ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CHOLERA PREVENTION STRATEGIES AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN KATSINA STATE, NIGERIA

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DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION

FACULTY OF EDUCATION

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ZARIA, NIGERIA

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES AHMADU BELLO UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER DEGREE IN HEALTH EDUCATION

DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION,

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MARCH, 2021

DECLARATION

I declare that the work in this dissertation entitled "**ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CHOLERA PREVENTION STRATEGIES AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN KATSINA STATE, NIGERIA**" has been carried out by me in the Department of Human Kinetics and Health Education. The information derived from the literature has been duly acknowledged in the text and a list of reference provided. No part of this research work has been submitted for another degree or diploma in this or any other institution.

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Name of Student   Signature   Date

CERTIFICATION

This dissertation entitled "**ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CHOLERA PREVENTION STRATEGIES AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN KATSINA STATE NIGERIA**" by Hope Jacob meets the regulations governing the award of degree of Masters of Education in Health Education of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literacy presentation.

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Dean, School of Post graduate Studies.

DEDICATION

This dissertation is dedicated to alljunior secondary school students in Katsina State, Nigeria.

ACKNOWLEDGEMENTS

ABSTRACT

This study assessedknowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria. Ex-post facto research design was used. The respondents used for the purpose of data collection were four hundred (400) sampled from a population of 271,690 junior secondary school students inKatsina State Nigeria. The respondents were drawn through multistage sampling technique, which consisted of stratified, simple random sampling andproportionate sampling techniques. A close ended questionnaire was used to obtain responses from the participants. Three hundred and ninety-eight (398; 99.5%) questionnaires were returned. Descriptive statistics of frequency, percentages, means and standard deviations were used to describe the demographic characteristics of the respondents.The hypotheses were tested at 0.05 level of significance using one sample t-test, independent sample t-test and analysis of variance. The findings of the study revealed that knowledge of cholera prevention strategies among junior secondary school students in Katsina State of Nigeria was significantly adequate (t = 3.070; p= 0.001), practice of cholera prevention strategies among junior secondary school students in Katsina state of Nigeria was not significant (t=1.291; p= 0.110), junior secondary school students in Katsina State of Nigeria do not significantly differ in their knowledge of cholera prevention strategies based on demographic characteristics(p = 0.17, 0.21, 0.10)and junior secondary school students in Katsina State, Nigeria do not significantly differ in their practices of cholera prevention strategies based on demographic characteristics (0.7, 0.5, 0.1). On the basis of the findings of the study, it was concluded that Junior secondary school students in Katsina State of Nigeria have knowledge of cholera prevention strategies, but they do not practicecholera prevention strategies,and they do notdiffer in their knowledge and practice of cholera prevention strategies based on demographic characteristics. However, It was,recommended that: school managements should put in place adequate measures within the school environment to checkmate and control the healthy practices of student this include provision of hand washing sink, provision of safe drinking water, supervising the canting, provision of charts and notice board within the school environment and adequate use of latrine by students.

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LIST OF ABBREVIATIONS

WHO   :   World Health Organization

OCV   :   Oral Cholera Vaccine

CPP   :   Cholera Prevention Practices

ORS   :   Oral Rehydration Solution

WASH   :   Water, Sanitation and Hygiene

CDC   :   Centers for Disease Control and Prevention

OPERATIONAL DEFINITION OF TERMS

Knowledge: Is the awareness or knowing the various ways of \preventing cholera by the respondents.

Practice: These are the actions or what the respondents do to improve their skills in the prevention of cholera.

Prevention Strategies: These are skills or activities done in the prevention of cholera.

CHAPTER ONE

INTRODUCTION

1.1   Background of the Study

Cholera is an acute diarrhea disease that is caused by the bacterium called vibrio cholera, it is an infection of the small intestine caused by ingestion of food or water contaminated with the bacterium vibrio cholera. According to World Health Organization (WHO, 2015),cholera hascontinued to be a global threat to public health and is a key indicator of lack of social development such as human biological development (WHO, 2015). The disease used to be a global health problem, but the developed countries over the years have overcome the challenge now leaving the disease largely confined to developing countries especially in the tropics and subtropics. It is endemic in Africa, part of Asia, Middle East, South and Central America (Chiyangwa, 2017).

In endemic areas, outbreaks usually occur when war or civil unrest disrupts public sanitation. Natural disasters like earthquakes, tsunami, volcanic eruptions, landslides and floods contribute to the outbreaks by disrupting the normal balance of nature (Qadri, 2016). As such, these create many health problems, food and water supplies can become contaminated by parasites and bacteria when essential systems, like those for water sewage are destroyed. Developing countries are disproportionately affected because of lack of resources, infrastructure and Prevention methods (Sur, 2017). In newly affected areas, outbreaks may occur during any season and affect all ages. The organism normally lives in aquatic environment along the coast. People acquire this infection by consuming water, sea food, or other foods contaminated with

the bacterium vibrocholerea. Once infected, they excrete the bacteria in stool. Thus, the infection can spread rapidly, particularly in areas where human waste is untreated (WASH, 2014).

A multidisciplinary approach based on prevention, preparedness and response, with an efficient surveillance system is the key in mitigating cholera outbreak, controlling cholera in endemic areas and reducing deaths (WHO, 2016). In most industrialized countries, cholera was largely eliminated by water and sewage treatment over a century ago. The prevention of cholera constitutes one of the most immediate and serious problem facing government approaches, in African cities Consequently, people's health and their economy steadily continue to degrade due to cholera outbreak, if it is not effectively prevented (WHO, 2018).

Usman (2017), believed that Borno,Yobe, Zamfara, Bauchi,Kano and Katsina states of Nigeria are the 'most affected' States in Nigeria with cholera, most parts of the state and its environs are partially or wholly hit by cholera. The situation may have improved but still most of the Northern states rely on hand dug wells, ponds and streams for their sources of drinking water which may be contaminated and putting the community members at risk of contracting the disease. Usually, other source of contamination is through other cholera infected patients when their untreated diarrheal discharge is allowed to get into water supplies (Igomu, 2018). Today, it remains a significant cause of morbidity and mortality in Northern parts of Nigeria, where it is a marker for inadequate drinking water and sanitation infrastructure (Usman, 2017). These deplorable situations are not only unique to Northern parts of Nigeria, but exist in most African Countries.

Sanitation among secondary school students is the hygienic means of promoting health through prevention of human contact with the infected wastes. Wastes that can cause health problems are human and animal feces, solid wastes, domestic wastewater (sewage, sullage, and grey water), industrial wastes, and agricultural wastes. Inadequate sanitation among secondary school students is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities (Utsalo, 2018)

In response to cholera outbreak, the Katsina State government and partner agencies initiated emergency public health responseactivities which is aimed at treating suspected cholera cases, preventing new ones and preparing for the outbreak (Pam, 2017). Response activities included mass media, cholera campaigns through radio and hygiene promotion activities by community health workers, and unlimited administration of oral cholera vaccine (OCV). Prevention efforts focused on internally displaced persons' settlements in Katsina state and poorer neighborhoods of the state where information regarding cholera knowledge, dissemination of cholera information and prevention was limited (Pam, 2017).Smith (2017) stated that knowledge is a theoretical or practical understanding of a subject. When knowledge is related to prevention of cholera, it is called knowledge of cholera prevention. Knowledge towards cholera prevention as in this study refers to the most common learning and how to remember ways of preventing cholera and the level of available information about cholera prevention.

Practice can be defined as the act of doing something customarily or performing something often (Webster, 2017). Practice is also defined as a way of doing something

regularly (Dunkle, 2016). When practice relates to cholera prevention, it is called Cholera Prevention Practices (CPP). Cholera prevention practices in this study, refers to the most common and regular methods of cleaning the environment regularly, covering of water supply, filtering of water, how to prepared oral rehydration solution, washing of hands after using latrine with soap and water among junior secondary school students of Katsina state.

Knowledge and practice of junior secondary school students towards cholera preventionstrategies are important for planning, prevention, execution, and evaluation ofhealth education programs. Cholera prevention is far cheaper and effective by means ofpreventionstrategy than a curative one. This study intends to assess knowledge and practices of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

1.2   Statement of the Problem

An ideal environment in Europe, Asia, and other developed and developing nations of the world including Nigeria and Katsina State in particular should always be free from cholera outbreak. The inhabitant should have adequate and sufficient knowledge of cholera, its symptoms and prevention measures.

In Nigeria, outbreaks of cholera have been occurring with increasing frequency since the first outbreak in 1970. Since then, cholera has continued to cause high mortality in humans. The outbreak of cholera is mostly common in the following Northern States Kaduna, Bauchi, Zamfara, Kano and Katsina of Nigeria killing close to 200 people within a week when the outbreak occur. In Kano State, a total of 5,600

cholera cases and 340 deaths were recorded in 2006 (Ministry of Health, 2006). In 2018,Cholera outbreak was declared in Yobe State, North East Nigeria by the state ministry of health, two weeks after a cholera outbreak was declared in Borno state. The cumulative number of recorded cases in both states are 3126 including 97 deaths. In Yobe State, 989 cases of suspected cholera were recorded in five local government area including 61 death as at 2018. A total of 2137 cases of suspected cholera cases have been recorded in eight (8) local government area including thirty six (36) death in Borno State in 2018 (Ministry of Health,2018). The outbreak of cholera in Katsina state is largely attributed to drinking water sold by street water vendors and failure to wash hand with soap before meals were taken.

This problem is still endemic in Katsina state, with 3110 cholera cases in seven(7) local government as at 2017, the epidemic continues to spread to neighboring communities, with the number of deaths being reported as ninetyone (91) (Mazana, 2017), because most of the communities do not have access to good water sources as they get water from streams or hand dug wells, making the inhabitants more vulnerable to the epidemic. Furthermore, these communities are prone to cholera epidemic which has resulted into poor maintenance and destruction of available infrastructure (like drainage system and water pipes).

The researcher observed that the persons infected with cholera might be as a result of poor knowledge and bad practices of cholera prevention strategies which might involve secondary school students, also overcrowding, dirty environment, unhygienic food and water are likely causes of cholera amongjunior secondary school students. Most of the boreholes in the communities are not functional, the wells are leftuncovered

and the environment not sanitized. Cholera spreads in many ways, in secondary schools, students buy food from food vendors, most food vendors do not cover their food, exposing it to flies that might be carrying the cholera causing bacteria. Eating such food can cause cholera, many schools has a lot of student but very few toilet to care for them, in addition, the toilets are not used properly nor are they cleaned frequently, making them a breeding ground for vibrocholerae. If one student with cholera use them, flies comes into contact with their excreta and then lands on food, this could start a cholera outbreak in schools. Many schools also have poor disposal of refuse, waste create a breeding ground for the bacteria that causes cholera. Unfortunately, school students dispose waste carelessly.

The researcher observed that some schools do not have access to clean, safe drinking water, and some do not have satisfactory facilities for safe disposal of human waste. It is against this background that, the researcher became motivated to study the knowledge and practice towards cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

1.3   Purpose of the Study

The main purpose of this study was to assess the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

The specific purposes of the study are to assess:

i.   the knowledge of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

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ii. the practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

iii. the difference of demographic characteristics (gender, age and class) on the knowledge of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

iv. the difference of demographic characteristics (gender, age and class) on the practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

1.4   Research Questions

The following research questions were raised to guide this study:

1. What is the knowledge of cholera prevention strategies amongjunior secondary school students in Katsina State, Nigeria?

2. What is the practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria?

3. Will junior secondary school students in Katsina State, Nigeria differ in their knowledge of cholera prevention strategies base on demographic characteristics (gender, age and class)?

4. Will junior secondary school students in Katsina State differ in their practices of cholera prevention strategies base on demographic characteristics (gender, age and class)?

1.5   Hypotheses

The following research hypotheses were formulated for this study:

1.   Knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria is not significant.

2.   Practice of cholera prevention strategies among junior secondary school students in Katsina state Nigeriais not significant.

3.   Junior secondary school students in Katsina State, Nigeria do not significantly differ in their knowledge of cholera prevention strategies base on demographic characteristics.

4.   Junior secondary school in Katsina State, Nigeria do not significantly differ in their practice of cholera prevention strategies base on demographic characteristics.

1.6   Significance of the Study

The findingsof this study would improve theknowledge of juniorsecondary school students in Katsina State as regards to cholera prevention because it would create awareness tostudents and the society at large on causes of cholera and preventive measure. The finding would also correct the possiblenegative practice of junior secondary school students towards cholera prevention.This study would encourage junior secondary school students to intensify effort towards preventing cholera outbreak because it would motivate individual student to improve in the practice of personal hygiene.

It would also help other researchers to come out with similar research in other parts of the country, particularly areas frequently affected by cholera. The finding of this study would be beneficial to Ministry of Health in formulating further polices and guideline on environmental health to prevent outbreak of cholera in Katsina state.

The findings of this study would be significant to teachers, Ministry of Health, voluntary agencies and non-governmental organization that adequate intervention programs such as health campaigns, seminars, lectures, symposiums, and workshops can be put in place to mitigate outbreak of cholera in the state. This study would as well be useful to state governments in line with identifying the knowledge gap and empowering health educators and public health officers to bridge the knowledge gap and advocate for practices that can motivate cholera prevention.

It would contribute to the existing body of knowledge on cholera preventionstrategies in Katsina State and Nigeria through mass media such as radio programs, television programs, online blogs, libraries, social medias and community town hall meetings.

1.7   Basic Assumptions

The basic assumptions of this study were assumed to be as follows:

1. Junior secondary school students in Katsina State have adequate knowledge on cholera prevention strategies.
2. Knowledge of cholera prevention will influence desirable practices of junior secondary school students in Katsina state.

3. Demographic characteristics will differ in the knowledge of cholera prevention strategies among junior secondary school students in Katsina State.

4. Demographic characteristics will differ in practice of cholera prevention strategies among junior secondary school students in Katsina State.

1.8   Delimitations of the Study

This study was delimited to;

i.   the knowledge of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

ii.   the practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

iii. the difference of demographic characteristics (gender, age and class) on the knowledge of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

iv.   the difference of demographic characteristics (gender, age and class) on the practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1   Introduction

Relevant professional studies and available research findings related to knowledge and Practice of cholera prevention strategies among junior secondary school students in Katsina State are reviewed and presented in this chapter under the following sub-headings:

2.2   Conceptual Framework

2.2.1   Concept of Cholera

2.2.2   Prevalence of Cholera

2.3   Causes of Cholera

2.3.1   Epidemiology

2.3.2   Cholera Outbreak in Nigeria

2.4   Study Variables

2.4.1   Knowledge of Cholera Prevention Strategies

2.4.2   Practice of Cholera Prevention Strategies

2.4.3   Cholera Prevention Strategies

2.5   Theoretical Framework

2.6   Empirical Studies

2.7   Summary

2.2 Conceptual framework

2.2.1 Concept of Cholera

Cholera is an acute diarrhea disease caused by the bacterial Vibrio cholera. Typical symptoms include; the sudden onset of profuse, effortless, watery diarrhea followed by vomiting, rapid dehydration, muscle cramps and suppression of urine, Unless there is rapid replacement of fluid and electrolytes, fatalities may be as high as 30-40 percent (Park, 2018). Vibrio species grow naturally in estuarine and marine environments worldwide, and are able to survive and replicated in contaminated water with increased salinity. The disease is transmitted through the fecal-oral rate such as, eating and drinking contaminated fecal matter that contains vibrio cholera (Chiyangwa, 2017). Asymptomatically, infected humans can also be an important reservoir for this organism in areas where vibrio cholera is endemic (Igbinasa&Okoh, 2016) cholera has an extremely short incubation period of two hours to five days which enhances the potentially explosive pattern of outbreaks, as the number of cases can rise very quickly. Individuals with lower immunity, such as the malnourished children or people living with HIV, are at greater risk of death if infected by cholera because of their weak immune systems (WHO, 2015).

Vibrio cholera, a curved Geam-negative bacillus belongs to the family of vibrionaceae and shares some characteristics with the family ofEnterobacteriaceace (Farmer, 2016). The species v. Cholera comprises both pathogenic and non-pathogenic strains. Vibrio cholera 01 and 0139 are the only serotypes responsible for the disease defined clinically and epidemiologically as cholera (Traore, 2017).

Cholera is both an epidemic and pandemic disease. The epidemicity and endemicity of a disease will depend on the characteristics of the agent, and those of the system (environment). Characteristics of the agent which influence its distribution include its ability to survive in a given environment, its virulence, the average number of organisms required to cause infection. Characteristics of the system which affect the distribution of the agent include the number of susceptible, and the opportunities it provides for transmission of the infection. Global experience has shown that the introduction of cholera into any country cannot be prevented, but cholera can create a problem only in areas where sanitation is defective. Epidemic of cholera are characteristically abrupt and often create an acute public health problem. They have a high potential to spread fast and cause deaths. The epidemic reaches peak and subsides gradually as the "force of infection" declines. Often-times, by the time control measures are instituted the epidemic has already reached its peak and is warning. Thus, cholera epidemic in a community is self-limiting. It tends to decline after reaching its peak this is attributed to the acquisition of temporary immunity, as well as due to the occurrence of a large number of subclinical cases (Park, 2018).

