KNOWLEDGE, PERCEPTION AND PRACTICES RELATING TO CHOLERA AMONG RESIDENTS OF SABO COMMUNITY IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE, NIGERIA

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ABSTRACT

Cholera is an endemic disease in some parts of Ibadan especially in Sabo and inner-core areas of the city. Despite this development, behavioural antecedent factors associated with the occurrence of the disease such as knowledge and perception as well as practices which influence the epidemiology of the disease have not been adequately explored. This study was therefore, designed to investigate the knowledge, perception and practices relating to cholera among Sabo community residents in Ibadan North Local Government Area (LGA).

A descriptive cross-sectional design was adopted and a multi-stage sampling technique was used to select 418 male and female household heads residing in Sabo community. A semi-structured questionnaire used for data collection included questions on socio-demographic characteristics; knowledge on causes, symptoms, prevention and treatment of cholera; perception; and practices relating to the spread and prevention of cholera. An observation checklist was also used to assess the wells, toilet facilities and the surroundings of each house. Respondents' knowledge and perception were measured using a 48- point and an 11-point scale respectively. Knowledge scores of < 24, 24-35 and > 35-48 points were rated as poor, fair and good respectively. Perception scores of ≤ 8.3 and > 8.3 were categorized as unfavourable and favourable respectively. The data were analyzed using descriptive statistics, T-test, F-test and Chi-square test at p= 0.05.

Respondents' mean age was 35.7 ± 13.4 years, 74.6% were Hausa, 92.8% were adherents of Islam and most (94.7%) were married. Respondents mean knowledge score was 26.1 ± 5.7, with those having poor, fair and good knowledge being 31.1%, 63.4% and 5.5% respectively. The mean perception score was 4.6 ± 2.7 with only 17.0% having favourable perceptions. None of the respondents knew that the pathogen that causes cholera is *Vibrio cholerae* and 79.0% did not know whether flies can facilitate the spread of the disease. Most (99.5%) respondents reported that they washed their hands after using the toilet. Slightly less than half (48.3%) reportedly boiled their water before drinking while only 16.0% added chlorine to their drinking water. Most (93.6%) respondents were able to correctly identify the ingredients used to prepare sugar-salt-solution and 77.7% stated that they could prepare it. Significant differences were noted in respondents' mean knowledge scores by gender, ethnic group,

religion, highest levels of education and occupations. A similar pattern was observed in respondents' perception scores.

Observations showed that 59.1% of the respondents obtained their water from shallow wells which are prone to contamination by *Vibrio cholerae*. Majority (75.9%) of the toilets were dirty and 50% of them had flies present around them. Majority (79.0%) of the drainage systems were blocked and 93.6% were dirty.

Overall, respondents had inadequate knowledge relating to the disease and majority of them had perceptions and exhibited some practices that could put them at risk of getting cholera. Health promotion and education strategies such as community-based health education, public enlightenment and provision of portable water and sanitation facilities are needed to improve cholera prevention and control in the community.

Keywords: Cholera, Household heads, Cholera-related knowledge, Cholera-related
perception, Water and Sanitation practices.

Word count: 493

DEDICATION

This research work is dedicated to God for keeping me alive throughout the MPH programme and for giving me the strength and grace to execute this work successfully.

This research is also dedicated to my late Father, Elder J.H Abalaka, who was a pillar of support and encouragement in my academics; he taught me that hard work and sincerity pay.

iv

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CERTIFICATION

I hereby certify that this study was carried out by Bernice Ibe ABALAKA in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria under my supervision.

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TABLE OF CONTENTS

CHAPTER 3: METHODOLOGY

CHAPTER 4: RESULTS

CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATION

LIST OF TABLES

x

LIST OF FIGURES

LIST OF ACRONYMS

BCC:	Behavioural Change Communication
CDC:	Centre for Disease Control and Prevention
CFR:	Case Fatality Rate
IBNLGA:	Ibadan North Local Government Area
LGA:	Local Government Area
NCDC:	Nigerian Centre for Disease Control and Prevention
NDHS:	Nigerian Demographic and Health Survey
NPC:	National Population Commission
ORS:	Oral Rehydration Salt
PRECEDE:	Predisposing, Reinforcing and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation
RA:	Research Assistant
SPSS:	Statistical Package for Social Sciences
UNICEF:	The United Nations International Children's Emergency Fund
VIP Latrine:	Ventilated Improved Pit Latrine
WHO:	World Health Organization

LIST OF APPENDICES

Page

OPERATIONAL DEFINITION OF TERMS

Cholera: Cholera is an infection caused by *Vibrio cholerae.* Cholera is spread through the drinking of water or food contaminated by the pathogen. It is called *Kwalara* in the study community.

Knowledge: Knowledge relates to facts or correct information relating to the definition, causes, signs and symptoms, prevention and treatment of cholera.

Perception: This relate to a beliefs or opinions or views held by someone or people.

Practice: This refers to what people do or fail to do which has implications for cholera occurrence, prevention and treatment.

Household Heads (HH): People who are identified as key decision makers in households. In this study it refers to either a married man (husband) or a woman (wife).

Antecedent factor: These are predisposing factors to behaviour that provides motivation or a reason for the behaviour.

Risk factor: A risk factor is any attribute, character or exposure of an individual that increases the likelihood of developing a disease or injury**.**

Favorable perception: Perception that is in line with biomedical or scientific word view.

Unfavorable perception: Perception that is not in line with biomedical or scientific word view.

1.1 Background to the Study

Cholera is a bacterial infection that is caused by *Vibrio cholera* (WHO, 2017). The main symptoms of the disease are profuse watery diarrhea and vomiting. Transmission of the pathogen is primarily through the consumption of contaminated drinking water and food (Ogbeyi, Bito, Anefu, and Igwe, 2017). The cholera related diarrhea and vomiting can lead to rapid dehydration and electrolyte imbalance (Colwell and Huq, 2004). Every year there is an estimated 1.3million to 4.0 million cases of cholera, and 21,000 to 143,000 cholera-related deaths worldwide (Ali, Nelson, Lopez, and Sack, 2015). The disease's short incubation period of two to five days, enhances the potential explosive pattern of outbreaks (Faruque, 2008).

Cholera transmission is closely linked to poor environmental sanitation. Typical vulnerable areas include peri-urban slums, where basic water and sanitation infrastructures are not available or inadequate and camps for internally displaced people or refugees, where minimum requirements of clean water and sanitation are not usually met (Ogbeyi, Bito, Anefu *et al*., 2017). The consequences of a disaster such as disruption of the life of populations, inadequate hygiene-related infrastructure and overcrowded camps can increase the risk of cholera transmission (WHO, 2011).

Cholera remains a global threat to public health and a key indicator of lack of social infrastructural development. The re-emergence of cholera has been noted to be associated with the ever increasing size of vulnerable populations living in unsanitary conditions (WHO, 2017). There could be high mortality rate in the absence of prompt and appropriate treatment (Li, Shimada, Morris, Sulakvelidze, and Sozhamannan, 2002). The explosive nature of the disease and the potential threat to food and water supplies have prompted the listing of *Vibrio cholerae* as an organism of biological defense research (Zhang, Zheng, Weiyun, and Karaolis, 2003). In an epidemic, the great majority of cases can be recognized

1

by clinical diagnosis easily and a bacteriological diagnosis is often not required (Azman, Kara, Derek, and Justin, 2013).

Cholera is found in many tropical countries around the world including most of Africa (Gidado, Awosanya, Halidu, Ayanleke, Idris, Mamuda, Mohammed, Michael, Waziri, and Nguku, 2018). Cholera has a significant destructive impact on Populations. Between 1970 and 1974, African countries in Sub-Saharan reported a total of 103,000 Cholera cases (WHO, 2005). Approximately 1,000,000 people developed cholera of which perhaps 100,000 died (WHO, 2005). A total of 131,943 cases including 2,272 deaths were notified from 52 countries in 2005. This year was marked by a particular series of outbreaks in West Africa, involving 14 countries which accounted for 58% of all cholera cases world-wide (WHO, 2005).

Cholera is endemic in Nigeria and there have been investigations on possible sources of outbreaks (Hutin, Luby, and Paquet, 2003). Investigations on outbreaks in Nigeria have focused on epidemiological features, probable sources of contamination and the risk factors without spatial linkage of health data (Lawoyin, Ogunbodede, Olumide, and Onadeko, 1999). However, advances in Geographical Information Systems (GIS) technology provides this opportunity and have become an indispensible tool for processing, analyzing and visualizing spatial data within the domains of environmental health, disease ecology and public health (Kistemann, Classen, Koch, Dangendrof, Fischeder, Gebel, Vacata, and Exner, 2002).

The use of GIS is not new for mapping cholera studies. It has been applied in investigating other waterborne disease outbreaks, microbial risk assessment of drinking water reservoirs, drinking water supply and spatial patterns of diarrhea illness with regards to water supply structures (Dangendorf, Kistemann, Herbst, and Martin, 2002). In cholera studies, GIS technology has been applied in studying correlation between socio-economic and demographic indices and cholera incidence, environmental risk factors, spatial epidemiology, health risk prediction, spatial and demographic patterns of cholera (Kistemann, Classen, Koch *et al.*, 2002).

2

There were reported cases of cholera in 2008 in Nigeria leading to 429 deat hs out of 6,330 cases that were recorded. A total of 2,304 cases occurred in Niger State resulting in 114 reported dead in 2008 (WHO, 2009). According to WHO (2011) the years 2007-2010 witnessed severe cholera outbreaks in developing countries; these countries included India (2007), Iraq (2008), Congo (2008), Zimbabwe (2008-2009), Haiti (2010), and Kenya (2010). In Nigeria, a total of 7,052 cases including 149 deaths were reported from eight states, namely Borno, Kaduna, Kano, Kebbi, Kwara, Lagos, Oyo and Zamfara. (WHO, 2011). Recently, according to the Nigerian Centre for Disease Control (NCDC, 2018) as at the 22nd of June 2018, a total of 13,009 suspected cholera cases and 116 deaths were reported from the following twelve states: Adamawa, Anambra, Bauchi, Borno, Kano, Kaduna, Kogi, Nasarawa, Niger, Plateau, Yobe and Zamfara.

The changing epidemiology of cholera in Ibadan, Oyo state has become a public health challenge and outbreaks of the disease have been occurring with increasing frequency since the first outbreak in 1970 (Lawoyin, Ogunbodede, Olumide *et al*., 1999). In the 1996 outbreak of cholera in Ibadan, 1384 persons were diagnosed and treated for the disease at the cholera unit, Ibadan from January to December 1996. Cholera cases were clustered within the densely populated areas of the city and significantly more cases were seen during the rainy season (Lawoyin, Ogunbodede, Olumide *et al*., 1999).

In September 2011, another episode of cholera epidemic occurred in Ibadan North West Local Government Area and the communities mostly affected included the following: Foko, Opoyeosa, Abebi, Idi Ikan, Ekotedo and Alawo areas. A total of 16 cases and 4 deaths were reported and they were taken to Ayeye health centre and Maternity centre at Oniyanrin for treatment (Ministry of Health Oyo state, 2011). It was noted that the cause of the epidemic was traceable to the absence of toilet facilities in most of the houses and defecation in gutters and streams in the affected communities which in turns lead to the contamination of their water sources.

Sabo community in Ibadan consists mainly of Hausa and Fulani ethnic groups from the Northern part of Nigeria. The living condition in most of Sabo is akin to a settlement camp for Internally Displaced Persons. Incidences of cholera have been reported in the past in the

3

years 2011, 2013, 2014 and 2015 in the community and an outbreak was recorded in October 2017 which recorded about 10 cases and 3 deaths. The poor environmental sanitation situation of Sabo community, unplanned and crowded settlement pattern and other poor hygiene related behaviours or practices in the community have great potential for triggering off the occurrence of Cholera.

Few studies have probed into the modifiable behavioural risk factors such as those relating to knowledge, perception and practices which can favour the outbreak of cholera in Sabo community. In addition few studies have focused on the non-bahavioural factors which could promote the occurrence of the disease in Sabo community. Awareness of these factors (behavioural and non-behavioural factors) is needed for designing appropriate prevention and control interventions. The study is, therefore, designed to determine the modifiable behavioural and non-behavioural factors relating to cholera in Sabo community, Ibadan.

1.2 Statement of the Problem

In Nigeria, the first major series of cholera outbreaks were reported from 1970-1990 (WHO, 2011). Despite this long experience with cholera, behavioural antecedent factors such as knowledge and perception which influence the epidemiology of the disease have not been adequately explored. The threat of cholera has been of concern in Nigeria and it constitutes an emerging and re-emerging disease in many parts of Nigeria including Ibadan. There are several settings in Ibadan with behavioural and environmental conditions which can lead to the outbreak of Cholera. One of such settings is Sabo community with most residents being migrants from the far Northern part of Nigeria. Series of field works conducted by postgraduate students of the Department of Health Promotion and Education have shown that Sabo community is prone to cholera outbreak due to the prevailing poor environmental sanitation practices. Several outbreaks of cholera have been experienced in Sabo with the most recent being the one that occurred in October, 2017.

The disease can be prevented, controlled, treated or cured. However the behavioural antecedent factors as well as environmental factors which create a fertile ground for the disease to occur in the community have not been well explored. The study was, therefore, designed to investigate the water and sanitation related facilities in Sabo community as well

4

as the knowledge, perception and practices of residents of Sabo community, Ibadan relating to Cholera.

1.3 Justification

This study is justified by the need to document the knowledge and perception of the people within Sabo community with special references to the causes, symptoms and prevention/control of cholera as well as water and sanitation practices which could be used to design intervention programmes aimed at improving, promoting and enhancing cholera control, appropriate behaviours or practices in Sabo community. The results will also be useful for formulating appropriate policies relating to Cholera control/prevention in similar settings in Ibadan and other parts of Nigeria.

1.4 Research Questions

The research was guided by the following questions:

1. What is the level of knowledge of cholera among residents of Sabo community?

2. What is perception of cholera among Sabo community residents?

3. What are the practices among the people of Sabo community relating to cholera?

4. What are the water and hygiene related facilities in Sabo community?

1.5 Objectives

Broad Objective

The broad objectives were to investigate the knowledge, perception and practice relating to cholera among residents of Sabo community relating to cholera transmission and prevention and to explore the water and hygiene related facilities in the community.

Specific Objectives

The specific objectives were to:

1. Assess Sabo community resident's knowledge of cholera transmission and prevention

2. Assess the perception of cholera among Sabo community residents

5

3. Identify the practices of Sabo community residents relating to Cholera
4. Identify the water and sanitation related facilities in the community

1.6 Research Hypotheses

The hypotheses formulated to guide the study were as follow:

HO1: There is no significant association between respondents' knowledge and their self-efficacy relating to prevention and treatment of cholera.

HO2: There is no significant association between age of respondents and their perception of cholera.

1.7 Study Variables

Two broad categories of variables were measured. They are dependent and independent variables.

Dependent Variables

The dependent variables measured were as follow: knowledge of cholera, perception of cholera and practices relating to cholera.

Independent Variables

The independent variables measured were as follow: age, sex, religion, ethnicity, level of education, occupation, sources of drinking water and toilet facilities.

6

CHAPTER TWO

LITERATURE REVIEW

2.1 The Nature of Cholera

Cholera is caused by *Vibrio cholera*; a curved Gram-negative bacillus which belongs to the family, Vibrionaceae and shares some characteristics with the family, Enterobacteriaceae (Stanislas, Bertrand, and Faucher, 2013). *Vibrio cholera* comprises both pathogenic and nonpathogenic strains. *Vibrio cholera* O1 and O139 are the only serotypes responsible for the disease defined clinically and epidemiologically as cholera (Lopez-Gigosos, Plaza, Diez-Diaz, and Calvo, 2011). *Vibrio cholera* O1 is divided into classical and El Tor biotypes. *Vibrio cholera* O139 has characteristics in common with the El Tor biotype but differs from O1 in its polysaccharide surface antigen (Sozhamannan and Yildiz, 2011).

Cholera cases are confirmed through the isolation of *Vibrio cholera* O1 or O139 from stools in any patient with diarrhea (WHO, 2017). Other serovars of *Vibrio cholera* are generally termed non-O1, non-O139 strains; they are non-choleragenic and they usually cause a milder form of gastroenteritis than O1 and O139. The non-01 and non-0139 are normally associated with sporadic cases and small outbreaks rather than with epidemics and pandemics (WHO, 2017). *Vibrio cholerae* 01 Eltor is the commonest strain in Nigeria (Usman, Sarkinfada, Mufunda, Nyarango, Mansur and Daiyabu, 2005).

About 75% of people infected with *V. cholera* do not develop any symptoms, although the bacteria are present in their faeces for 7-14 days after infection and are shed back into the environment, potentially infecting other people. Among people who develop symptoms, 80% have mild or moderate symptoms, while around 20% develop acute watery diarrhea with severe dehydration (Ogbeyi, Bito, Anefu *et al*., 2017). In severe infections, more than one quarter of water and salts is lost per hour. The stool looks gray and has flecks of mucus in it- termed "rice water stools". Within hours, dehydration can become severe, causing intense thirst, muscle cramps, and weakness. According to Gidado, Awosanya, Halidu *et al*., (2018) very little urine is produced and the eyes may become sunken, and the skin on the fingers may become much wrinkled. If dehydration is not treated, loss of water and salts can lead to

7

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 (Gidado, Awosanya, Halidu *et al*., 2018).

The most important virulence factor associated with V. cholera O1 and O139 is the cholera toxin (ctx). The ctx genes (ctxA and ctxB) encoding the production of the cholera toxin have been sequenced and these have enabled development of Deoxyribonucleic acid (DNA) probes and Polymerase Chain Reaction (PCR) methods for detection of the organism (Ademola, Kovashnee, and Balakrishna, 2011). In addition to cholera toxin, choleragenic strains of V. cholera possess the ability to adhere to, and colonize, the small intestine (colonization factor), which has been ascribed to a toxin co-regulated pilus (TCP). Genes encoding major virulence-associated factors are found in clusters (Hacker, Blum-Ochler, Muhldorfer, and Tschape, 1997; Jeandron, Cumming, Rumedeka, Saidi, and Cousens, 2018). It has been shown that ctx genes form part of a filamentous bacteriophage designated CTX phage (Faruque, Albert, and Mekalanos, 2008, George, Rashid, Ameida, Saf-ur-Rhaman, Monira, Bhuyian, Hasank, Sack, Alam, and Stine, 2017). The pilus colonization factor is also known to act as a receptor for the CTX phage (George, Rashid, Ameida *et al*., 2017) and is encoded by the tcpA gene that is part of the V. cholera pathogenicity island (Zhang, Zheng, Weiyun *et al*., 2003, George, Rashid, Ameida *et al*., 2017).

A complex cascade of regulatory proteins that control expression of V. cholera virulence determinants has been reported. For instance, in responding to the chemical environment at the intestinal wall, the organism produces the TcpP/TcpH proteins, which, together with the ToxR/ToxS proteins, activate the expression of the ToxT regulatory protein. ToxT then directly activates expression of virulence genes that produce the toxins, causing diarrhea in the infected person and allowing the bacteria to colonise the intestine (Adagbada, Adesina, Nwaokorie, Niemogha and Coker, 2012). Although reports on characteristics of Nigerian strains are insufficient, It may be assumed that pathogenic potential and characteristics of *V.cholerae* in Nigeria are similar to those that have been studied elsewhere (Adeneye, Musa, Oyedeji, Oladele, Ochoga, Akinsinde, Niemogha, Nwaokorie, Bamidele, Brai, Omonigbehin, Bamidele, Fesobi, Smith, and Ujah, 2016).

8

2.2 Global Epidemiology

Cholera first emerged from the Ganges Delta of the Indian sub-continent as early as the nineteenth century and later swept the world in the form of seven pandemics since1817 (Zhang, Zheng, Weiyun *et al*., 2003, Yung, Wang, Gao and Wang, 2017). The current seventh pandemic was caused by the El Tor biotype of *V. cholerae* serogroup 01 which began in Indonesia in 1961, and subsequently spread to Africa and the Americas in 1970 and 1991 respectively (Centre for Disease and Control, 2014)

During the 19th century, cholera spread across the world from its original reservoir in Bangladesh and West Bengal (Karaolis, Johnson, Baily, Boedeker, Kaper and Reeves, 1998; George, Rashid, Ameida *et al*., 2017), claiming millions of lives across all continents most especially Africa and Asia. The cholera outbreak in Bangladesh in 2004 was post flooding involving more than 17 000 cases, with the isolation of Vibrio cholera O1 Ogawa and O1 Inaba (Qadri F., 2004, Stanislas, Bertrand, Faucher, 2013). The seventh pandemic of cholera which started in South Asia in 1961, reached Africa in 1971 and the Americas in 1991 (Reeves, Lan, 1998). Cholera is now endemic in many countries and recent studies have indicated that global warming creates a favorable environment for the bacteria to thrive (Lipp, Huq, Cowell, 2002, Christian, Luliano, Uyeki, Mintz, Nichol, Rollin, Staples, and Arthur, 2017).

