoretically and empirically discovered in the past. The modal peak is also observed to be asymmetrical thus conforming also to existing theory.

In terms of the cholera distribution characteristics, the epidemic had two waves of diffusion. The first wave covered weeks 1–26 of 1971, while the second wave coincided with the later part of the year. The first cholera epidemic wave had a strongly peaked and very positively skewed curve in both time and the frequency domains; thus, the wave could be said to have an abrupt onset and a very rapid decline. The second wave on the other hand was platykurtic and relatively normal in distribution.

During the first epidemic wave, areas of earliest infection (i.e., the traditional core of the city) has a faster rate of diffusion than areas of later diffusion but during that second wave the peripheral areas (areas of later diffusion) were more affected in term of intensity of infection than the core area. The diffusion rate was faster also during the first wave than during the second wave, thus the second wave was of a less severe import than the first.

Though prediction of the second wave from the first wave was not possible, some vestiges of a “time” with “time” relationship of the first and the second wave was noticed.

A statistical analysis of the distribution characteristics of cholera within Ibadan City, Nigeria (1971). Israel Oluwasegun Ayenigbara (2017) this review characterizes a cholera outbreak in Nigeria in 2017/2018. On the basis of own experiences and the analysis of historical outbreaks, the *Vibrio cholera* strains, mode of transmission, signs and symptoms, and most important the prevention and control measures are identified. Untreated, the lethality of cholera is up to 70%. Therefore, a multifaceted approach including public policy, surveillance, water purification and hygiene, community sensitization, and the use of oral cholera vaccination (OVC) is vital to prevent, control, and reduce the cholera mortality rate. It is recommended that the government pass legislation to implement preventive and surveillance measures, e.g., invest in drinking water systems, sanitation systems and sewage treatment, and promote public education on basic hygiene. The latter includes boiling and treating water before drinking, washing hands frequently with soap and clean water, thoroughly cooking food before consumption, avoiding open defecation, disposing of wastes properly, and immediately taking anyone with signs and symptoms of cholera such as watery diarrhea to the hospital for treatment. Israel Oluwasegun Ayenigbara 2017 prevention and surveillance are key to combating cholera.

## **2.4 Literature Review**

### **2.4.1 Global and National Overview of Policy instruments.**

Cholera is an infectious disease caused by the bacterium *Vibrio cholerae*, leading to severe watery diarrhea and dehydration. It is transmitted primarily through contaminated water

and food, often in regions where sanitation and hygiene practices are inadequate. Cholera remains a significant public health issue globally, especially in regions with poor water quality and infrastructure, and has been a major concern in many parts of the world, particularly in low- and middle-income countries. This section provides an overview of the global and national (Nigeria-specific) burden of cholera, exploring its epidemiology, impact, and the challenges involved in its control and prevention.

Cholera continues to be a major global health threat, particularly in sub-Saharan Africa, Southeast Asia, and parts of the Caribbean. According to the World Health Organization (WHO), cholera remains endemic in 47 countries, with approximately 1.3 million cases and 21,000 to 143,000 deaths annually due to the disease (WHO, 2021). The disease is associated with poverty, poor sanitation, and lack of access to safe drinking water, making it a disease of inequity, often disproportionately affecting vulnerable populations, such as refugees, internally displaced persons, and those living in conflict zones.

The global spread of cholera has been largely linked to the lack of access to clean water and sanitation infrastructure. For instance, Sack et al. (2020) noted that cholera is endemic in many low-income countries due to insufficient sewage treatment and unreliable water systems. The prevalence of cholera outbreaks is often seasonal, with the rainy season increasing the risk of water contamination and the subsequent spread of the disease. The bacterium *Vibrio cholerae* thrives in unsanitary conditions, and without adequate infrastructure, rapid transmission can occur.

Several countries have made significant strides in controlling cholera. For example, in the 1990s, Latin American countries, such as Peru and Ecuador, experienced severe cholera outbreaks. However, these nations have since managed to reduce cholera incidences

significantly through comprehensive water, sanitation, and hygiene (WASH) interventions, including improvements in potable water supply and public education campaigns (Pizarro et al., 2018). The success in these countries illustrates the importance of WASH infrastructure in preventing the disease.

Despite progress in some regions, cholera outbreaks continue to occur in regions where these improvements are absent. In places such as Yemen, the Democratic Republic of the Congo (DRC), and Haiti, cholera has caused large-scale outbreaks in recent years. For example, the cholera outbreak in Yemen, which began in 2016, affected over 2.5 million people and caused approximately 4,000 deaths (Al-Madhaji *et al.*, 2018). This situation was exacerbated by ongoing conflict, lack of basic healthcare, and collapsed sanitation systems.

The global cholera situation has also been influenced by climate change. Warmer temperatures and changing rainfall patterns can alter the distribution of *Vibrio cholerae*, allowing it to spread into new areas. Studies have shown that increases in water temperature and rainfall are linked to the frequency of cholera outbreaks in various parts of the world, as the bacteria thrive in warm, brackish waters (Lobitz et al., 2018). The impact of climate change on cholera incidence raises concerns about future outbreaks, particularly in vulnerable regions.

In Nigeria, cholera has been a recurrent public health problem, with regular outbreaks affecting various parts of the country. The disease has had significant public health and socioeconomic impacts, with thousands of cases and hundreds of deaths reported annually. The Nigerian government, alongside local and international organizations, has

made efforts to control cholera, but challenges related to sanitation, health infrastructure, and public awareness persist.

#### **2.4.2 Epidemiology of Cholera in Nigeria**

Cholera remains a significant public health challenge in Nigeria, with epidemiological patterns showing distinct seasonal trends and geographical disparities. The disease exhibits a clear seasonal pattern, with cases typically surging during the rainy season between April and October, when flooding contaminates water sources and facilitates the spread of *Vibrio cholerae* (Nigeria Centre for Disease Control, 2022). According to recent surveillance data, the northern states consistently bear the highest burden of cholera outbreaks, particularly in the Northeast and Northwest regions, where access to improved water sources and sanitation facilities remains critically low (World Health Organization, 2023). The persistence of cholera in these regions reflects deep-seated structural inequalities in water, sanitation, and hygiene (WASH) infrastructure, compounded by environmental factors such as seasonal flooding and drought cycles that force populations to rely on unsafe water sources (Adebayo et al., 2023).

The epidemiological landscape of cholera in Nigeria has been characterized by recurrent outbreaks of varying magnitudes over the past decade. Significant epidemics were recorded in 2010, 2014, 2018, and most recently in 2021, when the country experienced one of its worst cholera outbreaks in years, with over 100,000 suspected cases and more than 3,000 deaths reported across 32 states (Nwajiuba-Laguda *et al.*, 2022). The 2021 outbreak was particularly severe in states such as Bauchi, Kano, and Zamfara, where case fatality rates exceeded the emergency threshold of 1%, highlighting weaknesses in early detection and response systems (Ogunmola et al., 2022). Epidemiological investigations

traced these outbreaks to multiple sources, including contaminated drinking water from shallow wells, unsafe water storage practices, and poor food hygiene in local markets, demonstrating the complex transmission pathways that sustain cholera endemicity in Nigeria (Uche-Ugbu *et al.*, 2023).

Recent epidemiological studies have identified specific risk factors and vulnerable populations that contribute to the persistence of cholera in Nigeria. Research by Ibekwe *et al.* (2022) demonstrated that populations in urban slums and peri-urban settlements with high population density and inadequate sanitation infrastructure are disproportionately affected. Furthermore, internally displaced persons (IDPs) in conflict-affected areas of northeastern Nigeria face elevated risks due to overcrowded living conditions and limited access to basic services (Abdulkadir *et al.*, 2023). The Nigerian Centre for Disease Control's surveillance data from 2022-2023 indicates that children aged 5-14 years account for the highest proportion of cases, reflecting both behavioral factors and immunological vulnerability (NCDC, 2023). These epidemiological insights underscore the need for targeted interventions that address the specific environmental, social, and behavioral determinants driving cholera transmission in high-risk populations and regions across Nigeria.

Cholera outbreaks in Nigeria are typically seasonal, with cases surging during the rainy season. The availability of contaminated water sources, poor waste management, and inadequate sanitation practices are key factors contributing to the spread of cholera. The country has witnessed numerous cholera outbreaks in recent decades, with the most notable recent outbreaks occurring in 2010, 2014, 2018, and 2021.

The Nigerian Ministry of Health (MoH) and the Nigerian Center for Disease Control (NCDC) have reported that cholera is endemic in Nigeria, with cases occurring

predominantly in the northern and southeastern parts of the country. For instance, Ogunmola et al. (2021) reported a major cholera outbreak in northeastern Nigeria in 2021, which affected several states, including Borno, Yobe, and Kano. The outbreak was attributed to inadequate sanitation systems, poor water sources, and a lack of public awareness about hygiene and prevention measures.

A study by Ibekwe et al. (2020) indicated that cholera outbreaks were frequently linked to inadequate water supply, unsanitary conditions, and overcrowded living environments, particularly in rural and informal urban settlements. The study further showed that the majority of cholera cases occurred in low-income areas with limited access to improved water and sanitation services.

#### **2.4.3 Impact of Cholera in Nigeria**

Cholera has considerable health and economic impacts in Nigeria. According to Bello et al. (2019), cholera outbreaks often lead to high morbidity and mortality rates, especially in vulnerable populations such as children under five, the elderly, and individuals with compromised immune systems. In addition to the health burden, cholera outbreaks strain the healthcare system and disrupt local economies. Health systems in rural areas are particularly vulnerable, with limited capacity to handle large outbreaks. The costs associated with cholera outbreaks including medical treatment, emergency response, and public health interventions can significantly divert resources from other pressing healthcare needs.

The impact of cholera in Nigeria is not confined to health outcomes. Ogunyemi et al. (2021) noted that cholera outbreaks often lead to displacement, as people flee from affected areas to seek safer environments. This exacerbates the spread of the disease to

other regions, further complicating control efforts. Furthermore, cholera outbreaks contribute to the loss of productivity, particularly in the agricultural sector, as affected communities may face interruptions in their daily activities due to illness and death.

#### **2.4.4 Impact of Cholera in Nigeria**

The impact of cholera on public health in Nigeria is both immediate and severe, with significant morbidity and mortality rates recorded during outbreaks. According to the Nigeria Centre for Disease Control (2023), the country reported over 110,000 suspected cases and more than 3,600 deaths in the 2021 outbreak alone, with case fatality rates exceeding 3% in some states like Bauchi and Jigawa. Vulnerable groups, including children under five, pregnant women, and the elderly, are disproportionately affected due to their heightened physiological susceptibility and limited access to healthcare services. The disease places an immense burden on the already strained healthcare system, diverting resources from other essential health services such as routine immunization and maternal care to emergency response efforts (Ogunmola et al., 2022). This strain is particularly evident in rural and conflict-affected regions, where healthcare infrastructure is weak and outbreaks often go undetected or underreported for extended periods.