The force of infection is composed of 2 components, namely the force of infection through water and force of infection through contacts. It is well-known that the elimination of contaminated water does not immediately bring an outbreak to an end, but a so called tail of the epidemic is produced. This is due to the continuation of transmission through contact.In areas where cholera is endemic, it does not show a stable endemicity like typhoid fever (Datta, 2017). It undergoes seasonal fluctuations as well as epidemic outbreaks. The seasonal variation differs between countries and even

between regions of the same country. The seasonal incidence is also subject to change. For example, the disease used to be most common in the summer in Kolkata and in the early winter in Bangladesh; now in both places, it is most frequent in autumn (WHO, 2018).

The El-Tor biotype, where it has spread, has become endemic with periodic outbreaks. It appears to have greater "endemic tendency" than its classical counterpart as such, it causes a higher infection-to-case ration in apparent infections and mild cases (WHO, 2016).Cholera occurs at intervals even in endemic areas.75% of people infected with cholera do not develop any symptoms. Pathogens stay in their faces for 7 to 14 days and are shed back into the environment, possibly by infecting other individuals (Park, 2018). Among people who develop symptoms, 80% have mild or moderate symptoms, while around 20% develop acute watering diarrhea with severe dehydration. In a severe infection, more than one quart of water and salts is lost per hour. The stool looks gray and has flecks of mucus in it-termed rice water stools (WHO, 2016). Within hours, dehydration can become severe, causing intense thirst, muscle cramps, and weakness. Very little urine is produced and the eyes may become sunken, and the skin on the finger may become much wrinkled. If dehydration is not treated, loss of water and salt can lead to kidney failure, shock coma and death. In people who survive, symptoms usually subside in 3 to 6 days. Most people are free of the bacteria in two weeks. The bacteria remain in a few people indefinitely without causing symptoms (Narayanan, 2014).

Cholera is an ancient disease reported globally and is associated with high mortality and morbidity rates. This life threatening infection has an estimated annual

burden of 2-4 million cases in endemic area (Akinsinde, 2014). The world has experienced seven major pandemics of this disease since the early 19th century (Faruque, 2010). The first six were caused by toxigenic strains of classical (CL) biotype, serotype 01 which was reported to have originated from India, while the current 7th is caused by v. Cholera 01 of the El-Tor (ET) biotype (Zhang, 2014).In Africa, majority of cases between early 1990 and 2015 occurred in Angola, Democratic Republic of the Congo, Mozambique, Nigeria, Somalia, Tanzania and South Africa. In Nigeria, the first recorded cases of cholera was in a village near Lagos, on December, 1970 with 22,931 cases and 2945 deaths (WHO, 2017). There is a little information on the circulating strains. Recently however, the two biotype were reported by Marin (2014). Marin (2014), described multidrug resistance, atypical El-Tor and non-01/non 0139 as the agent responsible for cholera/diarrhea outbreak of 2015 and 2016 in Borno, Katsina and Osun States, Oyedeji (2015) reported enterotoxin carrying classic biotype 01 in the Borno, Bauchi, Gombe and Katsina States within the sameperiod, while Akinsinde (2014) went ahead to demonstrate that these epidemic strains were of multiple phage type.

2.2.2 Prevalence of Cholera

For a cholera outbreak to occur, two conditions have to be met: there must be significant breaches in the water, sanitation, and hygiene infrastructure used by groups of people, permitting large-scale exposure to food or water contaminated with *Vibrio cholera* organisms and cholera must be present in the population (WHO, 2018). Cholera has been proven to be transmitted through fecal-oral route via contaminated food,

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carriers of the infection and inadequate sanitary conditions of the environment (WHO, 2018). The principal mode of transmission however remains ingestion of contaminated water or food. The World Health Organization (WHO) maintains a public database of cholera cases and provides outbreak updates and an annual summary of aggregate national data in the Weekly Epidemiological Record. Owing to its rapid spread, cholera was one of the three diseases requiring notification to the (WHO) in 1969 International Health Regulations (IHR), and today, after the 2005 revision of the IHR, cholera outbreaks still require notification (Blake and Paul, 2017). Despite this, cholera notification remains incomplete because of inadequate laboratory and epidemiological surveillance systems and economic, social and political disincentives to case reporting. WHO estimates that the officially reported cases represent only 5–10% of the actual number occurring annually worldwide of the estimated 3 to 5 million cases that occur globally every year, about 100 000 to 120 000 die. Lapinski and Franklin (2016) calculated, using the fraction of diarrhea cases estimated to be caused by cholera (0.05%),that 11 million cholera cases occur globally every year among children under 5 years of age.However, adults and older children can also get cholera, and mortality can be high in all age groups (Datta, 2017).

Cholera is a disease characterized by profuse diarrhea accompanied with a severe dehydration and loss of electrolyte (Connolly, Gayer, Ryan, Salama, Spiegel and Heymann, 2016), caused by toxigenic Vibrio cholerae, a serologically diverse, environmental, and gram-negative rod bacterium (Liz & Yix, 2015). In the absence of appropriate treatment, there is a high mortality rate. Cholera is a major public health concern because of its high transmissibility, death-to-case ratio and ability to occur in

epidemic and pandemic forms (Kaper,2016). Cholera is responsible for an estimated death of 120,000 globally every year (WHO, 2007), and still continues to be a scourge worldwide covering all continents. In developing countries with endemic areas, cholera is still very significant with incidence of more than five million cases per year (Deb, Sircar, Sengupta & Gupta, 2016). The explosive epidemic nature and the severity of the disease and the potential threat to food and water supplies have prompted the listing of V. cholerae as an organism of biological defense research (Zhang, 2014). In an epidemic, the great majority of cases can be recognized by clinical diagnosis easily and a bacteriological diagnosis is often not required. Cholera is responsible for an estimated death of 120,000 globally every year (WHO, 2014), and still continues to be a scourge worldwide covering all continents. In developing countries with endemic areas, cholera is still very significant with incidence of more than five million cases per year (Yuryit, 2014). The explosive epidemic nature and the severity of the disease and the potential threat to food and water supplies have prompted the listing of V. cholerae as an organism of biological defense research. In an epidemic, the great majority of cases can be recognized by clinical diagnosis easily and a bacteriological diagnosis is often not required (Zhang, 2014).

2.3 Causes of Cholera

All age group are affected but the risk is reduced in a breast-feeding infants partly as a result of reduced exposure and partly from maternal antibodies to V. Cholerae. The presence of certain factors can increase the incident of cholera in a community leading to an epidemic by increasing the susceptibility of individuals to experiencing severe signs and symptoms. Globally, documented risk factor associated

with cholera outbreak and cholera infestation hinge mainly on factor that promote fecal-transmission of V. Cholerae (Datta, 2017).

The single most important factor, particularly in developing countries is poor sanitary conditions. Cholera is more likely to flourish in situations where there is poor personal and environmental hygiene often resulting from lack of safe water supply and poor disposal of human waste. Contamination of river water supply by human waste was said to be responsible for 2018 cholera outbreak in Ghana (Opara, 2017) and open land/river defecation increased the odds of cholera risk in Papau New Guinea (Rosewell, 2017). Drinking and domestic use of contaminated water was described as the cholera risk factor in India between 2016 and 2018 (Datta, 2017). These challenges with water supply and sanitation are common to refugee camps, impoverished countries, and areas devastated by famine, war or natural disasters as in Haiti cholera outbreak (Dunkle, 2016).

Reduced or nonexistent stomach acid (hypochlorhydria) is another documented predisposing factor to cholera. This is because v. Cholerae cannot survive in an acidic environment, and ordinary stomach acid often serves as a first-line defense against infection. Therefore, people with low levels of stomach acid such as children, older secondary school students and people who take antacids, portion pump inhibitors do not have this protection and are at greater risk of developing severe cholera symptom (Kaper, 2017).

Exposure to an individual infected with cholera in a household setting is another risk factor. People are at significantly increased risk of cholera if they live with someone who has the disease. For example, contact with exudates and secretions from

people infected with cholera was a significant factor reported in 2016 Harare cholera outbreak in Zimbabwe (Kone-Coulibaly, 2018).

2.3.1 Epidemiology

Cholera affects an estimated 3–5 million people worldwide, and causes 58,000–130,000 deaths a year as of 2010. This occurs mainly in the developing countries. In the early 1980s, death rates are believed to have been greater than three million a year. It is difficult to calculate exact numbers of cases, as many go unreported due to concerns that an outbreak may have a negative impact on the tourism of a country. Cholera remains both epidemic and endemic in many areas of the world. In October 2016, an outbreak of cholera began in war-ravaged Yemen. WHO called it "the worst cholera outbreak in the world" (Narayanan, 2016).

Although much is known about the mechanisms behind the spread of cholera, this has not led to a full understanding of what makes cholera outbreaks happen in some places and not others. Lack of treatment of human feces and lack of treatment of drinking water greatly facilitate its spread, but bodies of water can serve as a reservoir, and seafood shipped long distances can spread the disease. Cholera was not known in the Americas for most of the 20th century, but it reappeared towards the end of that century (Masson, 2015).

With the advances in sanitation systems and food handling practices, coupled with heightened awareness of personal hygiene, cholera incidence has been markedly reduced in the recent decade. A review of cholera cases notified to the Department of Health (DH) between January 2001 and December 2018 was conducted to delineate the recent epidemiology. Cases are defined as persons with compatible clinical features

together with laboratory confirmation of V. cholera serogroups O1 or O139 from stool specimen or rectal swab by the Public Health Laboratory Services Branch (PHLSB) of Centre for Health Protection (CHP) or microbiology laboratory of public hospitals. Over the 10-year period under review, a total of 79 cases were recorded, with the annual number ranging from 0 in 2001 to 38 in 2016. A seasonal pattern was observed, with higher numbers occurred in the summer months (from June to September) than in the winter months. The majority of cholera cases appeared sporadically with some clustering of cases involving a common food source or a common vehicle of infection (Mackey, 2014).

Forty cases (50.6%) were locally acquired, 38 (49.1%) were imported, and 1 (1.3%) was unclassified due to trans-boundary movement during the incubation period. Most of the imported cases were from the Philippines (36.8%), India (21.1%), Indonesia (13.2%), Mainland China (7.9%) and other countries such as Pakistan (7.9%), Nepal (5.3%), Thailand (5.3%), and Singapore (2.6%). Cases were quite evenly distributed between the two sexes, with a male-to-female ratio of 1:1.5. Adults had a higher incidence than children in general. The age of the patients ranged between 8 months and 91 years, with a median of 38 years and those aged 25 to 34 had a higher incidence across all age groups (Osnala, 2016).

2.3.2 Nature of Cholera Spread

In Nigeria, the 1996 cholera outbreak in Ibadan (Southwest) was attributed to contaminated potable water sources. Street vended water and not washing of hands with soap before eating food are possible reasons for the 1996-2016 cholera outbreaks in Kano state (Sack, Sack, Nair & Siddique, 2016). Drinking water sold by water vendors

was also connected with increased risk of contracting the disease. In Katsina, the outbreak of the disease was linked to faecal contamination of well water from sellers. The recent 2018 outbreak of cholera was speculated to be directly related with sanitation and water supply. The hand dug wells and contaminated ponds being relied on by most of the Northern states as source of drinking water was a major transmission route during the outbreak. Perhaps, these wells were shallow; uncovered and diarrhea discharge from cholera patients could easily contaminate water supplies (Sistrom & Hale, 2016).

Cholera is a disease of water transmission, whereas transmission of El-Tor is by water. For every clinical case of El-Tor cholera there can be as many as 100 asymptomatic cases, explaining how epidemics spread one region to another, but not how epidemics spread from one region to another, but not how infection remains in the environment. One method may be persistence of infection in the human population due to continuous person-to-person transmission in a subclinical asymptomatic cycle (Datta, 2017). When a susceptible person enters the cycle, or there is an environmental or climatic change, a fresh epidemic starts (WHO, 2016). A natural cycle has now been established in an aquatic environment, with v. Cholera living in copepods or in other zooplankton, as found in algal blooms. Vibrios are easily destroyed by sun-light, chemical action or competing bacteria; however, where for some time and in saline for at least a week. The level of salinity needs to be between 0.01 and 0.1%, as is found in estuarine or lagoon water. V. Cholerae in this saline environment can be taken up by shellfish or fish, which then form an alternative method of infection when eaten uncooked. Rising sea levels and increase in water temperature due to climate change

makes cholera outbreaks developing from an estuarine environment more likely (Webber, 2017).

The isolation of V. Cholerae from river water has been an enigma because epidemiological investigations show this source of infection to be important, but bacteriologists have not isolated organisms in sufficient numbers. One possible explanation is the presence of non-agglutinablevibrios (alternatively known as non-cholera vibrios), which are closely related to V. Cholera, except that they do not agglutinated antisera (Seal, 2017). These are known to be mutations, so that shifts between typical vibrios and non-agglutinable forms may occur. If this is a regular feature in nature, then it could help to explain where cholera goes to, (especially the classical form) during inter-epidemic periods. The appearance of non-01 cholera (vibrio 0139) supports this view (Webber, 2017).

Vibrio Cholerae has been found to remain viable in crude sewage for over a month and in sewage-contaminated soil for up to 10 days, thereby providing a possible source of infection to rivers or wells. It has been isolated from a number of foodstuffs, especially those with a Potential of Hydrogen (pH) of between 6 and 8, such as milk produce, sugar solutions, meat extracts or article of food preserved by salt. Uncooked fish and vegetables that have been washed or irrigated by effluent have been responsible for outbreaks (WHO, 2017).

The importance of the El-Tor biotype is that it can survive longer in water, is more infectious, can cause mild infections and more frequently produces the carries state. If cholera is epidemic and preliminary investigations indicate that water is the vehicle of transmission, then the supply should be sterilized by supper-chlorination

(adding two to three times the calculated amount of chlorine required for the volume of water) or everybody told to boil their water. Boiling water is unpopular as it uses vital firewood and monopolizes scarce cooking pots, and the water has a flat taste (WHO, 2017). However, there is no reason why water cannot be boiled at the same times as the meal is cooked and simple clay pots used instead of metal ones. Boiled water can be retreated by shaking it up. A not so safe, but easier, method is to leave water to stand and then decant off the three-pot system (Webber, 2017). The solar water disinfection method, using polythene bottles of water heated by the sun can also be used. Chlorine can be added to a well or communal water supply, but any vegetable matter in the water will inactivate chlorine, and several times the amount calculated may be required (WHO, 2018).

Sanitation is as long-standing, public health issue when early people settled in communities and started to cultivate crops and raise animals, sanitation became a primary concern for society. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. Good basic personal hygiene and hand washing are critical to help prevent the spread of illness and disease. Keeping hands clean helps prevent the spread of germs. Hand washing with soap is the best way to reduce the number of germs on them (WHO, 2016). Bad sanitation and poor hygiene have to coincide with people carrying the Vibrio Cholerae before cholera outbreak could occur (Sinha, Sengupta and Ghosh, 2017).

Cholera is one of the most widespread and deadly disease of the 19th century, killing an estimated ten of million people (WHO, 2016). It is estimated that cholera

affects 3-4 million people worldwide, and causes 100,000-130,000 deaths a year as of 2016 (WHO, 2016). This occurs mainly in the developing world. More than 100,000 people die from the disease every year, with the majority of the cases in Sub-Saharan Africa (Sack, Sack, Nair & Siddique, 2016). Cholera remains both epidemic and endemic in many areas of the world (WHO, 2016).

One of the major contributions to fighting cholera was made by the physician a pioneer medical scientist John Snow in his epidemiological field studies, found a link between cholera and contaminated drinking water (Sack, Sack, Nair & Siddique, 2016). He was able to demonstrate, that human sewage contamination was the most probable disease vector in cholera epidemic outbreak (Sack, Sack, Nair & Siddique, 2016). Worldwide, 40 percent of the population does not have ready access to clean, safe drinking water, and approximately 60 percent does not have satisfactory facilities for the safe disposal of human waste. Infectious agents in drinking water and food cause the diarrheal deaths of several million children annually. Whereas, waterborne agents are the cause of many diseases in the world (Diarrhea, Guinea worm, Typhoid Fever, Dysentery, Malaria, Ring worm and Cholera). Therefore, the issue of water sanitation is highly paramount. Water sanitation is directly related to water quality and water pollution. Water quality usually describes the level of certain compounds that could present a health risk (Park, 2018).

Generally, the climate of Nigeria does not pose serious problem for sanitation as such. Except for recent times, when high variability and extremes particularly with rainfall have been attributed to climate change. As such, only the littoral states (Lagos, Edo, Delta, Bayelsa, River, AkwaIbom, Cross River, Ogun and Ondo) which receive

the most of rainfall all year round and perhaps the least of temperature may be prone to being water bound which may constitute some challenge for sanitation. Other impinging factors are topographical nature of an area couple with the soil texture in some part of the country (Sokoto and Kebbi state) (Usman, 2017).

Most people in the tropics get their water from wells, while some do so from rivers and springs. Rain provides the water, because during the dry season, the wells and the rivers and even springs give less water (Arther & Anne, 2017). Spring water is usually safe to drink because it contains no harmful bacteria. Water from streams may be safe, but whether this is so depends upon the size of the population near them (WHO, 2016). In addition, according to WHO (2016), river water is rarely safe and that fast-flowing streams are safer than slow ones, water at the center of large rivers is safer for drinking purposes than at the sides. For streams and rivers it is wise to sterilize the water before drinking it. If streams are used for domestic purposes, drinking water should always be obtained upstream of the house or village and washing carried out downstream of the point where drinking water is taken. Water from the well is usually polluted and should be sterilized before use. Pollution occurs from the ground, and is caused by insanitary condition, and also by the presence of animals (Arther & Anne, 2017). People are usually in the habit of washing themselves and washing clothes near sources of water supply; this may cause pollution. Any defecation by people or animals near the source of water supply causes pollution. Water is never safe if any latrines are nearer than 30 meters from the well (WHO, 2016).