Although reports of cholera epidemic in Nigeria have not been consistent, the disease is very dynamic. The emergence of cholera was evident in 1970 and was re-introduced in 1991. During the last two decades, three major epidemics have occurred in 1992 (Umoh, Adesiyun, and Adekeye, 1983), 1995-1996 (Hutin, Luby, and Paquet, 2003), and 1997 (Usman, Sarkinfada, Mufunda *et al*., 2005). Northern Nigeria has been known to be endemic for cholera infection.

Epidemiological data from Public Health Department of Kano State Ministry of Health, Nigeria, revealed that the frequency and distribution of recurrent cholera epidemics in the state during 1995 to 2001, were 2 630 in 1995/1996, 847 in 1997 and 2, 347 in 1999 (Usman, Sarkinfada, Mufunda *et al*., 2005). In Jos, North Central Nigeria, Opajobi, Kandakai, Mawak, Olukemi and Bello (2004) observed that all isolated strains were Vibrio cholerae 01

9

Eltor of Inaba serotype. The authors concluded that Vibrio cholerae 01 is endemic in Jos, Nigeria (Opajobi, Kandakai, Mawak *et al*., 2004).

2.3 The Situation of cholera in Nigeria

Cholera infection rate, sex and age distribution and seasonality are not constant. In 1982, Katsina, Nigeria, was affected by an outbreak of gastroenteritis associated with Vibrio cholera serotype ´Ogawa (Umoh, Adesiyun, and Adekeye, 1983). The overall case fatality rate was 7.7%. During the Calabar outbreak, adults and those in the 11-20 and 21-30 age groups accounted for most of the cases regardless of sex (Ndon, Udo, and Wehrenberg, 1992). The report from Jos (North-central) indicated that age group 20-29 years had the highest isolation rate (Opajobi, Kandakai, Mawak, *et al*., 2004).

The 1996 outbreak reported in Kano, Northern Nigeria affected 1, 384 individuals with a fatality rate of 5.3% (Hutin, Luby, and Paquet, 2003). Children were the most affected among all age groups and accounted for 22% of the total cases reported in Ibadan, southwest Nigeria (Lawoyin, Ogunbodede, Olumide *et al*., 1999). The wave of the El Tor cholera pandemic that occurred in 1991 had a case fatality ratio of 13% in Nigeria (UNICEF 2010).

Lawoyin, Ogunbodede, Olumide *et al*., (1999) reported an outbreak of cholera in Ibadan which occurred from January to December 1996. In this outbreak, 1384 persons were seen, diagnosed and treated for the disease at the cholera unit, Ibadan. No child under one year was seen. The age adjusted case fatality rate was 5.3%. Diarrhoea and vomiting were the most common combination of symptoms present in 97.3% of all cases, followed by diarrhea, vomiting and dehydration (84.3%). The median number of days spent on admission was two days. Cholera cases were clustered within the densely populated and poorly planned areas of the city including Sabo, Bere, Foko and Saki communities. Though significantly more cases were seen during the rainy season than during the dry season (p<0.01), the deaths were not seasonally related (p=0.67). Contamination of otherwise potable sources of water, late presentation to the cholera treatment unit and low levels of knowledge about the disease were the major factors that contributed to outbreak of the disease.

In Abeokuta, South-western Nigeria, between November 2005 and January 2006, 11 deaths from the 115 cases with case fatality rate of 9.6% were reported from a cholera outbreak (Shittu, Akpan, Popoola, Oyedepo and Ogunshola, 2010). The 2005 outbreak in Abeokuta was projected as the worst in Nigeria since 1991 with the highest case-fatality rates (UNICEF 2010).The Nigerian states and their case fatality rates (CFRs) in the 2010 outbreak were Plateau (23.0%), Kaduna (9.0%) and Katsina (7.6%) states at and respectively. Women and children accounted for 80% of reported cases (UNICEF 2010). Despite this, the occurrence of the hyper-infectivity of the organism remains largely unknown and no documented epidemiological information on the infecting strains or patients (UNICEF 2010).

Nevertheless cholera exists as a seasonal disease, occurring mostly during rainy seasons. Pascual, Bouma and Dobson, (2002) highlighted the importance of rainfall as a driver of the seasonal cycle of cholera through its waterborne transmission, its dose-dependent nature of infection, and the decline of cases during the dry season. Higher number of cases reported in Kano, Nigeria occurred during the rainy season (Umoh, Adesiyun, and Adekeye, 1983). In Calabar, South-southern part of the country, the incidence of cholera mostly occurred during the dry season followed by subsidence at the onset of rainy season (Ndon, Udo, and Wehrenberg, 1992). Consequently, seasonality of infection is not a critical issue in Nigeria as infections have been reported in both rainy and dry seasons.

2.4 Mode of Diagnosis of Cholera and risk factors for transmission in Nigeria

Cholera is transmitted by the faecal-oral route, usually after ingestion of food or water that has been contaminated with infected faeces. Other common vehicles of infection include contaminated fish and shellfish, produce or leftover cooked grains that have not been reheated properly (Mintz, 2010, Weil, Ryan 2018). Direct person-to-person transmission of cholera is rare, as a high infectious dose of 108 bacteria is necessary to cause the disease in healthy individuals, but much a lower dose (105) is sufficient in individuals with low levels of gastric acid (Zhang, Zheng, Weiyun *et al*., 2003)

Cholera can be confirmed by culture of stool or rectal swab specimen, followed by serological testing with 01 0r 0139 antisera. Further characterization of serotype can be performed using antisera to serotypes Inaba and Ogawa (Feglo and Sewurah, 2018).

11

Commercially available rapid diagnostic test kits are convenient for use in epidemic settings. However, they do not yield an isolate for antimicrobial susceptibility testing and subtyping and should not be used for routine diagnosis (WHO 2018).

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, 2017). 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, 2017).

In Nigeria, the 1996 cholera outbreak in Ibadan (Southwest) was attributed to contaminated potable water sources (Lawoyin, Ogunbodede, Olumide *et al*., 1999). Street vended water and not washing of hands with soap before eating food were possible reasons for the 1995-1996 cholera outbreaks in Kano state (Lipp, Huq and Cowell, 2002). Drinking water sold by water vendors in Ibadan was also connected with increased risk of contracting the disease (Lawoyin, Ogunbodede, Olumide *et al.,* 1999). In Katsina, the outbreak of the disease was linked to faecal contamination of well water from sellers (Umoh, Adesiyun and Adekeye, 1983). The 2010 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 diarrhoea discharge from cholera patients could easily contaminate water supplies (Igomu, 2011).

Adeneye, Musa, Oyedeji et al., (2016) conducted a study to investigate the risk factors associated with cholera epidemic during the 2010 outbreak in some States in Nigeria. Semi-structured questionnaires were administered to consented parents and/or their parents/guardians in Bauchi and Gombe States in North East Nigeria. Few (33.7%) respondents had access to safe and clean drinking water through the pipe-borne system compared to wells (47.8%) and river (19.6%). Respondents' means of sewage disposal were: pit/latrine (77.2%); bush (15.2%); and water closet (4.3%). Observation showed poor

sanitation and food hygiene practices in the communities visited. The results provided insights for planning educational programmes through information, education and communication/behavioral change communication efforts to boost knowledge on cholera in the communities.

2.5 Management and prevention/control of cholera

The mainstay of the case management of cholera is treatment of dehydration using Oral Rehydration Therapy (ORS) or IV fluids (Ringer lactate) and electrolytes (Mafi, Goya and Hajia, 2016). Although, Oral Rehydration Therapy (ORS) has the advantage of being low-cost and simple, using the technique of decision analysis, it was concluded that community-based control of Diarrhoeal Diseases interventions in Nigeria is problematic to evaluate (Babaniyi, 1991, Pande, Kwesiga, Bwire, Kalyebi, Riolexus, Matovu, Makumbi, Mugerwa, Musinguzi, Wanyenze, and Zhu 2015).

In cholera management, antibiotic prophylaxis is usually not part of intervention but essential for disease treatment in severe cases. However, *Vibrio cholera* strains from endemic and outbreaks situation within the last decade revealed interesting patterns of antibiotic resistance to commonly used antimicrobial agents (Kotsiou, Michalaki, and Anagnostopoulou, 2017). Mobile genetic elements able to transfer multiple drug resistance among *Vibrio cholera* strains have been described in numerous studies and are considered a major public health problem (Coppo, Colombo, and Pazzani, 1995; Kotsiou, Michalaki, and Anagnostopoulou, 2017).

Eighty six strains of *Vibrio cholera* O1 (79 Ogawa serotype and 7 Inaba serotype) from 1992 outbreak in Nigeria were less sensitive to ampicillin, penicillin, cloxacillin, cotrimoxazole, streptomycin, and tetracycline (Olukoya, Ogunjimi, and Abaelu, 1995,). The 1995 study also described V. cholera strains with 4.5 kilo base to 150 kilo base plasmids specifying resistance to ampicillin, tetracycline, and trimethoprim. Ten of the forty-one isolates were able to transfer resistant plasmids to *Escherichia coli* K-12 by conjugation suggesting that conditions conducive for transmission of resistant strains exist in Nigeria (Olukoya, Ogunjimi, and Abaelu, 1995).

13

Obvious emergence of resistant strains could be correlated with widespread therapeutic and prophylactic administration of antibiotics especially tetracycline and their availability over the counter. While continued misuse of antibiotics has indubitably contributed to endemic nature of most infections, the recent cholera outbreak experience proposes that other factors also play a role in determining whether a particular strain (or resistance plasmid) remains in a given geographic area. Studies are however needed in this area to elucidate this concept (Jeandron, Cumming, Rumedeka, Saidi, and Cousens, 2018).

In Nigeria, existing prevention and control strategies are multi-sectorial. Epidemic Preparedness and Response (EPR) approaches including registration of cases, case management and public health measures targeting personal hygiene and water treatment as well as emergency responses from both governmental and non-government agencies have contributed to the reduction in case fatality rates over the years and should be sustained (Gidado, Awosanya, and Haladu, 2018). Nevertheless, the need to explore more viable approaches cannot be overplayed if the infection has to be wholly curtailed (Gidado, Awosanya, and Haladu, 2018).

Various studies elsewhere have utilized geographic and mathematical information systems to assess spatial distribution of cholera at local levels, demonstrating case clustering and disease risk areas (Tuite, Tien, Eisenberg, Earn, Junling, and Fisman, 2011). Modeling techniques using climate data, remote monitoring, and geographic information systems also provide new techniques that may contribute to the prediction of cholera epidemics (Colwell, 1996, Feglo and Sewurah, 2018). According to Feglo et al, (2018) such models can aid understanding of epidemic processes and help design effective control strategies. Due to its endemic nature in Nigeria, surveillance systems can provide early alerts to outbreaks, therefore leading to coordinated response.

More importantly, it is necessary to introduce intervention measures that address the root problems of poor sanitation and unsafe water supplies in order to prevent future cholera epidemics (Siyange, Brunkard, Kapata, Mzaba, Musonda, Hamoonga, Kapina, Kapaya, Mutale, Kateula, Nanzaluka, Zulu, Musyani, Winstead, Davis, Nicho, Mulambya, Sakubita, Chewe, Nyimbili, Onwuekwe, Adrien, Blackstock, Brown, Derado, Garrett, Kim, Hubbard,

14

Kahler, Maqlambo, Mintz, Murphy, Narra, Rao, Riggs, Weber, Yard, Zyambo, Bakyaita, Monze, Malama, Mulwande, and Mukonka, 2018). In this regards, perhaps, prevention of the disease is the best way to counter subsequent outbreaks. Simple measures as boiling the water for drinking, washing and cooking purposes, treatment of infected facilities, sewages and drainage systems, proper disposal of infected materials such as waste products, clothing, and beddings, treatment of infected faecal waste water produced by cholera victims and sterilization of utensils either by boiling or by using chlorine bleach (WHO,2016). Studies have also indicated that use of soap and hand washing promotion can achieve a 26% to 62% decrease in the incidence of cholera in developing countries (Shahid, Greenough, Samadi, Huq, and Rahman, 1996; Siyange, Brunkard, Kapata *et al*., 2018).

Understanding the seasonality and location of outbreaks may also provide guidance for improving cholera control activities for vulnerable areas. Vigorous health promotion activities in terms of continuous public enlightenment on cholera are evidently essential to controlling the infection. Health systems need to be strengthened with the provision of adequate manpower, equipment, drugs and consumables (Ogbeyi, Bito, Anefu *et al*., 2017). There should also be an improvement on surveillance systems, communication and transport (NCDC, 2018). Mechanisms for quick intervention should be put in place. Defining strain diversity using molecular biology techniques may also assist with describing the intrinsic characteristics of diseases, such as the persistence of infection. The knowledge of interaction of strain variants may also be critical option for controlling the infection since molecular biology techniques are accessible. This can improve prevention plans, as well as risk assessment for potential cholera outbreaks (NCDC, 2018).

Above all, World Health Organization (WHO) recommends that immunization with currently available cholera vaccines be used in conjunction with the usually recommended control measures in areas where cholera is endemic as well as in areas at risk of outbreaks (WHO, 2018). Oral vaccine has been shown to provide short-term protection of 85-90% against V. cholera O1 among all age groups at 4-6 months following immunization with minimal side effects (WHO, 2018). Rehydration with replacement of electrolytes lost is the mainstay of cholera treatment. According to the dehydration stage (A, B, C), the patient should receive

15

different rehydration therapy (oral or intravenous fluids). Oral rehydration solution (ORS) should be used during and after IV therapy (WHO, 2016).

16

Table 2.1 Stages of dehydration and rehydration therapy treatment

Dehydration Stage	Signs	Treatment
Severe	Lethargic, unconscious, floppy Very sunken eyes Drinks poorly, unable to drink Mouth very dry Skin pinch goes back very slowly No tears (only for children)	IV therapy + antibiotics + ORS
Mild	Restless and irritable Sunken eyes Dry mouth Thirsty, drinks eagerly Skin pinch goes back slowly No tears (only for children)	ORS + very close surveillance
No dehydration	None of the above signs	ORS at home

Source: WHO Cholera Response, 2016

17

Ringer's lactate is the preferred IV fluid. Normal (9%) saline or half normal saline with 5% glucose can also be used, but ORS solution must be given at the same time to replace the missing electrolytes. Plain glucose solution is not effective in rehydrating cholera patients. When IV rehydration is not possible and the patient cannot drink, ORS solution can be given by nasogastric tube. However, nasogastric tubes should not be used for patients who are unconscious (Mafi, Goya, and Hajia, 2016).

Antibiotics should be given only in severe cases, to reduce the duration of symptoms and carriage of the pathogen. Antimicrobial resistance is increasing (WHO, 2017). In most countries Vibrio cholera is resistant to co-trimoxazole; in some settings it has also developed resistance to tetracycline (WHO, 2017). The laboratory should be asked about patterns of resistance of the strain at the beginning of and during the outbreak: antibiotic sensitivity to antibiotics may return after a certain period. Mass chemoprophylaxis is not effective in controlling a cholera outbreak. Selective chemoprophylaxis (one dose of doxycycline) may be useful for members of a household who share food and shelter with a cholera patient (WHO, 2017). However, in societies where intimate social mixing and the exchange of food between households are common, it is difficult to identify close contacts. Nevertheless, chemoprophylaxis may be useful when a cholera outbreak occurs in a closed population, such as a prison (WHO, 2017).

2.6 Knowledge, Perception, Attitudes and Practices relating to cholera

African countries have been trying to impart knowledge in people all these years but cholera has remained a major threat to Africa. Literature has revealed that Cholera is one of the most endemic public health problems of the warm climates and has widely spread since the 1800th (Kotsiou, Michalaki, and Anagnostopoulou, 2017). In 1832, Chadwick started sanitary condition during cholera outbreak. The report he prepared after his study showed the need for urgent improvement of Public Health in England.

Chadwick recognized that filth was man's greatest enemy and with this, they began an "ANTI FILTH CAMPAIGHN/CRUSADE" to tackle the problem of filth. At this time Public Health Act of 1948 was enacted and they accepted the principle that the state was responsible for the

18

health of the people. When this principle was accepted people demanded clean water from the government. In another development Sir John Snow (1860-1906) was responsible for the sanitary disposal of waste material in England. He built a system of Public Health which was admired by the rest of the world in an effort to prevent cholera (Lawoyin, Ogunbodede, Olumide *et al*., 1999).

A study on attitude towards cholera was conducted on 27 carriers and 18 cases in 1980 during an epidemic in Europe. The study results linked the cases to dinner parties and wedding ceremonies which took place around that time of the epidemic. The infected individuals were found to have either attended the wedding function or had eaten food from a box of food distributed to family members, friends and neighbors and these were as a result of not following a warning not to gather during cholera epidemics which is a negative attitude towards cholera prevention (Yung, Wang, Gao *et al*, 2017).

In 1988, 20,872 cases were reported from eleven countries. China reported a large outbreak during the 1989 epidemic that affected Xinjiang Religion. A total of 12,785 were reported in Asia from 12 countries, the source of cholera in both years was as a result of infected fecal matter contaminated water supply. After the cholera attack people developed positive and good attitudes towards cholera and they managed to control the disease (CDC, 1990).

Goodgame and Greenough (1975) reported that West African countries were free from cholera during the years 1894 to 1970. A major epidemic started in 1970 in Guinea Bissau and there after spread to other West African countries causing an estimated 150,000 and more cases and 20,000 more deaths during the initial attack of the disease. The death was as a result of negative attitude for not learning from neighboring countries' cholera attacks. During this epidemic of 1970, cholera transmission from one person to the other during gathering such as at funerals, festivals and assemblies was identified as a result of not adhering to the warning to avoid gatherings.

A study was conducted in Latin America to determine the risk factors that were associated with the transmission of cholera. The reported agent for cholera transmission included the following practices: drinking contaminated water with fecal matter, improper preserved fish

19

practices and under cooking shellfish, rice and raw oyster practices (Blake, 1992). In 1991 a study was conducted on 17 cases associated with cholera epidemic in South America. The study result showed that the associated six cases were travelers to South America who were not screened for cholera; the remaining eleven cases had eaten crabs which were brought by travelers from Ecuador.

The above study is evidence enough to conclude that the practice of not screening travelers at airports and the habit of buying foods from food vendors can predispose people to the germ that causes cholera. Cholera can be transmitted through the practice of eating foods contaminated with fecal matter, drinking contaminated food, drinks and water when infected individuals unknowingly travel from epidemic areas to non-epidemic areas. In 1990 Romania reported two cases which occurred in Danube Delta area and the primary source of infection was found to have come from Delta River. Those infected were found to have been infected after drinking contaminated water with sewer from Delta River (WHO 1991).

It has been observed that *Vibrio cholerae* infect faecal matter, contaminated water, foods such as fruits, fish, improperly brewed traditional drinks and contaminated utensils could also transmit cholera (WHO, 2018). Many people in the study had poor practice of not treating drinking water, shared traditional brewed drinks and did not practice good environmental hygiene. The report also showed that many people got infected from shared food especially at various gatherings (WHO, 2018).

Mpuzi, et al, (2005) conducted a study on Knowledge, Attitude and Practice of Illala residents in Tanzania with regards to cholera outbreaks. Three hundred and ten (310) respondents were involved in the study of whom 186(59.9%) were females and 124(40.1%) were males aged between 13-84 years. The proportion of respondents with good knowledge of cholera in the study was 85%. About 14% of the respondents with low level of knowledge of cholera drank water from wells without boiling while 31.8% drank un-boiled piped water and 21.6% wash their hands in a common container.

Also in Tanzania, a study was conducted by Mpaz and Mnyika (2005) and they reported that 84.8% of the respondents had good knowledge of cholera and 15.2% had poor level of

knowledge. Housewives were found to have good knowledge of cholera (97.2%) as compared to other groups. Majority (86.4%) of the respondents conceded having access to adequate water supply. However, 13.6% had no adequate supply of portable water.