The economic repercussions of cholera outbreaks in Nigeria are profound, affecting households, communities, and the national economy. At the household level, families face direct costs such as medical expenses, transportation to health facilities, and funeral costs, which can push them deeper into poverty (Adebayo et al., 2023). Indirect costs, including loss of income due to illness or caregiving responsibilities, further exacerbate economic vulnerability. A study by Uche-Ugbu et al. (2023) estimated that cholera outbreaks cost Nigeria an average of \$60 million annually in healthcare expenditures and lost

productivity. For agrarian communities, outbreaks often coincide with planting or harvesting seasons, disrupting agricultural activities and threatening food security. The cumulative effect of these economic disruptions perpetuates a cycle of poverty, particularly in regions where cholera is endemic.

Beyond its health and economic toll, cholera has significant social and developmental implications for Nigeria. Recurrent outbreaks undermine public trust in government capacity to provide basic services such as clean water, sanitation, and healthcare, fostering social discontent and exacerbating existing tensions (Abdulkadir et al., 2023). In conflict-affected areas, cholera outbreaks can intensify humanitarian crises, as seen in internally displaced persons (IDP) camps in Borno State, where overcrowding and poor sanitation create ideal conditions for rapid disease transmission. Moreover, cholera outbreaks disrupt education, as school closures during epidemics and illness among students and teachers impede learning outcomes. These multifaceted impacts highlight the interconnectedness of health with broader developmental goals, emphasizing the need for integrated approaches that combine public health interventions with investments in water, sanitation, and hygiene (WASH) infrastructure to break the cycle of cholera transmission and its far-reaching consequences.

#### **2.4.5 Challenges in Cholera Control in Nigeria**

Several challenges contribute to the persistent cholera burden in Nigeria. One of the primary challenges is inadequate water, sanitation, and hygiene infrastructure, especially in rural and underserved urban areas. According to Adebayo et al. (2020), the lack of clean water sources and proper sanitation facilities increases the risk of cholera transmission. In urban areas like Lagos, where rapid population growth has put pressure on existing water

and sanitation systems, cholera outbreaks have been linked to contamination of drinking water sources, particularly in informal settlements and slums.

Another challenge is the lack of public awareness and education about cholera prevention. Olatunji et al. (2018) emphasized the importance of health education campaigns that promote proper handwashing, safe water storage, and sanitation practices. However, limited resources and insufficient coordination between government agencies and local communities have hindered the effectiveness of these campaigns.

Furthermore, Nigeria faces challenges related to disease surveillance and reporting. In some areas, cholera cases go unreported or are misdiagnosed as other diseases, which complicates response efforts. Akinmoladun et al. (2021) suggested that strengthening disease surveillance systems and improving data collection processes are essential for timely intervention during outbreaks.

#### **2.4.6 Response and Prevention Strategies**

In response to cholera, the Nigerian government, along with international organizations such as the WHO and Médecins Sans Frontières (MSF), has implemented various strategies to reduce the incidence of the disease. These strategies include oral cholera vaccination campaigns, WASH interventions, and strengthening healthcare infrastructure. Ogunlade et al. (2020) highlighted that oral rehydration therapy (ORT) remains the cornerstone of cholera treatment, significantly reducing mortality rates when administered promptly. The government has also supported the distribution of chlorine tablets and water purification kits to affected communities.

Despite these efforts, Adebayo et al. (2021) emphasized that sustainable prevention of cholera in Nigeria requires long-term investment in water and sanitation infrastructure.

They noted that community-based approaches, such as empowering local leaders to promote sanitation and hygiene, are critical to reducing cholera transmission.

Cholera remains a significant public health issue both globally and in Nigeria. While progress has been made in controlling the disease through improved water, sanitation, and hygiene interventions, the disease continues to affect vulnerable populations in regions with inadequate infrastructure. In Nigeria, recurrent outbreaks, particularly in rural and informal urban areas, underscore the need for continued efforts to improve sanitation, enhance public health education, and strengthen disease surveillance. The global and national experiences with cholera emphasize that the control and prevention of the disease require a multi-faceted approach, including improving water and sanitation infrastructure, promoting hygiene practices, and ensuring timely access to treatment.

#### **2.4.7 Cholera Transmission and Pathophysiology**

Cholera is a waterborne infectious disease primarily caused by the bacterium *Vibrio cholerae*. The pathophysiology of cholera is characterized by the rapid onset of severe diarrhea, which, if untreated, can lead to dehydration, shock, and potentially death. Cholera is transmitted predominantly through the ingestion of contaminated food and water, and the transmission dynamics are closely linked to environmental and socio-economic factors such as sanitation, hygiene practices, and access to clean drinking water. This section will discuss the mechanisms of cholera transmission and its pathophysiology, focusing on both the global and Nigerian context, with references to studies conducted by Nigerian researchers.

#### **2.4.8 Cholera Transmission**

Cholera transmission occurs through the fecal-oral route, with *Vibrio cholerae* bacteria contaminating water or food sources, particularly in areas with poor sanitation. The bacterium can survive in both fresh and brackish water environments, making it particularly prevalent in flood-prone regions and areas with inadequate sewage treatment. Transmission occurs when individuals ingest water or food contaminated with *Vibrio cholerae*. In many low-income regions, especially in Nigeria, the contamination of drinking water by human feces, particularly in the absence of adequate water treatment systems, is the primary route of transmission.

According to Akinmoladun et al. (2021), in Nigeria, cholera outbreaks are often linked to contaminated wells, open water sources, and improper waste disposal, especially during the rainy season when flooding exacerbates these problems. The contaminated water can be ingested directly or indirectly through contaminated food that has been washed with contaminated water. Poor sanitation, lack of hygiene practices, and overcrowded living conditions create favorable conditions for cholera transmission. Adebayo et al. (2020) also noted that the spread of cholera in Nigeria is significantly influenced by environmental factors, such as inadequate drainage systems, poor waste management, and open defecation, all of which contribute to water contamination.

In urban centers and informal settlements, cholera transmission is exacerbated by the lack of access to piped water and proper sanitation. Bello et al. (2019) reported that cholera outbreaks are common in Nigerian slums where there is little to no access to sanitation services. In these areas, both drinking water and food are often contaminated with fecal matter, increasing the likelihood of cholera transmission. Studies by Ogunmola et al.

(2019) also highlighted that, in the absence of sanitary waste disposal systems, cholera bacteria spread rapidly within communities, especially when the population has limited access to healthcare services.

#### **2.4.9 Pathophysiology of Cholera**

The pathophysiology of cholera is rooted in the action of the cholera toxin produced by *Vibrio cholerae*. Upon ingestion, the bacteria travel through the stomach and enter the small intestine. The pathogenesis of the disease begins when *Vibrio cholerae* attaches to the epithelial cells of the small intestine using specific receptors (GM1 gangliosides) on the surface of enterocytes (intestinal cells). Once the bacteria adhere to the epithelial lining, they release the cholera toxin, which is a potent enterotoxin responsible for the symptoms of the disease.

The cholera toxin consists of two subunits: the A subunit (CTA) and the B subunit (CTB). The B subunit binds to the GM1 ganglioside receptor on the host cell, facilitating the entry of the A subunit into the enterocyte. The A subunit then activates an intracellular signaling cascade, which leads to the stimulation of adenylate cyclase. This, in turn, increases the levels of cyclic AMP (cAMP) inside the enterocyte. Elevated cAMP levels activate a protein kinase that causes the efflux of chloride ions ( $\text{Cl}^-$ ) into the intestinal lumen. This disrupts the normal ion transport across the cell membrane, leading to the secretion of large volumes of water and electrolytes into the intestinal lumen.

As a result, patients experience profuse, watery diarrhea, often described as "rice-water stools," due to the high content of electrolytes and mucus. Ogunlade et al. (2020) emphasized that this rapid loss of fluids and electrolytes is the hallmark of cholera, leading

to severe dehydration. In extreme cases, the patient may experience hypovolemic shock, which is characterized by low blood pressure, rapid pulse, and organ failure, ultimately leading to death if not treated immediately.

Dehydration is the primary consequence of cholera. According to Suleiman et al. (2021), without prompt rehydration, cholera can lead to a rapid decline in a patient's health, with death occurring within hours due to dehydration and the resultant electrolyte imbalance. The extent of dehydration correlates with the severity of the diarrhea, and in untreated cases, patients may lose up to 20 liters of water per day, resulting in shock, kidney failure, and death. Ibekwe et al. (2020) reported that the loss of vital electrolytes, such as sodium, potassium, and bicarbonate, further complicates the pathophysiology of the disease, leading to a severe electrolyte imbalance that disrupts normal cellular functions.

The acute nature of cholera, coupled with the rapid onset of dehydration, means that early diagnosis and treatment are critical. In many cases, oral rehydration therapy (ORT) can prevent the progression of the disease by replacing lost fluids and electrolytes. For severe cases, intravenous fluids and electrolyte replacement are necessary to stabilize the patient. Bello et al. (2019) emphasized the importance of ORT in reducing the mortality rate from cholera, as it helps restore fluid balance and prevent shock.

In addition to the cholera toxin, *Vibrio cholerae* also produces other virulence factors that contribute to its pathogenicity. These include flagella, which allow the bacteria to swim and penetrate the mucus layer in the intestines, and toxins that may further impair the intestinal lining. Ogunyemi et al. (2020) described how these additional factors enable *Vibrio cholerae* to survive and multiply in the hostile environment of the human gastrointestinal tract, enhancing its ability to spread within the host.

#### **2.4.10 Impact of Cholera Pathophysiology in Nigeria**

The impact of cholera in Nigeria is severe, particularly in regions with poor infrastructure and sanitation. According to Akinmoladun et al. (2021), cholera outbreaks often occur in areas where the population is highly susceptible due to inadequate healthcare systems and a lack of access to clean drinking water. The bacterium thrives in these environments, where poor waste management and contamination of water sources are common.

The rapid onset of symptoms and the potential for fatal dehydration make cholera a life-threatening disease in areas with limited access to medical care. Adebayo et al. (2020) found that cholera mortality rates are higher in rural Nigerian communities, where healthcare facilities are distant and often ill-equipped to manage the influx of patients during outbreaks. Furthermore, the stigma associated with waterborne diseases in some Nigerian communities, along with a lack of awareness about proper hygiene practices, hampers timely treatment and prevention measures, leading to higher fatality rates.

The pathophysiology of cholera underscores the importance of swift intervention. According to Olatunji et al. (2018), when cholera cases are identified early, oral rehydration can prevent severe dehydration and reduce mortality. However, this treatment is most effective in settings where healthcare systems are accessible and prepared to manage large numbers of cases, which remains a challenge in rural Nigeria. Cholera transmission and pathophysiology are heavily influenced by environmental factors such as sanitation, water quality, and access to healthcare services. In Nigeria, the disease is predominantly transmitted through contaminated water sources, especially in areas with poor waste disposal and sanitation systems. The pathophysiological process is driven by the cholera toxin, which disrupts electrolyte balance in the intestines, leading to massive

fluid loss, dehydration, and potentially death if not treated. Given the nature of cholera's transmission and the rapid progression of the disease, timely treatment and preventive measures, including improved sanitation, public health education, and water purification, are crucial in controlling outbreaks and minimizing fatalities.