2.3.3   Risk factors of Cholera

For a cholera outbreak to occur, two conditions have to be met: there must be significant breaches in the water, sanitation, and hygiene infrastructure used by groups of people, permitting large-scale exposure to food or water contaminated with Vibrio cholera organisms; and cholera must be present in the population. Cholera has been proven to be transmitted through fecal-oral route via contaminated food, carriers of the infection and inadequate sanitary conditions of the environment. The principal mode of transmission however remains ingestion of contaminated water or food (WHO, 2016).

Another factor that may greatly contribute to risk of cholera transmission is population movement which enhances the spread of the infectious agent to others and to different sites. For instance, all the surviving residents that fled a two month outbreak in (North-west) became indices for subsequent infection in the north and southern part of a neighboring state (Datta, 2017). Additional overcrowding increases risk of contact with vomitus, excreta and contaminated water or food. Since early detection and containment of cases (isolation facilities) are paramount in reducing transmission, poor access to health services and poor diagnosis may become major barrier to controlling the infection. Lack of safe water and poor sanitation are important risk factors. All these features have contributed greatly to cholera infections in Nigeria (Datta, 2017).

Susceptibility to cholera infection and factors enhancing its spread is multi-factorial. The host immune system is the critical defense mechanism against cholera. However, infection with cholera can result in a range of responses, from severe and life threatening diarrhea to mild or unapparent infections. Another factor is differences in gastric acidity (Olutayo, 2014). It been stated that low acid production can lead to

increased susceptibility to cholera (WHO 2016). People who produce less stomach acid such as young children, older people, and those taking drugs that reduce stomach acid, including proton pump inhibitors (such as omeprazole) and histamine-2 (H2) blockers (such as ranitidine)are likely to contact the infection (Olutayo, 2014).

A number of demographic and socioeconomic factors including age, gender, nutritional status, social status and economic status are also known to play crucial role in susceptibility to V. cholera (WHO 2016). Sanitation and nutrition are particularly important factors and it has become clear that good sanitation and hygienic practices largely prevent the disease (WHO 2016). Vibrio cholera infection is known to be more severe in individuals suffering from malnutrition. Hypochlorhydria associated with malnutrition, B12 deficiency and gastritis predispose to the development of cholera. As regards host susceptibility factor, epidemiologic research suggests that there is association between cholera and blood group. Researchers postulated that the incidence of cholera in patients with blood group A was lower than those in the general population, while incidence in those with blood type O was significantly higher. The likelihood of V. cholera infection progressing to the severe form, cholera gravis, appears to be related to the individual's ABO blood group. Thus, individuals with blood group O are more likely to exhibit severe diarrhea. No epidemiologic data from studies in Nigeria to suggest an association between individual´s susceptibility to cholera and blood group (Liz and Yix, 2015).

Host genetic factors and climatic factors were documented to significantly increase cholera risk in some populations. Individual with type O blood for reason that are not entirely clear are reported to be twice as likely to develop cholera as are people

with other blood types (Harris, 2018). Also, the incidence of cholera was found to be significantly related to higher temperature and humidity as was as lower precipitation in the Middle East just as lower cholera risk was reported in the highest elevation suburbs of Harare, Zimbabwe in 2018 (Harris, 2018).

Consumption of raw or undercooked shellfish is associated with increased risk of V. Cholera infection. Although large-scale cholera outbreaks no longer occur in industrialized nations, eating shellfish from waters known to harbor the bacterial greatly increases the risk. A study from coastal towns of Cote d'ivoire reported incidence of cholera from consumption of crustaceans (Traore, 2017).

Nigeria, several risk factors have been reported to be associated with cholera outbreak in the last four decades. Massive cholera outbreak in Kano northwestern Nigeria resulted from drinking contaminated water usually from water vendors, lack of tap water and poor hand washing practice (Usman, 2018). As at 2016, 42% of the entire population lacked access to improved water source and 68% to proper sanitation facilities (WHO, 2016). Another outbreak at Ibadan, Southwestern Nigeria was said to be predicated on overcrowding onset of rainy season and contamination of water source (WHO, 2016). In Calabar, South-South Nigeria, poor sewage disposal systems, lack of potable water supply, contact with sea water and consumption of fishery products and leftover foods were reported as risk factors for Vibrio diseases (Utsalo, 2017).

Another factor that may greatly contribute to risk of cholera transmission is population movement which enhances the spread of the infectious agent to others and to different sites. For instance all the internal displace persons (IDP) that fled out of Nasarawa state (North Central Nigeria) became induces for subsequent infection in

Katsina state (North-Central Nigeria) and some part of the neighboring state (Okeke, Abudu&Lamikanra,2016). Additional overcrowding increase risk of contact with vomitus, excreta and contaminated water or food, since early detection and cases (isolation facilities) are paramount in reducing transmission, poor access to health services and poor diagnosis may become major barrier to preventing the infection. Lack of safe-water and poor sanitation is an important risk factors. All these factors contributes greatly to cholera infection in Katsina state.

2..4   Knowledge of Cholera Prevention

Knowledge is the ability to recall or recognize something such as a fact concept, principle or custom (Kalua, 2016). It is further stated that knowledge can be acquired through formal or informal settings either by the help of someone or alone. Knowledge is said to be a source of power necessary for everyone to make informed decisions about one's health and participate actively in promoting health of the community (Kalua, 2016). Knowledge of oneself has been considered to be at the very care of human behaviour (William, 2018). Knowledge of oneself, self-awareness, self-insight, and self-understanding is essential to one's productive and interpersonal functioning and in understanding and empathizing with other people (William, 2018) state that the knowledge we possess about yourself, who make our self-concept, are control to improving our management skills.

Studies have shown that knowledge acquisition takes place in two phases, namely assimilation and accommodating (Kalua, 2016) where;

i. Assimilation is the process making part of external environment become part of one-self. This happens when one is exposed to new pieces of information or cues.

ii. Accommodation follows assimilation. It is the adaptation that one goes through to the newly assimilated object to make to meaningful in one's life. It is manifested in charged value and attitude.

For knowledge to be meaningful and applicable this theory posits that people, know about things and event around them through their senses and knowledge (Ganson, &Vyamru, 2015). This mean that people should:

i. Be aware of cholera

ii. Be certain about the management

iii. Learn understanding or grasp of the object of knowledge.

iv. Be familiar with cholera management

v. Be able to recognize or identify the managing method of cholera

vi. Ability to distinguish between cholera & other communicable disease.

vii. Have enough experience and training and to be intimate with the disease.

According to WHO (2017), the skills and knowledge needed by people to ensure cholera management is:

- Proper and timely case management in cholera treatment centers;

- Specific training for proper case management

- Sufficient pre-positioned medical supplies for case management

- Improved access to water, effective sanitation, proper waste management and vector control; enhanced hygiene & food safety practices;

- Improved communication and public information

Chiyangwa (2017) revealed that people have shallow knowledge on cholera prevention and its effect on the economic. Qadri (2016) attributed this lack of knowledge to the inability of health personnel to cover the whole state, partly as a result of incessant responds. Other reasons are lack of information material and health education personnel, and perhaps the most serious, the absence of community based heart to heart talks (Sanusi, 2016). Mukandavire, Liao, Wang, Gaff, Smiyh& Morris (2016), added that education efforts are needed to correct misguided knowledge and to improve people's practices towards cholera prevention. Lucas and Masson (2018) observed that educating the public as well as parents on cholera prevention is an important matter which must be of great concern to health associations, schools and colleges, appropriate university department and faculties, government with their relevant agencies, medical and paramedical personnel. The co – operation of these associations and institutions may go a long way in solving cholera outbreak. Kalna, (2016) reveal that people in Haiti had access to cellular telephone (88.1%), radio (67.1%) and television (66.3%). The preferred form of communication for receiving cholera message were television (71.1%), radio (68.8%) and trucks with megaphones (44.0%), knowledge of common symptoms of cholera was high; the 2 most common sign described were diarrhea (89.1%), and vomiting (83.4%). Respondent also showed high knowledge of transmission mode; 71.9% indicated consumption of contaminated

water and 61.4% indicated consumption of contaminated food. The most common management cited was hand washing (86.0%).

Okeke (2016), carried out a study on assessment of knowledge, following cholera outbreak among students of Federal College of Education Pankshin in Plateau State, Nigeria. Using a sample of 238 students, Mean age 27.6 (standard Deviation: 7.6 years). Male were 61.5% (174). Fifty eight (20.2%) knew the cause and the mode of transmission of cholera. 14.13% believed cholera is a spiritual problem while 91.51% knew it was a disease. Clinical signs of diarrhea and vomiting was known by 67 (23.7%) of students. The main water source was deep well (39.3%), however 197 (69.6%) treated their water before drinking while 264 (93.3%) covered their drinking water. A one day sensitization seminar on the prevention of cholera, emphasizing the importance of good personal hygiene managing of oral rehydration therapy (ORT) and treatment of water before drinking was organized for the student and staff. In conclusion the student lacked adequate knowledge on the cause and Prevention measures of cholera. Measures to prevent transmission of cholera were unsatisfactory.

Chiyangwa, (2017) conducted a study on community Based emergency management on cholera outbreak in Zimbabwe. Findings from the focus group discussions indicated that the community understood cholera as a disease as they related it to erratic water supplies and the sanitation infrastructure in Zimbabwe coupled with inconsistent refuse collection. However, it should be noted that before the outbreak knowledge and understanding of the disease was limited as indicated by participants. Some participants revealed that other community members initial beliefs for the cause

of death were witchcraft or food poisoning understood to be caused by food shortages at the time.

Elizabeth (2016) conducted a survey on factors affecting cholera which focused on detecting cholera in communities of Chiradzula district from the study it was seen that overall 95% of respondents mentioned diarrhea and 78% mentioned vomiting as a signs of cholera. The result showed that all the villages had knowledge on cholera despite the distance either to the main hospital or the health facility. The results were in agreement with Monteith (2017) revealed that Managochi, Kadungu and Blanture which showed that 98% of the people were aware of the signs and symptoms of cholera, but the knowledge were inadequate. Educating the public on the detecting of cholera should be given a priority in the communities. Sanusi (2010) also revealed that female (20%) is more knowledgeable then male (19%). Some of the reasons for that are biological and social demands of the female, which exposes them to a lot of health hazards. The problem here is that they are so serious when it comes to house hygiene. In view of the above, the need for health education in our various communities should be emphases. Utaslo et al., (1982) observes that educating the public on the important of cholera prevention, which most of great concern to health association, school, government with their relevant agencies, and medical personal. The co-operation of that association/institution may go a long way in educating public on the important of cholera prevention.

2.4.1 Practice of Cholera Prevention

Practice is an action or behaviour that individual engages in and is normally induced by attitude either consciously or unconsciously. It can also be referred to as

behaviours, specifically referring to a behaviour that a person engages in (Williams, 2018). The terms, practice and behaviours, are used synonymously in this study.

Behaviour is mostly learned and this learned action is a reaction to social or physical environmental stimulus and is goal-oriented. It is an overt manifestation of inner feelings and thoughts which form attitude and is therefore an indirect mechanism of expressing attitude (Williams, 2018). The type of behaviour an individual will engage in can be predicted from the type of attitude formed for instance, effective and timely case management contributes to reducing mortality to less than 1% (Park, 2015). However, for this to happen, enabling before such as time, self-esteem and availability and accessibility of needed technical power needs to be present (Williams, 2018). These make it possible for an individual to convert an attitude into behaviour.

From the earlier discussion on knowledge and how they are intertwined, it can be comfortably said that behaviour is a product of knowledge and practices. Given, this scenario, Williams (2018) have summarized the relationship among these four statements.

   i.   "there are no options without knowledge"

  ii.   "knowledge is the basic and essential element of conceptualization"

 iii.   "conceptualization is the heart of practice formation"

 iv.   "practice direct behaviour"

Before, the outbreak, most common practices of drinking water sources were piped water and public kiosks. These water sources were chlorinated irregularly, and only 6.2% of respondents believed that drinking water from the piped supplies was safe. Microbiological testing of 11 unchlorinated piped water sources indicated that 7 were

positive for an indicator of fecal contamination (E. coli). Collection of piped water decreased during the cholera outbreak, whereas collection of drinking water from private kiosks nearly doubles (47.6%). Public health messages on the health benefits of water treatment showed diffusion in these neighbor hoods; water treatment practices increased from 30.3% before the cholera outbreak to 73.9% after the outbreak, and the 2 most common methods used were water purification table (66. 6%) and bleach (57.7%). Water purification tables were considered palatable by most respondents (87.7%), and 70.2% reported purchasing them in the past month. Geographical, socio-economic and social cultural backgrounds of the people in the affected area which influenced practices may also contribute to spread of cholera. These include low educational level, unhygienic food handling practices and proximity to surface water (Sur, 2016). This is because the bacteria (Vibrio cholerae) that cause cholera are known to be normal inhabitants of surface water (Qadri, 2016). Result of a study in Tanzania revealed very poor practices towards cholera management in spite of high level of correct knowledge (85%) of and positive practices (97%) toward cholera management (Mpazi&Mnyika,2018).

Hygienic practices (hand washing and latrine use) are critical for managing the spread of diarrheal diseases (Dunkle, 2016), according to Venatesh and Davis (2017), Haiti people had active acceptance of these practices and use of soap was high among respondents. Approximately, 94.1% reported washing their hands with soaps; 84.1% reported having access to soap, 95.7% reported purchasing soap, and 16.5% reported receiving soap from a distribution location since the outbreak started. Use of improved latrines was also reported by most respondents (74.0%). Oral Rehydration Solution

(ORS) is a lifesaving therapy for diarrheal diseases, including cholera (Virgina,2015). Nearly 90% of respondents stated that they knew the method of ORS preparation, although only 76.0% of respondents indicated the correct volume of water needed to prepare ORS sachet as recommended by the World Health Organization (WHO, 2015). One fourth of respondents had ORS in their home when the survey was conducted.

Okeke (2016), in a research conducted, stated that majority of the respondents did not practice hand washing with soap and water. Sanitary practices such as proper disposal of waste away from the house/pit was done by 264 (93.3%) of the respondents. Open defection was practiced by 39 (25%) of the students off and on campus. In this study infection of cholera is likely to occur because the student do not practice hand wash with soap and water after defecting. According to Bhattacharya (2014), there is need to practice hand wishing after defecting and toilet should be practically used.

Another research conducted by Lindi and John (2018), their purposed of the study was to determine the behaviour factors associated with cholera outbreak in Kilosa district; the study involving 400 heads of households. The study revealed that only 39.6% of respondents were aware of causes, mode of transmission and prevention of Cholera. Female were better informed about the disease (44.2%) than male (32.9%). Although (88.3%) of respondents had latrines, only three out of five washed their hand after latrine use. Regarding clean and safe water for drinking, 59.6% of respondents use tap water for washing domestic utensils and 56% of respondents use tap water for washing their cloths for waste management, the study revealed that 52.3% of respondents were disposing domestic water haphazardly around the houses. Far knowledge on the mode of transmission of Prevention measure of cholera among

community members posed a challenge to control measures of the disease in the district. Based on these finding, it is clear that there are poor community based programmed on methods of pit latrine reinforcement and poor supportive supervision to villages on environmental sanitation. Therefore the awareness and advocacy campaign on cholera disease as well as community participation on cholera planning, implementation and evaluation of cholera control prevention strategies (Lindi and John, 2018).

Monteith (2016), indicated that local health officers do not broaden their approach and use their spectrum of strategies to build community capacity and to promote community health, it is also generally taken to mean that a given community takes responsibility of all stages of program including planning and implementation (Ronan & Johnson, 2018). In cholera outbreak, community members should naturally gather and share information with others members and though casual and purposeful contact with others members, case definition and case finding in outbreak investigation can be expedited (Sinha, Sengupta & Ghosh, 2017). This partnership between health professional and community constituents is argued by other health professionals that it enhances the sharing of responsibilities decision making and commitment to intervention to improve community health outcome (Porche, 2016).

Deb,Sircar, Sengupta, Mondal, Gupa and Pal, (2016). On interventions to prevent cholera transmission in urban slum, it reported that in light of cholera outbreaks, poverty, malnutrition, overcrowding, and unhygienic living conditions are important contributing to the spread of cholera. Understanding local practices and participation of community is key in implementing intervention strategies for cholera (Connolly, Gayer, Ryan, Salama, Spiegel, &Heymann, 2016). An investigation in a

Malawi refugee camp that underwent repeated cholera outbreak showed that an improved water bucket with cover and spout to prevent household contamination was acceptable to the population, despite the existence of a less familiar but more cost-effective method of chlorinating water (Roberts, Chartier, Malenga, Toole, &Rodka, 2016).

Another research done by Zhang (2014) showed that mothers have poor level of water and sanitation practices in the community. Water for life aims to promote sustainable water practices by emphasizing action based programs and policies that encourages long-term water resource management and improved sanitation (International Decade,2017). According to UNICEF's most recent water, sanitation and Hygiene (WASH) statistic, the Millennium Development Goals (MDG), stated that 'halve by 2016, the proportion of the population without sustainable access to safe drinking water and basic sanitation (WASH, 2014). However, improvements in sanitation still lag far behind. At least 2.5 billion people still lack access to improved sanitation and over 1 billion have no access to any sanitation facilities and are force to defecate in the open (Water, Sanitation and Hygiene, 2014). For communities without access to sanitation, the introduction of clean water access point may not be enough to eliminate the spread of disease. As more and more people migrate to urban centers, the need for both safe water access and sanitation will continue to grow.