A descriptive cross sectional study carried out by Kabita (2010) was used to collect data from the first week through to the fourth week of September, 2009 on 50 adult respondents using a structured interview schedule from Kabuta and Kashikishi catchment areas. The data collected were analyzed manually. The findings of the study showed that 60% of the study respondents had poor knowledge; they did not know how far their toilets were from the source of water, and 82% of the respondents with primary education had low level of knowledge of cholera causes. 82.2% of the female respondents had low level of knowledge of cholera prevention. 70% of the respondents had good attitude towards prevention of cholera.

Majority, 92.6% of the respondents had poor practice of hand washing after using the toilet. 77.8% of the study respondents who stayed in high density area had poor practice, they did not treat water for drinking and also 72.7% of people who were crowded in one house disposed off refuse carelessly which is a poor practice. Majority of respondents 56% drew water from contaminated lake and shallow wells. The major implications of the study were that toilets built near the source of water contaminated water tables and people were drawing contaminated water from boreholes. The practices of not washing hands after using the toilet lead to contamination of food and utensil causing auto infection with *vibrio cholera.*

Velery, Beau, Julie, Molly, Lara, Kamil, David, Cathie, Jean, Roody, Jordan, and Thomas, (2011), conducted a study in Haiti on knowledge, attitudes and practices related to treatment and prevention of cholera which involved administration of questionnaires to 405 households from 27 clusters. Persons interviewed were primarily female household heads and knowledge of common signs of cholera was high; the two most common signs of cholera were diarrhea (89.1%) and vomiting (83.4%). Respondents also showed high knowledge of transmission modes; 71.9% indicated consumption of contaminated water and 61.4% indicated consumption of contaminated food.

21

The most common prevention method reported by Velery, Beau, Julie *et al.,* (2011) was hand washing (86.0%). Approximately 94.1% reported washing their hands with soap; 84.1% reported having access to soap. Use of improved latrines was also reported by most respondents (74.0%). Nearly 90% of the respondents stated that they knew the methods of ORS preparation, although only 76.0% indicated the correct volume of water needed to prepare an ORS sachet as recommended by WHO.

Chepwogen (2011) carried out household level interviews guided by a structured questionnaire and focus group discussions among community members and it revealed that despite high level of awareness among the residents, a good proportion of over 40% were unable to describe the disease, giving an indication of the likelihood of lacking knowledge. Majority of the household heads (89.9%) were aware of cholera. However, 42.5% of those who were aware of the disease were unable to describe it while 19.8% said it is a waterborne disease transmitted through dirty water and 9.6% associated it with diarrhea. Others described it generally as a bad disease (18.3%), communicable disease (6.7%), disease caused by parasites (1.5%) and curable disease (2.1%).

In the above study, tap water was found to be the main source of drinking water as reported by 31.4% of the heads. Water from boreholes (23.6%) and dams (23.4%) was also commonly used for drinking in the households. Other households used water from river (13.2%), rain water (7%) and oasis (1.3%) for drinking. Treatment of water before drinking was reported by 58.2% of the households while the 41.8% of the households who do not treat their drinking water was still a significant proportion. Among the households that treat their water, 62.5% boil, 20.1% chlorinate, 9.8% sieve and 7.6% treat by sedimentation. This study found out that lack of safe drinking water, lack of latrines and poor hygienic practices are possible risk factors for cholera transmission. In addition, the pastoralist's lifestyle that involves movements within the population is a likely factor that encourages easy transmission during outbreaks.

Merten, Schaetti, Manianga, Lapikia, Chaignat, Mhalu, Mntenga, and Mtango, (2013) in Democratic Republic of Congo revealed that after listening to a short vignette about a person affected by profuse watery diarrhoea, 96% of respondents identified the affliction as cholera.

The majority of respondents considered insufficient hygiene and sanitation levels as key causes of cholera. Ingestion of contaminated water or food was spontaneously mentioned by 63% and 61% as main sources of cholera transmission. Other common explanations were contact with flies, a dirty environment, lack of latrines and not washing hands. When asked about ways to prevent cholera, 67% respondents mentioned availability of clean water and 66% said food hygiene.

According to Merten, Schaetti, Manianga *et al*., (2013), in a Key Informant Interview conducted, the nurse pointed out that witchcraft beliefs used to lead to delayed treatment seeking: *"Sometime back it was bad. The fact that people who were walking simply dropped and were in a coma made people think directly of witchcraft. The first thing they did was to go to the traditional healer. Only if this didn't work, then the people were taken to the clinic. That is why there were many deaths. Only when people realized that witchdoctors died as well, they started to doubt that it was witchcraft"*

Tasnuva, Sheikh, Nirod, Iqbal, Alajandro, Firdausi, Ashraful, and Jasim, (2013) in Dhaka, Bangladesh also revealed that only 23% could recognise a case of cholera. Most (83%) respondents stated that eating unprotected or rotten food and drinking unsafe water were the main causes of cholera. About 92% of the respondents were aware of ORS. According to knowledge scoring, less than half of the respondents had good knowledge and 54% had poor knowledge of cholera. Most (90%) In-depth interview participants also mentioned that eating unhygienic or rotten food and drinking contaminated water or water which was not boiled or filtered were the causes of cholera. One of the respondents said: *"When any member of a household is affected by cholera, other members should be careful otherwise, the germ from the affected person will spread to them"*

In a study carried out in Egbeda LGA of Oyo state, Nigeria spatial clustering of cholera cases were detected at different temporal and spatial scales. Cases relative to water sources also exhibit spatial clustering. Stool samples and water samples were positive for *Vibrio cholera.* 97(80%) out of 122 houses surveyed which had no toilet facilities (Gbolahan, Abasa, Adewuyi, and Olawoyin, 2014). It was noted in this survey that most of the houses constructed shallow and uncovered wells. The clustering cases support an important role of

23

secondary transmission in the dynamics of cholera epidemics in Egbeda LGA of Oyo State. The spatial clustering of cases relative to water sources suggests an effective role of water reservoirs during the onset of cholera outbreak. The contaminated well was sealed off, other wells were chlorinated, needs for standard toilet facilities were emphasized and health education was done on improved personal hygiene for the community members (Gbolahan, Abasa, Adewuyi *et al*., 2014).

Omoregie (2015) conducted a research to investigate practices related to water and sanitation in cholera affected communities (Abebe, Sango, Opoyosa, Idikan, Ayeye, Agbani, Ladapo, Ori-Elu and Bere) and non-cholera affected communities (Asukuna, Alekuso, Olasaoko, Feleye, Oke-Are, Atowodo, Omitowoju, Ode-olo and Olopometa) during 2011 cholera outbreak in Ibadan North West Local Government Area, Oyo state. The study was conducted among 400 household heads each in the cholera affected communities and non-cholera affected communities using a semi-structured questionnaire and focus group discussions. Observation checklist was used to assess the surroundings of households and sanitary conditions of wells and toilets.

According to Omoregie (2015), most (79.0%) of respondents in the cholera affected communities had a poor knowledge of cholera compared with 53.3% in non-cholera affected communities. Majority (70.2%) of the respondents in non-cholera affected communities observed satisfactory water hygiene and sanitation practices compared with only 29.8% in cholera affected communities. Only 49.5% and 46.5% of respondents in cholera affected communities and non-cholera affected communities respectively usually treat their water before drinking. Observations showed that faecal waste was indiscriminately disposed around the premises in cholera affected communities (10.0%) compared with non-cholera affected communities (1.0%). Knowledge of cholera, water hygiene and sanitation practices and sanitation facilities were poorer in the cholera affected communities compared with the non-cholera affected communities.

Chamba, Haruna, Modu, Lawan, Babamai, Ahmed, and Zhigillah (2016) carried out a study to assess the factors contributing to the recurrence of cholera outbreak in Gwange ward, Maiduguri. A descriptive cross sectional study design was used. The respondents were

24

selected using questionnaires. A study size of Seventy (70) households was used. However, only sixty (60) questionnaires were retrieved. The study population consisted of the heads of households aged 15 years and above. Both the males and females who have lived in Gwange ward for the past 7 years and above were available at the time of data collection. Primary data was collected using self- administered questionnaires.

According to Chamba, Haruna, Modu *et al*., (2016), more than half (70%) of the respondent responded that cholera was caused by a germ that caused cholera, while (18%) of the respondents thought that cholera was caused by bad air. Slightly more than half (63%) of the respondents knew that giving ORS helps manage diarrhea before taking to the hospital while only (37%) posed that cholera patient should be taking to the clinic for treatment, while none (0%) believed that cholera can be cured by administering traditional medicine. More than two third (45%) of the respondents believed that cholera can be prevented through cleaning the house and toilet, while only (25%) believed that it can be prevented by washing hands after toilet. More than half (81%) of the respondents had knowledge that covering and re-heating the food before eating prevents cholera outbreak while less than a quarter (12%) of the respondent covered the food but ate it cold. More than half (58%) of the respondents knew that washing hands before serving food prevents cholera while only (42%) of the respondents knew that washing hands after serving food can prevent cholera.

The above study showed that high level of unemployment (87.0%) contributed to their inability to maintain a high standard of environmental and personal hygiene thereby posing a great risk of diarrheal disease outbreaks such as cholera. On the basis of these findings, it can thus be concluded that the contributing factors to the recurrence of cholera outbreak in Gwange ward was due to high level of poverty, poor personal hygiene and environmental sanitation.

Adeneye, Musa, Oyedeji *et al*., (2016) in their study conducted on knowledge of cholera, only 34.8% knew water, food and poor sanitation as transmission routes for cholera. There was a significant gender difference in knowledge of lack of safe and clean drinking water and poor sanitation as contributing factors to cholera infection.

25

Ogbeyi, Bito, Anefu *et al.*, (2017) conducted a study on the determinants of knowledge, attitude and preventive practices relating to Cholera in Wadata- a sub-urban slum of Markudi, Benue sate, North Central Nigeria. The sample size was 80 and was obtained through multi-stage sampling technique where two villages were randomly selected. Data were collected through a structured interviewer administered questionnaire. A total of 80 respondents were analysed; only 27% could define cholera correctly while 89% were aware of oral rehydration salt (ORS). 43% had good knowledge score of cholera, 96.7% had high positive attitude towards cholera and 65% reported good practice relating to cholera prevention. Knowledge of cholera was significantly associated with sex, education, attitudes and practice. Findings in this study showed that knowledge, attitude and preventive measures related to cholera can be improved through health education and community involvement in various environmental challenges in the area by government agencies and non-governmental development organizations.

26

2.7 Theoretical Framework

The PRECEDE framework was adopted to guide the study. The acronym PRECEDE stands for Predisposing, Reinforcing, Enabling Constructs in Educational/ Environmental Diagnosis and Evaluation. This framework was developed by Lawrence Green and colleagues in 1970 for health education and health promotion programmes. It offers a framework for identifying behavioral antecedent factors and appropriate intervention strategies. Just as a medical diagnosis is needed to design a treatment plan, educational diagnosis is needed to design a health promotion intervention according to the model.

According to the model, behavioural antecedents could be categorized into the following categories: Predisposing factors; Reinforcing factors; Enabling factors

Predisposing factors: These are factors that provide the rational or motivation for the behaviour. It includes the knowledge, beliefs, perception, attitude, values and norms of households' heads towards cholera. The antecedent factors assessed in this study were knowledge and perception of heads of households in Sabo.

Enabling factors: These are factors which relates to the presence or absence of resources such as money, skills, water, toilet which can influence households' heads and other members of the household. The enabling component of the PRECEDE was used to guide the measurement of factors relating to toilet facilities, water and environmental sanitation facilities.

Reinforcing factors: These are factors subsequent to behaviour which provide continuing reward or incentives for the behaviour and contribute to its persistence and perpetuation. These include influence of community organization, government organization, family, friends and other households' heads and symptoms relief. In the context of this study, the reinforcing factors assessed that contribute to persistence of positive behaviour were relief from symptoms of cholera, a visibly clean and sanitary environment and dust bin for refuse collection.

The application of the PRECEDE framework to the study is shown in figure 2.1

27
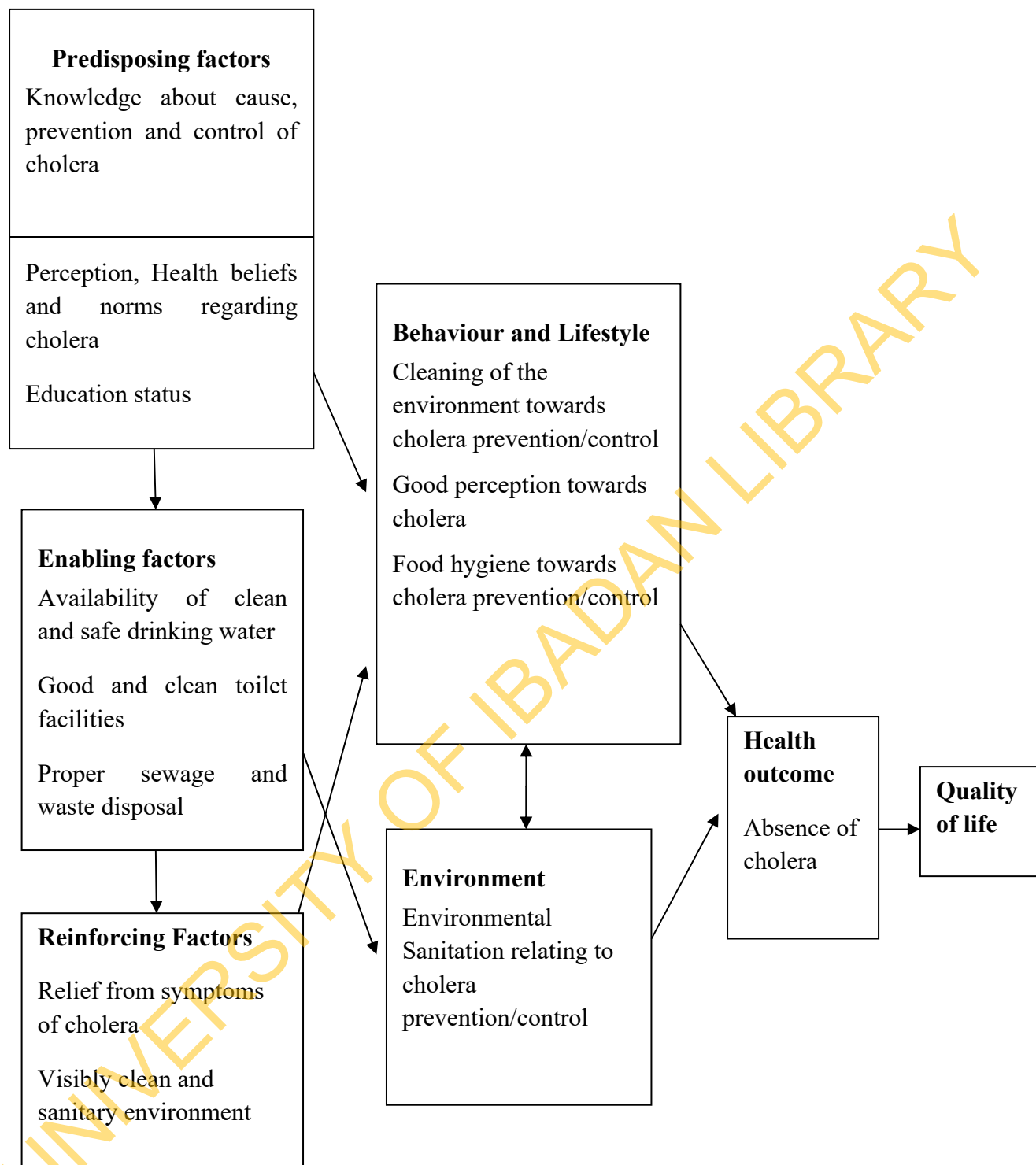
Figure 2.1: Application of the PRECEDE framework to guide the study

CHAPTER THREE

METHODOLOGY

3.1 Study design and scope

A descriptive cross-sectional survey using a semi-structured questionnaire was adopted. The study was limited in scope to the assessment of the following: the knowledge of causes, symptoms, prevention and control of cholera; the perception of cholera; practices relating to cholera prevention and the modifiable behavioural and non-behavioural factors relating to cholera in Sabo community in Ibadan North Local Government Area (IBNLGA).

3.2 Description of study area

The study was carried out among residents of Sabo community in IBNLGA, Oyo State, Nigeria. Sabo community is situated in ward 6 in IBNLGA. It is bounded on the North by Mokola road, on the West by Veterinary and Jemibewon road, on the South by Adamasigba Stadium Complex and on the East by Alafia Hospital and Dugbe road. The leader of Sabo is the *Sarkin Hausawa* of Ibadan who is also recognized by the Olubadan of Ibadan.

Sabo, a densely populated community, predominantly consists of people from the Northern part of the country. There are also other ethnic minorities from different parts of the country as well as nationals of other countries who reside in the community. The major commercial activities in the community are *bureau de change* related services, *suya selling*, tailoring, embroidery and motorcycle business (*okada*). The community has one police station, one Primary Health Center and three patent medicine stores. There are also two filling stations (Con oil and Probat) and four public schools which are Saint Gabriels Secondary School, Saint Lukes Secondary School, Saint Brigids Primary and Secondary School and Akintola Primary School as well as two private schools which are Mercy Day Group of Schools and Army Nursery and Primary school. Sabo community is dominated by Muslims; a few Christians also reside in the community. The community has one central mosque and two other smaller mosques and ten Islamic schools for both the Men and Women including children. The churches in the community are Bishara baptist church and Zion day church.

29

The population of Sabo was estimated by Frank Salamone (1990), to be 10,000. However, recent information from the National Population Commission reveals that the current estimated population is 29,873 (NPC, 2015). The community is divided into different clusters/settlements; these are shown in table 3.1.

The community has a nucleated settlement pattern and is poorly drained. The available drainages are often blocked, open and contain contaminated stagnant water. Domestic animals are reared in the community and the domestic animals include goats, sheep, rams and chickens. Wastes in the community are usually dropped at the middle of the main road that cuts across the community and later collected and disposed off by the government refuse collection agents. It is not uncommon for some residents to throw generated waste into streams or get them burnt. Majority of people in Sabo defecate in the river that passes through the community or defecate in the bush. The toilets commonly used are the pit latrines and Ventilated Improved Pit (VIP) latrines which are usually dirty and unhygienic (Department of Health Promotion and Education Field work reports, 2017)

 Respondents' sources of drinking water are as follow: wells (most of which are not sanitary), borehole, stream and water purchased from hawkers. There are several cooked food selling spots in the community. It is also very common to find hawkers selling cooked foods which are not protected or covered in the community. Foods and vegetables sold in the community include rice, beans, pasteurized cow milk, cucumber, cabbage, carrots, tiger nuts and date fruits. The food selling practices are poor; thereby exposing consumers to food poisoning and other food related diseases including cholera. The health problems commonly experienced by residents of Sabo are cholera, diarrhea, malaria, diabetes and eye-related challenges (Department of Health Promotion and Education Field work reports, 2017).

Table 3.1 Neighbourhoods and their population in Sabo community

Neighbourhoods/Settlements	Population
Sabo central	6,188
Turmu sawa	1,947
Gangare	1,638
Saint Lawrence	491
Sabo garage	1,542
Ganna	1,633
Oke esu	9,578
Ile ayo	1,223
Oro compound	941
Alafia hospital area	636
Con oil area	742
Saint brigids area	428
Oke hausa	1,206
Magirika	1,993
Christus hospital area	628
Total	**29,873**

Source: National Population Commission, Oyo State, (2015)

31

3.3 Study Population

The study population consisted of male and female Household Heads (key economic and decision makers at the nuclear family level). They were respondents of different socio-demographic characteristics.

3.4 Sample Size Determination

Sample size was calculated using the formula: $n= z^2pq$ (Leslie Kish, 1965)

Where: d^2 `

n= minimum sample size

z= Standard normal deviation usually set at 1.96 which corresponds to 95% confidence level

p= prevalence of knowledge of cholera in North Central, Nigeria (43%) (Ogbeyi et al., 2017)

q= the compliment of "p" (1-p)

d= level of precision which is set at 5% (0.05)

$$n= \frac{1.96^2 \times 0.43 \times 0.57}{0.05^2} = 376.630464$$

This was approximated to 377

In order to address the possible cases of attrition or no response, 11% of the sample size was calculated and added.

It was calculated as follows:

$$\frac{11}{100} \times 377 = 41.47$$

This brought the total sample size to 377 + 41.47

= 418.47

= 418 (i.e approximately)

3.5 Sampling Procedure

Sampling was done using the multi-stage sampling technique. The study sample was drawn from population of men and women resident in the five main neighbourhoods or settlements that make up Sabo; they are as follow: Sabo Gangare; Sabo Oke Hausa; Sabo Oke Esu; Sabo Ganna; and Sabo Central. The stages were as follow:

Stage One: The five neighbourhoods/settlements were constituted into five natural strata or clusters.