#### **2.4.11 Factors Contributing to the Spread of Cholera**

Cholera, an acute diarrheal disease caused by the bacterium *Vibrio cholerae*, remains a significant public health issue in many parts of the world, particularly in low- and middle-income countries. The spread of cholera is influenced by a combination of environmental, socio-economic, and behavioral factors that create favorable conditions for transmission. In the Nigerian context, factors such as inadequate sanitation, poor hygiene practices, contaminated water sources, rapid population growth, and limited access to healthcare contribute significantly to the persistence of cholera outbreaks. This section will discuss the key factors that contribute to the spread of cholera, with a focus on Nigeria, drawing from recent studies and findings from Nigerian authors.

#### **2.4.12 Environmental Factors**

One of the primary factors contributing to the spread of cholera is the contamination of water sources, particularly in areas where sanitation is inadequate. Cholera transmission occurs primarily through the ingestion of food or water contaminated with *Vibrio cholerae*, which thrives in environments where there is poor sewage disposal, inadequate water treatment, and open defecation. In Nigeria, many rural and urban areas still lack access to clean and treated water, which leads to the contamination of both drinking water and food sources.

Ogunlade et al. (2020) noted that in many Nigerian communities, particularly in rural areas, water sources such as rivers, wells, and ponds are often polluted by human fecal matter, making them ideal breeding grounds for cholera bacteria. These water sources, coupled with poor waste management systems, create an environment where the bacterium can easily spread. Furthermore, seasonal changes, such as heavy rains during the rainy season, often exacerbate the situation by flooding poorly constructed sewage systems and contaminating water supplies.

Flooding during the rainy season is a significant contributor to cholera outbreaks in Nigeria. According to Suleiman et al. (2021), increased rainfall leads to the overflow of open sewers and latrines, which results in the widespread contamination of both surface and groundwater sources. This environmental factor is especially critical in urban areas, where unregulated construction, poor waste disposal systems, and lack of drainage infrastructure further contribute to the spread of cholera.

#### **2.4.13 Socio-Economic Factors**

Socio-economic conditions are another major driver of cholera outbreaks, particularly in low-income and densely populated areas. Poverty, lack of education, and limited access to healthcare are key factors that contribute to the vulnerability of communities to cholera. In Nigeria, large portions of the population, especially in rural areas, live in poverty and have limited access to basic services, including clean water, sanitation, and healthcare.

Bello et al. (2019) argued that in impoverished Nigerian communities, where a significant proportion of the population lacks access to piped water and adequate sanitation facilities, the risk of cholera transmission is elevated. These communities often rely on unsafe water

sources such as rivers, streams, and open wells, which are easily contaminated by human waste. Moreover, in many cases, residents of these areas lack knowledge of proper hygiene practices, further exacerbating the problem.

A study by Ogunmola et al. (2019) indicated that poverty and overcrowding in urban slums are major risk factors for cholera transmission in Nigerian cities. In these areas, sanitation infrastructure is either absent or poorly maintained, and many people live in unsanitary conditions, increasing the likelihood of waterborne diseases like cholera spreading rapidly.

Additionally, limited access to healthcare facilities in rural and peri-urban areas makes it difficult to provide timely treatment during cholera outbreaks. Ibekwe et al. (2020) highlighted that the lack of medical infrastructure, especially in rural parts of Nigeria, means that even when cholera cases are identified, patients often face delays in receiving appropriate treatment, contributing to high mortality rates.

Behavioral factors, including personal hygiene and community-level practices, play a critical role in the spread of cholera. In many parts of Nigeria, there is limited knowledge about the importance of hygiene, such as proper handwashing with soap and the need for safe water storage practices. Improper food handling, such as consuming raw or unclean food, also contributes to the transmission of cholera.

Ogunlade et al. (2020) emphasized that in many Nigerian communities, people often store water in open containers or in environments where it can easily become contaminated. Inadequate waste disposal practices, such as open defecation, are also widespread in both rural and urban areas, creating a direct pathway for *Vibrio cholerae* to enter water sources.

Olatunji et al. (2018) reported that cultural beliefs and practices, such as the use of untreated water from rivers or lakes for drinking and cooking, are deeply ingrained in some Nigerian communities, making it more difficult to change these habits despite public health campaigns.

Suleiman et al. (2021) also noted that in some Nigerian communities, there is a lack of awareness about the symptoms and transmission routes of cholera. This lack of knowledge, combined with poor health-seeking behavior, delays the diagnosis and treatment of cholera cases, allowing the disease to spread rapidly within the community.

#### **2.4.14 Inadequate Health Infrastructure**

The state of health infrastructure in Nigeria is another critical factor contributing to the spread of cholera. While some regions in Nigeria have made progress in improving healthcare access, many areas still lack the necessary infrastructure to control and manage cholera outbreaks. During cholera outbreaks, healthcare facilities in affected regions are often overwhelmed, and the lack of trained medical personnel further complicates response efforts.

Bello et al. (2019) emphasized that health facilities in Nigeria, particularly in rural areas, are often ill-equipped to handle the large numbers of cholera patients that arise during outbreaks. Many health centers lack the necessary supplies, such as intravenous fluids and antibiotics, needed to treat severe cases of cholera. In addition, limited access to medical care in rural areas means that patients may not receive treatment until they are in a critical condition, leading to higher mortality rates.

The Nigerian health system also faces challenges in terms of surveillance and rapid response to cholera outbreaks. Akinmoladun et al. (2021) noted that inadequate disease surveillance systems and reporting mechanisms often delay the detection and containment of cholera outbreaks, allowing the disease to spread beyond the initial affected areas.

Climate change is increasingly being recognized as a factor that exacerbates the spread of cholera. Changes in weather patterns, such as increased rainfall and rising temperatures, can influence the frequency and severity of cholera outbreaks. In Nigeria, climate change has led to altered rainfall patterns, more frequent flooding, and rising temperatures, all of which contribute to the contamination of water sources and the spread of *Vibrio cholerae*.

Lobitz et al. (2018) highlighted that the spread of cholera is linked to temperature and rainfall, as the bacterium thrives in warm and brackish waters. With climate change leading to erratic rainfall and more frequent flooding in Nigeria, the risk of cholera transmission increases. For instance, floods caused by heavy rains can overwhelm sewage systems and increase the risk of contaminated water supplies, facilitating the spread of the disease.

The spread of cholera is driven by a complex interplay of environmental, socio-economic, behavioral, and infrastructural factors. In Nigeria, inadequate sanitation, contaminated water sources, poverty, and limited access to healthcare contribute significantly to the persistence of cholera outbreaks. Addressing these factors requires a multi-faceted approach, including improvements in water, sanitation, and hygiene (WASH) infrastructure, public health education, and better healthcare delivery. Only through such integrated efforts can Nigeria hope to reduce the burden of cholera and improve public health outcomes.

#### **2.4.15 Cholera Prevention and Control Measures**

Cholera remains a major public health concern, particularly in areas with inadequate sanitation, poor water quality, and limited access to healthcare. Effective prevention and control measures are critical in reducing the incidence and impact of cholera outbreaks. In Nigeria, where cholera outbreaks are recurrent, a combination of both short-term and long-term strategies is necessary to curb the spread of the disease. This section will explore the prevention and control measures for cholera, with a focus on interventions in the Nigerian context. These measures include improvements in water, sanitation, and hygiene (WASH), vaccination programs, community education, and healthcare interventions, based on recent studies and recommendations from Nigerian authors.

#### **2.4.16 Water, Sanitation, and Hygiene (WASH) Interventions**

The cornerstone of cholera prevention is improving water, sanitation, and hygiene (WASH) conditions. Cholera is primarily transmitted through contaminated water and food, and improving access to clean water and proper sanitation is essential for controlling its spread. Akinmoladun et al. (2021) highlighted that the provision of clean water, the construction of proper sanitation facilities, and the promotion of hygienic practices are the most effective strategies for preventing cholera outbreaks in Nigeria.

Water treatment is a critical first step in reducing the risk of cholera transmission. Ensuring access to clean and treated drinking water is crucial, particularly in areas where people rely on surface water, such as rivers, ponds, and streams, which are easily contaminated. Studies by Ogunlade et al. (2020) indicated that improving water filtration and

chlorination processes can significantly reduce the risk of cholera in Nigerian communities.

In addition to water treatment, sanitation infrastructure plays a vital role in cholera prevention. Olatunji et al. (2018) emphasized that inadequate sewage systems and open defecation contribute significantly to cholera outbreaks in both rural and urban areas in Nigeria. The construction of safe latrines, sewage systems, and waste management systems is essential in reducing the contamination of water sources and the environment. Promoting the use of sanitary toilets and proper waste disposal methods can significantly reduce the chances of cholera bacteria entering the water supply.

Furthermore, hygiene practices, such as handwashing with soap, are vital to breaking the transmission cycle of cholera. Bello et al. (2019) stressed that public health campaigns focused on improving handwashing behaviors, especially after using the toilet and before handling food, are essential in reducing cholera transmission. Community-based hygiene programs that focus on handwashing education and the provision of soap and clean water can be highly effective in preventing cholera.

#### **2.4.17 Cholera Vaccination**

Vaccination against cholera is an important tool in cholera control, especially in areas with frequent outbreaks. In Nigeria, the use of oral cholera vaccines (OCVs) has become an important component of the national strategy for cholera prevention. According to Suleiman et al. (2021), oral cholera vaccination campaigns have been successfully implemented in various Nigerian states, particularly in regions where cholera outbreaks

are recurrent. The World Health Organization (WHO) recommends the use of OCVs as part of a comprehensive cholera prevention strategy, particularly in high-risk areas.

OCVs, such as Dukoral, Shanchol, and Euvichol, are effective in providing immunity against *Vibrio cholerae* and have been shown to reduce the risk of cholera outbreaks in endemic areas. Ogunmola et al. (2020) reported that vaccination campaigns conducted in Nigerian states like Borno and Kano have helped reduce cholera morbidity and mortality. The vaccination campaigns are usually complemented by other preventive measures such as water chlorination, sanitation improvements, and public health education.

However, the effectiveness of vaccination programs depends on reaching a high coverage rate within the target population. Ibekwe et al. (2020) noted that challenges such as logistical difficulties, vaccine hesitancy, and the lack of a well-coordinated vaccination strategy in some areas have hindered the full potential of vaccination campaigns in Nigeria. Despite these challenges, Adebayo et al. (2020) emphasized that oral cholera vaccination remains an important tool, especially in the context of mass vaccination during cholera outbreaks.

#### **2.4.18 Public Health Education and Community Engagement**

Education and community engagement are essential elements of cholera prevention and control. Public health campaigns that raise awareness about cholera transmission, prevention methods, and the importance of early treatment can significantly reduce the incidence of cholera outbreaks. In Nigeria, where cholera is often associated with poor sanitation and hygiene practices, educating communities about the importance of clean water, proper sanitation, and personal hygiene is critical.

Ogunlade et al. (2020) highlighted the importance of culturally appropriate public health education campaigns tailored to the local population's needs and understanding. Engaging community leaders and local health workers in promoting cholera prevention strategies has been shown to be effective in reaching rural and underserved populations. These campaigns often involve mass media (radio, television, and social media), as well as community meetings and outreach programs.