Mackey(2014) conducted a research on practices of cholera prevention on sanitation in Malawi, the researcher found that poor sanitation and drinking unsafe water have been found the major causes of cholera especially in cities and refuge. In the

same studies lack of practices like hand washing and water hygiene have been the main contributing factor to contamination of food and water.

2.4.3 Cholera Prevention Strategies

Cholera prevention is an act that focused on prevention, preparedness, and response to combat the spread of cholera (WHO, 2015). They also stress the importance of an effective surveillance system. Government can play a role in all of these areas, and in preventing cholera or indirectly fascinating it spread. Although cholera may be life threatening, prevention of the disease is normally straight forward if proper sanitation practices are followed. Today most developed countries have provided safer infrastructure to ensure clean provision of water and treatment of swage before clean provision of water and treatment of sewage before disposal to water bodies (Gaffga, Tauxe &Nintz, 2014). In developing countries, the amount of treated sewage being discharged into rivers has increased over time and this has led to the determination of water quality in many of our major rivers (Roberts, Chartier, Malenga&Rodka, 2016). In situations of outbreak, the provision of safe water and adequate sanitation can be established as emergency measures, but Blattacharya, (2014) noted that these measures are usually not guaranteed to remain once the outbreaks ends. Epidemic preparedness, and the ability to defect are verify the existence of evidences, is crucial for the early containment of outbreaks and reduction in mortality (Connolly, Gayer, Ryan, Salama, Spiegel&Heymann, 2016).

i.   Water Sanitation

World Health Organization (2016), water is the basis of all life. But for millions of children, the water they drink can also be a source of persistent illness, leading to an early grave. A child dies of diarrheal disease every 30 seconds (WHO, 2016). And for every child who dies of diarrheal disease, three more children die of other diseases passed along by unwashed hands, or made more deadly by chronic malnutrition resulting from constant bouts of diarrheal disease and intestinal parasites (Driscoll, 2016).Thus, every 7 seconds, a child in the developing world dies of water sanitation and hygiene (WASH)-related disease or WASH-related malnutrition (WASH, 2015).

According to the World Health Organization (WHO, 2017) and the centers for disease control and prevention (CDC), 80 percent of all childhood diseases are WASH-related (WHO, 2017). While secondary school students also suffer from WASH-related diseases, 90 percent of those who succumb to them are children under the age of 5 (Foster, 2017). Even more alarming, 70 percent of these don't survive the first year of life, and 40 percent don't make it past the first month (WHO, 2016). Before we can help these children to thrive, we must help them simply to survive. Providing a with access to safe water, sanitation, and hygiene is one of the most effective ways to ensure his or her survival (Gyau-Boatge, 2017)

Lack of access to adequate water and sanitation is, first and foremost, a public health concern millennium development goal 7 (MDG), target 10 aims to "halve by 2016 the proportion of people without sustainable access to safe drinking water and sanitation." Infant mortality rate in urban areas are significantly lower in homes with piped water (Hsiao, 2016). The pripode studies confirm the severity of the situation. In

a study of child (age 0-5) diarrhea prevalence in town medium-sized Cameroonian cities, Ebolowa in the south and Maroua in the north, researchers found prevalence rate of 13% in the former and 24% in the latter. Compared to a national rate of 16%, in Maroua, only 6.5% of households had modern toilet, versus 18.4% in Ebolowa, though a slightly higher proportion had access to improved latrines (68.3% vs. 58.7%). The proportion of children with diarrhea increased in direct relationship to the quality of toilet facilities. Perhaps reflecting source water quality, the semi-arid Maroua diarrhea had prevalence rates of 19% for internal tap water and 24-25% for public taps and wells, whereas in Ebolowa. It was roughly half these levels. Treatment of water reduced prevalence by 62%. Demographic factors - such as the education level of the parents - are intimately associated with diarrhea prevalence, presumably reflecting an income/amenity effect as well as a personal hygiene effect (Lindi and John, 2018).

In Brazzaville, a research was conducted and the researchers found that 85% of house-holds report have access to tap water, but because of the unreliability of the public water supply, households also depend on rainwater, wells, water services, and the river (in descending order from 30 to 10%). The study found that 35% of respondents reported a case of cholera in the household in the past 12 months (Lindi and John, 2018). The researchers attribute this to the poor state of the public water service, which employ neither water testing nor treatment before delivering water to households.

A study was conducted by Hsiao (2016), the study finds that industrial and agricultural wastes and runoff, especially heavy metals and agro-chemicals, are polluting streams and aquifers. Contamination is particularly acute near industrial facilities, Because of regular flooding (56% of households in the districts studied had

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experience flooding), contaminants mix with flood waters to produce severe environmental health problems. The study of Kampala finds that inadequate evacuation of solid wastes from disposal areas create lactates that are washed into water sources. As a result, 90% of protected springs have been declared unfit for human consumption, yet the population continues to drink the water for lack of alternatives (Lindi and John, 2018).

Functioning solid waste disposal systems are generally lacking in low in-come country cities, which contribute to the spread of infectious disease. The lack of adequate waste removal can be attributed to rapid growth of new settlements, reductions in public sector spending associated budgetary constraints (WHO, 2017). Waste removal also varies by neighborhood, with the poorest neighborhoods generally reporting the greatest problems with inadequate or non-existent waste removal, reflecting the general pattern of social segregation. The Brazzaville, study found that 38% of households reported some kind of trash collection (either public or private), whereas 36% threw their trash out in "natural areas" and 24% burned or buried their trash. The Cameroon pripode study found a high proportion of residents disposed of waste by depositing them in pits outside their compounds or by burning. They found little relationship between the type of trash removal and diarrhea prevalence.

In a survey conducted for the Accra study, residents of the two slums, Narayanan, (2014) reported the lack of proper solid waste disposal as the biggest environmental risk. Poor drainage and clogged gutters ran a close second, which is also the result of improper waste disposal. A high percentage of residents in these slums favored the provision of rubbish containers and regular trash collection. In the Lagos

study, a survey of residents in four Local Government Areas (LGAs) representing different income and population density levels technical job, but who do not have the level of knowledge required to gain a detailed understanding of hydrogeology, most drillers whether nongovernmental organization (NGOs) or private contractors, record routine field data, such as that described, during water borehole drilling and development (WHO, 2016). This study examines whether this field data can be used to help predict borehole sustainability. The research findings suggest that there is, indeed, a limited amount of useful information that can be deduced from this data. The key points being:

i.   The initial measured yield of a borehole is the single largest factor that influences subsequent borehole failure. It is important that realistic guideline figures are set and adhered to. Boreholes with low yields should be drilled to greater depth with respect to DWL (and have longer screened intervals) than those with higher yields, rather than adopting a uniform approach.

ii. Rainfall intensity during the month of drilling has a direct influence on failure rates. It is essential that where drillers operate throughout the year, they develop compensation strategies for seasonal drilling. This is likely to involve drilling to greater depth in relation to DWL during the wet season, but groundwater levels must be recorded in order to develop appropriate strategies for different geological environments.

iii. Borehole failure increases with age and is most common at five years old or more, suggesting that most borehole failures are associated with reduction in yields and degradation of well construction over times.

iv.   The sitting success rate in a given area does not have a strong effect on the borehole failure rate in that area. It should not, therefore, be assumed that areas of complex hydrogeology will result in higher failure rates (Narayanan, 2014).

On the basis of the results obtained it is important that drillers develop field practices which take full account of seasonal groundwater variations and low borehole yields. The people involved in groundwater development must have the skills and knowledge required to be effective, so that they can acquire a real understanding of the environment in which they operate, rather than just follow rigid operational guidelines. The required yield should be matched to forecasted water demand for each specific borehole, based on the population and water usage, rather than using a fixed arbitrary guideline value. Drilling practitioners must pay special attention to low pH water and it is essential that pH value is measure both prior to construction and after development. While there are a range of techniques that can be used for borehole rehabilitation, such as acid treatment, chlorination, and hydro fracturing, the cost and management needs associated with these are often prohibitive. Prevention is better than cure, but this requires appropriate monitoring and information management.

We are in a situation where many thousands of boreholes have been drilled in sun-Saharan Africa and little knowledge has been gained from them (Main, 2018). What information we have must be used to its maximum potential, and further information should be collected and managed, in order to ensure sustainable development, on all fronts.

ii.   Refuse Disposal

Refuse disposal consists of garbage, rubbish, trash, ash, street refuse, industrial, agricultural, animal and human wastes, sewage treatment sludge and other. Waste disposal management involves collection, storage, processing, transport and dispersion. Processing includes separation, size-reduction, treatment or incineration/pyrolysis. Shredding and grinding are common size-reduction methods of garbage disposal. Trommel is the most widely used screen in material separation and recovery, prior to disposal (Narayanan, 2014). The principal disposal options are land filling, compost, incineration and recycling methods. Proper planning and care should be taken in the waste disposal management as chemicals from landfills, dumps, and lagoons can leach into aquifers and streams (Narayanan, 2014).

The floors and furniture in the house should be kept clear of dust, as dust harbors spores of bacteria. When sweeping out dust, it is preferable to dampen the surface is swept. After sweeping, the dust other and solid refuse that normally accumulates in a house-ashes, broken crockery, tins, empty bottles-and placed in a dustbin (Bala, 2014). A dustbin should be made of galvanized iron, with a close fitting weighted lid, so that the lid cannot be easily removed and scattered by scavenging dogs and hyenas (Arther & Anne, 2014).

In addition to dust and dirt, dry refuse accumulates from the kitchen, vegetable peelings, bones husks, fruit skins. This dry refuse should be deposited in the dustbin as well. Wet refuse should be avoided in a dustbin, as the dampness causes the bottom of the bin to rust away. The dustbin should always be placed on a concrete base, and not on the ground. Any moisture collecting in the bin will trickle out and contaminate the ground, whereas a concrete base can be kept clean by washing with disinfection. Badly

protected dustbins with poor lids attract disease-spreading animals such as flies and rates. The dustbin should be periodically cleaned with disinfectant in water and fried in the sun (Bala, 2014).

In larger villages and towns, solid refuse is collected and destroyed by the public authorities. In the country, the householder should get of his own rubbish by burning it. Solid refuse can be buried in a simple pit, or burnt in a small incinerator which can be made to serve more than one house (Olutayo, 2014). Refuse can be disposed of by composting. Pits, or trenches, 90cm deep, are dug, and refuse put in to a depth of 30cm to 45cm. The refuse is sprayed with sewage sludge, which starts the bacterial action for the first stage in humus manufacture. Plenty of air is necessary for the decomposition of refuse in the humus. For this reason, the trenches have a layer of clinker or coarse stones along the bottom. The land can be used for cultivation after the compost has digested for two or three years (WHO, 2016) will be a fair quantity of waste water from the kitchen and the house. Waste water from the bathroom, washing place, and kitchen should be led by a drainage pipe to a soakage pit. A grease trap should be provided for the drainage pipe. It should be examined and cleaned periodically (Bala, 2014).

A suitable soakage pit would be 120cm deep by 60cm wide and long enough to deal with the soakage pit should not be dug near a well. The least distance between a well and a soakage pit should be 30m. When the waste water enters the soakage pit, the water trickles over the stones and into the earth and seeps away into the subsoil water (Arther& Anne, 2017). Air spaces in the pit allow bacterial action to hasten decay, and the covering keeps out flies, rats and mosquitoes. When water is scanty, the soakage pit should have smaller trenches leading off it in a 'herring bone' pattern (Arther& Anne,

2017). Water containing soap, and water containing detergent, should not be mixed, since an insoluble precipitate is formed which will block the drainage pipe and the pit (Bala, 2014).

iii.   Sewage Disposal

There are many factors that influence the quality of water. Clay minerals are among the most common suspended matter found in natural water (WHO, 2018). Because of their structure and high surface area per unit mass, these minerals have a strong tendency to adsorb chemical species from water. Sewage is the spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter. Domestic, gardening, farming and industrial usage of water commonly adds contaminants and chemicals to the discharge. Domestic pollution is mainly due to food, household and sanitary activities. Agriculture-based pollution is due to crop wastes, fertilizers and pesticide and herbicides. Industrial pollution is due to food, beverages, wood, paper mills and power and industrial operations and waste discharge (Narayanan, 2014)

When organic waste is present in water, the nutrients (nitrogen and phosphorus) are utilized by various organisms present in the aquatic environment. In that process they extract dissolved oxygen (DO) for their respiration, creating biochemical oxygen demand (BOD). Thus, a number of nutrient species such as ammonia, nitrates, phosphates and phosphoric acid are considered hazardous or serious water pollutants. Ammonia is also toxic and its toxicity increases with increase in pH and temperature (Lucas, 2018). A water body with a pH value 6.0-9.0 can hinder the activity of the micro-organism needed for the natural cleaning process (WHO, 2016)

Water pollution is caused primary by the drainage of contaminated waters into the surface water or ground waters (aquifers). For drinking purposes water most be free from pathogenic organisms and hazardous chemicals. Sewage can pollute water through chemicals, metals, plant nutrients, waste heat and pathogens. Contamination through human activities can spread infectious diseases. Therefore, water supply and water disposal should be optimized to maintain water standards for drinking, domestic and other purposes. This is achieved by: (i) selection of suitable water sources for different purposes, (ii) Sewage treatment before discharge into water source and (iii) storage and treatment facilities for industrial effluents (Narayanan, 2014)

Sewage from home, community, farm or industrial discharge, contains dissolved or suspended matter and is unfit for domestic use and/or hazardous to life and wellbeing. Pollutants alter the physical, chemical and biological characteristics of water. Municipal sewage contains sediments, scum, oil, grease, organic algal nutrients, oxygen-demanding compounds, pathogens. Sediment constitutes a mixture of clay, silt, sand, minerals and organic matter. The purpose of water treatment is to correct the deficiencies in water quality. The purification is usually based on stepwise cleaning (WHO, 2017)

Water-pollution control primarily involves the removal of impurities from sewage before it reaches natural water bodies or aquifers. Sewage must be purified or treated to some degree in order to protect public health and to prevent deterioration of existing water quality. In developed countries specifications are laid out for permitting treated water to be let into surface or underground water sources. Some of the parameters that have to be controlled are turbidity, dissolved oxygen (DO), BOD, coli

forms, acidity and toxic substances (WHO, 2017). To meet these requirements sewage, in particular sewage, treatment processes consist of several levels of purification.

1. *Primary Treatment:* At this stage the process is aimed to remove about 60 percent of suspended solids and 35 percent of BOD. Dissolved impurities are not removed.

2. *Secondary Treatment:* About 85 percent of both suspended solids and BOD is removed. In many countries a minimum level of secondary treatment is obligatory.

3. *Tertiary Treatment:* This is put into practice when a high degree of purification is desired. In addition to total solids and BOD, dissolved impurities like nitrate and phosphate are also eliminated. Nearly 99 percent of all impurities from the sewage are removed by an elaborate treatment. The effluent from the tertiary treatment is almost of drinking water quality. For the same reason it is very expensive and is undertaken only when high quality water is in demand (WHO, 2017).

Whatever might be the level of water treatment in each case, the last step, before discharging it into a body of surface waters, is disinfection. This is achieved by chlorination. In modern water treatment plants ultraviolet irradiation and ozone treatment are often chosen for this purpose (Narayanan, 2014)

iv.   **Soil Pollution**

Soil pollution is the build-up in soils of persistent toxic compounds, chemicals, salts, radioactive materials, or diseasecausing agent, which have adverse effects on plant growth and animal health (Foster, 2014). Soil is the thin layer of organic and materials that covers the Earth's rocky surface. The organic portion, which is derived from the decayed remains of plants and animals, is concentrated in the dark uppermost topsoil.

The inorganic portion made up of rock fragments, was formed over thousands of years by physical weathering of bedrock. Productive soils are necessary for agriculture to supply the world with sufficient food (Narayanan, 2014).

Soil pollution is caused by the presence of man-made chemical or other alteration in the natural soil environment. These types of contamination typically arise from the rupture of underground storage links, application of pesticides, and percolation of contaminated surface water to subsurface strata, oil. The most common chemicals involved are problem hydrocarbons, solvents, pesticides, lead and other heavy metals. This occurrence of the phenomenon is correlated with the degree of industrialization and intensities of chemical usage (Narayanan, 2014).

As soil pollution is any factor which deteriorates the quality, texture and mineral and content of the soil or which disturbs the biological balance of the organism in the soil. Pollution in soil has adverse effect on plant growth (Agarwal, 2017).

Pollution in soil is associated with

- Indiscriminate use of fertilizers
- Indiscriminate use of pesticides, insecticides and herbicide
- Dumping of large quantities of solid waste.
- Deforestation

v.   Indiscriminate Use of Fertilizers

Soil nutrients are important for plant growth and development. Plants obtain carbon, hydrogen and oxygen from air and water. But other necessary nutrients like nitrogen, phosphorus, potassium, calcium, magnesium, sulfur and more must be

obtained from the soil (Agarwal, 2017). Farmers generally use fertilizers to correct soil deficiencies. Fertilizers contaminate the soil with impurities, which come from the raw materials used for their manufacture. Mixed fertilizers often contain ammonium nitrate (NH_4NO_3), phosphate as P_2O_5, and potassium as K_2O. For instance, As, Pb and Cd present in traces in rock phosphate mineral get transferred to super phosphate fertilizer. Since the metals are not degradable, their toxic levels due to excessive use of phosphate fertilizers, becomes an indestructible poison for crops (Horowitz, 2017).