Stage Two: Proportionate sampling technique was used to determine the total number of respondents to be selected from each stratum as shown in table 3.2 using the following formula:

$$\frac{x}{y} \times 418$$

Where x= estimated population

y= total population of Sabo community

418= calculated sample size

The proportion of respondents sampled from Sabo gangere; for instance, was determined as follow: $\frac{1638 \times 418}{20243} = 34$

A similar procedure was used to calculate the proportionate sample size for the other neighbourhoods or settlements.

Stage Three: Systematic sampling procedure was used to select the required number of houses from each stratum. This was done by dividing the total number of houses in the selected neighbourhoods by the desired number of houses to be selected. A sampling interval of two (2) was gotten hence, every second house was selected in a systematic sequence. The centre of each selected neighbourhood was located. From this point, an empty coke bottle

33

was spinned and allowed to come to rest; whichever direction the mouth was pointing to indicated the direction where sampling would first take place. If the bottle pointed to the North, then every second house was selected for study until all the eligible houses in that direction were studied. Then investigators came back to the centre and start the selection of houses in another direction. This way houses towards the East, West and South were visited and studied.

Stage Four: Simple random sampling by balloting was used to select a household from each house where there was more than one household. The household head of the selected household that meets the inclusion criteria and was willing to participate in the study was then recruited as a respondent and interviewed using a questionnaire. Any household head selected that refused to participate in the study was left and the second household was picked and the household head interviewed.

Stage Five: The data were collected by administering copies of the questionnaire among equal proportion of male and female Household heads. This was purposively done to accommodate as much as possible the male-female perspectives relating to the variables studied. The interviews were done such that if a male household head was interviewed in the first house selected then in the selected second house, a female household head was interviewed. This was done until the entire sample size was interviewed. The water and sanitation facilities as well as the environmental sanitation situation of each house were assessed using an observation checklist.

Table 3.2 Proportionate sampling of respondents

Strata	Estimated population	Proportionate sampling	Total number of respondents by stratum
Sabo Gangare	1,638	$\frac{1638}{20243}$ x 418	34
Sabo Central	6,188	$\frac{6188}{20243}$ x 418	128
Sabo Ganna	1,633	$\frac{1633}{20243}$ x 418	34
Oke Esu	9,578	$\frac{9578}{20243}$ x 418	197
Oke Hausa	1,206	$\frac{1206}{20243}$ x 418	25
Total	**20,243**		**418**

35

3.6 Inclusion and Exclusion criteria

Inclusion criteria

- Respondents were male and female household heads in Sabo community.
- Respondents were permanent residents of Sabo community with a permanent resident defined as someone that had been living continually in the community for five or more years.

Exclusion criteria

- Respondents who were not household heads.
- Respondents who were not permanent residents of Sabo community.
- Persons who only transact business in Sabo but do not live in the community.

3.7 Methods and Instrument for Data collection

Two instruments were used for data collection- a questionnaire and an observation checklist. A semi-structured questionnaire was used to collect data from respondents while an observational checklist was used to observe factors in the environment that could predispose residents to cholera.

The questionnaire comprised both open-ended and closed-ended questions. It was divided into four sections as follow:

- A. Socio-demographic characteristics of respondents;
- B. Knowledge on causes, symptoms, prevention and treatment of cholera;
- C. Perception relating to seriousness and vulnerability to cholera;
- D. Practices relating to the spread and prevention of cholera;

The English version of the instrument is shown in appendix I while the Hausa version is shown in appendix II.

The observational checklist that had two sections was used to assess the wells, toilet facilities and the surroundings of each house where interview was conducted. The issues observed were organized as follow:

Section A: General information

Section B: Assessment of wells, toilets and drainages of respondents' household

36

3.8 Recruitment of Research Assistants, Validity and Reliability

3.8.1 Recruitment of Research Assistants

Four Research Assistants (RA) (2 males and 2 females) were recruited and trained on the issues relating to the following: ethics of research involving human participants as well as the following: the research process, maintainance of confidentiality, interviewing skills, storage of data and techniques for establishing rapport with the respondents. Fluency in speaking and good understanding of Hausa language, good knowledge of the study area and minimum of university qualification were criteria for recruitment of RA.

3.8.2 Validity of the Instrument

The questionnaire and observational checklist were developed by the researcher after a review of literature and the input from the investigator's project supervisor. In addition specialists in Environmental health and Community medicine based at the University of Ibadan also vetted and made input on the instruments. The questionnaire was drawn in English and translated into the Hausa language in order to address the need of participants who do not understand the English language. The translation process was as follow: Firstly, it was given to a translator who is versed in both English and Hausa languages to translate to Hausa; next, the Hausa version was given to another translator who is also versed in the two languages to translate it back to English. Lastly, the two versions were then compared by a third person who is versed in the two languages and necessary corrections were made. The translation process was embarked upon to verify the accuracy of the translation.

3.8.3 Reliability of the Instrument

The reliability of the questionnaires was established before it was used. This was done as follow: first it was pretested among 10% of the total sample size (i.e 42 respondents approximately) in another representative population. The community where the pretest was done was Sasa community in Akinyele LGA. Sasa is inhabited by a large population of Hausa speaking people from the Northern part of Nigeria. It shares similar characteristics with Sabo. Observation checklist was also pretested in Sasa community and necessary modifications were made.

The trained research assistants were made to participate in the pretest exercise and this created an opportunity for them to acquire practical experience relating to the conduct of the main study. The data collected during the pretest were analysed and the Cronbach alpha coefficient was used to establish the questionnaire's reliability. In this approach, a coefficient score of 0.5 was adjudged to be reliable; the reliability increases as it approaches 1. In this study the Cronbach alpha coefficient score obtained was 0.7 indicating that it was very reliable.

3.9 Data Collection Process

Permission was obtained from the opinion leaders in Sabo community before data collection started. The opinion leaders included the Sarkin Hausawa, the Waziri, Garkuwa and other council chiefs. Upon arrival at the sampled house, the researcher greeted the eligible respondents with respect. The researcher/RA introduced himself/herself to the respondent and read out the informed consent form. Thereafter participant was requested to sign or thumb print the consent form before it was collected from him or her. The researcher assured the respondents of confidentiality of the information which they volunteered. Respondents were also informed that their participation was voluntary and that they were free to withdraw from the study at any point in time without any loss of privilege or sanction whatsoever. After all the explanations and permission to collect data from the respondent, the interview was conducted. After completing the interview, the investigator/RA quickly reviewed the completed questionnaire to ensure that it had been appropriately completed.

The investigator/RA also inspected the following facilities in each house: wells, toilets, food hygiene facilities and waste collection and disposal facilities. This was done using the pretested observation checklist.

3.10 Data Management, Analysis and Presentation

A serial number was written on each copy of the questionnaire for easy identification and recall of any instrument with problems for correction. Each of the administered copies of the questionnaire was checked and reviewed for purpose of completeness and accuracy. A

38

coding guide was developed after a careful review of responses to facilitate coding of the questionnaire and observation checklist.

The data contained in the copies of the questionnaire and observation checklist were coded and entered into the computer. A template was designed on the Statistical Package for the Social Sciences (SPSS version 21) software for entry of the coded data. The data entered into the computer were analyzed using descriptive statistics such as mean, percentage and inferential statistics (Chi-square test, t-test and f-test at $P = 0.05$). Respondents' knowledge and perception were measured using a 48- point and an 11- point scale respectively. The knowledge of respondents was determined and their knowledge scores categorized as poor (0 to 24 points), fair (24 to 35 points) or good (36 to 48 points). Perception scores of ≤ 8.3 points were categorized as unfavourable while perception scores of > 8.3 points were categorized as favourable. Respondents' self-efficacy relating to the prevention and treatment of cholera prevention and treatment was also measured using a 14- point scale. The self-efficacy scores of 0-10 points were categorized as low self-efficacy while self-efficacy scores of 11-14 points were categorized as high self-efficacy. The results are presented in tables and charts in chapter four.

3.11 Ethical Considerations

Ethical approval was obtained from the Oyo State Ethical Review Committee. Respondents were requested to sign the provided informed consent (see appendix VI) before he/she was interviewed. They were informed that participation in the study was voluntary and that they were not going to suffer any consequences if they choose not to participate.

The study was conducted in accordance to the stipulated ethical norms concerning the use of human participants in research. The research participants were informed of the following:

1. *Confidentiality of data*

   That serial numbers and not names of participants were used to maintain confidentiality. The respondents were assured that their responses would be kept confidential and that the questionnaires would be kept safe in a locked cupboard.

They were also told that research data in the computer system would be password-protected and accessible to the investigator only.

2. *Beneficence to Participants*

The study would not have a direct benefit to respondents. Participants were told that findings of the study would be forwarded to relevant stake-holders in Sabo community as well as the ministries of health and education with a view to formulating policies relating to community-based prevention and control of cholera.

3. *Non-maleficence (non-harmful) to Participants*

The participants were told that the study is non-invasive and would not physically harm the participants. They were also told that there were some questions which respondents might find uncomfortable to answer as they might be related to their privacy.

4. *Right of decline/withdrawal from the study without loss of benefits*

Participants were informed that they were free to decide to participate or not to participate and that they could choose to discontinue at any point during the process of the interview. In addition they were informed that they would not suffer any adverse consequences whatsoever if they choose not to participate.

3.12 Limitation of the Study

Several research participants were reluctant to allow the investigator to inspect their toilets and other facilities in their premises. However, effort was made to assure them that the research was strictly confidential and that data obtained from the research would not be shared with anyone. Respondents were informed that the results from the study could be of benefit for designing intervention programmes geared towards promoting the quality of life of the people of Sabo in future. Participants who denied the investigator's access to their toilets and other facilities were left alone in compliance with the voluntary nature of involvement in the study and participants rights to withhold any information relating to their privacy.

RESULTS

4.1 Socio-demographic characteristics of respondents

Overall, a total of 418 respondents participated in this study. Table 4.1 shows the age, sex, ethnicity, marital status, religion, highest level of education and occupation of the respondents. The respondents' ages ranged from 18-87 years with a mean of 35.7 ± 13.4. Respondents within the 25-34 years age group topped the list (43.3%), followed by those in the 35-44 years age group, (25.1%). There were 50.0% males and 50.0% females; this was due to the fact that the study was purposively designed to ensure equal or nearly equal distribution of respondents by sex. Majority (74.6%) of the respondents were Hausa and 94.7% were married. The religious affiliation of the respondents were Islam (92.8%) and Christianity (7.2%). Respondents with secondary school education topped (44.3%) the list while 8.4% had no formal education. The occupations of the respondents included trading (28.7%), artisan (24.9%) and civil service (2.2%). About 11.5% were unemployed and 32.8% were house wives. (See table 4.1 for more details).

4.2 Respondents' water and sanitation related resources

Table 4.2 presents the various sources of drinking water used by respondents. About two-third (68.7%) of the respondents obtain their drinking water from borehole and/or deep wells with installed hand pumps while 47.6% fetched their drinking water from wells without pumps. Rainwater, public tap, streams and rivers were the sources of drinking water for 23.7%, 16.7%, 3.3% and 2.6% respectively. (See table 4.2 for more details).

The types of toilet facilities used by respondents are contained in table 4.3. Slightly less than half (47.8%) of the respondents used pit latrines while other types of toilet facilities used included the following: water closet (24.2%), VIP latrine (13.6%) and bowl (0.7%). Respondents who used the bush constituted 12.9% while very few (0.7%) had no toilet facilities (See details in table 4.3).

Table 4.1 Socio-demographic Characteristics of Respondents

N=418

Socio-demographic Characteristics	N	%
**Age in years **		
15-24	56	13.4
25-34	181	43.3
35-44	105	25.1
≥45	76	18.2
Sex		
Male	209	50.0
Female	209	50.0
Ethnicity		
Hausa	312	74.6
Yoruba	89	21.3
Ethnic Minorities *	17	4.1
Marital status		
Married	396	94.7
Widowed	10	2.4
Divorced	8	1.9
Co-habiting	4	1.0
Religion		
Islam	388	92.8
Christianity	30	7.2
Highest level of education		
No formal education	35	8.4
Primary	170	40.7
Secondary	185	44.3
Tertiary	28	6.6
Occupation		
House wife	137	32.8
Trading	120	28.7
Artisan	104	24.9
Unemployed	48	11.5
Civil service	9	2.2

* Ethnic Minorities = Consisted of 17 (4.1%) of the total sample. It consists of Non-Nigerian Hausa speaking populations 7(41.2%), Igbo 4(23.6%), Kanuri 3(17.6%) and Igbira 3(17.6%)

**$\bar{x}$ = 35.7 ± 13.4

42

Table 4.2 Respondents' reorted Sources of water

N= 418

Sources of drinking water	Yes (%)	No (%)
Borehole/deep well with pump	287 (68.7)	131 (31.3)
Well	199 (47.6)	219 (52.4)
Sachet water	112 (26.8)	306 (73.2)
Rainwater	99 (23.7)	319 (76.3)
Public tap	70 (16.7)	348 (83.3)
Stream	14 (3.3)	404 (96.7)
River	11 (2.6)	407 (97.4)

43

Table 4.3 Type of toilet facilities used by respondents

<div style="text-align: right">N= 418</div>

Type of toilet facilities	N	%
Pit latrine	200	47.8
Water Closet	101	24.2
VIP latrine	57	13.6
Bush	54	12.9
Bowl	3	0.7
None	3	0.7

4.3 Respondents' Knowledge of causes, symptoms, prevention and treatment of cholera

All (100.0%) the respondents did not know that the pathogen that causes cholera is *Vibrio cholerae*. Indirect causes (factors that promotes occurrence of cholera) were listed and these included housefly (8.4%), contaminated water (4.8%), dirty environment (4.5%) and contaminated food (2.2%). (See table 4.4 for details).

Fig. 4.1 highlights the knowledge of respondents on whether flies can facilitate the spread of cholera. Majority (79.0%) of the respondents did not know whether flies can facilitate the spread of cholera. Only 13.0% of them correctly stated that flies can facilitate the spread of cholera. (For details, see fig. 4.1).

Respondents' knowledge of the conditions/materials or practices that can promote the spread of cholera is shown in table 4.5. The correctly stated conditions or practices that can promote the spread of cholera were contaminated food (78.5%), dirty drainage (84.0%), contaminated water (86.8%), unwashed fruits (70.1%) and infected feacal matter (71.5%). The incorrectly stated conditions were as follow: witchcraft (58.1%) and contact with blood (65.6%) (See table 4.5 for details).

The knowledge of respondents on the common symptoms of cholera is contained in table 4.6. Those who correctly stated the common symptoms of cholera to be dehydration, vomiting, nausea, diarrhea and abdominal pain were 69.6%, 88.3%, 76.6%, 89.0% and 65.6% respectively. (For more details, see table 4.6). Respondents' knowledge of the symptoms of severe cholera is shown in table 4.7. About a quarter (25.1%) of the respondents correctly mentioned acute renal failure as a symptom/consequence of severe cholera. Other correctly mentioned severe symptoms included the following: coma (41.4%) and shock (41.1%). convulsion (52.6%), excessive sleep (60.0%) and constipation (45.5%) were wrongly mentioned as symptoms of severe cholera. (See table 4.7 for details).

Table 4.8 summarizes respondents' knowledge relating to effective ways of preventing/controlling cholera. The correctly listed effective ways of preventing cholera by respondents included eating non-contaminated food (93.1%), safe drinking water (90.4%), keeping toilets clean (89.5%), covering of food properly (88.5%), hand washing after using

45

the toilet (86.4%) and cleaning of the drainage around the house (82.8%). The wrongly mentioned ways of preventing cholera included the following: avoiding people who have cholera (72.0%%); adding alum to water and filteration before drinking (80.1%); avoiding contact with blood (66.3%); and use of rubber plates for eating (23.7%) (See table 4.8 for more details).

Respondents' knowledge relating to the treatment for cholera is presented in table 4.9. Mentioned of hospital-based care/treatment topped (94.7%) the list closely followed by use of oral rehydration salt (90.9%) which is normally given for the home management of cholera to rehydrate after loss of electrolytes from the body through diarrhea and vomiting. Treatments for cholera which were inaccurate included the following: Praying using the holy book (77.0%), Herbs (69.1%), paracetamol (67.7%) and use of anointing oil (42.3%) (See table 4.9 for more details). Fig. 4.2 highlights respondents' overall knowledge scores with only 5.5% having good knowledge. The mean knowledge score was 26.1 ± 5.7. (For details, see fig 4.2)

Table 4.4 Respondents' knowledge of the Pathogen that causes cholera

N=418

Cause of cholera	N	%
Correctness of mentioned cause of cholera		
Correct	0.00	0.0
Incorrect	418	100.0
Mentioned indirect and wrong causes of cholera:		
Housefly +	35	8.4
Contaminated water +	20	4.8
Dirty environment +	19	4.5
Contaminated food +	9	2.2
Mosquito *	4	1.0
I don't know (No idea about the causative pathogen)	331	79.2

+ Indirect causes (factors that promotes occurrence of cholera)

* Neither a direct or indirect causative factor.

47
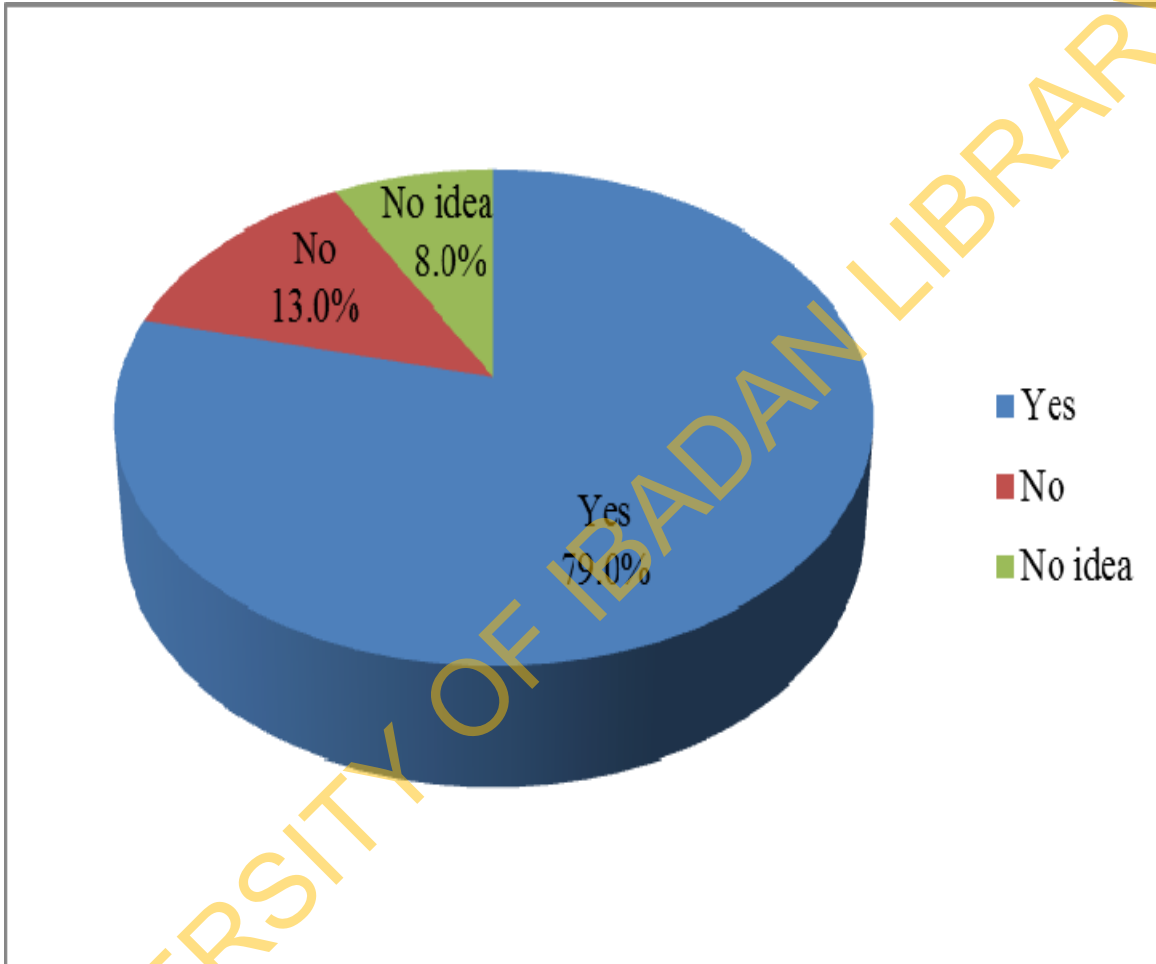
Fig 4.1 Respondents' knowledge relating to whether flies can facilitate the spread of cholera

Table 4.5 Respondents' Knowledge of the Conditions/materials/practices that can promote spread of cholera

N= 418

Conditions/materials/practices that can promote spread of cholera	Responses		
	True (%)	False (%)	Don't know (%)
Through contaminated food	328 (78.5)*	56 (13.4)	34 (8.1)
Through witchcraft	243 (58.1)	124 (29.7)*	51 (12.2)
Contact with blood	274 (65.6)	75 (17.9)*	69 (16.5)
Dirty drainage	351 (84.0)*	42 (10.0)	25 (6.0)
Contaminated water	363 (86.8)*	36 (8.6)	19 (4.5)
Unwashed fruits	293 (70.1)*	97 (23.2)	28 (6.7)
Infected feacal matter	299 (71.5)*	53 (12.7)	66 (15.8)

* Correct responses

49

Table 4.6 Respondents' knowledge of Common symptoms of cholera

<div align="right">

N= 418

</div>

Common symptoms	Responses		
	True (%)	False (%)	Don't know (%)
Dehydration	291 (69.6)*	43 (10.3)	84 (20.1)
Vomiting	369 (88.3)*	33 (7.9)	16 (3.8)
Nausea	320 (76.6)*	41 (9.8)	57 (13.6)
Diarrhea	372 (89.0)*	31 (7.4)	15 (3.6)
Cough	247 (59.1)	128 (30.6)*	43 (10.3)
Abdominal pain	274 (65.6)*	99 (23.7)	45 (10.8)
High blood pressure	170 (40.7)	133 (31.8)*	115 (27.5)
Weight loss	250 (59.8)	58 (13.9)*	110 (26.3)
Muscle cramps	159 (38.0)	61 (14.6)*	198 (47.4)

* Correct responses

50

Table 4.7 Respondents' knowledge of symptoms of severe cholera

<div align="right">N= 418</div>

Symptoms of severe cholera +	Responses		
	True (%)	False (%)	Don't know (%)
Convulsion	220 (52.6)	62 (14.8)*	136 (32.5)
Coma	173 (41.4)*	77 (18.4)	168 (40.2)
Shock	172 (41.1)*	78 (18.7)	168 (40.2)
Excessive sleep	251 (60.0)	109 (26.1)*	58 (13.9)
Constipation	190 (45.5)	103 (24.6)*	125 (29.9)
Acute renal failure	105 (25.1)*	81 (19.4)	232 (55.5)

* Correct responses

+ These symptoms can also be regarded as the adverse consequences of cholera.