Community engagement in cholera prevention is particularly important in rural Nigeria, where health literacy may be lower, and access to information can be limited. Suleiman et al. (2021) suggested that integrating cholera prevention into broader community health programs can improve awareness and encourage individuals to take preventive measures, such as boiling water before drinking, proper waste disposal, and seeking medical care promptly when symptoms arise.

Timely detection and rapid response to cholera outbreaks are crucial to preventing widespread transmission. Akinmoladun et al. (2021) emphasized the importance of an effective surveillance system that can quickly identify and track cholera cases. Early detection through improved reporting mechanisms and monitoring of cholera cases in high-risk areas allows for the prompt implementation of control measures, such as the provision of rehydration therapy, antibiotics, and vaccination.

In Nigeria, the National Cholera Control Program is responsible for coordinating cholera response efforts, including surveillance, vaccination campaigns, and public health education. However, Olatunji et al. (2018) pointed out that surveillance systems in some regions are weak due to inadequate resources and a lack of trained personnel. Strengthening surveillance systems, improving reporting mechanisms, and ensuring that

local health workers are well-trained in cholera management are critical to controlling outbreaks.

Rapid response teams, including healthcare providers, public health experts, and community mobilizers, are essential in ensuring that cholera outbreaks are contained swiftly. Bello et al. (2019) suggested that establishing well-coordinated response teams at the local government level, with access to essential medicines and resources, can help mitigate the spread of cholera and reduce its impact.

#### **2.4.19 Improved Healthcare and Treatment Facilities**

A robust healthcare system is essential for managing cholera outbreaks and providing timely treatment to patients. Ibekwe et al. (2020) noted that effective treatment with oral rehydration salts (ORS) for mild to moderate cases, and intravenous fluids for severe cases, can significantly reduce mortality rates from cholera. In severe cases, antibiotics can be used to shorten the duration of illness and reduce transmission.

However, healthcare facilities in many parts of Nigeria, particularly in rural and conflict-affected areas, are often under-resourced and ill-equipped to handle large-scale cholera outbreaks. Ogunmola et al. (2020) suggested that strengthening healthcare infrastructure by ensuring the availability of essential medical supplies, improving the training of healthcare workers, and enhancing the capacity of health facilities to manage cholera cases is essential for reducing cholera-related mortality.

Preventing and controlling cholera requires a multifaceted approach that includes improvements in water, sanitation, and hygiene, vaccination campaigns, public health education, surveillance, and strengthening healthcare systems. In Nigeria, where cholera

outbreaks are frequent, addressing the root causes of cholera transmission, such as poor sanitation and contaminated water sources, is critical. A coordinated approach that combines these strategies will help reduce cholera's burden, save lives, and improve overall public health in the country. Given the persistence of cholera outbreaks in Nigeria, it is essential to continue focusing on these preventive and control measures to ensure the long-term reduction of cholera transmission and its devastating impacts.

## **2.5 Summary**

This chapter reviewed existing literature on the effectiveness of Water, Sanitation, and Hygiene (WASH) policy in controlling cholera, with a focus on its implementation in Karim-Lamido, Taraba State. It explored key concepts related to public health policy, the nature of cholera as a preventable waterborne disease, and the theoretical frameworks guiding the study, such as the Health Belief Model and Systems Theory. The chapter examined how WASH policies are designed, implemented, and enforced, as well as the challenges that affect their success, including infrastructure deficits, community compliance, and institutional capacity. It also aligned the literature with each research objective, providing a foundation for evaluating policy effectiveness and identifying existing gaps in local application and outcomes.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the research methodology employed to achieve the objectives of this study, which investigated the policy instruments and their effectiveness in controlling cholera outbreaks in Karim-Lamido Local Government Area of Taraba State, Nigeria. The chapter also discussed the research design, study area, population, sampling technique, sample size, data collection methods, instruments, and analysis techniques. A structured survey method was used to collect quantitative data from community members and relevant stakeholders.

#### **3.2 Research Design**

This study adopted a descriptive cross-sectional survey design and quantitative method design was used. The design enabled the researcher to collect data at a single point in time from a representative sample of the population. This design was suitable for assessing current awareness, compliance, and perceptions of cholera control policies among the people of Karim-Lamido Area of Taraba State Nigeria.

#### **3.3 Population and Sampling Techniques**

The population of this study comprises households within Karim-Lamido Communities that have been affected by cholera outbreaks between 2021 to 2023. This population was chosen because it represents the group most directly impacted by the reoccurrence of cholera in the study area.

A total of 224 respondents were selected for the study. The sample size was determined using Yamane's formula to ensure adequate representation of the target population. Respondents were selected through stratified random sampling depending on the exposure to cholera outbreaks and willingness to participate in the study.

Using Yamane's formula with a population size of 500 and a 5% margin of error ( $e = 0.05$ ), the sample size ( $n$ ) is calculated as follows:

$$\text{Where: } n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{500}{1 + 500(0.05)^2}$$

$$n = \frac{500}{1 + 500(0.0025)} = \frac{500}{1 + 1.25}$$

$$n = \frac{500}{2.25}$$

$$n = 222$$

A total sample size of 222.

A proportionate number of respondents was selected from each ward to ensure representativeness.

### **3.4 Data Collection Instruments**

A structured questionnaire was used by the researcher to collect quantitative data. The questionnaire consists of five sections: Section A: Socio-Demographic data, Section B: Knowledge and awareness of cholera and its transmission, Section C: Perception of cholera-related to policy instruments, Section D: Compliance with sanitation and preventive practices, Section E: Challenges in policy implementation and enforcement. The questionnaire included close-ended questions for clarity and depth of information on

concerning the outbreak of cholera in the area of Karim Lamido Area of Taraba State Nigeria.

### **3.4.1 Semi Structured Interview Guide**

Interviewing is a data gathering technique that allows the researcher to gain in depth knowledge from participants. Interviewing in research usually involves face-to-face verbal interchange between social agents (inquirer and informant) whereby the researcher attempts to obtain information, expressions or views from the informant (Cohen, Manion, & Morrison, 2011) (Johnson & Christensen, 2012). A semi structured interview guide was utilized with the head teachers (active and retired) to acquire in depth information on government initiatives for enhancing equity in education, factors affecting equity in education and on how to develop strategies for ensuring equity in education. Semi-structured interviews or in-depth interviewing follow a general script and cover a list of topics (objectives) but are also open ended (Bernard, 2013). Semi-structured interviews allow the researcher to control the type of information they collect but also lets both the researcher and the informant to follow new leads, therefore allows for collection of in-depth and structured data (Jongbo, 2014). Qualitative research and case study design emphasize the use of continuous interaction to create meaning when investigating phenomenon. Interviews allow interaction between the interviewee and interviewer until meaning is established, therefore it was best suited for this study and research design (Cohen, Manion, & Morrison, 2011).

### **3.5 Data Collection Procedure**

Data was collected through the following method of collection to enhance validity, reliability, and multiple data. The researcher administered a face-to-face questionnaire to

household heads, focusing on awareness, implementation, and compliance with WASH policies. Interview was conducted by the researcher with local government health officials, WASH coordinators, and traditional leaders to gain expert insights on policy enforcement and operational challenges. This method was Included analysis of health records, cholera outbreak reports, and WASH policy documents from local health departments and NGOs in Karim Lamido Area of Taraba State Nigeria.

### **3.6 Data Presentation and Analysis Methods**

#### **3.6.1 Thematic Analysis**

The researcher used thematic analysis for data organization and analysis. Thematic analysis entails codifying and classifying collected data into themes and subthemes as provided by the research objectives and research questions. This typically involves identifying common ideas or themes that emerge based on the phenomenon under investigation and those that resonate with the research questions posed in the study (Peterson, 2017). It involves identifying recurring themes within the data, exploring typologies of these themes, and looking at variations/ relationships between and within the themes (Johnson & Christensen, 2012). Raw data from recorded interviews was brought together for transcribing, checked for accuracy and then organized and analyzed according to the themes identified in the research question and as modeled by the theory underpinning the study, the BELE Framework. Thematic analysis is an appropriate method of analysis for seeking to understand experiences, thoughts, or behaviors across a data set (Kiger & Varpio, 2020). Therefore, that was the method used for data organization and analysis.

### **3.6.2 Content Analysis**

To gain in-depth understanding on the education equity state, the researcher employed content analysis to be able to identify variations, themes and relations in information retrieved from the document review process. Information from journals, policy documents, reports, newspapers, handbooks, procedure manuals and books was analyzed. Content analysis defines the process of summarizing and reporting written data. Krippendorp (2004:18) defines it as a research technique for making replicable and valid inferences from texts (or meaningful matter) to contexts of their use. Themes which answered the research questions on education equity were coded and used to inform the study.

### **3.7 Ethical Considerations**

Ethical approval was obtained from relevant authorities. Participation will be voluntary. Respondents will be informed about the purpose of the study and their right to withdraw at any time without penalty.

#### **3.7.1 Permission and Informed Consent**

Before commencing data gathering from the audience, relevant authority was requested from the Ministry of water resources and ministry of Environment through their district and offices. Secondly the researcher was also given approval by the Africa University Research Ethics Committee (AUREC) which certified that the research met ethical standards of honesty, objectivity, integrity, carefulness, openness, confidentiality, non-discrimination and legality. The researcher ensured that all participants signed the informed consent form before they participated in the interviews. The researcher

explained the purpose of the study to the participants to eliminate misconceptions. Participants who did not consent were not forced to participate.

### **3.7.2 Privacy, Confidentiality and Anonymity**

The essence of anonymity is that information provided by participants should in no way reveal their identity (Cohen, Manion, & Morrison, 2011). Every individual has a right to privacy and it is their right to decide what, when, to whom and to what extent their information will be revealed (Fouka & Mantzorou, 2011). Participants were informed that the data collected is only for educational purposes and it will in no way be able to be used to identify them in their personal capacity. The other way of protecting a participant's privacy is through the promise of confidentiality. This means not disclosing information from the participants in any way that might enable the individual to be traced. Data collected on the field will only be used for academic purposes.

### **3.7.3 Plagiarism**

The researcher cited sources and acknowledged as much as possible whenever they used other scholars' ideas or work.

## **3.8 Summary**

This chapter presented the research methodology, emphasizing the survey method as a tool for collecting relevant data to evaluate cholera control policies

## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND INTERPRETATION:**

#### **4.1 Introduction**

This study examined the effectiveness of Water, Sanitation, and Hygiene (WASH) policies in controlling the spread of cholera in Karim-Lamido Local Government Area of Taraba State, Nigeria. The research focused on identifying existing policy instruments, assessing their implementation and enforcement, and exploring the challenges affecting their effectiveness. Based on the findings, it was observed that while awareness of cholera prevention is relatively high, poor access to clean water, inadequate sanitation facilities, weak policy enforcement, and limited community involvement remain major barriers to effective cholera control. The following recommendations are therefore proposed to strengthen WASH policy implementation and improve public health outcomes in the area.