The cover use of fertilizer reduces quantity of vegetables and crops grown on soil over the years. It also reduces the protein content of wheat, maize, grown on that soil. The carbohydrate quality of such crops also gets degraded. Excess potassium content in soil decreases Vitamin C and carotene in vegetables and fruits. The vegetables and fruits grow on over-fertilized soil are prone to attacks by insects and disease (Monteith, 2016).

vi.   Indiscriminate Use of Pesticides, Insecticides and Herbicide

Plans on which we depend for food are under attack from insects, fungi, bacteria, viruses, rodents and other animals, and must compete with weeds for nutrients. To kill unwanted populations living in or on their crops, farmers use pesticides. The first widespread insecticide use began at the end of World War II and included DDT (dichlorodiphenyltrichloroethane) and gammaxene (Pafflin, 2018). Insects soon became resistant to DDT and as the chemical did not decompose readily, it persisted in the environment. Since it was soluble in fat rather than water, it biomagnified up the food chain and disrupted calcium metabolism in birds, causing eggshells to be thin and fragile. As a result, large birds of prey such as the brown pelican, ospreys, falcons and

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eagles became endangered. DDT has been now been banned in most western countries. Ironically many of them including USA still produce DDT for export to other developing nations whose needs outweigh the problems caused by it (Pierce, 2016).

The most important pesticides are DDT, BHC, chlorinated hydrocarbons, organophosphates, aldrin, malathion, dieldrin, furodan, etc., the remnants of such pesticides used on pest may get adsorbed by the soil particles, which then contaminate root crops growth in that soil. The consumption of such crops causes the pesticides remnants to enter human biological systems, affecting them adversely (Pierce, 2016).

An infamous herbicide used as a defoliant in the Vietnam War called Agent Orange (dioxin) (Agarwal, 2017). Was eventually banned Soldiers' cholera cases, skin conditions and infertility have been linked to exposure to Agent Orange? Pesticides not only bring toxic effect on human and animals but also decrease the fertility of the soil. Some of the pesticides are quite stable and their bio-degradation may take weeks and even months (Purdom, 2016).

Pesticide problems such as resistance resurgence and health effects have caused scientists to seek alternative. Pheromones to attract or repel insect and using natural enemies or sterilization by radiation have been suggested (Ronan & Johnson, 2018).

vii.   Dumping ofLarge Quantities Solid Wastes

In generals, solid waste includes garbage, domestic refuse and discarded solid materials such as those from commercial, industrial and agricultural operations. They contain increasing amounts of paper, cardboards, plastic, glass, old construction material, packaging material and toxic or otherwise hazardous substances (Pafflin, 2018). Since a significant amount of urban solid waste tends to be paper and food

waste, the majority is recyclable or biodegradable in landfills. Similarly, most agricultural waste is recycled and mining waste is left site (Monteith, 2016).

The portion of solid waste that is hazardous such as oils, battery metals, heavy metals from smelting industries and organic solvents are the ones we have to pay particular attention to. These can in the long run, get deposited to the soil of the surrounding area and pollute them by altering their chemical and biological properties. They also contaminate drinking water aquifer sources. More than 90% of hazardous wastes is produced by chemical, petroleum and metal - related industries and small businesses such as dry cleaners and gas stations contribute as well (Smith, 2014).

Solid Waste disposal was brought to the forefront of public attention by the notorious Love canal case in USA in 2012. Toxic chemicals leached from oozing storage drums into the soil underneath homes, causing an unusually large number of birth defects, choleras and respiratory, nervous and kidney diseases (Smith, 2014).

viii   Deforestation

Soil Erosion occurs when the weathered soil particles are dislodged and carried away by wind or water (Sposito, 2016). Deforestation, agricultural development, temperature extremes, precipitation including acid rain and human activities contribute to this erosion. Humans speed up this process by construction, mining, cutting of timber, over cropping and overgrazing. It results in floods and cause soil erosion (Yaron, 2017).

Forests and grasslands are an excellent binding material that keeps the soil intact and healthy. They support many habitats and ecosystems, which provide innumerable feeding pathways or food chains to all species. Their loose would threaten food chains

and the survival of many species. During the past few years quite a lot of vast green land has been converted into deserts (Yao, 2016). The precious rain forest habitats of South America, tropical Asia and Africa are coming under pressure of population growth and development (especially timber, construction and agriculture). Many scientists believe that a wealth of medicinal substances including a cure for cholera and aids, lie in these forests. Deforestation is slowly destroying the most productive flora and fauna areas in the world, which also form vast tracts of a very valuable sink for carbon dioxide (CO_2). (Yaron, 2017).

ix   Surveillance and Disease Detection

Surveillance is often described as gathering information for action. This description emphasizes the need for a reliable supply of timely, accurate, and relevant information to efficiently prevent and control diseases. Applied to cholera, this means that we have to know quickly where, when, and whom the disease occurs. Surveillance and prompt reporting allow for containing cholera epidemics rapidly. Cholera exit as a season disease in many endemic countries, occurring annually mostly during rainy seasons, surveillance systems can provide early alerts to outbreak, therefore leading to coordinated response and assist in preparation of preparedness plans. Efficient surveillance system can also improve the risk assessment for potential cholera outbreak. Understanding the seasonality and location of outbreaks provides guidance for improving cholera control activities for the most vulnerable (Dirita, Parsot, Jander, &Mekalanos, 2011) for prevention to be effective, it is important that cases be reported to national health authorities(Sack, Sack, Nair & Siddique, 2016). Cholera cases and

deaths are officially reported to world health organization through the National Integrated Disease Surveillance and Response Systems (IDSR) and published in the weekly epidemiological records.

x.   Integrated Disease Surveillance and Response

Cholera was included as one of the three noticeable diseases in the international health regulating 1969. The International Distance Survey Resources (IDSR) guidelines classify cholera as a disease with "highly epidemic potential". These guidelines defined the modalities of reporting from the local to the national level and stated in details which reporting competency should be available at each level (WHO, 2017). The IDSR guidelines for community health workers asked them to report cases with plenty of "watery diarrhea" to the district health officers that feed these notifications into the IDSR systems.

National cholera plans are unfortunately the exception, even among countries to which cholera is considered endemic. Kenya recently issued a draft multi-sectoral cholera prevention and cholera plan for 2016-2016 (not publicly available) and an integrated drought and cholera preparedness and response operation plan (WHO, 2016). Also in Nigeria, a study conducted in Kano State, where recurrent cholera epidemics occurred; Factors associated with prevention of the epidemics and health outcomes were examined. The state epidemiology unit, which is responsible for surveillance, detected epidemics using set thresholds and activated multisectoral emergency response. Control measures compassed accurate diagnosis of the reference laboratory, registration of cases, case prevention, and public health measures targeting personal hygiene and water treatment.

Case fatality rates decreased from 15% in 2016-96 to 5% in 1997 and 2% in 2015 (Usman, Sarkinfada, Mufunda, Nyarango, Mansur &Daiyabu, 2018). The organism responsible for all the outbreak was vibrio cholera, El-tor of inabaserotype of importance, the research concluded that multi-sectoral Epidemic Preparedness and Response (EPR) approaches contributed to the reduction in case fatality rates over the years.

Cross-border collaboration, at least in the many countries affected by cholera in Africa, is not yet well developed. A recent encouraging example is the epidemic in Guinea and sierra-Leon that has been ongoing since February 2017. The health authorities responsible for cholera control in both countries established a cross-border collaboration committee comprising senior technical staff from Disease Control Departments and National Reference Laboratories. They met to facilitate a platform for preparing for and responding to outbreaks of cholera and other priority communicable diseases along their common borders. Similar initiatives need to be emerged in other countries where cholera is endemic or where new epidemics are anticipated. Cholera epidemic to not stop at border; thus, surveillance should not stop, there either (WHO, 2017).

Laboratory confirmation of cholera for the first cases of acute watery diarrhea is a requirement for the declaration of a cholera outbreak in accordance with WHO guideline. The standard is conformation by growth of colonies of vibrio cholerae isolated from patient's stool samples on standard culture media and on selective thiosulfate citrate bile salts sucrose (TCBS) agar (WHO, 2016). WHO recommends laboratory confirmation only at the beginning of an outbreak to verify the outbreak?

Thereafter only sporadic sampling and conformation is recommended to monitor strains antibiotic resistance profile and toward the end of the outbreak to ensure that no further cases of cholera are occurring.Confirmation of cholera cases in remote areas without laboratory facilities is challenging and can delay confirmation of a cholera outbreak and subsequently control efforts. To overcome this challenge, several rapid diagnostic tests have been developed and successfully tested and have been found to have a sensitivity of 67%-100% and a specificity of 71% -97% (Sinha, Sangupta, & Ghosh, 2017). New diagnostic tools are under development, such as biosensors that are easier and less expensive (Virginia, 2017) which strains can be isolated and culture confirmation can be performed at any place at any time (Osemwenkhea, Isere & Okuonghae, 2015).

xi.   Drinking Water Interventions

Cholera is transmitted mainly through the fecal-oral route (WHO, 2018), and the ingestion of water contaminated with faeces plays a primary role in spreading the disease, especially during epidemics. Cholera can be reliably prevented and controlled only by stopping the fecal-oral contamination cycle, where ensuring use of appropriate sanitation and proper hygiene (personal and food) and access to safe drinking water for the whole population is of utmost importance (WHO, 2016& WHO, 2014). In epidemic cases, cholera can be contracted only by swallowing something (usually water or food) that has been contaminated with fecal matter containing vibrio cholera. Consequently, if fecal material is not ingested orally, this spread of cholera can be completely stopped and infection can be entirely prevented (United Nations Children Education Fund, 2016).

The World Health Organization/United Nation Children's Fund (WHO/UNICEF) joint monitoring program for water supply and sanitation monitors access to safe drinking water. Through the proxy indicator of improved drinking water sources, which are defined as those that are by nature of their construction protected from outside contamination, in particular from contamination with fecal matter (WHO/UNICEF, 2017). During a cholera outbreak, water treatment and safe water storage are commonly recommended additional measures. Although, the provision of safe water for drinking and food preparation is crucial to cholera prevention and control, WHO (2016) suggested that during an outbreak, water used for all domestic purposes (including washing and bathing) should be safe because it could be ingested and, thus, be a potential vehicle for cholera transmission. Water of good quality needs to be available in sufficient quantity to enable the population to exercise health hygiene practice.

xii   Sanitation Intervention

Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces, and other wastes that can negatively impact human health and well-being (Gaffgaet al., 2014). Inadequate sanitation is a major cause of infectious diseases, and improved sanitation that hygienically separates human excreta from human contact substantially improves the health of individuals and communication.

Cholera is transmitted mainly through the fecal-oral route and the ingestion of focally contaminated water plays in the spread of the disease (WHO, 2017). Cholera can be reliably prevented and controlled only by stopping the fecal-oral contamination

cycle, where ensuring used of appropriate sanitation and proper hygiene (personal and food) and access to safe drinking water for the whole population is of the utmost importance (WHO, 2016).

In an acute outbreak situation, constructing latrines or setting up of solid-waste management system may not be realistic or practical as a priority measure because of time requirement (Lucas, 2018); however, a later improvement in the sanitary conditions is likely to significantly decrease future outbreak risks. Immediate isolation of cholera patients in specialized health facility (Cholera Treatment Centers [CTCs], cholera treatment units [CTUs] is advisable to improve patient care and reduce the risk for further spread of the disease. These facilities should be established and operating within 24hours after an outbreak is confirmed (Medicines, 2016). Timely identification and preparation of adequate sanitation in these facilities is therefore required, including strategic prepositioning of materials, suppliers, and equipment, as well as staff training.

xiii   Hygiene Intervention

Hygiene promotion in the emergency context is defined by the WASH (Water Sanitation Hygiene) (2017) as "the planned, systematic attempt to enable people to take action to prevent or mitigate water, sanitation, and hygiene related diseases and provides a practical way to facilitate community participation and accountability in emergencies" Hygiene promotion also involves ensuring optimal use of the water and sanitation facilities provided during cholera prevention and control interventions (Mukandavire, Liao, Wang, Gaff, Smith, & Morris, 2016). Previous experience shows that behaviour cannot be fully changed if hardware provision is not combined with an enabling environment that ensures proper operation and maintenance of the facilities

and provides is not combined with an enabling environment that ensures proper operation and maintenance of the facilities and provides a strong sense of community ownership.

Understanding the public's risk perception, views, and concerns is critical to effective communication in emergencies without knowing how people understand and perceive the risk for cholera transmission and their existing beliefs and practices, correct decision and required behaviour changes necessary to protect health may not occur, and societal or economic disruption may be more severe.

Therefore, understanding what motivates people to make healthy choice in the context of cholera prevention and control is important because often health gain is not the primary motivating factor for change, instead, other factors analyzed during cholera interventions in Haiti in 2018 (WASH, 2017). Such as convenience for practicing a specific behaviour, fear of imminent death or fear of a disease often associated with poverty, nurturing and protective feelings, and affiliation or social norms, might be the driving forces behind change.

xiv   Use of Oral Cholera Vaccine

The availability of safe and effective oral cholera vaccine (OCV) provides optimism for acceleration control of this devastating infection. The vaccines have great potential for reducing rates of cholera and cholera-related deaths; however, the public health community is only beginning to understand how when to most effectively use OCV (Knaa&Oguabanjo, 2015) OCV is not a "silver bullet" but it is a major new tool for cholera control that can work synergistically with other intervention. The modern development of OCV began in the late 1970s, resulting in a large phase-three trial in

Bangladesh initiated in 1985 (Clements, Sack, & Harris, 2017). Subsequently, many other studies were been carried out with both Dukoral&Shanchol vaccine, and other studies are still under way (Liz, & Yix, 2015. Khatib, Alim & Von-Seidlein, 2017). The currently licensed OCV consists of mixture of killed vibrio cholera strains, which stimulates an intestinal immune response to the cell wall of v. Cholerae and limits the ability of the bacteria to colonize the intestine (Dicesar, Dupon, &Matheuson, 2017). By reducing intestinal colonization, OCV also lowers the number of bacterial in patient stool and renders people less likely to spread infection. Furthermore, when a large proportion of a population has been vaccinated, OCV confers herd protection. In several controlled trials, the efficacy of the vaccine has been about 70%. Two vaccine does are given generally 2 weeks apart, although the interval can be longer if necessary.

Because the vaccine is given orally is safe and effective with essentially no side effects, WHO recommended its use (WHO, 2018). Furthermore one OCV (shanchol) is relatively inexpensive (currently US $ 1. 85 per does). Therefore, these vaccines would be expected to be used widely.

OCV can be part of both a crises management plants and long-term strategy for cholera elimination. Crises management is needed for outbreak response and should be part of a general response to an emergency situation, particularly when improvements in water and sanitation n as difficult and can be achieved only in a long term. On the other hand, some countries do have long-term development plant will require 10years to complete, a vaccine program can be used as a interim measure to control cholera while the infrastructure project is under ways at which point the vaccination might be stopped, recent OCV trails have shown long-term protection (up to 5years). With the long

duration of protection, areas threatened with cholera should realize benefits over the long term. Thus, the success of a vaccine campaign is assessed not by its ability to control and individual outbreak but rather by its benefits over the long-term, even if implemented in response to a specific outbreak.

The World Health Organization is now establishing a stockpile, initially with 2 million does, which will make OCV available for emergency use (WHO 2017). It is being organized in a manner similar to the already established stockpiles for yellow fever and meningitis vaccine. In addition to making OCV available for emergency use, the stockpile will raise the profile of OCV and will facilitate the availability of OCV for endemic use (Them, Dean& Von-Seidlien, 2016).

xv.   Oral Rehydration Therapy

Effective and timely case management contributes to reducing mortality to less than 1% (park, 2015). It consists of prompt rehydration of patient. Mild and moderation cases can be successfully treated with oral rehydration salts (ORS) only. The remaining 20% of severe cases will need rehydration with intravenous fluids (WHO, 2017). Antibiotics are not paramount to successfully treat patients, but they can reduce during disease, diminish the volume of hydration fluids needed, as well as shorten during of shedding of the germ. ORS can dramatically reduce the number of death, particularly during an epidemic and when given early when symptoms arise. ORS cannot influence the infection process, but corrects dehydration and thus save lives. Numerous experiences with ORS have shown convincing evidence that ORS could be given by non-medical personal, volunteers and family members, reducing death rates dramatically (Sack, Sack, &Siddeque, 2014). Delays in rehydrating patients contribute

to higher mortalities and thus call for early ORS therapy already at home, while waiting to get access to proper medical treatment at cholera treatment center or health care facilities.