51

Table 4.8 Respondents' knowledge of effective ways of preventing/controlling cholera

N= 418

Effective ways of preventing/controlling cholera	Responses		
	True (%)	False (%)	Don't know (%)
Use of rubber plates for eating	99 (23.7)	194 (46.4)*	125 (29.9)
Eating non-contaminated food	389 (93.1)*	10 (2.4)	19 (4.5)
Safe drinking water	378 (90.4)*	23 (5.5)	17 (4.1)
Taking vaccine for cholera	330 (78.9)*	34 (8.1)	54 (12.9)
Avoid buying food from street hawkers	233 (55.7)*	119 (28.5)	66 (15.8)
Thorough hand washing after using the toilet	361 (86.4)*	36 (8.6)	21 (5.0)
Cleaning drainage around the house	346 (82.8)*	41 (9.8)	31 (7.4)
Cover food properly	370 (88.5)*	26 (6.2)	22 (5.3)
Boil water before drinking	331 (79.2)*	59 (14.1)	28 (6.7)
Not eating uncooked vegetables	242 (57.9)*	101 (24.2)	75 (17.9)
Not defecating in the open	318 (76.1)*	49 (11.7)	51 (12.2)
Keeping toilets clean	374 (89.5)*	19 (4.5)	25 (6.0)
Avoiding people who have cholera	301 (72.0)	71 (17.0)*	46 (11.0)
Adding alum to water and filter before drinking	335 (80.1)	51 (12.2)*	32 (7.7)
Avoiding contact with blood	277 (66.3)	72 (17.2)*	69 (16.5)

* Correct responses

52

Table 4.9 Respondents' knowledge relating to treatment for cholera

N= 418

Treatment for cholera	Responses		
	True (%)	False (%)	Don't know (%)
Taking oral rehydration salt	380 (90.9)*	11 (2.6)	27 (6.5)
Use of paracetamol	283 (67.7)	100 (23.9)*	35 (8.4)
Taking antibiotics	235 (56.2)*	83 (19.9)	100 (23.9)
Intravenous fluids	222 (53.1)*	66 (15.8)	130 (31.1)
Using zinc capsules	167 (40.0)*	64 (15.3)	187 (44.7)
Use of herbs (Maganin gargajia)	289 (69.1)	68 (16.3)*	61 (14.6)
Anointing oil (Habatu sauda)	177 (42.3)	153 (36.6)*	88 (21.1)
Pray using the holy book (Quran)	322 (77.0)	63 (15.1)*	33 (7.9)
Hospital based care/treatment	396 (94.7)*	13 (3.1)	9 (2.2)

* Correct responses

53
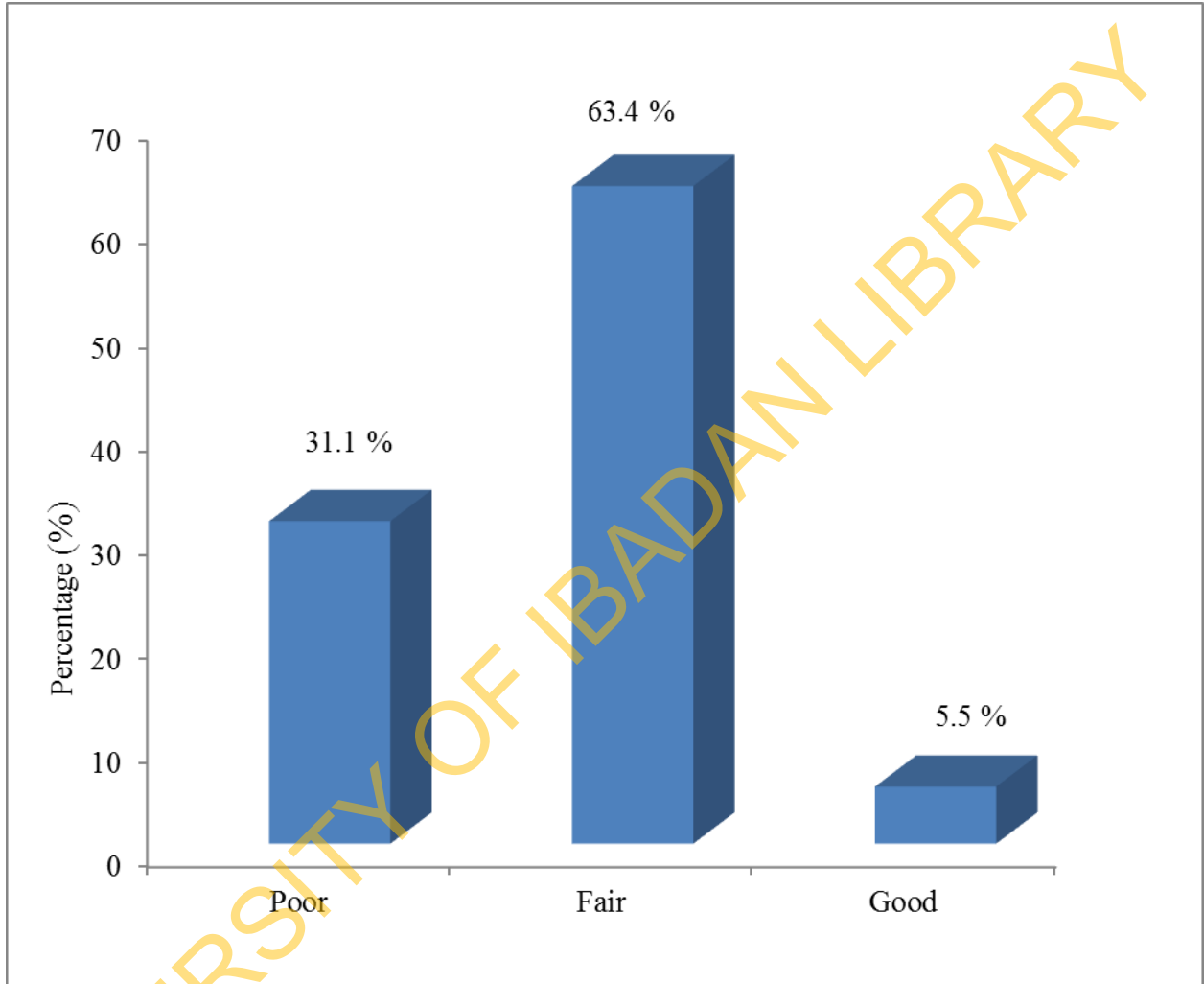
Mean Knowledge Score = 26.1 ± 5.7

Fig 4.2 Respondents' Overall Knowledge of Cholera

54

4.4 Comparisons of Respondent's Knowledge

Table 4.10 summarizes the comparison of respondents' knowledge by socio-demographic characteristics. The result shows a statistically significant difference in the mean knowledge scores by gender, ethnic group, religion, highest levels of education and occupation. The difference in the mean knowledge scores by age was not however, significant. Similarly there was no significant difference in respondent' mean knowledge scores by marital status.

The comparison of respondents' mean knowledge score by respondents' typology of perception is shown in table 4.11. The mean knowledge scores among respondents with unfavourable perception (i.e perception not in line with biomedical view) was 25.2 ± 5.6. On the other hand, among those with favourable perception (i.e perception in line with biomedical view point), the mean knowledge score was 30.3 ± 4.0 (See the table under reference for details).

55

Table 4.10 Comparison of Respondents' knowledge of cholera by Socio-demographic Characteristics

Socio-demographic Variable Characteristics	No	$\bar{x}$ knowledge score	Std. Deviation	Df	F/t-test	P value ++
Age in years						
15-24	56	25.66	5.541	3	1.962 **	0.119
25-34	181	25.54	5.435			
35-44	105	27.17	5.999			
≥45	76	26.13	5.716			
Sex						
Male	209	24.89	6.185	1	4.346 *	0.000
Female	209	27.25	4.828			
Ethnicity						
Hausa	312	25.68	4.915	2	6.011 **	0.003
Yoruba	89	27.81	6.821			
Ethnic Minorities +	17	24.18	9.362			
Marital status						
Married	396	26.07	5.674	3	0.343 **	0.794
Widowed	10	24.80	5.391			
Divorced	8	27.38	4.779			
Co-habiting	4	27.00	8.446			
Religion						
Islam	388	25.62	5.508	1	6.170 *	0.000
Christianity	30	31.97	4.255			
Highest level of education						
No formal education	35	21.37	5.589	3	36.681**	0.000
Primary	170	24.73	5.268			
Secondary	185	27.08	4.883			
Tertiary	28	33.50	4.023			
Occupation						
House wife	137	25.89	4.297	4	3.628**	0.006
Trading	120	26.80	5.737			
Artisan	104	25.78	7.082			
Unemployed	48	24.44	4.929			
Civil service	9	31.33	4.950			

*Results are based on t-test analysis   **Results are based on F-test analysis

+ Ethnic Minorities = Consisted of 17 (4.1%) of the total sample. It consists of Non-Nigerian Hausa speaking populations 7(41.2%), Igbo 4(23.6%), Kanuri 3(17.6%) and Igbira 3(17.6%)

++ Final cut off = 0.05

56

Table 4.11 Comparison of Respondents' knowledge by Perception

Perception	No	$\bar{x}$ knowledge score	Std. Deviation	df	t-test	P value
Unfavourable	345	25.18	5.564	1	7.435	0.000 *
Favourable	73	30.29	4.022			

* Statistically Significant

57

4.5 Perception of Respondents Relating to Cholera

This section presents the following two typologies of respondents' perception relating to cholera- perceived seriousness of cholera and perceived vulnerability to cholera.

The respondents' perceived seriousness of cholera is presented in the table 4.12. The table also indicates the expressed perceptions that are in line with the biomedical world view. Majority (88.0%) of them were of the view that cholera is a serious disease. The perception of 40.4% of the respondents was that cholera cannot kill or lead to death while 47.8% was of the view that cholera is only serious in children not among adults. Slightly over half (55.5%) of the respondents did not share the view that cholera can prevent one from working while 38.0% was of the view that without treatment, symptoms of cholera disappear after some days. Very few (8.1%) perceived cholera as a mild disease (See details in table 4.10).

Table 4.13 shows respondents' perceptions of vulnerability to cholera. Majority (73.4%) of the respondents perceived themselves not to be vulnerable because flies do not come near their food. Some respondents (34.4%) claimed that only very young children are vulnerable to cholera. Respondents' perceptions that are indicative of vulnerability are asterisked in the table (See table 4.11 for more details).

The respondents' overall perception scores are highlighted in figure 4.3. The figures reveals that only 17% have favourable perception i.e. perception in line with the biomedical word views. The mean perception score was 4.6 ± 2.7.

4.6 Comparisons of Respondent's Perceptions

The comparison of respondents' perception by socio-demographic characteristics is summarized in table 4.14. The result showed a statistically significant difference in the perception scores of male and female respondents. The mean perception scores among the males and females were 3.87 ± 2.498 and 5.28 ± 2.668 respectively with a significant difference. The perception scores by ethnicity, religion, highest level of education and occupation were also statistically significant (details are shown in table 4.14).

58

Table 4.12 Respondents' Perceived seriousness of cholera

N= 418

Perceived seriousness of cholera	Responses		
	Agree (%)	Undecided (%)	Disagree (%)
Cholera is a serious disease	368 (88.0)*	40 (9.6)	10 (2.4)
Without treatment, symptoms of cholera disappear after some days	159 (38.0)	107 (25.6)	152 (36.4)*
Cholera is a mild disease	34 (8.1)	112 (26.8)	272 (65.1)*
Cholera cannot kill or lead to death	169 (40.4)	48 (11.5)	201 (48.1)*
Cholera can't prevent one from working	232 (55.5)	54 (12.9)	132 (31.6)*
Cholera is only serious in children not among adults	200 (47.8)	70 (16.7)	148 (35.4)*

* Perception in line with biomedical world view/appropriate

Table 4.13 Respondents' Perceived vulnerability to cholera

N= 418

Perceived vulnerability to cholera	Responses		
	Agree (%)	Undecided (%)	Disagree (%)
I cannot have cholera because flies do not come near my food	307 (73.4)	34 (8.1)	77 (18.4)*
I cannot get cholera from the water we use in the community	247 (59.1)	68 (16.3)	103 (24.6)*
I cannot get cholera because I don't over feed	198 (47.4)	66 (15.8)	154 (36.8)*
No member of my family can have cholera because we use Water Closet toilet	226 (54.1)	98 (23.4)	94 (22.5)*
Only very young children get cholera	144 (34.4)	65 (15.6)	209 (50.0)*

* Perception in line with biomedical world view/appropriate

60
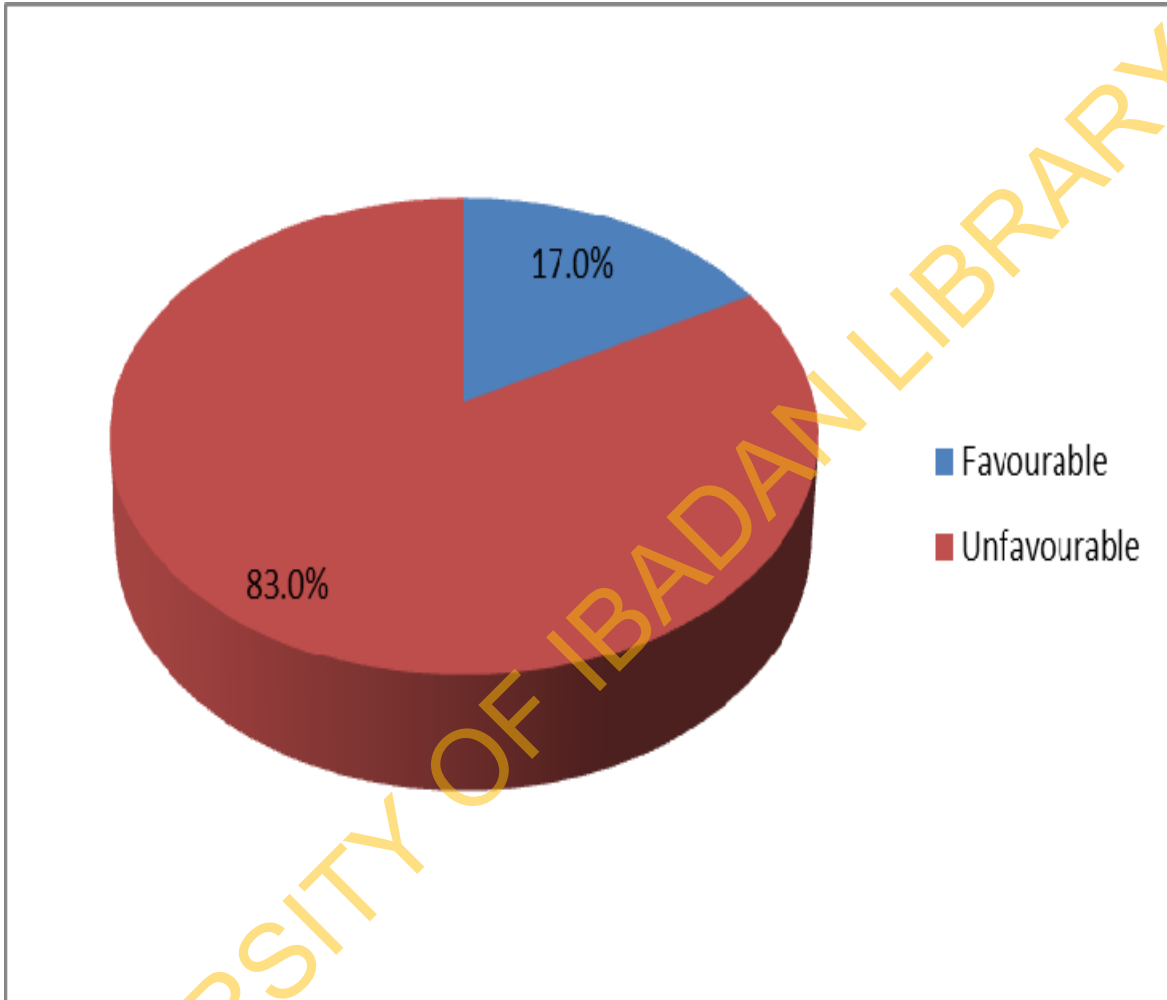
Mean Perception Score= 4.6 ± 2.7

Fig 4.3 Respondents' Overall Perception relating to Cholera

Table 4.14 Comparison of Respondents' Perception of cholera by Socio-demographic Characteristics

Socio-demographic Characteristics	No	$\bar{x}$ perception score	Std. Deviation	df	F/t-test	P value
Age in years						
15-24	56	5.23	2.886	3	1.747 **	0.157
25-34	181	4.31	2.615			
35-44	105	4.67	2.578			
≥45	76	4.59	2.753			
Sex						
Male	209	3.87	2.498	1	5.584 *	0.000
Female	209	5.28	2.668			
Ethnicity						
Hausa	312	4.37	2.558	2	4.932 **	0.008
Yoruba	89	5.36	2.837			
Ethnic Minorities +	17	4.35	3.297			
Marital status						
Married	396	4.58	2.678	3	0.234 **	0.873
Widowed	10	4.60	3.098			
Divorced	8	4.13	2.167			
Co-habiting	4	5.50	3.109			
Religion						
Islam	388	4.38	2.606	1	5.549 *	0.000
Christianity	30	7.10	2.295			
Highest level of education						
No formal education	35	2.71	2.270	3	15.241 **	0.000
Primary	170	4.04	2.431			
Secondary	185	5.22	2.746			
Tertiary	28	5.93	2.176			
Occupation						
House wife	137	4.70	2.516	4	4.235 **	0.002
Trading	120	5.17	2.683			
Artisan	104	4.29	2.712			
Unemployed	48	3.42	2.759			
Civil service	9	4.33	2.121			

*Results are based on t-test analysis   **Results are based on F-test analysis

+ Ethnic Minorities = Consisted of 17 (4.1%) of the total sample. It consists of Non-Nigerian Hausa speaking populations 7(41.2%), Igbo 4(23.6%), Kanuri 3(17.6%) and Igbira 3(17.6%)

4.7 Respondents' Self-efficacy relating to the prevention and treatment of Cholera

Respondents' mean self-efficacy score was 10.5 ± 3.3; those with high self-efficacy constituted 55.3% while 44.7% had low self-efficacy. Respondents who were very confident in terms of hand washing after using the toilet topped (69.6%) the list closely followed by *covering food all the time* (67.5%) while 65.6% were very confident in terms of *cleaning their toilets properly*. A total of 61.5% were also very confident in terms of cleaning drainage around their houses. About 44.0% stated that they were very confident in being able to prepare oral rehydration salt for the home management of cholera while 45.5% were very confident in terms of the use of oral rehydration salt (See table 4.15 for more details).