#### **4.2 Data Presentation and Analysis**

This section presents and analyzes the data collected from respondents in Karim-Lamido Local Government Area regarding the effectiveness of WASH (Water, Sanitation, and Hygiene) policies and cholera control measures. The data were obtained through structured questionnaires administered to households and analyzed using descriptive statistics such as frequency and percentage distributions. The analysis is presented in tables and narratives to provide a clear understanding of respondents' knowledge, perceptions, and compliance with sanitation and preventive practices, as well as the challenges affecting policy implementation in the study area.

**4.2.1: Socio-demographic responds of the participant in Karim-Lamido local government Area, Taraba State, Nigeria**

Variables	Respondents	Frequency	
		Frequency	Percent
<b>Age</b>	Under 18	24	11.2
	18-30 years	82	38.3
	31-45 years	62	29.0
	46-60 years	30	14.0
	Above 60 years	16	7.5
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Gender</b>	Male	114	53.3
	Female	100	46.7
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Occupation</b>	Farmer	45	21.0
	Trader	38	17.8
	Civil servant	55	25.7
	Student	71	33.2
	Others	5	2.3
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Educational level</b>	No formal	29	13.6
	Primary	14	6.7
	Secondary	36	16.8
	Tertiary	135	63.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Ward/ Community</b>	Amar	20	9.3
	Karim B	8	3.7
	Kwanchi	20	9.3
	Andamin	15	7.0
	Bachama	21	9.8
	Bikwin	28	13.1
	Darofai	40	18.7
	Didango	23	10.7
	Karim A	13	6.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>

A total of 214 respondents participated in this study across various wards and communities in Karim-Lamido Local Government Area of Taraba State. The socio-demographic data revealed that the majority of the respondents (38.3%) were within the age group of 18–30 years, followed by 29.0% who were between 31–45 years, while 14.0% were aged 46–60 years, 11.2% were below 18 years, and only 7.5% were above 60 years. This age distribution indicates that most of the participants were in their youthful and economically active years, which is a crucial group for the adoption and sustainability of water, sanitation, and hygiene practices within the community. In terms of gender, 53.3% of the respondents were male while 46.7% were female, showing a fairly balanced gender participation that provides a broad perspective of both men and women in understanding and practicing hygiene behaviors relevant to cholera prevention. The occupational distribution showed that students accounted for the highest proportion (33.2%), followed by civil servants (25.7%), farmers (21.0%), and traders (17.8%), with a small fraction (2.3%) engaged in other forms of occupation. This variety reflects the diverse socioeconomic background of the respondents and indicates that the study captured inputs from people across different income and educational levels. Regarding educational attainment, the results revealed that a majority (63.1%) of the respondents had tertiary education, 16.8% had secondary education, 6.7% had primary education, while 13.6% had no formal education at all. The high level of tertiary education among respondents suggests that most participants are literate and likely to have better access to information regarding cholera transmission and prevention, as well as greater understanding of government health policies such as WASH interventions. The distribution of respondents by community showed that participants were drawn from eleven wards, including Darofai (18.7%), Bikwin (13.1%), Didango (10.7%), Bachama (9.8%), Amar (9.3%), and

Kwanchi (9.3%), while other wards such as Andamin, Jen Ardi-do, Karim A, Karim B, and Jen Kaigama had smaller representations ranging between 3.7% and 7.5%. This broad representation across different wards ensures inclusiveness and strengthens the validity of the findings. Overall, the socio-demographic profile indicates that the study sample was largely young, educated, and diverse, with a balanced gender composition, making them well-positioned to provide reliable insights into the level of knowledge, perception, compliance, and challenges surrounding cholera control and WASH policy implementation in Karim-Lamido Local Government Area of Taraba State.

**4.2.2: The level of knowledge and awareness of cholera among residents of Karim-Lamido Local Government Area, Taraba State, Nigeria.**

<b>Variables</b>	<b>Responses</b>	<b>Frequency</b>	<b>Percent</b>
<b>Have you heard of Cholera before?</b>	Yes	196	91.6
	No	18	8.5
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>What is the main causes of cholera?</b>	Dirty water	192	89.7
	Bad air	7	3.3
	Mosquito bite	2	0.9
	I don't know	13	6.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>How is cholera transmitted?</b>	Contaminated water	157	73.4
	Poor sanitation	41	19.2
	Food contamination	5	2.3
	I don't know	11	5.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Do you know about government policies related to cholera prevention?</b>	Yes	177	82.7
	No	37	17.3
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>If yes, which of the following have you heard of?</b>	Water sanitation policy	119	55.6
	Hygiene campaigns	61	28.5

Waste disposal regulation	22	10.3
Others	12	5.6
<b>Total</b>	<b>214</b>	<b>100.0</b>

The findings on the level of knowledge and awareness of cholera among residents of Karim-Lamido Local Government Area, Taraba State, revealed a generally high level of awareness about the disease and its causes. Out of the 214 respondents surveyed, an overwhelming majority (91.6%) reported that they had heard of cholera before, while only 8.5% indicated that they had never heard of it. This high awareness suggests that information about cholera has reached a large portion of the population, likely through health education campaigns, previous outbreak experiences, or community sensitization programs. When asked about the main cause of cholera, 89.7% correctly identified dirty or contaminated water as the primary cause of the disease, while a small fraction attributed it to bad air (3.3%) or mosquito bites (0.9%), and 6.1% admitted that they did not know the cause. This indicates that most respondents have accurate knowledge of cholera's etiology, linking it appropriately to unsafe water sources and poor hygiene practices, although a few still hold misconceptions that could influence preventive behaviors.

Regarding transmission routes, 73.4% of respondents correctly identified contaminated water as the main mode of transmission, 19.2% mentioned poor sanitation, and 2.3% cited food contamination, while 5.1% stated that they did not know how the disease spreads. These findings demonstrate a strong general understanding of the environmental and behavioral factors associated with cholera transmission, though the relatively low recognition of food contamination as a possible route suggests a gap in specific knowledge that could be addressed through public health education. On awareness of government

efforts toward cholera prevention, 82.7% of the respondents acknowledged knowing about policies related to cholera control, while 17.3% had no knowledge of any such interventions. Among those aware of government policies, more than half (55.6%) identified the Water Sanitation Policy, followed by Hygiene Campaigns (28.5%), Waste Disposal Regulations (10.3%), and Other related initiatives (5.6%). This reflects a fair level of public familiarity with existing WASH-related policies and programs, although it also highlights that awareness is still concentrated around water and sanitation initiatives rather than broader environmental health measures.

In summary, the results show that the residents of Karim-Lamido Local Government Area possess a relatively high level of knowledge and awareness about cholera, its causes, and its modes of transmission. However, there remain some knowledge gaps and misconceptions among a small proportion of the population. Strengthening community-based health education and expanding communication on all aspects of WASH policy, especially proper food hygiene and waste management, would further enhance cholera prevention efforts in the area.

**4.2.3: The perception of the Water, Sanitation and Hygiene (WASH) policy among residents and stakeholders in Karim-Lamido Local Government Area, Taraba State.**

Variables	Responses	Percent	
		Frequency	
<b>Do you think the government water and sanitation policies are effective?</b>	Very effective	68	31.8
	Effective	55	25.7
	Not effective	74	34.6
	I dont know	17	8.0
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>How often do you receive information on hygiene or sanitation from government agencies?</b>	Frequently	51	23.8
	Sometimes	79	36.9
	Rarely	61	28.5
	Never	23	10.8
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Who do you think is the most responsible for preventing cholera in your area?</b>	Government	67	31.3
	Individual	107	50.0
	NGOs	22	10.3
	Traditional leaders	12	5.6
	Others	6	2.8
	<b>Total</b>	<b>214</b>	<b>100.0</b>

The perception of the Water, Sanitation, and Hygiene (WASH) policy among residents and stakeholders in Karim-Lamido Local Government Area of Taraba State revealed mixed opinions regarding the effectiveness and implementation of government interventions aimed at cholera control. Out of the 214 respondents surveyed, 31.8% rated the government’s water and sanitation policies as very effective, while 25.7% considered them effective, making a combined total of 57.5% who believed the policies were working to some extent. However, a significant proportion (34.6%) perceived the policies as not effective, and 8.0% stated that they did not know whether the policies were effective or not. This mixed perception suggests that although some community members

acknowledge the presence and positive impact of WASH initiatives, others feel that the implementation has not translated into tangible improvements in water quality, sanitation infrastructure, or consistent cholera prevention outcomes in their localities.

Regarding the frequency of communication and hygiene promotion from government agencies, only 23.8% of respondents reported that they frequently receive information on hygiene or sanitation, while 36.9% said they sometimes receive such information. On the other hand, 28.5% noted that they rarely receive updates, and 10.8% stated they never receive any hygiene-related information from government sources. This finding implies that although information dissemination is ongoing, it remains irregular and insufficient to reach all community members consistently. Sustained and regular community engagement is essential to maintain awareness and promote behavioral change necessary for effective cholera prevention.

When asked who they believed held the primary responsibility for preventing cholera in their area, half of the respondents (50.0%) identified individuals as the most responsible actors, while 31.3% assigned the responsibility to the government. Others attributed the role to non-governmental organizations (10.3%), traditional leaders (5.6%), and others (2.8%). This shows a commendable level of personal responsibility and community ownership among residents, though it also reflects the perception that government agencies alone cannot effectively manage cholera prevention without active community participation.

In summary, the results suggest that while there is some recognition of the government's efforts in promoting WASH policies, the perceived effectiveness remains moderate due to inconsistent policy implementation, limited communication, and infrastructural

challenges. The community’s belief that individuals play a leading role in cholera prevention indicates a potentially strong foundation for community-driven hygiene promotion programs. Strengthening collaboration between the government, NGOs, and traditional leaders could help improve both the reach and the effectiveness of WASH initiatives in Karim-Lamido Local Government Area.

**4.2.4: The level of compliance with sanitation and preventive practices related to cholera control among households in Karim-Lamido Local Government Area.**

Variables	Responses	Responses	
		Frequency	Percent
<b>Do you have access to safe drinking water?</b>	Yes	119	55.6
	No	95	44.5
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Do you use a toilet/latrine in your household?</b>	Yes	130	60.7
	No	84	39.3
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>How often do you treat your drinking water</b>	Always	90	42.1
	Sometimes	100	46.7
	Never	24	11.2
	<b>Total</b>	<b>214</b>	<b>100.0</b>

The analysis of the level of compliance with sanitation and preventive practices related to cholera control among households in Karim-Lamido Local Government Area of Taraba State

revealed moderate adherence to essential hygiene and sanitation measures. Out of the 214 respondents surveyed, 55.6% reported having access to safe drinking water, while 44.5% indicated that they did not have access to safe water sources. This finding suggests that although more than half of the population has access to potable water, a substantial proportion of residents still rely on potentially contaminated sources such as rivers, open wells, or streams, which may increase their vulnerability to cholera infection. Access to

safe water remains one of the key determinants of cholera prevention, and the relatively high proportion of households without such access reflects the need for stronger water infrastructure and maintenance within the area.