ORS is a sodium and glucose solution which is prepared by diluting 1 sachet of ORS in the liter of safe water (Park, 2015). It is important to administer the solution in small amounts at regular intervals on a continuous basis. In case ORS packets are not available, homemade solutions consisting of either half a small spoon of salt and six levels small spoons of sugar dissolved in one liter of safe water, or lightly salted rice water or even plain water may be given to prevent or delay the onset of dehydration on the way to the health facility (Park, 2015). However, these solutions are inadequate for treating dehydration caused by acute diarrhea particularly cholera, in which the stool loss and risk of shock are often high. To avoid dehydration, increase fluids should be given as soon as possible. All oral fluids, including ORS solution, should be prepare with the best available drinking water and stored safely continues provision of nutrition's food is essential and breastfeeding of infants and young children should continue.

xvi   Antibiotics

An antibiotics treatment for one to three days shortens the cause of the disease and reduces the severity of the system (Sack, Sack, Nair, & Siddique, 2016). Use of antibiotics also reduces fluid requirements (CDC, 2016). People will recover without them, however, if sufficient hydration is maintained (WHO, 2015). Doxycycline is typically used first line, although some strains of V. cholerae. have shown resistance

(Sack, Sack, Nair, & Siddique, 2016). Testing for resistance during an outbreak can help determine appropriate future choice (Sack, Sack, Nair, & Siddique, 2016). Other antibiotics proven to be effective include cotrimoxazole, erythromycin, tetracycline, chloramphericol and furazolidone (Molson Medical Information, 2016). Fluoroquinolones such as ciprofloxacin also may be used, but resistance has been reported (Krishna, Putil, &Chandrasek, 2016). Many areas of the world, antibiotic resistance is increasing. In Bangladesh, for example, most cases are resistant to tetracycline, trimethoprim-sulfamethoazole, and erythromycin (Sack, Sack, &Chaiguat, 2016). Rapid diagnostic assay methods are available for the identification of multiple drug-resistance cases (Mackey, 2014). New generation antimicrobials have been discovered which are effective against in *vitro*studies (Ramamurthy, 2016). Antibiotics improve outcome in those who are both severely and not severely dehydrated. Azithromycine and tetracycline may work better than doxycycline or ciprofloxacin (Leibovici-weissman, Neuberger, Bitterman, Sinclaire, Salam, & Paul, 2014).

xvii   Health Education

The most effective prophylactic measure is perhaps health education it should be directed mainly to:

a. The effectiveness and simplicity of oral rehydration therapy

b. The benefits of early reporting for prompt treatment

c. Food hygiene practices

d. Hand washing after defecation and before eating

e. The benefit of cooked, hot foods and safe water. Since cholera is mainly a disease of the poor and ignorant, these groups should be tackled first (Park, 2015).

Informing and training communities and community health workers-key components of cholera management as necessary to ensure that cholera infected persons are treated promptly effectively

xviii   Food Preparation

Many of the food we eat require that we subject them to a process before we could derive the optimum utility from them (Bala, 2018). Vegetables should be cleaned of earth, decayed portions should be removed and the prepared vegetables washed well. Preparation should be carried out on a wooden table top which can be cleaned thoroughly after each meal. Utensils should be kept clean, and traces of stale food removed after use, neglect of this will enable bacteria to grow in food particles left on dirty dishes. The decay so brought about, besides spoiling the taste of a meal, may also cause food poisoning such as cholera. (Akanbi, 2014). As far as possible in preparation, the food should be kept covered, either in water, or else by having a wire mesh cover placed over it. If precautions are not taken, the food will attract flies, and diseases may spread. (Bala, 2018).

All food should be eaten as soon as it is cooked. Food should not be left on the table to attract flies before people arrive to eat the meal. (Arther& Anne, 2014) food

should be provided in dishes with covers, so that food not actually being eaten is covered. After a meal, dishes should be washed in hot water and left to drain. If drying cloths are used, care should be taken to see they are clean. (Bala, 2018)

xix   Personal Hygiene

Good basic personal hygiene and hand wishing are critical to halt the spread of cholera. Clean, safe running water is essential for proper hygiene and hand washing (Olutayo, 2014). Keeping hands clean helps prevent the spread of germs. Washing hands with soap and safe water is the way to reduce the number of germs on them. If soap and water are not available, alcohol-based hand sanitizer that contains at least 60% alcohol can be use (WHO, 2016).

Olutayo (2014) indicated the following steps for washing hands:

i.   Wash your hands with clean, running water (warm or cold) and apply soap.

ii.   Rub your hands together to make lather and scrub them well; be sure to scrub the backs of your hands, between your finger, and under your nails.

iii.   Continue rubbing your hands for at least 20 seconds.

iv.   Rinse your hands well under running water.

v.   Dry your hands using a clean towel or air dry them.

vi.   After changing diapers or cleaning up a child who has used the toilet.

vii.   Before and after caring for someone who is sick.

viii.   After blowing your nose, coughing, or sneezing.

ix.   After touching an animal waste.

x.   After touching garbage.

xi.   Before and after treating a cut or wound.

Apart from the various ways mentioned above. Individual should also adhere to certain personal hygiene; these prevent the spread of germs and diseases. Toilet should be washed daily with soap and disinfectants. Compounds and environments be kept clean on a daily bases. Households refuse disposition be done in appropriate manner either burning/garbage pit. Stagnant water in the environment disposed because these can harbor vector (Olutayo, 2014).

2.5   Theoretical Framework

Knowledge and Practice Theory

The critical knowledge theoryapproaches knowledge as an ongoing dialogue. This theory suggests that an individual is ignorant or holds a belief about a health matter, the educator attempts to change or ascertain the individual's level of knowledge towards the health or concept through questioning the respondent. As the person answer the health question the person's knowledge and belief will begin to change, new questions arise and the respondent ask the educator some questions, the educator respond to these questions(Dicesare, Dupont & Matheison, 2017). This theory posits that people know about things and events around them through their senses and that knowledge can mean any of the following to:

- be aware of something,

- be certain about it,

- have understanding or gasp of the object of knowledge,

- be familiar with something

- be able to recognize or identify something

- ability to distinguish between things,

- have enough experience and training and to be intimate with something (Dicesare, Dupont & Matheison, 2017)

Practice Theory of Self-efficacy holds that, the belief that one has is able to control one's practice of a particular behaviour. Self-efficacy refers to one's belief that one can successfully execute a particular action. People are more likely to engage in certain practice when they believe that they are capable of executing those practices successfully. This mean that they will have high self-confidence towards an action. In layman's terms, self-efficacy could be looked at as self-confidence towards action, in analyzing this, individuals tend to choose activities they will be successful in doing and they tend to put more effort to activity and behaviour they consider they could achieve successfully (Bhattacharya, 2014).

Application of Knowledge and Practice Theory

Impact on disease due to poor knowledge and practice is a complex issue. The occurrence and severity of cholera related death among junior secondary students is greatly enhanced by their behaviour with regards the practice of healthy lifestyle and avoidance of risk factors. Poor practice is a major problem in among students. Cholera is a huge burden among students causing many elites to lose their lives.

Knowledge and practice are some of the measures which are thought to be on the causal pathway to behaviour. Poor knowledge and practice of cholera prevention will have negative consequences on the health of the people and overall development.

2.6   Empirical Studies

Okeke, (2016), carried out a study on assessment of knowledge, following cholera outbreak investigation among students of Federal College of Education Pankshin in Plateau State, Nigeria. Using a sample of 238 students, Mean age 27.6 (standard Deviation: 7.6 years). Male were 61.5% (174). Fifty eight (20.2%) knew the cause and the mode of transmission of cholera. 14.13% believed cholera is a spiritual problem while 91.51% knew it was a disease. Clinical signs of diarrhea and vomiting was known by 67 (23.7%) of students. The main water source was deep well (39.3%), however 197 (69.6%) treated their water before drinking while 264 (93.3%) covered their drinking water. A one day sensitization seminar on the prevention of cholera, emphasizing the importance of good personal hygiene managing of Oral Rehydration Therapy (ORT) and treatment of water before drinking was organized for the student and staff. In conclusion the student lacked adequate knowledge on the cause and Prevention measures of cholera. Measures to prevent transmission of cholera were unsatisfactory.

Opara (2017) assessed knowledge and practices of cholera prevention among School Children aged 6-14 years inAbraka, Delta State, Nigeria. The study covers an area of 21.2 square kilometer and is located on longitude 50 45' N and 60 15' E of the meridian. It is in the tropical rain forest area of Nigeria and comprises of nine communities namely Otororho, Uhruoka, Ekrejeka, Oria, Ajalomi, Erho, Ugono, Urhovie and Umeghe; with River Ethiope running through. The official language of the people is Urhobo and their major occupation is farming. A minimum sample size of 384 was obtained using the Fischer's formula for population above ten thousand (Araoye, 2013). Although the computed minimum sample size was 384, a multi-stage sampling

technique was however used to select a total of 476 children who gave assent for the study as follows: In the first stage, ten public primary schools were selected from the list of twenty-one primary schools in Abraka by simple random sampling technique. In the second stage, making using the class register, a stratified simple random technique (proportionate sampling) was used to select children from each class level in the ten selected schools. The study instrument was a pre-tested structured interviewer administered questionnaire which elicited information on the socio-demographic characteristics of the children and assessed their knowledge and practices related to knowledge and cholera prevention practice. Data collected was entered into the computer using the SPSS (version 15.0) software. A simple descriptive analysis was carried out to give a general overview of the study population. This was followed by bivariate analysis. The level of significance was set at $P< 0.05$. Ethical approval for this study was obtained from the Health Ethics and Research Committee of the Delta State University Teaching Hospital, Oghara, Delta State. Informed consent was also obtained from the Local Government Education Department, the School Authorities and Parent-Teachers Associations (PTA) of the ten Primary Schools that were selected.

Ibrahim (2014), conducted a study which focused on attitude and preventionof cholera and oral cholera vaccine, using a sample of 2,830 families in Zamfara State. The study was carried out with the objectives to assess the practice and knowledge of cholera prevention in Gusau. The researcheradopted survey design.Thepopulation of the study was three thousand eight hundred and ninety five (3895) comprising one hundred and fifty two (152)health personnel and three thousand seven hundred and forty-three(3743) secondary school students. A sample size of 350 were drawn from the

population and used as respondents. Purposive and random sample techniques were adopted to draw the sample. Two sets of questionnaire were developed and administered on the two categories of respondents. The findings revealed that 2.3% could recognize cholera as acute watery diarrhea and 16% had ever heard of oral cholera vaccine. About 54% of respondents had poor attitude on cholera-related issue, while 97% has a positive attitude toward cholera and oral cholera vaccine. One third showed poor attitude relating to the prevention of cholera. This clearly indicated the strengthening of health education activities to improve attitude towards cholera, its prevention and treatment, and information on cholera vaccination among high-risk population.

Another research conducted by Abdulmaleek (2018), was to determine the behaviour factors associated with cholera outbreak in Kebbi State. The study was carried out with three objectives. The study involved 400 heads of households. The study revealed that only 39.6% of respondents were aware of causes, mode of transmission and prevention of Cholera. Female were better informed about the disease (44.2%) than male (32.9%). Although (88.3%) of respondents had latrines, only three out of five washed their hand after latrine use. Regarding clean and safe water for drinking, 59.6% of respondents use tap water for washing domestic utensils and 56% of respondents use tap water for washing their cloths for waste management, the study reveal that 52.3% of respondents were disposing domestic water haphazardly around the houses. Far knowledge on the mode of transmission of Prevention measure of cholera among community members posed a challenge to control measures of the disease in the district. Based on these finding, it is clear that there are poor community based

programmed on methods of pit latrine reinforcement and poor supportive supervision to villages on environmental sanitation. Therefore the awareness and advocacy campaign on cholera disease as well as community participation on cholera planning, implementation and evaluation of cholera control prevention strategies.

A research carried out by Chingayipe (2016) on the belief towards cholera prevention and their responding evaluation of the consequences of cholera outbreak in Zimbabwe shows that 67% of the people have positive attitude but still lack appropriate knowledge and safe practice in cholera prevention. The study evaluate the knowledge, and practices (KAP) of hygiene among rural school children in Zimbabwe and assessed the extent to which proper knowledge of hygiene was associated with personal hygiene characteristics. This cross-sectional study comprised of 669 students who were interviewed by trained staff. Participants were in grades 1-6 at Angolela Primary School, located in rural Zimbabwe. Data consist of hygiene and hand washing practices, knowledge about sanitation, personal hygiene characteristics, and presence of gastrointestinal parasitic infection. The findings of the study revealed that attitude, belief and method of cholera prevention of people sometimes differ probably because of individual knowledge, background, culture, awareness or work. The study recommended that Successful implementation of the findings is likely to substantially attenuate the outbreak of cholera in Zimbabwe.

The average knowledge and practice scores related to cholera prevention recorded among the School Children studied were 74.6 % and 54.9 % respectively. This high level of knowledge related to basic personal hygiene exhibited by the children was not totally reflective of their practices of basic personal hygiene; as 29.4 %, 37.0 % and

46.3 % of them washed their hands after using the toilet, cover the food they eat properly and wash their hands after leaving the rest room respectively. The result of physical inspection of the children revealed that 17.9 %, 45.2 % and 57.4 % of them had dirty hair, dirty uniform and dirty nails respectively. The study revealed that although a sizeable number of the children studied had adequate knowledge related to basic causes of cholera, their practices related to same was poor.

Marin(2018), indicated that local health officers do not broaden their approach and use their spectrum of strategies to build community capacity and to promote community health, it is also generally taken to mean that a given community takes responsibility of all stages of program including planning and implementation (Ronan & Johnson, 2018). In cholera outbreak, community members should naturally gather and share information with others members and though casual and purposeful contact with others members, case definition and case finding in outbreak investigation can be expedited (Sestron& Hale, 2016). This partnership between health professional and community constituents is argued by other health professionals that it enhances the sharing of responsibilities decision making and commitment to intervention to improve community health outcome (Porche, 2016).

Another research done by Zuckerman, Rombo & Fisch (2017) showed that mothers have poor level of water and sanitation practices in the community. Water for life aims to promote sustainable water practices by emphasizing action based programs and policies that encourages long-term water resource management and improved sanitation. According to UNICEF's most recent water, sanitation and Hygiene (WASH) statistic, the millennium development goals (MDG), stated that 'halve by 2016, the

proportion of the population without sustainable access to safe drinking water and basic sanitation. However, improvements in sanitation still lag far behind. At least 2.5 billion people still lack access to improved sanitation and over 1 billion have no access to any sanitation facilities and are force to defecate in the open (Water, Sanitation and Hygiene, 2017). For communities without access to sanitation, the introduction of clean water access point may not be enough to eliminate the spread of disease. As more and more people migrate to urban centers, the need for both safe water access and sanitation will continue to grow.

2.7   Summary

Cholera is an acute diarrheal disease caused by the bacterial vibrio cholera. Typical symptoms include; the sudden onset of profuse, effortless, watery diarrhea followed by vomiting, rapid dehydration, muscle cramps and suppression of urine. The virus cholera remains the epidemic agent of greatest concern and represents the only serogroup that is currently prevalent in Africa, Latin-American, Oceania, but the situation in Nigeria in particular and Katsina state in general is still alarming. Hygienic practices (hand washing and latrine use) are critical for managing the spread of diarrheal diseases.

Sanitation is the hygienic means of promoting health through prevention of human contact with the hazard of wastes. Hazards can be physical, microbiological, biological or chemical agents of disease. Wastes that can cause health problems are human and animal feces, solid wastes, domestic wastewater (sewage, sullage, and grey

water), industrial wastes, and agricultural wastes. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities.

CHAPTER THREE

METHODOLOGY

3.1   Introduction

This study assessedthe knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State. To achieve this purpose, research design, population, sample and sampling techniques, instrumentation, validation of instrument, data collection, and data analysis were presented and described in this chapter.

3.2   Research Design

Ex-post facto research design was adopted to assessed the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina state, Nigeria. Asika (2015), stressed that ex-post facto (after the fact) research design is a systematic empirical study in which the researcher does not in any way control or manipulate independent variables because the situation for the study already exist or has already taken place. The researcher cannot manipulate the independent variable because it cannot be manipulated. But the researcher can indeed create or contrive a situation that will generate the requisite data for analysis. Therefore, ex-post facto was suitable for this study since the data already exist and the research is non-experimental where there are control and non-control groups (Asika, 2015).

3.3 Population of the Study

The population of this study comprised of 271,690 junior secondary school students in Katsina State Nigeria(Ministry of Education, 2018).

3.4 Sample and Sampling Techniques

The sample size for this study was 400 junior secondary school students. To obtain a sample size from the total of 271,690, Kerlinger (2012), formula for determining sample size was used. The formula stated that for large samples of about one million, 400 subjects can be adequately used as a sample size for a study. Below is the formula;

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

Where:

n=   Sample Size

N=   Population Size

e=   Sample error

I=   Constant

$$n = \frac{271,690}{1+271,690\ (0.05)^2}$$

$$= \frac{271,690}{1+271,690 \times 0.0025}$$

$$= \frac{271,690}{271,691 \times 0.0025}$$

$$= \frac{271,690}{679.2275}$$

$$= 399.9$$

=   **400**

For a population of 271,690, a sample size of 399.99 was obtained. Hence, a total of 400 respondents were drawn from the population to serve as the sample size for this study.

To select the sample size, the multistage sampling techniques was used as follows:

Stage 1: Stratified random sampling technique was used to divide the State into three (3) already existing senatorial zones, as strata namely Katsina Northern, Katsina Central and Katsina South. In each of the three (3) senatorial zones, four (4) junior secondary schools was randomly selected. A total number of twelve (12) junior secondary schools wasselected.

Stage 2:To select the respondents from the selected schools, simple random sampling techniques was used by writing 'Yes' and 'No' on pieces of paper, folded and dropped into a container and shaken properly. Each respondent was asked to pick one piece of paper. The participants who picked 'Yes' was given the questionnaire to fill, while the participants who picked "No" was not given the questionnaire to fill.