4.8 Comparisons of Respondent's Self-efficacy

The comparison of respondents' Self-efficacy by socio-demographic characteristics is highlighted in table 4.16. The result showed that significant differences were in mean S.E scores by religion, highest level of education and occupation. For instance, the mean S.E scores among the Muslims and Christians were 10.3 ± 3.3 and 12.9 ± 1.9 respectively (p< 0.05). Respondents with tertiary education had the highest S.E score of 11.6 ± 2.6 followed by those who had secondary education with a mean S.E score of 11.3 ± 2.9 while respondents with primary education had a mean S.E score of 9.8 ± 3.5. Respondents with the least S.E score were among those with no formal education with mean S.E score of 8.4 ± 3.3. For mean S.E score by occupation, those in the civil service had the highest score of 12.8 ± 1.6 with artisans having the least mean S.E score of 9.8 ± 3.7. However, there were no significant differences in mean S.E scores by age and marital status respectively.

63

Table 4.15 Respondents' self-efficacy relating to the prevention and treatment of Cholera

N= 418

Self-efficacy * (S.E)	Responses		
	Very confident (%)	A bit confident (%)	Not confident at all (%)
Cleaning my toilets properly	274 (65.6)	129 (30.9)	15 (3.6)
Cleaning drainage around my house	257 (61.5)	135 (32.3)	26 (6.2)
Washing my hands after the toilet	291 (69.6)	110 (26.3)	17 (4.1)
Covering my food all the time	282 (67.5)	116 (27.8)	20 (4.8)
I am able to prepare Oral Rehydration Salt	184 (44.0)	141 (33.7)	93 (22.2)
I know how to use Oral Rehydration Salt	190 (45.5)	148 (35.4)	80 (19.1)

* $\bar{x}$ S.E Score = 10.5 ± 3.3 (based on a 14 point S.E scale)

64

Table 4.16 Comparison of Respondents' Self-efficacy relating to cholera by Socio-demographic Characteristics

Socio-demographic Characteristics	No	$\bar{x}$ self-efficacy score	Std. Deviation	Df	F/t-test	P value
Age in years						
15-24	56	10.71	3.404	3	1.418 **	0.237
25-34	181	10.65	3.191			
35-44	105	10.62	3.395			
≥45	76	9.79	3.395			
Sex						
Male	209	9.45	3.498	1	6.789 *	0.000
Female	209	11.54	2.754			
Ethnicity						
Hausa	312	10.56	3.183	2	2.109 **	0.123
Yoruba	89	10.56	3.411			
Ethnic Minorities +	17	8.88	4.742			
Marital status						
Married/Co-habiting	400	10.49	3.331	1	0.401 *	0.880
Widowed/Divorced	18	10.61	3.013			
Religion						
Islam	388	10.31	3.323	1	4.268 *	0.000
Christianity	30	12.93	1.999			
Highest level of education						
No formal education	35	8.40	2.858	3	12.758**	0.000
Primary	170	9.84	3.399			
Secondary	185	11.33	3.709			
Tertiary	28	11.57	3.327			
Occupation						
Unemployed/House wife	137	10.88	2.995	3	3.838 **	0.010
Trading	120	10.32	3.413			
Artisan	104	9.83	3.685			
Civil service	9	12.78	1.641			

*Results are based on t-test analysis   **Results are based on F-test analysis

+ Ethnic Minorities = Consisted of 17 (4.1%) of the total sample. It consists of Non-Nigerian Hausa speaking populations 7(41.2%), Igbo 4(23.6%), Kanuri 3(17.6%) and Igbira 3(17.6%)

65

4.9 Respondents Practices relating to spread and prevention of cholera

Table 4.17 showed respondents practices relating to the spread and prevention of cholera. The table also indicates potential protective practices against cholera (see asterisks). Majority (68.7%) of the respondents stated that they washed their hands all the time after using the toilet. This is a potentially protective practice against cholera. Many of them (42.6%) washed fruits all the time before eating (See more details in table).

Respondents' practices relating to the washing of vegetables and/or fruits and patterns of washing them is depicted in table 4.18. About half (50.2%) of the respondents washed cucumber all the time while 34.4% washed green beans all the time. An almost equal proportion (34.7%) also claimed that they washed *tiger nuts* all the time. Respondents whose practices are indicative of potential protective practices against cholera are asterisked in the table. (For more details, see table 4.18).

The practices of respondents relating to the promotion of safe water for home use are shown in table 4.19. Slightly less than half (48.3%) boiled water for drinking while only very few (16.0%) added drops of chlorine to water. Respondents whose practices are not effective for protection against cholera are asterisked in the table (See table 4.19 for more details).

Table 4.20 contains a list of receptacles used by respondents for collecting refuse. They included the following: dust bins (40.9%); leather bags (28.2%); and drums (15.8%). Very few of the respondents (2.2%) used buckets while 12.9% had no receptacles and so dump refuse in an open space. (Details are contained in table 4.20)

Respondents' mode of refuse disposal is presented in table 4.21. Respondents that disposed their refuse by burning topped (31.3%) the list closely followed by those who disposed off their refuse through the local authority waste disposal system (31.1%). Other ways through which respondents dispose off refuse were by burying (8.6%); throwing into the river (26.8%); and very few (2.2%) who disposed refuse in open spaces within the community. Practices with some potential for promoting cholera outbreak are asterisked in the table. (See details in table 4.21).

66

Table 4.22 highlights respondents' food hygiene related practices. Majority (78.5%) of the respondents reportedly covered their left-over food. Slightly over half (54.1%) reportedly warm their left-over food before eating. However, about 20.8% ate their food without warming while 64.8% washed their hands before and after eating. (See table 4.22 for more details).

Respondents' practices relating to oral rehydration salt/sugar salt solution for the home management of cholera is presented in table 4.23. Respondents who bought already made oral rehydration salt were 62.7% while those who prepared sugar salt solution by themselves constituted 37.3%. Most (93.6%) of the respondents who prepared sugar salt solution by themselves were able to correctly mention the ingredients used for making the sugar salt solution (Details are presented in table 4.23).

Table 4.17 Respondents' Practices relating to Spread and Prevention of Cholera

N=418

Practices relating to cholera spread and prevention	Responses		
	Yes, all the time (%)	Yes, sometimes (%)	No (%)
Washing hands after using the toilet	288 (68.9) *	128 (30.6)	2 (0.5)
Buying food from street hawkers	76 (18.2)	254 (60.8)	88 (21.0) *
Buying fruits from street hawkers	112 (26.8)	257 (61.5)	49 (11.7) *
Washing fruits before eating	178 (42.6) *	223 (53.3)	17 (4.1)
Eating shared food in public gatherings	113 (27.0)	236 (56.5)	69 (16.5) *

* Potential protective practices against cholera

Table 4.18 Respondents' practices relating to washing of vegetables/fruits and pattern of washing vegetables

N=418

Vegetables/fruits	Pattern of washing		
	Wash, all the time* (%)	Wash, sometimes (%)	Do not wash (%)
Cucumber	210 (50.2)	138 (33.0)	70 (16.7)
Carrot	204 (48.8)	167 (40.0)	47 (11.2)
Cabbage	184 (44.0)	212 (50.7)	22 (5.3)
Lettuce	188 (45.0)	204 (48.8)	26 (6.2)
Green beans	144 (34.4)	192 (45.9)	82 (19.6)
Tiger nuts (*Cyperus esculentus*)	145 (34.7)	175 (41.9)	98 (23.4)
Date fruit (*Phonix dactylifera*)	146 (34.9)	191 (45.7)	81 (19.4)

* Potential protective practices against cholera

69

Table 4.19 Respondents' Practices relating to promotion of safe water for home use

N = 418

Safe water practices	Responses	
	Yes (%)	No (%)
By boiling	202 (48.3)	216 (51.7)
By letting the water to settle and then decanting	263 (62.9) *	155 (37.1)
By adding drops of chlorine	67 (16.0)	351 (84.0)
By filtering	75 (17.9) *	343 (82.1)
By adding alum to water	86 (20.6) *	332 (79.4)

* Practices not effective for the protection against cholera

70

Table 4.20 Receptacles used by respondents' to collect refuse

N= 418

Collection of refuse	Responses	
	N	%
Dust bin	171	40.9
Leather bag	118	28.2
Drum	66	15.8
Dump refuse in an Open space	54	12.9
Bucket	9	2.2

71

Table 4.21 Respondents' mode of refuse disposal

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N= 418

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Mode of refuse disposal	Responses	
	N	**%**
By burning	131	31.3
By burying	36	8.6
Through the local waste disposal authority	130	31.1
Throw into the stream *	112	26.8
Refuse dump in the community *	9	2.2

* Practices with some potential for cholera outbreak

72

Table 4.22 Respondents' food hygiene related practices

N= 418

Food hygiene related practices	Responses	
	N	%
How kept left-over food:		
Cover the food	328	78.5
Refrigerate	40	9.6
Left uncovered	36	8.6
I don't keep left-over food	14	3.3
What done with left-over food:		
Eat without warming	87	20.8
Eat after warming	226	54.1
Throw away	38	9.1
Give to animals	50	12.0
Give to children	17	4.1
When wash hands:		
Before eating only	84	20.1
After eating only	63	15.1
Before and after eating	271	64.8

73

Table 4.23 Respondents' Practices relating to Oral rehydration salt for home management of cholera

Practices relating to Oral rehydration salt/ or SSS	Responses	
	N	**%**
How get Oral Rehydration Salt for home management of cholera (N= 418)		
I prepare it myself (i.e. SSS +)	156	37.3
I buy the already made one (i.e. ORS ++)	262	62.7
Ingredients for making Oral Rehydration Salt (N= 156)		
Salt, sugar and water *	146	93.6
Salt, maggi and pepper	9	5.8
Sugar, milk and milo	1	0.6

* Correct response

+ SSS= Sugar Salt Solution

++ ORS= Oral Rehydration Salt

74

4.10 Observation of Households

This section presents the results based on the observation of the various households visited for interview. The environmental health related issues or facilities observed included the following: sources of water used by respondents; type of wells owned by respondents; presence and ownership of toilet; types of toilet present in house; characteristics and conditions of wells used by respondents; characteristics and conditions of toilets used by respondents; presence and types of waste or refuse bin in respondents' house; and condition of waste disposal facilities and condition of the drainage system.

The observed sources of water used by respondents are shown in table 4.24. Those who obtain their water from wells without installed pumps were 39.5%. Very few (13.2%) of the respondents sourced their water from borehole and/or deep wells with installed pumps. Respondents whose sources of water were not seen/available constituted 46.4%. (Details are contained in table 4.24).

The results from the observation of the type of wells owned by respondents are presented in table 4.25. Over half (56.7%) of the respondents had no wells. Respondents who had wells were 43.3%. A total of 181 respondents had access to wells, of this sub-group majority (82.9%) used public wells while 17.1 had access to private wells.. (See details in table 4.25).

Table 4.26 highlights the presence and ownership of toilets in respondents' houses. Few (24.4%) respondents had no toilets. Majority (68.0%) of those who had access to toilets used public toilets while 32.0% used private toilets. (Details are highlighted in table 4.26).

The types of toilets to which respondents had access are depicted in table 4.27. Majority (72.8%) had pit latrines while 14.5% and 12.7% had water closets and VIP latrines respectively. (See table 4.27 for details).

The observed characteristics and conditions of wells used by respondents are summarised in table 4.28. Wells with apron and parapets were 58.6% and 167.4% respectively. Most (91.9%) of the wells had a cover but less than half (49.2%) had a fixed container/receptacle for drawing water. Majority (75.1%) of the wells were fully covered. However, 59.1% of the

wells were shallow wells. The other details relating to the observed characteristics are depicted in the table under reference.

Characteristics and conditions of toilets used by respondents are contained in table 4.29. Toilets seen within the building constituted 72.5%. Majority (69.6%) of the toilets had roof structures while 69.3% of the toilets had covers. Majority (75.9%) of the toilets needed cleaning and half of the toilets had flies present around them. Water was available for washing hands in 45.6% of the toilets; however only 22.2% had soap available for washing hands. Toilets that were soiled with feacal matter and had bad odour were 31.6% and 59.8% respectively. (For additional details, see table 4.29).

Table 4.30 depicts houses of respondents that had waste or refuse bins and the type of waste bins present. Majority (69.1%) had waste bins. The waste bins included; plastic baskets (38.0%), drums (18.7%) and 43.3% used leathers. (See table 4.30 for details). The conditions of respondents' waste disposal facilities and drainage system is showed in table 4.31. It was observed that 55.7% of the waste bins were clean. Drainages were present in 37.6% households. Majority (79.0%) were blocked and most (93.6%) were not clean. (Details are contained in table 4.31).

76

Table 4.24 Observed sources of water used by respondents

Observed sources of water	N	%
Well	165	39.5
Borehole/deep well with pump	55	13.2
Stream	2	0.5
Tap	2	0.5
Not available/seen	194	46.4

77

Table 4.25 Observation of type of wells owned by respondents

Presence and type of well owned	N	%
Presence of any type of well		
Yes	181	43.3
No	237	56.7
Ownership of well to which have access(n=181)	181	43.3
Private well	31	17.1
Public well	150	82.9

78

Table 4.26 Presence and ownership of toilet in respondents' house

N= 418

Presence and type of toilet	N	%
Presence of any type of toilet		
Yes	316	75.6
No	102	24.4
Ownership of toilets which have access (n=316)	316	75.6
Private toilet	101	32.0
Public toilet	215	68.0

79

Table 4.27 Types of toilet present in respondents' house

<div align="right">N= 316</div>

Types of toilet present	N	%
VIP latrine	40	12.7
Pit latrine	230	72.8
Water cistern	46	14.5

Table 4.28 Observed characteristics and conditions of wells used by respondents

Well Conditions	Yes (%)	No (%)
Characteristics of wells:		
Apron present	106 (58.6)	75 (41.4)
Parapet present	122 (67.4)	59 (32.6)
Inner wall ringed	76 (42.0)	105 (58.0)
Inner wall cemented	78 (43.1)	103 (56.9)
Fixed bucket or container for drawing water	89 (49.2)	92 (50.8)
Cover present	165 (91.2)	16 (8.8)
Observed prevailing Conditions of wells:		
Well fully covered	136 (75.1)	45 (24.9)
Well parapet cracked or broken (N= 122)	40 (32.8)	82 (67.2)
Well located close to a latrine	44 (24.3)	137 (75.7)
Well at least 15 metres (20 adult steps) distance from the latrine	148 (81.8)	33 (18.2)
Well shallow	107 (59.1)	74 (40.9)
Presence /traces of feacal matter around the well	30 (16.6)	151 (83.4)

81

Table 4.29 Observed characteristics and conditions of toilet used by respondents

N= 316

Toilet Conditions	Yes (%)	No (%)
Toilet within the building	229 (72.5)	87 (27.5)
Toilet has roof structure	220 (69.6)	96 (30.4)
Toilet cover present	219 (69.3)	97 (30.7)
Toilet hole fully covered	129 (40.8)	187 (59.2)
Toilet cracked or broken	88 (27.8)	228 (72.2)
Toilet needs cleaning	240 (75.9)	76 (24.1)
Flies present around the toilet	158 (50.0)	158 (50.0)
Water available for washing hands	144 (45.6)	172 (54.4)
Soap available for washing hands	70 (22.2)	246 (77.8)
Toilet soiled with feacal matter	100 (31.6)	216 (68.4)
Toilet has bad odour	189 (59.8)	127 (40.2)

82

Table 4.30 Presence and type of waste bin in respondents' house

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N= 418

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Presence of waste bin and type	Yes (%)	No (%)
Presence of waste bins (N= 418)	289 (69.1)	129 (30.9)
Type of waste bin (N= 289)		
Plastic basket	110	38.0
Drum	54	18.7
Leather	125	43.3

83

Table 4.31 Condition of respondents' Waste disposal and drainage system

Condition of waste disposal and drainage system	Yes %	No %
Clean waste bin (N= 289)	161 (55.7)	128 (44.3)
Drainage channel present in the premises (N= 418)	157 (37.6)	261 (62.4)
Drainage channel present blocked (N= 157)	124 (79.0)	33 (21.0)
Drainage channel needs cleaning (N= 157)	147 (93.6)	10 (6.4)

84

4.11 Test of Hypotheses

Hypothesis 1 states that "*there is no significant association between respondents' knowledge and their self-efficacy relating to the prevention and treatment of cholera*". This was put to test using the Chi-square and the results are shown in table 4.32. Majority of the respondents with good knowledge (74.0%) topped the list of respondents with high S.E relating to the treatment and prevention of cholera. This group was followed closely in terms of high S.E by those with fair knowledge (60%). The result showed that there was a significant association between knowledge and self-efficacy relating to the prevention and treatment of cholera. (X^2= 14.467, df = 2, p-value = 0.001). The null hypothesis (Ho) was therefore rejected.

Hypothesis 2 states that "*there is no significant association between age of respondents and their perception of cholera*". This hypothesis was also tested using the Chi-square and the results are shown in table 4.33. More respondents with favourable perception (25.0%) were aged 15-24 years (the youth, WHO, 2011). Higher proportions of respondents aged 25 years and above (adults) had unfavourable perception of cholera. The result showed that there was no significant association between age and perception of cholera. (X^2= 4.881, df = 3, p-value = 0.181). The null hypothesis (Ho) was not therefore rejected.

Table 4.32 Association between Respondents' Knowledge and Self-efficacy relating to the prevention and treatment of cholera

Knowledge level in points	Self-efficacy		Chi-square	df	p-value
	High self-efficacy (%)	Low self-efficacy (%)			
			14.467	2	0.001
Poor (0-23)	55 (42.3%)	75 (57.7%)			
Fair (24-35)	159 (60.0%)	106 (40.0%)			
Good (36-48)	17 (74.0%)	6 (26.0%)			

(p<0.05)

Table 4.33 Association between Age of Respondents and Perception relating to Cholera

Age in years	Perception		Chi-square	df	p-value
	Unfavourable (%)	Favourable (%)			
			4.881	3	0.181
15-24	42 (75.0%)	14 (25.0%)			
25-34	157 (86.7)	24 (13.3%)			
35-44	85 (81.0%)	20 (19.0%)			
≥ 45	61 (80.3)	15 (19.7%)			

(p>0.05)

87

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This study was conducted to investigate the knowledge, perception and practices relating to Cholera among Sabo community residents. This chapter focuses on the discussion of the major findings of the study. It is organized into the following sub-sections: Socio-demographic characteristics of respondents; respondents' knowledge of causes, symptoms, prevention, treatment of cholera; perception of respondents relating to cholera; practices relating to cholera prevention and treatment; respondents' household water and sanitation related resources. Other sub-sections are the implications of the findings for health promotion and education, conclusion and recommendations.

5.1 Socio-demographic characteristics of respondents

The respondents' mean age was 35.7 ± 13.4 years with majority of them aged 25-34 years. This implies that the household heads constituted mainly of young adults. In this study there were equal males and females because the study was purposively designed to be so to avoid skewed data. It is to be noted that the Nigerian Demographic and Health Survey (NDHS) on household heads revealed that there were 81.5% male household heads and 18.5% female household heads (National Population Commission and Inner City Fund International, 2013). Most (92.8%) of the respondents were Muslims. This is so because Islam is the dominant religion in Sabo community. Hausa is the lingua franca in Sabo because most residents were migrant Hausas from the Northern part of Nigeria.

A study conducted in Bangladesh identified socio-economic status of the households as a factor which is associated with cholera transmission (Emch et. al. 2010). This study did not involve the measurement of the socio-economic status of the residents of Sabo community; however, certain measures like level of education and occupation measured in this study could be used as proxy indicators of SES. Majority of the residents were either primary or secondary school certificate holders and most of them were traders and unemployed housewives. This is a reflection of the low level of education in the community and the fact that the community consist largely of persons who belong to the lower socio-economic class.