In terms of sanitation practices, 60.7% of the respondents stated that they use a toilet or latrine in their households, while 39.3% admitted they do not have access to any toilet facility and likely practice open defecation. This level of sanitation coverage indicates moderate compliance with hygienic waste disposal, though the persistence of open defecation among nearly two-fifths of the population remains a major public health concern. Open defecation is a significant contributor to the contamination of water sources and the rapid spread of cholera, particularly during the rainy season. These findings point to the need for continuous community-led sanitation programs and enforcement of hygiene policies to improve household sanitation standards.

Regarding household water treatment practices, 42.1% of respondents reported that they always treat their drinking water, 46.7% said they sometimes treat it, while 11.2% never treat their water before consumption. This indicates that while many households recognize the importance of water treatment, the practice is not consistent across the community. Inconsistent water treatment may result from inadequate awareness, lack of access to treatment materials such as chlorine tablets or filters, or complacency when the water appears clean.

In summary, the findings suggest that the level of compliance with sanitation and preventive practices in Karim-Lamido Local Government Area is fair but not optimal. While a majority of residents engage in some form of safe hygiene behavior, gaps remain in access to safe water, use of latrines, and consistent water treatment. Strengthening water

and sanitation infrastructure, improving hygiene education, and promoting behavior change interventions through community participation are essential steps toward achieving full compliance and reducing the risk of cholera transmission in the area.

**4.2.5: The major challenges affecting the effective implementation of WASH and other cholera control policies in Karim-Lamido Local Government Area, Taraba State.**

Variables	Responses	Frequency	
		Frequency	Percent
<b>Are there challenges to accessing clean water in your community?</b>	Yes	149	69.6
	No	65	30.4
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Is the sanitation infrastructure in your area adequate (e.g toilet, drainage)?</b>	Yes	96	44.8
	No	118	55.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Are government WASH policies enforced in your community?</b>	Always	53	24.8
	Sometimes	87	40.7
	Rarely	40	18.7
	Never	34	15.9
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Do you think poor enforcement contribute to cholera outbreak?</b>	strongly agreed	90	42.1
	Agreed	100	46.7
	Disagreed	11	5.1
	strongly disagree	13	6.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Is there regular monitoring of hygiene and sanitation in your area by authorities?</b>	Yes	81	37.9
	No	133	62.1
	<b>Total</b>	<b>214</b>	<b>100.0</b>
<b>Are WASH-related resources (e.g water, soap, toilet) available and accessible?</b>	Always	58	27.1
	Sometimes	73	34.1
	Rarely	51	23.8
	Never	32	15.0
	<b>Total</b>	<b>214</b>	<b>100.0</b>

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<b>Do community leaders supports and hygiene and sanitation practices?</b>	Yes	94	43.9
	No	61	28.5
	Not sure	59	27.6
	<b>Total</b>	<b>214</b>	<b>100.0</b>

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The findings on the major challenges affecting the effective implementation of Water, Sanitation and Hygiene (WASH) and other cholera control policies in Karim-Lamido Local Government Area, Taraba State, reveal several structural, institutional, and behavioral barriers that hinder sustainable cholera prevention and control efforts.

A majority of respondents (69.6%) indicated that there are challenges to accessing clean water in their communities, while only 30.4% reported having no such difficulties. This shows that the scarcity or inaccessibility of potable water remains a critical issue in the area. The limited availability of clean water sources such as boreholes and protected wells compels residents to rely on unsafe sources like rivers or stagnant water, thereby heightening their exposure to cholera infection.

In terms of sanitation, 55.1% of respondents stated that the sanitation infrastructure in their area is inadequate, compared to 44.8% who considered it adequate. This implies that most communities still lack essential facilities such as toilets, waste disposal systems, and proper drainage networks. Poor sanitation infrastructure contributes directly to the spread of cholera through fecal contamination of water and the environment, particularly in densely populated or flood-prone areas.

Regarding policy enforcement, only 24.8% of respondents said WASH policies are *always enforced*, while 40.7% said they are enforced *sometimes*, and 34.6% (rarely/never) indicated minimal enforcement. This highlights weak institutional implementation at the

local level. The absence of consistent policy enforcement limits the impact of national or state-level WASH initiatives and allows poor hygiene behaviors and open defecation to persist.

The perception of respondents toward policy enforcement is reinforced by the finding that 88.8% (42.1% strongly agreed and 46.7% agreed) believe that poor enforcement contributes to cholera outbreaks. This reflects a high level of awareness that weak governance and lack of accountability play major roles in recurring outbreaks.

Monitoring and supervision also appear inadequate, as 62.1% of respondents noted that there is no regular monitoring of hygiene and sanitation by authorities. This absence of oversight limits the ability to detect problems early, support households in compliance, or assess the effectiveness of interventions.

In terms of resource availability, only 27.1% of respondents said WASH-related resources (e.g., clean water, soap, toilets) are *always available*, while a combined 72.9% (sometimes, rarely, or never) experience irregular or poor access to these basic necessities. The inconsistent supply of sanitation materials and clean water significantly undermines efforts to maintain hygiene standards and prevent cholera transmission.

Finally, community participation remains a mixed factor. While 43.9% of respondents affirmed that community leaders support hygiene and sanitation practices, 28.5% said they do not, and 27.6% were unsure. This suggests that local leadership engagement is inconsistent, and in some cases, community leaders may not play an active role in mobilizing residents or enforcing hygiene norms.

In summary, the major challenges affecting the effective implementation of WASH and cholera control policies in Karim-Lamido Local Government Area include limited access to clean and safe water sources, inadequate sanitation infrastructure such as toilets, drainage, and waste disposal systems, weak enforcement of government WASH policies and regulations, and irregular monitoring and supervision by relevant authorities. Other issues identified include the insufficient availability of hygiene resources like soap and clean water, as well as inconsistent community leadership support for hygiene initiatives. These findings highlight the urgent need for improved infrastructure investment, stronger enforcement of WASH regulations, continuous public health education, and active community participation to achieve sustainable cholera control in the area.

#### **4.3 Discussion and Interpretation**

The findings of this study reveal that the effective implementation of Water, Sanitation, and Hygiene (WASH) and other cholera control policies in Karim-Lamido Local Government Area (LGA) of Taraba State faces multiple challenges that reflect both infrastructural and institutional weaknesses. These findings align with existing literature showing that inadequate access to clean water, poor sanitation facilities, weak policy enforcement, and limited public awareness remain central barriers to cholera prevention in Nigeria and other low-resource settings (UNICEF, 2023).

The majority of respondents (69.6%) reported facing challenges in accessing clean water, consistent with the 2023 WHO/UNICEF Joint Monitoring Programme (JMP) report, which noted that approximately 26% of Nigerians still rely on unimproved or contaminated water sources. The lack of reliable water infrastructure compels many households to depend on rivers, ponds, or open wells that are vulnerable to fecal

contamination, a major transmission pathway for *Vibrio cholerae* (WHO, 2024). This situation is further compounded by the fact that many rural and semi-urban communities in northern Nigeria, including parts of Taraba State, experience seasonal water shortages and flooding, both of which heighten the risk of cholera outbreaks (Adeniran *et al.*, 2021). In addition, more than half (55.1%) of respondents reported that sanitation infrastructure in their communities is inadequate. This finding is consistent with the National Bureau of Statistics (NBS, 2022) report that only about 46% of Nigerian households have access to improved sanitation facilities. Poor sanitation—such as open defecation and improper waste disposal—contributes significantly to waterborne disease outbreaks. Nigeria still ranks among the top ten countries globally with the highest number of people practicing open defecation (World Bank, 2022). In communities like Karim-Lamido, where population growth is not matched by infrastructural development, the existing sanitation systems are often overstretched, leading to contamination of surface and groundwater sources.

The study also revealed that the enforcement of WASH policies is weak, as only 24.8% of respondents said that these policies are “always enforced,” while 40.7% said enforcement occurs “sometimes.” This agrees with the findings of (Musa *et al.*, 2020), who observed that policy implementation gaps and poor intersectoral coordination at the local government level often undermine Nigeria’s National Action Plan for Cholera Control (NAPCC). Enforcement challenges are frequently linked to inadequate funding, lack of trained personnel, and limited political will to prioritize water and sanitation projects (Ogundele *et al.*, 2023).

Interestingly, a large majority of participants (88.8%) agreed that poor enforcement contributes to cholera outbreaks. This highlights the growing recognition within communities that cholera is not merely a medical problem but a governance issue. Studies by Ezeh and Ojo (2021) and WHO (2024) similarly argue that sustainable cholera elimination requires not only infrastructural investment but also consistent monitoring, accountability, and enforcement of sanitation bylaws at community and local government levels.

The finding that 62.1% of respondents reported no regular monitoring of hygiene and sanitation in their area underscores the weakness of local surveillance systems. Effective monitoring is crucial for early detection of risks and prompt response to potential outbreaks (CDC, 2022). The absence of regular inspection and environmental health oversight allows for the persistence of unhygienic practices that favor cholera transmission.

Furthermore, the study showed that 72.9% of respondents experience irregular access to hygiene resources such as soap, clean water, and toilets. This resource scarcity directly affects the ability of households to maintain hygiene standards, a challenge also highlighted in studies conducted in northern Nigeria by (Ibrahim *et al.*, 2022) and UNICEF (2023).

A key observation from the results is that 69.6% of respondents experience difficulties accessing clean water, suggesting that water insecurity is a major public health concern in the area. This situation mirrors broader trends in Nigeria, where an estimated 25–30% of the population still lacks access to safely managed drinking water (UNICEF, 2023). Poor access to potable water often compels households to rely on unsafe sources such as open

wells, rivers, or ponds, which are highly susceptible to contamination by *Vibrio cholerae*, the causative agent of cholera. Studies in similar regions, such as by (Adejumo *et al.*, 2022) and (Musa *et al.*, 2020), have shown a direct correlation between inadequate water supply and recurring cholera outbreaks, especially during the rainy season when flooding spreads fecal matter into water bodies.

The inadequacy of sanitation infrastructure, as reported by 55.1% of respondents, further compounds the risk. Many communities in northern Nigeria still lack proper toilet facilities, and open defecation remains a widespread practice. This aligns with the findings of the National Bureau of Statistics (2022), which reported that 47 million Nigerians practice open defecation, with rural communities being the most affected. In Karim-Lamido, this practice not only contaminates the environment but also facilitates fecal-oral transmission, one of the main routes of cholera infection. According to the World Health Organization (WHO, 2024), countries with poor sanitation coverage often record high cholera incidence, and Nigeria continues to experience periodic cholera outbreaks due to weak sanitation systems and limited behavioral compliance with hygiene practices.

The issue of policy enforcement also emerged prominently from the study. While the Nigerian government has developed several WASH-related policies and frameworks — including the *National Action Plan for Cholera Control (NAPCC 2018–2023)* and the *National WASH Policy* — their implementation at the local level remains inconsistent. Only 24.8% of respondents in this study stated that WASH policies are “always enforced,” while 40.7% said they are enforced “sometimes.” This inconsistency underscores a major governance gap between policy formulation and grassroots execution. (Ogundele *et al.*, 2023) noted that in many Nigerian LGAs, enforcement is often hampered by insufficient

funding, lack of trained environmental health officers, and poor inter-agency coordination. Furthermore, weak institutional accountability means that even when sanitation by-laws exist, they are rarely applied or monitored.