Stage 3: Proportionate sampling technique was used to select the respondents from each school selected.The respondents from each school selected using simple random sampling was sampled using proportionate sampling technique. For example, the total number of respondents per school over the total target population multiplied by the sampled size. The proportionate sampling technique used by the researcher is shown in table 3:1 below.

Table 1: Sampled Respondents per Selected Junior Secondary School using Proportionate Sampling Technique

School	Population	Sample
Katsina North		
Government Secondary School, Mashi	592	40
Government Secondary School, Baure	401	27
Government Commercial College, Sandamu	479	32
Government Secondary School, Kankia	403	27
Katsina Central		
Government Secondary School, Kaita	692	46
Government College, Batsari	395	26
Government Secondary School, Rimi	586	39
Government Secondary School, Dan Musa	492	33
Katsina South		
Government Secondary School, Funtua	615	41
Government Secondary School, Dandume	401	27
Government Secondary School, Malumfashi	502	34
Government Secondary School, Sabuwa	415	28
Total	**5973**	**400**

3.5   Instrumentation

To achieve the purpose of this study, a researcher-developed questionnaire was used to collect data on the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

The questionnaire consisted of three (3)sections. Section A contains four (4) items on demographic characteristics of the respondents. Section B contains eleven

(11) items on knowledge of cholera prevention. Section C contains eleven (11) items on practice of cholera prevention. Thus, a total of twentysix (26) items constitutes the questionnaire. 4-point Modified Likert scale was used as follows:

SA - Strongly agree = 4 points

A – Agree = 3 points.

D – Disagree = 2 points.

SD – Strongly disagree = 1 point.

Hence, a mean score of any response was considered positive, if it was 2.5 and above and mean score of any response less than 2.5 was regarded as negative score or not positive.

3.6   Validity of Research Instrument

In order to ensure the face and content validity of the research instrument, the researcher-structured questionnaire was submitted to five (5) professional experts in the field of Health Education for vetting so as to ascertain its appropriateness, relevance and clarity. Their suggestions, comments and corrections are incorporated and the final draft of the questionnaire was used for data collection.

3.7   Procedure for Data Collection

In order for the researcher to have access to the respondents in the selected schools for this study, the researcher collected an introductory letter from the Head of Department, Human Kinetics and Health Education, Faculty of Education, Ahmadu Bello University, Zaria and submit to the principal in charge of the sampled schools in the study area. The researcher used three (3) research assistants.

The researcher and her research assistants administered four hundred (400) copies of the questionnaire to the sampled school in Katsina State. In each school, the researcher and her research assistants administeredcopies of the questionnaire to the respondents using simple random sampling technique. In this technique, 'Yes' and 'No' was written on pieces of paper, folded and dropped into a container and shaken, properly. Each respondent was asked to pick one piece of paper. The participants who picked 'Yes' was given the questionnaire to fill, while the participants who picked "No" was not given the questionnaire to fill. This procedure was carried out until all the copies of questionnaire are administered to the 400 respondents. The researcher and her research assistants retrieved the filled questionnaire. The process of data collection lasted for three weeks.

3.8 Procedure for Data Analysis

The following statistics was used to describe the demographic characteristics andanswer the research questions and also test the formulated hypotheses of this study:

Descriptive statistics of frequency andpercentages, mean and standarddeviation were used to describe the demographic characteristics of the respondents and answer the research question respectively. Hence, mean score of any response was considered

positive, if it were 2.5 and above and mean score of any response less than 2.5 was regarded as negative response.

One sample t-test was used to test hypotheses one and two on the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina state Nigeria. Analysis of variance (ANOVA) was used to test hypotheses three and four in other to determine significant differences among junior secondary school students in Katsina state Nigeria baseon demographic characteristics (age, class and gender) while Independent sample t-test was used to test significant differences between male and female students in their knowledge and practice of cholera prevention strategies. All the stated hypotheses were tested at 0.05 level of significance.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1   Introduction

This study assessed the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria. Out of four hundred (400) copies of questionnaire administered, three hundred and ninety eight (398; 99.7%) were valid for the analysis. The statistical package SPSS Version 22 was used toanalyze the data obtained from the respondents. The demographic characteristics of respondents were computed using frequencies and simple percentages. The research questions were answered using descriptive statistics of mean and standard deviation.The formulated hypotheses were analyzed using one sample t-test and ANOVA. All the formulated hypotheses were tested at 0.05 alpha level of significance and the results were presented and discussed in this chapter.

4.2 Results

Table 2: **Demographic Characteristics of the Respondents**

	Variable	Frequency	Percentage
Gender	Male	271	68.1
	Female	127	31.9
	Total	**398**	**100.0**
Age Range	10 – 13 years	188	47.2
	14 – 17 years	139	34.9
	18 years and above	71	17.9
	Total	**398**	**100.0**
Class	JSS I	138	34.7
	JSS II	129	32.4
	JSS III	131	32.9
	Total	**398**	**100.0**
Religion	Islam	295	74.1
	Christianity	92	23.1
	Traditional	11	2.8
	Total	**398**	**100.0**

Table 2 above shows the demographic characteristics of the respondents, it reveals that 271 (68.1%) of the respondents were males while 127 (31.9%) of the respondents were females. With regards to age range of the respondents,it was revealed that majority (188; 47.2%) were of ages 10-13 years. However, the remaining respondents were (139; 34.9 %, and 71; 17.9%) of ages 14-17 and 18 years and above

respectively. Furthermore, table 2 also shows that (138; 34%)of the respondents (138; 34.7%) were in JSS I andthe remaining (129; 32.4%) of the respondents were in JSS II and (131; 32.9%) JSS III respectively.

Furthermore, Table 2 reveals that (295; 74.1%) of the respondents practice Islam, (92; 23.1%) of the respondents were Christians while (11; 2.8%) of the respondents were traditionalist.

Answering the Research Questions

Research Question One: What is the knowledge of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria?

Table 3: **Mean scores of responses on the knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria**.

S/N	Item	Mean	Standard Deviation
1	I am aware that Cholera is an infection of the small intestine that is caused by the bacterium called vibrio cholera;	3.31	0.69
2	I know that the infectious agent of cholera is acquired through consumption of contaminated water and food:	3.45	0.55
3	I am aware that poor disposal of refuse creates breeding groundfor the bacteria that causes cholera.	3.38	0.74
4	I understand that the symptoms of cholera are:		
	a. diarrhea	3.21	0.69
	b. vomiting	2.94	0.61
	c. fever	3.21	0.51
	d. dehydration	3.51	0.57
	e. stomach ache	3.36	0.61
5	I know that I can contact cholera through drinking contaminated water.	3.15	0.73
6	I know that unhygienic living conditions help in spreading cholera disease amongst people.	3.38	0.67
7	One of the easiest way of contacting cholera virus is through eating contaminated food	2.61	0.89
8	I am aware that the easiest way to prevent cholera by taking the oral cholera vaccine	3.37	0.72
9	I know that to prevent the spread of cholera, food should be properly cooked before serving.	3.32	0.76
10	I am certain that cholera can be highly treated with Oral Rehydration Solution (O.R.S)	3.31	0.54
11	I know that all fruits and vegetables must be washed properly before consumption	3.61	0.59
	Aggregate	**3.27**	**0.66**

Table 3 shows the mean scores of the responses on the knowledge of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria. The responses for each item were computed and item 11 had the highest mean score of 3.61(SD=0.59) indicating that the majority of the respondents know that all fruits and vegetables must be washed properly before consumption, while item 7 has the lowest mean score of 2.61 indicating that majority did not know that the easiest way of contacting cholera virus is through eating contaminated food. Furthermore, the table shows that all the remaining items from the responses indicated that respondents have knowledge of cholera prevention strategies. The aggregate mean score of 3.27 is greater than the constant mean of 2.5. This implies that junior secondary school students in Katsina State Nigeria have adequate knowledge of cholera prevention strategies.

Research Question Two: What is the practice of junior secondary school students towards cholera prevention strategies in Katsina State, Nigeria?

Table 4: **Mean scores of responses on the practice of cholera prevention strategies among junior secondary school students in katsina state, Nigeria.**

S/No	Item	Mean	Standard Deviation
1	I do drink water from		
	a. Borehole	2.51	0.29
	b. Well	1.53	0.52
	c. Stream	1.21	0.41
	d. Tap	1.38	0.74
2	I treat my drinking water by;	3.31	0.69
	a. flittering		
	b. boiling	2.41	0.83
	c. Use of Chemical	2.32	0.67
3	I cook my food properly before eating	2.29	0.89
4	I always wash my fruits and vegetables before eating	2.51	0.72
5	I clean my environment regularly to prevent cholera	3.38	0.66
6	I always wash my hands before eating	2.32	0.74
7	I always cover my drinking water to prevent cholera	3.41	0.29
8	To prevent incidence of cholera from my family, I dispose all wastes properly	2.54	0.52
9	I wash my hands with soap and water after using latrine	3.18	0.74
10	The waste in my school is properly disposed regularly to prevent cholera	2.51	0.69
11	I engage in environmental sanitation in my community every week	2.71	0.83
	Aggregate	**2.47**	**0.64**

Table 4 above reveals the mean score and standard deviation on the responses of the respondents on the practice of cholera prevention strategies among junior secondary school student in katsina state Nigeria.

From the look of table 4, it reveals that therespondents do not practice the prevention strategies of cholera. Most of the mean score were more than the fixed mean of 2.5 and even though the mean aggregate was 2.47 which was less than 2.5. However, some the respondents indicated that they do practice washing of fruits and vegetables (2.51; SD=0.72); regular cleaning of the environment (3.38; SD=0.66); and proper disposal of all wastes (2.54; SD=0.52). However it was therefore concluded that junior secondary school student in Katsina state Nigeria. do not adequately practice cholera prevention strategies with Aggregate mean of 2.47.

Research Question Three: Will junior secondary school students in Katsina State, Nigeria differ in their knowledge of cholera prevention strategies base on demographic characteristics (gender, age,class).

Table 5: Mean score of responses on the differences between male and female students in their Knowledge of cholera prevention strategies according to gender.

Gender	Mean	Standard Deviation	Mean Difference
Male	31.16	4.18	0.58
Female	31.74	4.05	

Looking at Table 5, reveals the difference of demographic characteristics on the knowledge of cholera prevention strategies among junior secondary school studentsby their gender. This is because the male respondents has a mean of 31.16 and standard deviation of 4.18 while the female respondents had a mean of 31.74 and standard deviation of 4.05 with the mean difference of 0.58 less than 2.50. However, though there was no difference between the males and their female counterparts, the female respondents were more knowledgeable (Mean = 31.74 and 31.16) than theirmale respondents.

Table 6: Mean score of Responses on knowledge of cholera prevention strategiesaccording to age

Variable	Mean	Standard Deviation	Mean Difference
10 – 13 years	21.62	3.13	
14 – 17 years	23.38	3.81	0.68
18 years and above	23.01	3.41	0.40

A look at Table 6 above shows that Knowledge of cholera prevention strategies according to age did not differ, because respondents of 10 – 13 years had a mean of 21.62 and standard deviation of 3.13, 14 – 17 years had a mean of 23.38 and standard deviation of 3.81, while 18 years and above has a mean of 23.01 and standard deviation of 3.41 with mean difference of 0.68 and 0.40 respectivelywhich is less than 2.50. However, from the results above, even though there was no difference in the knowledge of cholera prevention strategies according to age, the age group of 10 – 13 years seemed to be less knowledgeable of cholera prevention strategies.

Table 7: Mean score of responses on knowledge of cholera prevention strategies according to class level

Variable	Mean	Standard Deviation	Mean Difference
JSS I	21.62	3.13	
JSS II	23.38	3.81	0.68
JSS III	23.01	3.41	0.40

A look at Table 7 above shows that knowledge of cholera prevention strategies according to class did not differ, because respondents of JSS I had a mean of 21.62 and standard deviation of 3.13, JSS II had a mean of 23.38 and standard deviation of 3.81 while JSS III has a mean of 23.01 and standard deviation of 3.41 with mean difference of 0.68 and 0.40 respectivelywhich is less than 2.50. However, from the results above, even though there was no difference in the knowledge of cholera prevention strategies according to class, the JSS I seemed to be less knowledgeable about cholera prevention strategies when compared to the remaining the classes.

Research Question Four: Will junior secondary school students in Katsina State, Nigeria differ in their practice of cholera prevention strategies base on demographic characteristics

Table 8: Mean score of Responses on the differences between male and female students in their practice of cholera prevention strategies.

Gender	Mean	Standard Deviation	Mean Difference
Male	29.13	3.92	0.52
Female	29.65	4.15	

Looking at Table 8, reveals that there are nodifferences between male and female students in their practice of cholera prevention strategies. This is because the female respondents had a mean of 29.65 and standard deviation of 4.15 while the male respondents had a mean of 29.13 and standard deviation of 3.92 with the mean difference of 0.52. However, there was no difference between the male and their female counterparts but the female students seemed to practice cholera prevention strategies more than the male student.

Table 9: Mean score of Responses on practice of cholera prevention strategies according to age

Variable	Mean	Standard Deviation	Mean Difference
10 – 13 years	17.62	3.13	
14 – 17 years	18.38	3.81	0.76
18 years and above	19.01	3.41	0.63

A look at Table 9 above shows that practice of cholera prevention strategies according to agedid not differ, because respondents of 10 – 13 years had a mean of 17.62 and standard deviation of 3.13, 14 – 17 years had a mean of 18.38 and standard deviation of 3.81 while 18 years and above has a mean of 19.01 and standard deviation of 3.41 with mean difference of 0.76 and 0.63 respectively. However, from the results above, even though there was no difference in the practice of cholera prevention strategies according to age, age 10-13 years seemed to practices less of cholera prevention strategies.

Table 10: Mean score of Responses on practice of cholera prevention strategies according to class

Variable	Mean	Standard Deviation	Mean Difference
JSS I	14.62	3.41	
JSS II	15.38	3.11	0.72
JSS III	16.01	3.19	0.63

A look at Table 10 above shows that the practice of cholera prevention strategies among junior secondary school students in Katsina State,Nigeria according to class did not differ, because respondents of JSS I had a mean of 14.62 and standard deviation of 3.41, JSS II had a mean of 15.38 and standard deviation of 3.11 while JSS III and above had a mean of 16.01 and standard deviation of 3.19 with mean difference of 0.72 and 0.63 respectively. From the results above, there was significant difference in the practice of cholera prevention strategies according to class. However, JSS II and JSS III seemed to practice more of cholera prevention strategies than JSS1. Suggesting that the higher the level of class, the more the respondents know and practice cholera prevention strategies.

Hypotheses Testing

Hypothesis One: Knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria is significantly adequate.

Table 11: **One sample t-test on knowledge of cholera prevention strategies among junior secondary school students**

	Mean	Std. Deviation	t-value	df	P-value
Aggregate mean	3.27	0.66	3.070	397	0.001
Constant mean	2.50	0.00			

t (397) = 1.972, P <0.05

Table 11 reveals that the respondents were knowledgeable about cholera prevention strategies. This is because one-sample t-test calculated value 3.070wasgreater than the t-critical of 1.972 at degree of freedom 397 with probability value 0.001 less than 0.05 level of significance. Thus, this result shows that the sub-hypothesis which states that "Knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria is not significant" was therefore rejectedbecause junior secondary school students in Kastina state, Nigeria are knowledgeable about cholera prevention strategies.

Hypothesis Two: Practice of cholera prevention strategies among junior secondary school students in Katsina state Nigeria is not significantly positive.

Table 11: **One sample t-test on Practice of cholera prevention strategies**

	Mean	Std. Deviation	t-value	Df	P-value
Aggregate mean	2.47	0.639	1.291	397	0.110
Constant mean	2.50	0.00			

t (397) = 1.972, P >0.05

Table 11 reveals that practice of cholera prevention strategies among junior secondary school students is not significantly positive. This is because the one-sample t-test calculated value was 1.291 less than the t-critical is 1.972 at degree of freedom 397 with probability value 0.110 was greater than 0.05 level of significance. Thus, this result shows that the sub-hypothesis which states that "practice of cholera prevention strategies among junior secondary school students in Katsina State Nigeria is not significantly positive" was therefore retained because junior secondary school students in Katsina State Nigeria do not adequately practice cholera preventive strategies.

Hypothesis Three: junior secondary school students in Katsina State, Nigeria do not significantly differ in their knowledge of cholera prevention strategies based on demographic characteristics (gender age and class)

Table 12: Independent sample t-test analysis on the differences between male and female students in their knowledge of cholera prevention strategies.

Age group	Mean	SD	df	T value	P-value
Male	31.16	4.18	398	1.30	0.17
Female	31.74	4.05			

t (397) = 1.97, P > 0.05

Concerning differences between male and female students in their knowledge of cholera prevention strategies, the table reveals that differences did not exist among the respondents. This was because the calculated p value of 0.17 is greater than the 0.05 alpha level of significance while the calculated t value of 1.30 is lower than the 1.97 t critical at df 397. Therefore, the null hypothesis which state that gender of the respondents do not significantly differ in their knowledge of cholera prevention strategies among junior secondary school students in Katsina State, of Nigeria, was retained. This means that there is no significant different in the knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria base on gender..