88

It has been argued that poor people have fewer financial resources to invest in sanitary infrastructure or cleaner water sources (Emch, Yunus, Escamilla, Feldecker, and Ali, 2010). They also have little financial resources to buy good quality food and so they eat inappropriately. These situations make them vulnerable to food and water related diseases such as cholera.

Socio-demographic characteristics such as age, gender and level of education are very important in the design and implementation of educational programs targeted at different populations. They are usually taken into consideration in the selection of educational methods, strategies and educational aids. Therefore, these socio-demographic characteristics should be taken into consideration in the design and execution of appropriate educational activities aimed at preventing and controlling cholera among residents of Sabo.

5.2 Respondents' Knowledge on causes, symptoms, prevention and treatment of cholera

The respondents mean knowledge score was 26.1 ± 5.7 out of a maximum score of 48 with only 5.5% having good knowledge of cholera. A different result was obtained from a study conducted in Nigeria among household heads in Wadata district in Benue state. In that study a mean knowledge score of 7.5 ± 2.6 was obtained (Ogbeyi, Bito, Anefu *et al*., 2017). The variations in these results could be due to several factors ranging from differences in the measuring tools used and variables measured. The result shows that there are several gaps in heads of household's knowledge relating to cholera. For instance, none of the respondents was able to correctly mention the pathogen that causes cholera. This may be due partly to their relatively low level of education and the fact that it is a medical term which many of them may never have heard of.

The association of witchcraft and contact with blood with the spread of cholera shows their misconception or lack of knowledge relating to the causation of the disease. The study by Kabita (2010) conducted among residents of Nchelenga district in Zambia, similarly revealed some misconceptions. About 79% of this study population was aware that flies can facilitate the spread of cholera. This was also reported in a study conducted in Maiduguri which shows

89

that over half of the respondents stated that flies facilitate the spread of cholera (Chamba, Haruna, Modu *et al*., 2016).

Majority of the respondents were more conversant with the common symptoms of cholera like diarrhea and vomiting as compared with the symptoms of severe cholera. This is a gap in knowledge which needs to be bridged because severe cholera easily leads to death within few days of onset. (WHO, 2016). It should be noted that vomiting and diarrhea are the most common symptoms of cholera. Sabo community residents' fairly good knowledge of these symptoms is likely due to their experiences of the disease. It should be noted that Sabo has experienced several cases of cholera in the past. Many of the respondents were able to identify ways of preventing/controlling cholera; however, over half of them did not regard avoidance of buying food from street hawkers and not eating uncooked vegetables as prevention practices. This indicates that awareness needs to be created relating to the possible association of cholera with consumption of food bought from street hawkers and the eating of uncooked vegetables.

In this study, repondents were able to identify; washing of hands after using the toilet and boiling of drinking water as preventive measures against cholera. A study by Ogbeyi, Bito, Anefu *et al*., (2017) reported that respondents were able to identify preventive measures against cholera to include; safe drinking water, adequate sanitation, health education, food safety and basic hygienic practices. Respondents' knowledge of the primary health care treatment for cholera is high as about 90.9% mentioned ORS. Most (94.7%) of the respondents appropriately chose hospital based care/treatment for cholera episodes. However, 43.8% of the respondents were not aware that taking Zinc capsules was part of the treatment for cholera. Awareness needs to be created regarding this aspect of treatment in the study area.

The study showed that respondents with poor knowledge of cholera were seen in all age-groups with however, no significant differences. This implies that poor knowledge of the disease cuts across the socio-demographic characteristics. So, the curriculum of any future educational intervention geared towards enhancing their knowledge should not be fundamentally different by age group. Overall, female respondents were more knowledgeable

90

than male. This may be due to the fact that females are usually the primary care givers in many communities. Females are mostly housewives in Sabo and are the ones who handle most of the sanitation and domestic chores in the households. Therefore they should be preferentially targeted for improvement in knowledge related to the association between environmental sanitation, food handling and the occurrence of cholera. Respondents with secondary education (44.3%) and higher levels of education (6.6%) were significantly less likely to have poor knowledge of cholera compared to those with primary (40.7%) or no education (8.4%). This is consistent with the study conducted by Ogbeyi, Bito, Anefu *et al*., 2017 which reported a significant association between the respondents' knowledge of cholera and level of education.This is because education plays a key role in enlightening people about various diseases; the more educated one is, the more he/she is more likely to be exposed to health-related information.

By far more respondents with unfavourable perception (83.0%) of cholera were significantly more likely to have poor knowledge of cholera compared to those with more favourable perception (17.0%). This implies that knowledge influences the perception of respondents relating to cholera and that it is pivotal to the modification of perception or beliefs that can put people at risk of cholera.

5.3 Perception of Respondents Relating to Cholera

The respondents' mean perception score was 4.6 ± 2.7 out of a maximum score of 11 with 17% having a favourable perception towards cholera. Ogbeyi, Bito, Anefu *et al*., (2017) assessed their respondents' attitude to cholera and noted that their own respondents' attitudinal score was 6.9 ± 0.7 with 96.7% having a highly positive attitude towards cholera. What should be borne in mind is that the populations studied are different and the variables measured are different as well. The measurement of perception is different from the measurement of attitude, although they are related.

The perceptions of majority of the respondents were not in line with the biomedical world view; for instance, over half (55.5%) of the respondents' were of the perception that cholera cannot prevent them from working. This and several other unfavourable perceptions can

91

adversely affect the prevention and control of cholera. The perception of several respondents that cholera cannot kill and that it is only serious in children is worth noting. A qualitative study is needed to probe into why they are of the opinion that cholera cannot lead to death and that it is only serious in children. This perception is not consistent with the study conducted by Ogbeyi, Bito, Anefu *et al*., (2017) which reported that most of the respondents perceived cholera to be serious in adults and could lead to death. Majority (73.6%) of the respondents were of the perception that without treatment, symptoms of cholera will disappear after some days. This is indicative of misconceptions of the treatment of cholera; health education is needed to address it.

Majority of respondents feel they were not vulnerable to the disease. This is another wrong perception that needs to be modified; the fact is that everyone is vulnerable to cholera but some people are more vulnerable than others. Over half (59.1%) of the respondents had the perception that they cannot get cholera from the water they use in the community. This is not true; the living situation in the community which is characterised by poor environmental sanitation and inadequate access to portable water can make them vulnerable to cholera. A contrasting result was obtained from a study among respondents in Kenya which shows that most of the respondents were of the perception that cholera can be contacted from the water they use in the community (Chepwogen, 2011). However, a study conducted in Nchelenga district in Zambia showed that association between drinking water in the community and cholera was not significant after adjusting for potential confounders, including rainwater and sachet water. (Kabita, 2010).

There was a significant difference in perception of the respondents based on their sex, ethnicity, religion, and level of education. It was noted that females, ethnic minorities, Christians and those with higher levels of education had a more favourable perception. These peculiarities should be taken into consideration in the design of cholera control and prevention programmes in Sabo and similar settings.

5.4 Practices relating to cholera prevention and treatment

Most (99.5%) of the respondents claimed that they washed their hands after using the toilet. A similar result was reported in the study conducted by Ogbeyi, Bito, Anefu *et al*., (2017). This is a practice that should be promoted as a cholera preventive measure. According to Kabita (2010) hands must be washed because hand washing was the single most important aspect in infection prevention; hands must be washed with soap before and after eating food, after defecating, before cooking, after attending to a case of cholera and after attending to a dead person killed by cholera. Ignoring these important practices could lead to cholera auto-infection and contracting cholera germs from infected food and other materials.

Majority (79.0%) of the respondents reported that they buy food from street hawkers and ate food shared in public gatherings. It has been reported elsewhere that foods sold by street hawkers or shared in public gatherings have the potential for spreading cholera as the pathogen may have infected the food before or during its preparation (Kabita, 2010). This is enough evidence to conclude that Sabo residents are vulnerable to cholera. The food selling practices in the community favours the spread of the disease.

The study revealed that 48.3% of the respondents boiled their water before drinking while only few (16.0%) added chlorine to their drinking water. Boiling of water before use and use of chlorine are burdensome in terms of time, energy expenditure and financial resources needed to do so .The practices are costly and many people especially among the urban poor cannot afford to be doing so in a developing economy such as Nigeria. A study in Zambia has, however revealed that the water treatment at the household level was not common (Phiri, Nzala, and Baboo, 2015). According to the WHO guidelines for cholera control, boiling of water or adding three drops of chlorine to one litre of water and allowed to stand for 30mins helps in killing the *Vibrio cholera* contained in contaminated water (WHO, 2013).

Majority of the respondents who could prepare Oral rehydration salt (sugar salt solution) by themselves were able to correctly identify the ingredients used. This is consistent with a study conducted in Haiti which revealed that about 90.0% indicated correct ingredients for preparing ORS at home (Velery, Beau, Julie *et al*., 2011). The mainstay of the case

93

management of cholera is treatment of dehydration using Oral Rehydration Therapy (ORS) or IV fluids (Ringer lactate). Replacement of lost electrolytes using Oral Rehydration Therapy (ORS) has the advantage of being low-cost and simple to use at home (Mafi, Goya and Hajia, 2016).

5.5 Respondents' household water and sanitation related resources

In this study, it was noted that those who obtained their water from wells without installed pumps were 39.5% and about 59.1% of the wells were shallow. This is similar to what Kabita (2010) noted in his study. According to him 56.0% of the respondents obtained their water from shallow wells without installed pumps. Shallow wells are prone to contamination by *Vibrio cholerae* as they allow the pathogens to settle and multiply in numbers making water unsafe for human consumption (WHO, 2016). When respondents use shallow wells to draw water, they also draw water together with contaminated particles that had been drawn to the well by rain or animals. It is to be noted that previous cholera outbreak in Sabo community occurred during the rainy season. A similar observation was made in Maiduguri (Chamba, Haruna, Modu *et al*., 2016). Community health education in Sabo community should include the expected characteristics of sanitary wells.

Toilets were not available for about 24.2% of the households. This is indicative of improper management of feaces; Respondents without latrines are therefore potential agents for the distribution of cholera in a community. Inadequate toilet facilities are a major public health challenge in Sabo, Ibadan. A study conducted by Gbolahan, Abass, Adewuyi *et al*., 2014 in Egbeda one of the peri-urban LGAs in Ibadan reported that 80% of the households surveyed had no toilet facilities. Bushes around the homesteads were used by the household members to dispose human waste. This practice has a direct influence on the transmission of diseases in the area. It is likely that excreta from the bushes make their way to wells and streams especially during the rainy season.

Majority (75.9%) of the toilets in the community were dirty and half of them had flies present around them. Unhygienic toilets and flies create opportunities for the spread of cholera. Only 22.2% of the toilets had soap available for washing hands. Studies have

94

indicated that use of soap and hand washing promotion can achieve a 26% - 62% decrease in the incidence of cholera in developing countries (Shahid, Greenough, Samadi *et al*., 1996; Siyange, Brunkard, Kapata *et al*., 2018).

In this study, it was observed that about 30.9% had no waste bin for refuse disposal and so they disposed their refuse in open spaces in the community. A study conducted by Chamba et al., (2016) in Maiduguri reported that about 75.0% of respondents disposed their refuse in open space in the community; these practices facilitate the transmission of the *Vibrio cholerae* from refuse dump on to the food by flies.

Majority (79.0%) of the drainages in the community were blocked and most (93.6%) were dirty. Chamba, Haruna, Modu *et al*., (2016) noted a similar situation in their study. In areas where drainage and sanitation systems are poor, water runs over the ground during rainstorms, picks up faeces and contaminates water sources. This contributes significantly to the spread of cholera (Nigeria Centre for Disease Control, 2018).

5.6 Implications of the findings for Health Promotion and Education

Findings from this study have health promotion and education implications; they reiterated the fact that knowledge of cholera, perception and water and sanitation related practices have potential for influencing cholera transmission in communities. In Nigeria, unhygienic situations are not widely seen as a big health risk, making it a more difficult issue to address. The WHO suggests the need for multiple interventions including health education directed at tackling cholera. Health education is any planned combination of learning experiences designed to predispose, enable and reinforce voluntary actions, conducive to health in individuals, groups or communities (Green and Kreuter, 1991).

According to the Ottawa Charter of 1986, health promotion action includes building healthy policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services. A lack of awareness, education and a culture of unhygienic living make changes in the community slow and complicated. Often knowledge about hygiene does not transfer into practice very quickly (WHO, 1986). The implications of the aforementioned concepts of health promotion for cholera

prevention/control relate to people's capacities and need to prevent the disease and to treat it within the context of primary health care. The capacity development will relate to knowledge to change perception and skills for cholera prevention and/or control. Possible health promotion strategies that can be used include advocacy, training, public enlightenment, community participation and involvement. Community based health promotion needs to address the following issues: provision of essential and functional facilities; health education; and public enlightenment.

<u>Provision of essential and functional facilities</u>

Essential and functional facilities such as borne pipe water, sanitary wells and sanitary toilets should be provided in Sabo community. They are facilities which if appropriately used, have the potential for preventing and controlling the occurrence of cholera and other water borne diseases. The provision of these facilities requires multi-sectorial approach and the involvement of the community itself. It has already been established that cholera epidemics develop where access to clean water is limited, sanitation is inadequate and personal and domestic hygiene are compromised (WHO, 2016).

Past experiences have shown that providing access to safe water and promoting hygiene achieves great positive impact (NCDC, 2018). Constructing latrines or focusing on solid waste and controlling vectors such as flies, as previously noted are not always practicable in the middle of epidemics; these activities require time and resources and have less immediate impact (WHO, 2017). Although limited, epidemiologic information and studies exist regarding the extent of infection and characteristics of circulating strains of cholera in Nigeria, there is a clear link of the diseases with poverty, poor perception, dirty environment and lack of good water resources (Chamba, Haruna, Modu *et al*., 2016).. Cholera transmission and deaths can be prevented or at least reduced by ensuring adequate sanitation and improved hygiene practices. The provision of the aforementioned facilities is not enough; health education interventions are needed to promote their appropriate use and sustainability of their use

Health Education

Hygiene education with special reference to hand washing, health literacy and community environment education should be provided to the community; the education should entail active community involvement during the planning, implementation and evaluation. It is essential to provide community members with current evidence-based information on cholera with a view to increasing their knowledge relating to the disease. Health education has been successfully used in Guinea-Bissau to promote the prevention and control of cholera (Einarsdottir, Passa and Gunnluagsson, 2001). The health education messages on cholera prevention and control transmitted over the radio, during special programs and during outbreaks have been helpful in improving healthy hygiene and sanitation practices (Einarsdottir, Passa and Gunnluagsson, 2001).

Public enlightenment

Public enlightenment interventions should be launched by the Ministry of Health in collaboration with other relevant agencies and groups to create awareness relating to the cause, mode of transmission, prevention and control of cholera among the study community and the entire city at large. This can be done through the various print and electronic means based in Ibadan. In addition, Hausa traditional media of communication should be adopted in view of the fact that majority of residents of the community are of the Hausa extraction. Public enlightenment activities have been effectively used over the years to promote a variety of health innovations in Nigeria.

5.7 Conclusion

This study explored the modifiable behavioural and non-behavioural factors relating to cholera in Sabo community in Ibadan North LGA. The results indicated that the respondents have a fair knowledge of symptoms and preventive measures relating to cholera. However, the overall level of knowledge of cholera was low. There were gaps in respondents' knowledge relating to the pathogen that causes cholera, severe symptoms of cholera and treatment. Many respondents' perceived cholera to be a serious disease but did not feel they were vulnerable to getting cholera.

97

Overall, their perception of cholera is very unfavourable. There were some misconceptions relating to the disease which needs to be addressed. Findings from this study also revealed that majority of the respondents were aware of Sugar Salt Solution which is needed for the primary health care management of the disease with a view to preventing dehydration. Health promotion and education strategies and community-based health education should stress the pivotal roles of water hygiene and environmental sanitation practices in prevention and control of cholera. Sabo community is highly vulnerable to cholera. Any intervention designed to prevent/control the disease in Sabo should take community involvement and participation into consideration.

5.8 Recommendations

The following recommendations are made based on the findings of the study:

1. Behavioural Change Communication (BCC) materials should be developed in Hausa language and used to enhance their capacities to initiate measures aimed at preventing/controlling the occurrence of cholera in the community. Mosques and Islamic schools in the community could serve as rendezvous for the BCC activities.

2. Regulations relating to food hygiene and environmental sanitation should be enforced by the government in collaboration with key stakeholders in the community with a view to maintaining high standard of food safety, environmental hygiene and personal hygiene practices.

3. Educational programmes should be organised in the community with a view to upgrading the knowledge and modifying perceptions relating to cholera.

4. The Oyo State Government and IBNLG should work in collaboration with Sabo community to put in place facilities and services needed for preventing the occurrence of cholera in the community.

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107

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APPENDIX I

Questionnaire (English Version)

Knowledge, Perception and Practices relating to Cholera among Sabo community residents in Ibadan North Local Government Area, Oyo State.

Dear Respondent,

My name is Bernice Ibe Abalaka, a Master of Public Health Student in the Department of Health Promotion and Education, University of Ibadan. The purpose of this study is to investigate the *Knowledge, Perception and Practices relating to Cholera among Sabo community residents in Ibadan North Local Government Area, Oyo State.* Your participation in this study is voluntary. I appeal to you to provide honest and sincere answers to the questions in the questionnaire. The findings from this study will help in the design of programmes and formulation of policies aimed at preventing the outbreak of cholera in similar communities. All information gathered during the course of this study will be treated with high level of confidentiality, please note that your names are not needed in the study so you do not have to write your name on this questionnaire. Your willingness to answer the questions in this questionnaire implies that you have consented to participate in this study.

Thank you for your cooperation.

SECTION A: Socio-Demographic Characteristics of Respondents
In this section, please tick (√) any of the responses that apply to you in the options provided or complete the blank spaces provided as applicable.