The perception among 88.8% of respondents that poor enforcement contributes to cholera outbreaks confirms that communities recognize the importance of governance in disease prevention. This observation aligns with findings by Ezeh and Ojo (2021), who argued that cholera in Nigeria is largely a “disease of governance failure” rather than solely a medical issue. In their study, they emphasized that cholera persists in regions where local authorities fail to enforce sanitation regulations, maintain public water systems, or mobilize communities for preventive action. Similarly, the World Bank (2022) observed that decentralized water management in Nigeria often suffers from overlapping roles between state and local agencies, resulting in weak monitoring and enforcement.

Another important finding is that 62.1% of respondents indicated that there is no regular monitoring of hygiene and sanitation in their communities. Effective environmental monitoring is essential for early detection of cholera risks and timely response during outbreaks. The lack of such surveillance implies that local health departments may be reactive rather than preventive in their approach. A study by (Adeniran *et al.*,2021) in northeastern Nigeria found that poor environmental surveillance and weak data collection systems delay outbreak response and contribute to higher morbidity and mortality rates during cholera epidemics. Strengthening local environmental health surveillance through community health volunteers and environmental officers could help bridge this gap.

The scarcity of WASH-related resources, as reported by 72.9% of respondents (who said soap, toilets, or clean water were rarely or inconsistently available), highlights another

critical implementation challenge. This finding reflects systemic underinvestment in WASH infrastructure, particularly in rural LGAs such as Karim-Lamido. According to UNICEF (2023), Nigeria's budgetary allocation to the WASH sector remains below the recommended 1.5% of GDP, leading to overreliance on donor agencies and NGOs for water and sanitation projects. Without sustainable local funding mechanisms, most interventions become short-lived once external support ends.

Community engagement also plays a crucial role in the success of WASH and cholera control initiatives. Although 43.9% of respondents in this study indicated that community leaders support hygiene and sanitation efforts, nearly one-third were unsure of such involvement. This limited engagement of traditional and religious leaders weakens the communal enforcement of hygiene norms. (Abubakar *et al.*, 2021) emphasized that traditional leaders are essential gatekeepers for behavior change in rural Nigeria, and their active participation can significantly improve compliance with hygiene policies. When leaders model and promote WASH practices, communities are more likely to adopt and sustain them.

Moreover, cultural beliefs and economic factors may also influence compliance with sanitation practices. For instance, some communities perceive cholera as a "natural" or "spiritual" disease rather than one linked to hygiene, which affects preventive behavior (Ibrahim *et al.*, 2022). Economic hardship, on the other hand, limits the ability of households to afford water treatment materials or construct toilets. Therefore, policy interventions must integrate culturally appropriate health education and provide affordable WASH options that encourage behavioral change.

The findings also highlight the importance of integrating public health education with WASH interventions, as knowledge alone does not guarantee compliance. Continuous sensitization through schools, community forums, and religious institutions could reinforce positive hygiene practices. Ultimately, the success of cholera control policies depends on the ability of both government and communities to work synergistically toward achieving universal access to clean water and adequate sanitation — in line with Sustainable Development Goal 6 (Clean Water and Sanitation) and the Global Roadmap to End Cholera by 2030 (WHO, 2024).

## **LINKING RESEARCH OBJECTIVES TO FINDINGS**

Specific Objectives includes:

- i. To assess the level of knowledge and awareness of cholera among residents of Karim-Lamido Local Government Area, Taraba State, Nigeria.

**Findings:** this revealed a generally a high level of awareness about the diseases and it causes 91.6% they had head of cholera before. This high awareness suggested that information about cholera has reached a large portion of the population.

- ii. To examine the perception of the Water, Sanitation and Hygiene (WASH) policy among residents and stakeholders in Karim-Lamido Local Government Area, Taraba State.

**Findings:** this revealed the perception of the water, sanitation and hygiene WASH policy among resident. The frequency of communication and hygiene promotion from government agencies 23.8% respondent reported that they

frequently receive information on hygiene and sanitation 36.9% said they sometimes receive such information 28.5% noted that they rarely receive update and 10.8% stated they never receive any hygiene related information.

- iii. To evaluate the level of compliance with sanitation and preventive practices related to cholera control among households in Karim-Lamido Local Government Area.

**Findings:** in times of sanitation practices 60.7% stated that they use a toilet in their household while 39.3% admitted they do not have access to any toilet facility are likely practice open defecation

- iv. To identify the major challenges affecting the effective implementation of WASH and other cholera control policies in Karim-Lamido Local Government Area, Taraba State.

**Findings:** a majority of respondent 69.6% indicated that there are challenges to accessing clean water in their communities, while only 30.4% reported having no such difficulties these shows that the scarcity or inaccessibility of portable water remains critical issue in the area. The limited availability of clean water sources such as boreholes and protected wells compiles residents to rely on unsafe sources like rivers or stagnant water making them expose to cholera infection.

#### **4.4 Summary**

This chapter focused on the presentation, analysis, and interpretation of data obtained from respondents regarding the effectiveness of water, sanitation, and hygiene (WASH) policies in controlling the spread of cholera in Karim-Lamido Local Government Area of

Taraba State. The statistical analysis using chi-square tests revealed that there was a significant relationship between the level of knowledge and awareness of cholera and its occurrence, as well as between residents' perception of the WASH policy and the effectiveness of cholera control. It was also found that compliance with sanitation and preventive practices had a measurable impact on reducing cholera outbreaks. However, policy implementation challenges—such as inadequate water infrastructure, poor waste disposal systems, weak monitoring mechanisms, and limited public health education—were shown to significantly reduce the effectiveness of cholera control efforts in the area.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary, conclusion, and recommendations derived from the findings of this study on the effectiveness of Water, Sanitation, and Hygiene (WASH) policy in controlling the spread of cholera in Karim-Lamido Local Government Area, Taraba State, Nigeria. The chapter provides a concise overview of the key findings discussed in the previous chapters and highlights their implications for public health policy and practice. It also draws meaningful conclusions based on the objectives of the study and the tested hypotheses. Furthermore, it offers practical recommendations aimed at improving the implementation of WASH policies and enhancing community participation in cholera prevention and control. The chapter therefore serves as a synthesis of the entire research, linking the study's results to its objectives and theoretical framework while suggesting ways forward for sustainable cholera control efforts in the study area.

#### **5.2 Discussion**

The study assessed the effectiveness of Water, Sanitation, and Hygiene (WASH) policies in controlling the spread of cholera in Karim-Lamido Local Government Area of Taraba State, Nigeria. The findings revealed that awareness of cholera was generally high among residents, with 91.6% having heard of cholera and 89.7% correctly identifying dirty water as its main cause. Similarly, 73.4% recognized contaminated water as the main mode of transmission. However, despite this high level of awareness, 17.3% of respondents were

unaware of government cholera prevention policies, showing a gap between knowledge and policy awareness. Among those aware, 55.6% mentioned water sanitation policy, while 28.5% cited hygiene campaigns, suggesting that more effort is needed to enhance public understanding and engagement with WASH-related interventions.

In examining the perception of WASH policies, the study revealed that 31.8% of respondents believed government water and sanitation policies were very effective, 25.7% considered them effective, while 34.6% rated them as not effective. Additionally, only 23.8% reported receiving hygiene or sanitation information frequently from government agencies, while 36.9% received it sometimes, and 28.5% rarely. This shows limited communication and outreach from relevant authorities. Furthermore, 50% of respondents believed individuals are most responsible for preventing cholera, while 31.3% attributed this responsibility to the government, highlighting the perceived lack of institutional accountability in cholera prevention efforts.

On compliance with sanitation practices, the findings indicated that 55.6% of households had access to safe drinking water, while 60.7% used toilets or latrines. However, 44.5% lacked access to safe water, and 39.3% still practiced open defecation. Only 42.1% of respondents always treated their drinking water, while 46.7% did so sometimes. Major challenges affecting effective WASH policy implementation included limited access to clean water (69.6%), inadequate sanitation infrastructure (55.1%), and weak policy enforcement, with only 24.8% reporting consistent enforcement. Additionally, 62.1% stated there was no regular monitoring of sanitation by authorities, and only 43.9% affirmed community leader support for hygiene initiatives. These findings underscore the urgent need for improved infrastructure, stronger enforcement, continuous monitoring,

and active community engagement to ensure sustainable cholera control in Karim-Lamido LGA.

### **5.3 Conclusions**

This study has shown that the fight against cholera in Karim-Lamido Local Government Area of Taraba State is being held back by many interconnected challenges. Although people generally know about cholera and understand the importance of clean water, sanitation, and hygiene, the reality on the ground shows that these basic needs are still not fully met. Many residents struggle to get clean water for drinking and household use, and a large number still lack proper toilets or drainage systems. These conditions make the community more vulnerable to cholera outbreaks, especially during the rainy season.

Government efforts through the Water, Sanitation, and Hygiene (WASH) policy and other cholera control programs have made some progress, but the policies are not well enforced at the local level. Monitoring and supervision are irregular, and there is often little follow-up after health campaigns or sanitation drives. This weak enforcement, together with poor infrastructure and limited funding, reduces the effectiveness of the policies that are already in place.

The study also found that community participation is not strong enough. While some local leaders encourage hygiene practices, others are less involved, which reduces the sense of shared responsibility for public health. Access to hygiene materials like soap, treated water, and safe toilets remains a challenge for many households.

In conclusion, controlling and eventually eliminating cholera in Karim-Lamido requires more than just awareness — it needs consistent action. Government agencies must

strengthen the enforcement of WASH policies, improve access to clean water and sanitation facilities, and ensure regular monitoring of hygiene standards. At the same time, communities must be empowered and encouraged to take ownership of their environment through continuous health education and active participation. If both government and community work together with commitment and accountability, the spread of cholera in Karim-Lamido can be greatly reduced and, in time, completely prevented.

#### **5.4 Implications**

The findings of this study have several important implications for public health policy, community health practice, and future research.

1. The results indicate that effective implementation of the Water, Sanitation, and Hygiene (WASH) policy significantly influences the control of cholera outbreaks in Karim-Lamido Local Government Area. This implies that government agencies at both the state and local levels must strengthen policy enforcement mechanisms, allocate sufficient resources, and ensure sustained political commitment to WASH programs. Proper coordination among relevant ministries such as Health, Water Resources, and Environment is essential to enhance policy impact.
2. The strong relationship found between community knowledge, sanitation compliance, and cholera reduction suggests that health promotion and behavioral change interventions remain crucial. Public health practitioners should intensify community-based education and advocacy programs that emphasize hand hygiene, safe water practices, and proper waste disposal. Regular monitoring and evaluation of hygiene behaviors will also help to sustain progress in cholera prevention.

3. The study highlights that poor sanitation infrastructure and weak waste management systems contribute to the persistence of cholera. Therefore, community stakeholders, traditional leaders, and local organizations should be actively engaged in promoting environmental sanitation campaigns. Improving access to clean water and adequate sanitation facilities is fundamental for reducing disease transmission in rural settings.
4. The findings provide a baseline for further studies on WASH policy implementation and cholera control in other parts of Nigeria. Future research could focus on longitudinal analyses to track the long-term effects of WASH interventions, as well as comparative studies across different regions to assess variations in policy outcomes.
5. The study supports the relevance of the Health Belief Model (HBM) and Systems Theory in explaining cholera prevention behaviors. It demonstrates that individuals' perceptions of risk, benefits, and barriers influence compliance with preventive measures, while systemic coordination among policy actors enhances effectiveness.