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Table 13: Analysis of Variance on Knowledge of cholera prevention strategies according to their age

Variable	Sum of Squares	Df	Mean Square	F	P-value
Between Groups	11.81	2	1.16	1.61	0.21
Within Group	113.71	395	1.94		
Total	125.52	397			

f (2, 395) = 2.06, P > 0.05

Observation of Table 13 shows that result was not significant, because P value of 0.21 observed is greater than P value of 0.05. The observed F-value of 1.61 is less than the critical value of 2.06 at degree of freedom 2, 395. This means that the null hypothesis which stated that age of junior secondary school student in katsina state Nigeria do not significantly differ in their knowledge of cholera prevention strategieswas therefore retained. This means that there is no significant different in the knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria base on age.

Table 14: Analysis of Variance on knowledge of cholera prevention strategies according to their class

Variable	Sum of Squares	Df	Mean Square	F	P-value
Between Groups	10.35	2	1.33	1.59	0.10
Within Group	127.51	395	1.77		
Total	137.86	397			

f (2, 395) = 2.06, P > 0.05

Observation of Table 14 shows that result was not significant, because P value of 0.10 observed is greater than P value of 0.05. The observed F-value of 1.59 is less than the critical value of 2.06 at degree of freedom 2, 395. This means that the null hypothesis which stated that classes of junior secondary school student in katsina state Nigeria do not significantly differ in their knowledge of cholera prevention strategieswas therefore retained. This means that there is no significant different in the knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria base on class level.

Hypothesis Four: junior secondary school students in Katsina State, Nigeria do not significantly differ in their practices of cholera prevention strategies based on demographic characteristics.

Table 15: Independent sample t-test analysis on the differences between male and female students in their practice of cholera prevention strategies.

Age group	Mean	SD	Df	T	P-value
Male	29.13	3.92	397	1.30	0.7
Female	29.65	4.15			

t (397) = 1.97, P > 0.05

Concerning differences between male and female students in their practice of cholera prevention strategies, the table reveals that differences did not exist among the respondents. This was because the calculated p value of 0.7 is greater than the 0.05 alpha level of significance while the calculated t value of 1.30 is lower than the 1.97 t critical at df 397. Therefore, the null hypothesis which state that gender of junior secondary school students in Katsina State, Nigeria do not significantly differ to the practice of cholera prevention strategieswas retained.. This means that there is no significant different in the practice of cholera prevention strategies among junior secondary school students in Katsina State Nigeria base on gender

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Table 16: Analysis of Variance on practice of cholera prevention strategies according to their age

Variable	Sum of Squares	Df	Mean Square	F	P-value
Between Groups	17.62	2	1.33	1.13	0.5
Within Group	100.71	395	1.77		
Total	118.33	397			

f (2, 395) = 2.06, P < 0.05

Observation of Table 16 shows that result was not significant, because P value of 0.5 observed is greater than P value of 0.05. The observed F-value of 1.13 is less than the critical value of 2.06 at degree of freedom 2, 395. This means that the null hypothesis which stated that age of junior secondary school students in Katsina State, Nigeriado not significantly differ to the practice of cholera prevention strategies was therefore retained This means that there is no significant different in the practice of cholera prevention strategies among junior secondary school students in Katsina State Nigeria base on age

Table 17: Analysis of Variance on practice of cholera prevention strategies according to their class

Variable	Sum of Squares	Df	Mean Square	F	P-value
Between Groups	18.11	2	1.01	1.71	0.1
Within Group	91.05	395	1.53		
Total	109.16	397			

f (2, 395) = 2.06, P < 0.05

Observation of Table 17 shows that result was not significant, because P value of 0.1 observed is greater than P value of 0.05. The observed F-value of 1.71 is less than the critical value of 2.06 at degree of freedom 2, 395. This means that the null hypothesis which stated that class of junior secondary school students in Katsina State, Nigeriado not significantly differ to the practice of cholera prevention strategies was therefore retained. This means that there is no significant different in the practice of cholera prevention strategies among junior secondary school students in Katsina State Nigeria base on class level.

4.3   Discussion

This study assessed the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria.

The knowledge of cholera prevention strategies among junior secondary school students in Katsina State of Nigeria is significantly adequate with t value of 3.070, t-critical of 1.972 and P value 0.001 < 0.05. This means that junior secondary school students in Katsina State have knowledge of cholera prevention strategies. The finding of this study disagreed with Okeke, (2016) who reported that students of Federal College of Education Pankshin in Plateau State, Nigeria lack adequate knowledge on cholera prevention (p > 0.05). In another study conducted by Lindell and Barakat (2018) in some selected public secondary schools in Kebbi State, shows that, 95% of the students had knowledge on ways and methods of preventing cholera. Similarly, Alice and Mabela (2016) assessed the knowledge, attitude and practice regarding cholera prevention among secondary school students in Jalingo, Taraba State. They reported that 58% of the respondents had knowledge on cholera prevention strategy. 39% of the respondents had no knowledge on cholera prevention.Educational efforts are needed to correct misguided knowledge and to improve student's practices towards cholera prevention (Mukandavire, Liao, Wang, Gaff, Smiyh & Morris 2016). This statement is a clear prove that the students have learnt and had knowledge of cholera prevention strategies.Tierney (2017) reported that students who have heard, understood and personalized the risk of cholera are much more likely to adopt preventive measures than those without knowledge about an impending danger.

The results also revealed that practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria is not significantly positive with t value of 1.291, t-critical of 1.972 and P value 0.110> 0.05. This means that junior secondary school students in Katsina State do not adequately practice cholera prevention strategies. The finding of this study agreed with a research conducted by Siddique (2016), which stated that 367 students representing 87% of the respondents did not practice proper washing of hands with soap and water. Sewage disposal was properly practiced by only 47 representing 25% of the students. In this study infection of cholera is likely to occur because most of the student do not practice proper hand wash with soap and water after defecting and before eating. According to Berthoud (2017), there is need to practice hand washing after defecting and toilet should be practically used.

Another research conducted by Lindi and Basco (2018), their purposed of the study was to determine the behaviour factors associated with cholera outbreak among students in Kilosa District; the study involving 400 students. The study revealed that only 39.6% of respondents were aware of causes, mode of transmission and prevention of Cholera. Female students were better informed about the disease (44.2%) than male students (32.9%). only three out of five washed their hand after latrine use. Far knowledge on the mode of transmission and Preventive measure of cholera among students in the community posed a challenge to control measures of the disease in the district. Based on these finding, it is clear that there are poor knowledge and poor practices towards cholera prevention.

The results also revealed that demographic characteristics of the respondents did not significantly differ to the knowledge and practice of cholera prevention strategies. This means that junior secondary school students in Katsina State Nigeria do not significantly differ in their knowledge and practice of cholera prevention strategies base on demographic characteristics. The finding of this study agreed with Oyibo (2012) which assessed knowledge and practices of cholera prevention among School Children aged 6-14 years in Abraka, Delta State, Nigeria. The study covers an area of 21.2 square kilometer and is located on longitude 50 45' N and 60 15' E of the meridian. It is in the tropical rain forest area of Nigeria and comprises of nine communities namely Otororho, Uhruoka, Ekrejeka, Oria, Ajalomi, Erho, Ugono, Urhovie and Umeghe; with River Ethiope running through. A minimum sample size of 384 was obtained using the Fischer's formula for population above ten thousand (Araoye, 2013). It was reported that the students in Abraka, Delta State, Nigeria do not differ in their knowledge of cholera prevention strategies base on demographic characteristics (p=0.101)

The results also revealed demographic characteristics of the respondents do not significantly differ in the practice of cholera prevention strategies. This means that junior secondary school students in Katsina State, Nigeria do not significantly differ in their practice of cholera prevention strategies base on demographic characteristics. The finding of this study agreed with Adagbada (2017), entitled assessment of knowledge, attitude and practice of cholera eradication among secondary school students in Akwanga, Nasarawa state. 14 schools were randomly sampled and the sample size was 400 students, the study revealed that secondary school students do not differ in their knowledge and practice of cholera prevention strategies based on class level (p =

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0.121).   A study was also supported byWahed, Kaukab, Saha, Khan, Khanam, Chowdaury, Saha, Kha, Sudddik, Cravioto, Qadri and Uddin (2013) which reported that 83% of the female and 87% of the male had high knowledge about cholera, with no statistically significant differences between gender.In another earlier study although similarly reported that about 69% of the female and 56% of the male students had good knowledge, and there was no statistically significant difference between different sexes. Similarly the study also found no statistically significant difference on knowledge regarding cholera prevention between sexes. Therefore, the current study findings were supported by multiple findings. On the practice of cholera, the result shows no significant difference between male and female students. This result was also consistent with the earlier study findings.The result of current study demonstrated that for knowledge and practice regarding cholera, there was no statistically significant difference between gender and ages. Knowledge regarding cholera is related to the practice towards preventive measures and had been made known by different studies.

Another Colombian study by Campell (2011) revealed that although common people possess good knowledge but did not practice the preventive measures in their daily activities as it is still not accustomed. The result of this study shows that there is no significant difference between classes and age for KAP of respondents regarding cholera. The result was like of the findings in another earlier study. The mentioned study discussed the factors influencing cholera disease occurrence in a community of poor people in Kolkata, India. The mean scores of KAP are irrelevant with the age of respondents. No statistical significant difference was observed. However, in contrast to the above results, research conducted in Belgium shows that older adults of age 40

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years old and above have a higher level of practice on preventive measures regarding cholera.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1   Summary

This study assessed the knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria. Four (4) objectives, research questions and hypotheses respectively were formulated and tested for this study. Related literature were reviewed under the conceptual framework, theoretical framework and empirical studies. other aspect covered by the literature review were concept of cholera, prevalence of cholera, causes of cholera, epidemiology of cholera, cholera outbreak in Nigeria, risk factors for increased transmission of cholera, signs and symptoms of cholera, knowledge and practice of cholera prevention strategiesand summary. Ex-post facto research design was adopted for this study. The population of this study comprised of junior secondary school students in Katsina State with a population of 271,690.

A sample of four hundred (400) junior secondary school students was drawn from the population using a multi-stage sampling procedure of stratified sampling procedure, simple random sampling procedure and proportionate sampling procedure. The instrument used for data collection was self-structured questionnaire which was validated by five (5) experts in the Departments of Human Kinetics and Health Education, Ahmadu Bello University, Zaria. Data collected was analyzed with Statistical Package for Social Science (version 22) using frequencies, percentages, mean, standard deviation, inferential one sample t- test statistics, independent sample t test and analysis of variance at 0.05 alpha level of significance.

5.2   Major findings of this study are:

1.   Knowledge of cholera prevention strategies among junior secondary school students in Katsina State Nigeria was significant (t = 3.070; p= 0.001).

2.   Practice of cholera prevention strategies among junior secondary school students in Katsina state Nigeria was not significant (t=1.291; p= 0.110).

3.   Junior secondary school students in Katsina State, Nigeriadid not significantly differ in their knowledge of cholera prevention strategies based on demographic characteristics (p = 0.17, 0.21 and 0.10).

4.   Junior secondary school students in Katsina State, Nigeria do not significantly differ to their practice of cholera preventionstrategies based on demographic characteristics (0.7, 0.5 and 0.1).

5.3   Contributions to Knowledge

The followings were the contributions of this study to knowledge;

1.   Junior secondary school students in Katsina State Nigeria have knowledge of cholera prevention strategies (p = 0.001).

2.   Junior secondary school students in Katsina State Nigeria do not have a good practice of cholera prevention strategies (p = 0.110).

3.   Demographic characteristics of junior secondary school students in Katsina State, Nigeria do not significantly differ in their knowledge of cholera prevention strategies (p = 0.17).

4.   Demographic characteristics of junior secondary school student in Katsina State Nigeria donot significantly differ in their practice of cholera prevention strategies (p = 0.70).

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5.3   Conclusion

Based on the findings of this study, the following conclusions were drawn;

1.   Junior secondary school students in Katsina State Nigeria have knowledge of cholera prevention strategies(p = 0.001).

2.   Junior secondary school students in Katsina State Nigeria do not adequately practice cholera prevention strategies (p = 0.110).

3.   Demographic characteristics of junior secondary school students in Katsina State, Nigeria did not significantly differ in their knowledge of cholera prevention strategies(p = 0.17).

4.   Demographic characteristics of junior secondary school student in Katsina StateNigeria do not significantly differ in their practice of cholera prevention strategies(p = 0.70).

5.4   Recommendations

Based on the conclusions of this study, the following recommendations are made:

1.   the school management should be encouraged to continue sensitize student on the knowledge of cholera though teaching of health education in schools.

2.   school management should put in place adequate measures within the school environmentto checkmate and control the healthy practices of student this includeprovision of hand washing sink,provision of safe

drinking water, supervise the canting, provision of charts and notice board within the school environment and adequate latrine

3. Government through the ministry of health should create awareness program on the danger of cholera for the students in general irrespective of gender, class or religion via mass media, campaigns, and seminars.

4. School authority should always consider the Demographic characteristics of junior secondary school student in order to achieve cholera free-state.

5.5   Suggestions for Future Research

Further studies should be conducted on the following:

a) Determinant of cholera prevention strategies among primary school pupils (North West, South South, South East and North Central).

b) Comparative study on the factors influencing the increase of cholera outbreak among students.

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APPENDICES

DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION

FACULTY OF EDUCATION

AHMADU BELLO UNIVERSITY, ZARIA

QUESTIONNAIRE ON THE ASSESSMENT OF KNOWLEDGE AND PRACTICE OF CHOLERA PREVENTION STRATEGIES AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN KATSINA STATE, NIGERIA

Dear Respondent,

This questionnaire is designed to enable the researcher to conduct an academic research on the assessment of assessment of knowledge and practice of cholera prevention strategies among junior secondary school students in Katsina State, Nigeria. It is purely to generate research data, any information given will be treated confidentially.

Your response and time in filling this questionnaire is highly valued and appreciated.

Thank you.

_____

Hope Jacob

QUESTIONNAIRE ON CHOLERA PREVENTION

Section A: **Demographic Characteristics of the Respondents**

Instruction: Please tick (√) the item that best describes your opinion.

1. **Gender**

    a. Male ( )

    b. Female ( )

2. **Age Range**

    a. 10-13 years   ( )

    b. 14-17 years   ( )

    c. 18 years and above ( )

3. **Class**

    a. JSS I ( )

    b. JSS II( )

    c. JSS III( )

4. **Religion**

    a. Islam   ( )

    b. Christianity   ( )

    c. Traditional ( )

    d. Others Specify   _____

Instruction: Please tick (√) the column against each of the following statements that bestrepresent your opinion.

Key: SA = Strongly Agree
A = Agree
D = Disagree
SD = Strongly Disagree

Section B: Knowledge of Cholera Prevention

S/N	Item	SA	A	D	SD
1	I am aware that Cholera is an infection of the small intestine that is caused by the bacterium called vibrio cholera;				
2	I know that the infectious agent of cholera is acquired through consumption of contaminated water and food:				
3	I am aware that poor disposal of refuse creates breeding groundfor the bacteria that causes cholera.				
4	I understand that the symptoms of cholera are:				
	diarrhea				
	vomiting				
	fever				
	dehydration				
	stomach ache				
5	I know that I can contact cholera through drinking contaminated water.				
6	I know that unhygienic living conditions help in spreading cholera disease amongs people.				
7	One of the easiest way of contacting cholera virus is through eating contaminated food				
8	I am aware that the easiest way to prevent cholera by taking the oral cholera vaccine				
9	I know that to prevent the spread of cholera, food should be properly cooked before serving.				
10	I am certain that cholera can be highly treated with Oral Rehydration Solution (O.R.S)				
11	I know that all fruits and vegetables must be washed properly before consumption				

Section C: Practices towards Cholera Prevention

S/No	Item	SA	A	D	SD
1	I do drink water from				
	Borehole				
	Well				
	Stream				
	tap				
2	I treat my drinking water by;				
	flittering				
	boiling				
	Use of Chemical				
3	I cook my food properly before eating				
4	I always wash my fruits and vegetables before eating				
5	I clean my environment regularly to prevent cholera				
6	I always wash my hands before eating				
7	I always cover my drinking water to prevent cholera				
8	To prevent incidence of cholera from my family, I dispose all wastes properly				
9	I wash my hands with soap and water after using latrine				
10	The waste in my school is properly disposed regularly to prevent cholera				
11	I engage in environmental sanitation in my community every week				

DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA - NIGERIA
OFFICE OF THE HEAD OF DEPARTMENT

VICE CHANCELLOR: Professor Ibrahim Garba, B.Sc. M.Sc. (ABU), Ph.D. (London), D.I.C.
HEAD OF DEPARTMENT: Professor M. A. Suleiman, N.C.E (OYSCE) B.Sc. (UNICAL) M.Sc. Ph.D. (ABU)

Our Ref. No. P17EDPE8003   Date: 26/11/18

Dear Sir/Madam,

LETTER OF INTRODUCTION TO VET QUESTIONNAIRE

The bearer, **Hope Jacob** with Registration number (P17EDPE8003) is a postgraduate student of the above named Department. She is currently conducting a research on **"Assessment of Knowledge and Practice of Cholera Prevention Strategies Among Secondary School Students in Katsina State , Nigeria."**

On the basis of your professional experience, you have been selected to serve as one of the jurors to critically vet the questionnaire and make the necessary corrections for her improvement.

Please kindly return the questionnaire to the researcher after vetting it.

Thank you,

Dr. M. B. Turkur
Major Supervisor.