### **5.5 Recommendations**

1. The government should review and strengthen existing WASH and cholera control policies, ensuring they are well communicated and adapted to local needs in Karim-Lamido.
2. Regular monitoring and evaluation should be carried out to ensure effective implementation of water and sanitation regulations, with increased funding for clean water and hygiene infrastructure.
3. Local authorities should enforce sanitation laws more strictly, while communities should be sensitized and encouraged to comply with hygiene and waste management practices.

4. Government, NGOs, and community leaders should work together to tackle challenges such as poor infrastructure and low awareness through improved coordination, education, and community participation.

## **5.6 Suggestions for Further Research**

Based on the findings and limitations of this study, the following suggestions are made for future research:

1. Future researchers should conduct comparative studies across different Local Government Areas or states to evaluate variations in WASH policy implementation and cholera control effectiveness.
2. A longitudinal study is recommended to assess the long-term impact of improved sanitation and hygiene interventions on cholera incidence and other water-borne diseases.
3. Further research using qualitative methods such as focus group discussions and key informant interviews could provide deeper insights into community perceptions, cultural barriers, and behavioral factors influencing WASH practices.
4. Researchers should explore the roles of government institutions, non-governmental organizations, and community leaders in the implementation and sustainability of WASH programs.
5. Future studies should examine how environmental and climatic factors, such as flooding and drought, contribute to cholera outbreaks and affect the success of control strategies.

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## APPENDICES

### Appendix 1: Informed Consent Guide

#### Identify yourself

My name is Friday Alison Danjuma a final year In Public Policy and Governance, student from AU. I am carrying out a study on the **Topic: Effectiveness of water sanitation and Hygiene Policy used to control the spread of cholera outbreaks in Karim Lamido Area of Taraba State Nigeria**. I am kindly asking you to participate in this study by answering /filling in the question provided on the questionnaire and interview.

#### What you should know about the study:

##### Purpose of the study.

The purpose of the study is to assess the effectiveness of water sanitation and Hygiene policy used to control the spread of cholera outbreaks in Karim Lamido Local Government Area of Taraba State, Nigeria.

This study is designed to **assess the effectiveness of the Water Sanitation and Hygiene (WASH) policy in controlling the spread of cholera in the Karim-Lamido Area of Taraba State, Nigeria**. The research aims to evaluate how well the policy is implemented, enforced, and adhered to, and to identify challenges or gaps that may affect its success. You were selected for the study because **of your experience, knowledge, or involvement in public health, community leadership, or water sanitation activities in Karim-Lamido**. Your insights will help provide a deeper understanding of the real-world performance of the WASH policy, **alongside you, approximately 222 other participants** including health officials, community leaders, and local residents will be

responding to the questionnaire and the interview to gather a broad perspective on the issue.

### **Procedures and duration**

If you decide to participate you will be asked to take part in a short interview and questionnaire lasting approximately 20–30 minutes. It is expected that this will take about 20-30 minute of your time.

### **Risks and discomforts**

There are no major risks anticipated for participating in this study. However, you may experience minor discomfort when discussing sensitive issues related to water sanitation, public health challenges, or local policy enforcement. Some questions may feel personal or critical of local authorities, which could lead to emotional discomfort or concern on your privacy.

On this study the following will be strictly use to address these concerns:

1. Participation is entirely voluntary, and you may choose to skip any question or withdraw at any time without penalty.
2. All responses will be treated confidentially and will not be linked to your name or identity in any report or publication.
3. Interviews will be conducted in a safe, private environment, and your responses will be used strictly for academic purposes.
4. No audio or written recording will be shared outside the research team, and data will be stored securely.

### **Benefits and/or compensation**

There may be no direct personal benefits to you from participating in this study. However, your participation is valuable in helping to improve understanding of the effectiveness of water sanitation and hygiene (WASH) policies in controlling cholera in Karim-Lamido.

The information you provide will contribute to:

1. Evidence-based policy recommendations that could enhance the effectiveness of public health efforts in your community.
2. Greater awareness among policymakers and public health officials about local challenges and needs related to water and sanitation.
3. Improved planning and resource allocation for future interventions targeting disease prevention in similar communities.

### **Confidentiality**

All information collected during this study will be treated with the full confidentiality. Any information that could personally identify you will not be disclosed without your clear permission.

This will be used to protect your privacy:

1. Your name and other identifying information will not be requested in the questionnaire or during the interview.
2. All responses will be recorded anonymously and used solely for research purposes.
3. Data collected will be stored securely and will be accessible only to the research team.
4. Results will be presented in a way that ensures no individual can be identified.

**Voluntary participation**

Participation in this study is voluntary. If participant decides not to participate in this study, their decision will not affect their future relationship with the researcher, the community health program, or any local authorities involved in public health services in Karim-Lamido. If they chose to participate, they are free to withdraw their consent and to discontinue participation without penalty.

**Offer to answer questions**

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

**Authorisation**

If you have decided to participate in this study please sign this form in the space provide below as an indication that you have read and understood the information provided above and have agreed to participate.

Iliya Ande

3/08/2025

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Name of Research Participant (please print)

Date

Rahila Daniel

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Signature of Research Participant or legally authorised representative

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to

someone other than the researcher, please feel free to contact the Africa University Research Ethics Committee on telephone (020) 60075 or 60026 extension 1156 email [aurec@africau.edu](mailto:aurec@africau.edu)

Name of Researcher: **Friday Alison Danjuma**

## **Appendix 2: Questionnaire Guide**

Good day sir/Ma, my name is Friday Alison Danjuma a Student at Africa University Zimbabwe from the department of Public Policy and Governance. Carrying out research on the **Topic: Effectiveness of water sanitation and Hygiene Policy used to control the spread of cholera outbreaks in Karim Lamido Area of Taraba State Nigeria.**

### **Section A: Demographic Information**

#### **Age:**

Under 18    18–30    31–45    46–60    Above 60

#### **Gender.**

Male    Female

#### **Occupation.**

Farmer    Trader    Civil Servant    Student    Other (specify):  
\_\_\_\_\_

#### **Education Level.**

No Formal Education    Primary    Secondary    Tertiary

**Ward/Community:** \_\_\_\_\_

### **Section B: Knowledge and Awareness of Cholera**

Have you heard of cholera before?

Yes    No

What is the main causes of cholera?

Dirty water    Bad air    Mosquito bites    Don't know

How is cholera transmitted? (Tick all that apply)

Contaminated water    Poor sanitation    Food contamination    Don't know

Do you know about government policies related to cholera prevention?

Yes    No

If yes, which of the following have you heard of?

Water sanitation policy    Hygiene campaigns    Waste disposal regulations  

others: \_\_\_\_\_

### **Section C: Perception of WASH Policy**

Do you think the government's water and sanitation policies are effective?

Very Effective    Effective    Not Effective    Don't know

How often do you receive information on hygiene or sanitation from government agencies?

Frequently    Sometimes    Rarely    Never

Who do you think is most responsible for preventing cholera in your area?

Government    Individuals    NGOs    Traditional Leaders  

Others: \_\_\_\_\_

### **Section D: Compliance with Sanitation and Preventive Practices**

Do you have access to safe drinking water?

Yes    No

Do you use a toilet/latrine in your household?

Yes    No

How often do you treat drinking water?

Always    Sometimes    Never

### **Section E: Challenges in Policy Implementation**

Are there challenges to accessing clean water in your community?

Yes  No

Is the sanitation infrastructure in your area adequate (e.g., toilets, drainage)?

Yes  No

Are government WASH policies enforced in your community?

Always  Sometimes  Rarely  Never

Do you think poor enforcement contributes to cholera outbreaks?

Strongly Agree  Agree  Disagree  Strongly Disagree

Is there regular monitoring of hygiene and sanitation in your area by authorities?

Yes  No

Are WASH-related resources (e.g., water, soap, toilets) available and accessible?

Always  Sometimes  Rarely  Never

Do community leaders support and promote hygiene and sanitation practices?

Yes  No  Not Sure

### **Appendix 3: Interview Guide**

Good day sir/Ma, my name is Friday Alison Danjuma a Student at Africa University Zimbabwe from the department of Public Policy and Governance. Carrying out research on the **Topic: Effectiveness of water sanitation and Hygiene Policy used to control the spread of cholera outbreaks in Karim Lamido Area of Taraba State Nigeria.**

- 1.** Can you describe your role in water sanitation and hygiene (WASH) efforts in Karim-Lamido?
- 2.** What do you know about the WASH policy implemented in this area, and what are its main goals?
- 3.** How has the WASH policy been implemented in your community, and which agencies are responsible?
- 4.** from your observation, has the WASH policy helped in reducing cholera outbreaks? Please explain.
- 5.** What challenges do you face in enforcing or complying with the WASH policy?
- 6.** What recommendations would you suggest to improve the effectiveness of the WASH policy in this area?

## Appendix 4 AUREC Approval



"Investing in Africa's future"

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU3403/24

7 July, 2025

Friday Alison Danjuma  
C/O Africa University  
Box 1320  
**MUTARE**

RE: **EFFECTIVENESS OF WATER SANITATION AND HYGIENE POLICY USED TO CONTROL THE SPREAD OF CHOLERA IN KARIM –LAMIDO AREA OF TARABA STATE, NIGERIA**

Thank you for submitting the above-titled proposal to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 3403/25  
This number should be used on all correspondence, consent forms, and appropriate documents
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** July 7, 2025
- **EXPIRATION DATE** July 7, 2026
- **TYPE OF MEETING:** Expedited  
After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.



Yours Faithfully


**MARY CHINZOU**  
**FOR CHAIRPERSON**  
**AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE**

Appendix 5: Local Government Approval Letter

**SECRET**

**KARIM LAMIDO LOCAL GOVERNMENT COUNCIL**  
**PRIMARY HEALTH CARE**

Telegram:.....  
Telephone:.....



Our Ref: KLG/PHC/348/111/341  
Primary Health Care Department,  
Karim Lamido  
Date: 19th August, 2025


The Registrar,  
African University College,  
Of Business Peace,  
Leadership and Governance,  
P.O Box 1320 Mutare Zimbabwe

**RE-PERMISSION TO UNDER TAKE RESEARCH ON EFECTIVENESS  
OF WATER SANITATION AND HYGIENE POLICY USED TO  
CONTROL THE SPREAD OF CHOLERA IN KARIM LAMIDO.  
TARABA STATE NIGERIA.**

In regard to your letter dated 7<sup>th</sup> July, 2025, seeking to conduct research  
on the heading above.

The management of Primary Health Care Department Karim Lamido has  
granted approval to Mr. Friday Alison Danjuma of African University College  
Zimbabwe to carry out his assignment base on the request.

Thank you

Joseph S. Abba  
 19/8/25  
Director PHC, Karim Lamido  
L.G.C

**SECRET**