1. **Age** as at last birthday (in years) _____

2. **Sex**

   1. Male ☐   2. Female ☐

3. **Ethnicity**

   1. Hausa ☐   2. Yoruba ☐   3. Igbo ☐

   4. Any Other (Specify) _____

4. **Marital status**

   1. Single ☐   2. Married ☐   3. Widowed ☐

   4. Divorced ☐   5. Co-habiting ☐

   6. Any other (Specify) _____

109

5. **Religion**

    1. Islam ☐   2. Christian ☐   3. Traditional African religion ☐

    4. Any other (Specify) _____

6. **Highest level of education**

    1. No formal education ☐   2. Primary ☐   3. Secondary ☐

    4. University ☐   5. Islamic school ☐

    6. Any other (Specify) _____

7. **Current occupation**

    1. Unemployed ☐   2. Artisan ☐   3. Trading ☐

    4. Civil service ☐   5. House wife ☐

    6. Any other (Specify) _____

8. **Sources of drinking water** (You can tick more than one that you use)

    1. Well ☐   2. River ☐   3. Stream ☐

    4. Public tap ☐   5. Borehole ☐

    6. Rainwater ☐   7. Sachet water ☐

    8. Any other (Specify) _____

9. **Type of toilet facilities**

    1. Bush ☐   2. Pit Latrine ☐   3. VIP Latrine ☐

    4. Water Cistern ☐   5. None ☐

    6. Any other (Specify) _____

SECTION B: Knowledge of causes, symptoms, prevention and treatment of cholera
10. What is the main organism that causes cholera? _____

11. Do flies play roles in the spread of cholera?
    1. Yes ☐   2. No ☐   3. I don't know ☐

12**. Table 1** *contains terms or concepts relating to the cause of cholera and how it can be contacted. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.*

Table 1

	Main conditions/materials/practices that can promote spread of cholera	**Tick √**		
		True	**False**	**Don't know**
12.1	Through contaminated food			
12.2	Through witchcraft			
12.3	Contact with blood			
12.4	Dirty drainage			
12.5	Contaminated water			
12.6	Unwashed fruits			
12.7	Infected feacal matter			
12.8	Any other causes (specify):			

13. **Table 2** *contains a list of the common symptoms of mild cholera. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.*

Table 2

	Common symptoms of mild cholera	**Tick √**		
		True	**False**	**Don't know**
13.1	Dehydration			
13.2	Vomiting			
13.3	Nausea			
13.4	Diarrhea			
13.5	Cough			
13.6	Abdominal pain			
13.7	High blood pressure			
13.8	Weight loss			
13.9	Muscle cramps			

14. **Table 3** *contains terms relating to the symptoms of severe cholera. For each term tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.*

Table 3

	Symptoms of severe cholera	Tick √		
		True	**False**	**Don't know**
14.1	Convulsion			
14.2	Coma			
14.3	Shock			
14.4	Excessive sleep			
14.5	Constipation			
14.6	Acute Renal failure			

15. **Table 4** *contains statements or phrases relating to effective ways of preventing cholera. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.*

Table 4

	Effective ways of preventing cholera	Tick √		
		True	**False**	**Don't know**
15.1	Use of rubber plates for eating			
15.2	Eating non-contaminated food			
15.3	Safe drinking water			
15.4	Taking oral vaccines			
15.5	Avoid buying food from street hawkers			
15.6	Thorough hand washing after using the toilet			
15.7	Cleaning drainage around the house			
15.8	Cover food properly			
15.9	Boil water before drinking			
15.10	Not eating uncooked vegetables			
15.11	Not defecating in the open			
15.12	Keeping toilets clean			
15.13	Avoiding people who have cholera			
15.14	Adding alum to water and filter before drinking			
15.15	Avoiding contact with blood			

112

16. **Table 5** *contains a list of ways of treating cholera. For each statement tick (√) whether it is True or false. If you do not know if it is true or false, tick 'Don't know'.*

Table 5

	Treatment for cholera	Tick √		
		True	**False**	**Don't know**
16.1	Taking Oral Rehydration Salt			
16.2	Use of Paracetamol			
16.3	Taking any antibiotics			
16.4	Intravenous fluids			
16.5	Using Zinc capsules			
16.6	Use of herbs (maganin gargajia)			
16.7	Anointing oil (Habatu sauda)			
16.8	Pray using the holy book(qur'an)			
16.9	Going to the hospital to receive treatment for cholera			

SECTION C: Perception of residents of Sabo community relating to cholera

17. **Table 6** *contains statements relating to perceived seriousness of cholera. For each statement tick (√) whether you agree with it or whether you disagree with it. If you are not sure, tick (√) undecided.*

Table 6

	Perceived seriousness of Cholera	Tick √		
		Agree	**Undecided**	**Disagree**
17.1	Cholera is a serious disease			
17.2	Without treatment, symptoms of cholera disappear after some days			
17.3	Cholera is a mild disease			
17.4	Cholera cannot kill or lead to death			
17.5	Cholera can't prevent one from working			
17.6	Cholera is only serious in children not among adults			

18. **Table 7** *contains statements relating to perceived vulnerability to Cholera. For each statement tick (√) whether you agree with it or whether you disagree with it. If you are not sure, tick (√) undecided.*

Table 7

	Perceived vulnerability to Cholera	Tick √		
		Agree	**Undecided**	**Disagree**
18.1	I cannot have cholera because flies do not come near my food			

113

18.2	I cannot get cholera from the water we use in the community			
18.3	I cannot get cholera because I don't over feed			
18.4	No member of my family can have cholera because we use Water Cistern toilets			
18.5	Only very young children get cholera			

19. **Table 8** *contains statements relating to the Self efficacy of residents of Sabo community in preventing and treating cholera. For each statement tick (√) whether you are Very confident, A bit confident, Not confident or if you can't do it.*

Table 8

S/N	Self-Efficacy in prevention and treatment of cholera	Very confident	A bit confident	Not confident at all
19.1	Treating my water by boiling before drinking			
19.2	Cleaning my toilets properly			
19.3	Cleaning drainage around my house			
19.4	Washing my hands after using the toilet			
19.5	Covering my food all the time			
19.6	I am able to prepare Oral rehydration salt			
19.7	I know how to use Oral rehydration salt			

SECTION D: Practices relating to cholera Spread and Prevention.

For each question tick (√) for any of the responses that apply to you in the options provided or complete the blank spaces provided as applicable.

20. Do you wash your hands after using the toilet?
1. Yes, all the time ☐   2. Yes, sometimes ☐   3. No ☐

21. Do you buy food from street hawkers?
1. Yes, all the time ☐   2. Yes, sometimes ☐   3. No ☐

22. Do you buy fruits from street hawkers?
1. Yes, all the time ☐   2. Yes, sometimes ☐   3. No ☐

23. Do you wash fruits before eating?

1. Yes, all the time ☐   2. Yes, sometimes ☐   3. No ☐

24. Do you eat food shared at public gatherings and frequency?

1. Yes, all the time ☐   2. Yes, sometimes ☐   3. No ☐

25. **Table 9** *contains statements relating to whether you rewash the following vegetables/fruits before eating and frequency. For each statement tick (√) whether Yes, all the time, Yes, sometimes or No if u do not rewash the vegetables/fruits.*

Table 9

S/N	Whether rewash the following vegetables/fruits before eating and frequency	Yes, all the time	Yes, sometimes	No
25.1	Cucumber			
25.2	Carrot			
25.3	Cabbage			
25.4	Lettuce			
25.5	Green beans			
25.6	Tiger nuts			
25.7	Date fruit			

26. How do you ensure that your water for home use is safe? (You can tick more than one that you do)

1. By boiling ☐

2. By letting the water to settle and then decanting ☐

3. By adding chlorine ☐

4. By filtering ☐

5. By adding alum ☐

6. Others (Specify) _____

27. Where do you collect your refuse?

1. Dust bin ☐

2. Leather bag ☐

3. Drums ☐

115

4. Open space ☐

5. Others (Specify) _____

28. How do you get rid of the collected refuse from your home?

1. By burning ☐

2. By burying ☐

3. Through the local waste disposal authority ☐

4. Throw into the stream ☐

5. Others (Specify) _____

29. How do you keep left-over food?

1. Cover the food ☐

2. Refrigerate ☐

3. Left uncovered ☐

4. Others (Specify _____

30. What do you do to left-over food before eating it?

1. Eat without warming ☐

2. Eat after warming ☐

3. Throw away ☐

4. Give to animals ☐

5. Others (Specify) _____

31. When do you wash hands?

1. Before eating only ☐

2. After eating only ☐

3. Before and after eating ☐

4. I don't wash my hands ☐

116

32. How do you get Oral Rehydration Salt for home management of cholera?

1. I prepare it myself ☐

2. I buy the already made one ☐

33. If you prepare it yourself, what are the ingredients for preparation of Oral Rehydration

salt (or Sugar Salt solution?

1. Salt, sugar and water ☐   2. Salt, maggi and pepper ☐   3. Sugar, milk and milo ☐

117

APPENDIX II
Questionnaire (Hausa Version)
Ilimi, Ji da kuma Ayyukan da suka shafi Kwalara a tsakanin mazu zama a a'lummar Sabo da ke zaune a yankin Ibadan Arewa, Jihar Oyo.

Masoyi Mai amsa,

Sunana Bernice Ibe Abalaka, Babban Jami'in Harkokin Kiwon Lafiyar Jama'a a Sashen Harkokin Kiwon Lafiya da Ilimi, Jami'ar Ibadan. Manufar wannan binciken shine bincika ilimi, ji fahimta da kuma ayyukan da suka shafi Kwalara a tsakanin mazaunan Sabo da ke jihar yanki arewa Ibadan, Jihar Oyo. Komawarku a cikin wannan binciken ne na son rai. Ina rokonka don samar da amsoshin gaskiya da gaskiya ga tambayoyin a cikin tambayoyin. Sakamakon binciken wannan zai taimaka wajen tsara shirye-shiryen da kuma tsara manufofin da aka tsara don hana cutar kwalara a cikin al'ummomin da suka dace. Dukkanin bayanan da aka tattara a lokacin wannan binciken za a bi da ku tare da babban tsare sirri, a lura cewa sunayenku ba a buƙata a cikin binciken ba don haka ba ku da rubuta sunanku akan wannan tambaya. Samunka don amsa tambayoyin a cikin wannan tambaya yana nuna cewa kun yarda da shiga cikin wannan binciken.

Na gode da hadin gwiwa.

SASHE A: Yanayin Samun Tattalin Zamantakewar Yanayi na Masu Magana

A cikin wannan sashi, don Allah a sanya (√) duk wani martani da ya shafi ka a cikin zaɓuɓɓukan da aka samar ko kammala wuraren da aka ba su kamar yadda aka dace.

1. **Shekaru** a matsayin ranar haihuwa (a cikin shekaru) _____

2. **Jinsi**

   1. Maza ☐   2. Mace ☐

3. **Dangi**

   1. Hausawa ☐   2. Yorubawa ☐   3. Nyamiri ☐

4. Duk wani Sauran (Saka) _____

4. **Matsayin aure**

   1. Mara aure ☐   2. Mai aure ☐   3. Mai takaba ☐   4. Saki ☐

   5. Duk wani Sauran (Saka) _____

5. **Addini**

   1. Islama ☐   2. Krista ☐   3. Addini na al'ada na Afirka ☐

   4. Duk wani Sauran (Saka) _____

118

6. Harkokin ilimi mafi girma

   1. Babu ilimi ☐   2. Firamare ☐   3. Sakandare ☐

   4. Jami'a ☐   5. Makarantar islamia ☐

   6. Duk wani Sauran (Saka) _____

7. Zama na yanzu

1. Rashin aiki ☐   2. Aikin hanu ☐   3. Ciniki ☐

   4. Aikin kungiyoyin ☐   5. Uwar gida ☐

   6. Duk wani Sauran (Saka) _____

8. Hanyar zamun ruwan sha (Za ka iya sanya fiye da ɗaya da kake amfani)

   1. Rijiya ☐   2. Kogin ☐   3. Rafi ☐

   4. Ruwan pompo ☐   5. Rijiya burtsatse ☐

   6. Duk wani Sauran (Saka) _____

9. Iri wuraren bayan gidi

   1. Daji ☐   2. Ramin kashi ☐   3. Ramin kashi me kyau ☐

   4. Bayan gida na ruwa ☐

   5. Babu bayan gida ☐

   6. Duk wani Sauran (Saka) _____

SASHE NA B: Sanin ilimi akan haddasawa, bayyanar cututtuka, rigakafi da magani na kwalara

10. Mainene hanenhin abu de ke kawo cutar kwalara? _____

11. kuna gani ko kuda zaya iya kawo cutar kwalara?

1. E'e ☐   2. A'a ☐   3. Ban zani ba ☐

119

12**. Tebur na daya ya ƙunshi sharuddan ko ra'ayoyi game da dalilin cutar kwalara da yadda za'a iya tuntuɓar shi. Ga kowane bayani sanarwa (√) ko Gaskiya ne ko karya. Idan ba ku sani ba idan gaskiya ne ko karya, toka 'Ba ku sani ba'.**

Table 1

	Babban dalilin (s) kwalara	**Zabi √**		
		Gaskiya	**Karya**	**Ba ku sani ba**
12.1	Cin abinci da aka gurbata			
12.2	Maita			
12.3	An aika ta jinni			
12.4	Vibrio kwalara			
12.5	Malalewa mai datti			
12.6	Shan ruwan da aka gurbata			
12.7	Cin 'ya'yan itacen marmari da ba a wanke ba			
12.8	Duk wani abin da ya sa (saka):			

13. **Tebur na biyu ya ƙunshi jerin ayyuka; don kowane kaska (√) ko zai iya haifar da Kwalara ko a'a. Idan ba ku da tabbacin, zabi 'Ba ku sani ba'**

Table 2

	Ayyukan da zasu iya haifar da yaduwar cutar kwalara a cikin al'umma	**Tick √**		
		Karya	**Gaskiya**	**Ba ku sani ba**
13.1	Cin abinci mai tsabta			
13.2	Shan ruwan da ba shi da lafiya ko tsabta			
13.3	Kada ka wanke hannunka bayan amfani da bayan gida			
13.4	Barin kuda zu cike da abinci			
13.5	Siyar da cin abinci da aka sayar a hanya			
13.6	Ba wanke kayan abinci ba kafin cin abinci			
13.7	Cin kayan lambu da ba wanke sosai ba			
13.8	Cin 'ya'yan itacen marmari da ba wanke ba			

120

14. **Tebur na uku yana ɗauke da jerin nau'o'in bayyanar cututtuka na ƙwayar kwalara. Ga kowane bayani sanarwa (√) ko Gaskiya ne ko karya. Idan ba ku sani ba idan gaskiya ne ko karya, toka 'Ba ku sani ba'.**

Table 3

	Bayyanar cututtuka na kwalara mai laushi	Zabi √		
		Karya	Gaskiya	Ba ku sani ba
14.1	Rashin ruwa a jiki			
14.2	Yi amai			
14.3	Tashin zuciya			
14.4	Zawo			
14.5	Tari			
14.6	Zafin ciki			
14.7	Hawan jinni			
14.8	Rage nauyin jiki			
14.9	Zafin tsoka			

15. **Tebur na hudu yana dauke da sharudda game da alamun cututtukan ƙwayar kwalara mai tsanani. Ga kowane lokaci kalma (√) ko Gaskiya ko Karya. Idan ba ku sani ba idan gaskiya ne ko karya, toka 'Ba ku sani ba'.**

Table 4

	Cutar cututtuka na kwalara mai tsanani	Zabi √		
		Gaskiya	Karya	Ba ku sani ba
15.1	Daukar ruwa			
15.2	Barci kaman mutuwa			
15.3	Bugu			
15.4	Wuce kimar barci			
15.5	Ciwon koda			

16. **Tebur na biyar ya ƙunshi maganganun ko kalmomin da suka shafi hanyoyin da za a iya hana ƙwalara. Ga kowane bayani sanarwa (√) ko Gaskiya ne ko karya. Idan ba ku sani ba idan gaskiya ne ko karya, toka 'Ba ku sani ba'.**

Table 5

	Hanyoyi masu kyau na hana cutar kwalara	Zabi√		
		Gaskiya	Karya	Ba ku sani ba
16.1	Amfani da yumburan faranti don cin abinci			

121

16.2	Cin abinci marar gurbata			
16.3	Ruwan sha mai lafia			
16.4	Shan maganin alurar riga kafi			
16.5	Kar ku saya abinici daga masu sarwa a titi			
16.6	Wanke hannu da kyau bayan amfani da bayan gida			
16.7	Cin kayan lambu da ba dafa ba			
16.8	Rufe abinci da kyau			
16.9	Tafasa ruwa kafin shan			
16.10	Ba Cin kayan lambu da ba dafa ba			
16.11	Ba kashi a waje			
16.12	Kiyaye da tsabtan dakin bayan gida			
16.13	Guje wa mutanen da ke da kwalara			
16.14	Kara alum a cikin ruwa da tace kafin shan			
16.15	Guje wa karban jinni			

17. **Tebur na shida yana da jerin hanyoyi na magance kwalara. Ga kowane bayani sanarwa (√) ko Gaskiya ne ko karya. Idan ba ku sani ba idan gaskiya ne ko karya, toka 'Kada ku sani'.**

Table 6

	Magani na Kwalara	Zabi √		
		Gaskiya	**Karya**	**Ba ku sani ba**
17.1	Shan gishiri na ruwa mai kara karfin jiki			
17.2	Amfani da Paracetamol			
17.3	Shan kowane maganin rigakafi			
17.4	Ruwa aluran jiki			
17.5	Yin amfani da surar Zinc			
17.6	Amfani da ganye (maganin gargajiya)			
17.7	Man shafawa			
17.8	Yi addu'a ta yin amfani da littafi mai tsarki (Kur'ani)			
17.9	Samun asibiti don karɓar magani ga kwalara			

122

SASHE NA C: Jin mutanen da ke zaune a yankin Sabo game da kwalara

18. **Tebur na bakwai ya kunshi kalamai da suka shafi daTsinkayi muhimmancin na kwalara. Ga kowane bayani sanarwa (√) ko kun yarda da shi ko kuma rashin yarda. Idan ba ku tabbata ba, a saka (√) ba tare da komai ba**

Table 7

	Tsinkayi muhimmancin na kwalara	Zabi √		
		Yarda	Ba tare da komai ba	Rashin yarda
18.1	Kwalara cuta mai tsanani ne			
18.2	In ba sha magani ba, cututtuka na kwalara yana bace bayan wasu kwanaki			
18.3	Kwalara cuta mai laushi ne			
18.4	Kwalara ba zai iya kashe ko ya kai ga mutuwa ba			
18.5	Kwalara ba zai iya hana woni daga aiki ba			
18.6	Kwalara ne mai tsanani a cikin yara kawai ba cikin manya kamar mu ba			

19. **Tebur na takwas ya kunshi kalamai da suka shafi daTsinkayi yanayin shigewa na Kwalara. Ga kowane bayani sanarwa (√) ko kun yarda da shi ko kuma kun saba da shi. Idan ba ku tabbata ba, a saka (√) ba tare da komai ba.**

Table 8

	Tsinkayi yanayin shigewa na Kwalara	Zabi√		
		Yarda	Ba tare da komai ba	Rashin yarda
19.1	Ba zan iya samun ciwon kwalara ba saboda kuda ba sa kusa da abincina			
19.2	Ba zan iya samun kwalara daga ruwan da muke amfani da su a cikin al'umma ba			
19.3	Mutane suna samun kwalara lokacin da suke cin abinci mai yawa			
19.4	Babu wani dangi na zai iya samun ciwon kwalara saboda muna amfani da dakunan bayan gida na ruwa			
19.5	Kananan yara kawai ne suna samun kwalara			

123

SASHE D: Ayyukan da suka shafi aikata rigakafin Kwalara.
Ga kowace takaddun tambayoyin (√) don duk wani martani da ya shafi ka a cikin zaɓuɓɓukan da aka baiwa ko kuma kammala wuraren da aka ba su kamar yadda aka dace.

20. Kuna wanke hannunku bayan yin amfani da bayan gida?

1. Ee, duk lokacin [ ]   2. Ee, wani lokaci [ ]   3. A'a [ ]

21. Kuna sayar abinci daga masu yawo a titi?

1. Ee, duk lokacin [ ]   2. Ee, wani lokaci [ ]   3. A'a [ ]

22. Kuna sayar 'ya'yan itacen marmari daga masu yawo a titi?

1. Ee, duk lokacin [ ]   2. Ee, wani lokaci [ ]   3. A'a [ ]

23. Kuna wanke ya'yan itacen marmari kafin ku ci?

1. Ee, duk lokacin [ ]   2. Ee, wani lokaci [ ]   3. A'a [ ]

24. Sau nawa kuke cin abincin da aka raba a taron jama'a?

1. Ee, duk lokacin [ ]   2. Ee, wani lokaci [ ]   3. A'a [ ]

25. **Tebur na tara ya kunshi kalamai da wanke kayan lambu suka. Ga kowane wanke kayan lambu/ ya'yan itacen marmari kafin ku ci sanarwar (√) ko Ee, duk lokacin , Ee, wani lokaci, ko kuma idan baku iya yin bas aka A'a.**

Table 9

S/N	Wanke kayan lambu/ ya'yan itacen marmari kafin ku ci	Ee, duk lokacin	Ee, wani lokaci	*A'a*
25.1	Cucumber			
25.2	Karrot			
25.3	Kabbagi			
25.4	Lettuce			
25.5	Wake			
25.6	Aya			
25.7	Dabino			

124

26. Ta yaya za ka tabbatar da ruwan da kake sha don lafiya?

1. Ta tafasa ☐

2. Ta bar ruwa ya zauna sannan kuma ya yanke zuban ☐

3. Ta ƙara chlorine ☐

4. Ta hanyar tacewa ☐

5. Ta ƙara alum ☐

6. Wasu (Saka) _____

27. Ina ku na tattara dattin ku?

1. Jakar na sa datti ☐

2. Ganguna ☐

3. Wuri dake budu ☐

4. Wasu (Saka) _____

28. Ta yaya za ka kawar da datti da aka tattara daga gidanka?

1. Ta ƙona ☐

2. Ta binne ☐

3. Ta hanyar dalili zubar da sharar gida ☐

4. Wasu (Saka) _____

29. Yaya za ku ci gaba da abinci da ya rage?

1. Rufe abincin ☐

2. Saka a firiji ☐

3. Bari a budu ☐

4. Wasu (Saka) _____

30. Me kake yi wa akan abincin hagu kafin cin shi?

1. Ku ci da ba dumi ba ☐

2. Ku ci bayan an dumi ☐

3. Jefa a woje ☐

4. Wasu (Saka) _____

125

31. Wani lokoci za ku wanke hannun ku?

1. Kafin cin abinci [ ]

2. Bayan cin abinci [ ]

3. Kafin da bayan cin abinci [ ]

4. Bana wanke hannuna [ ]

32. Ta yaya kun a samu gishiri na sha kara karfin jiki a gida don cholera?

1. ina yi de kaina [ ]   2. Ina sarya a wuce [ ]

33. in kuna shirya da ken ku, Mene ne kayan aikin da za a shirya don gishiri na sha kara

karfin jiki?

1. Gishiri,Suga da ruwa [ ]   2. Gishiri, magi da borkono [ ]   3. Suga, milo da madara [ ]

Appendix III

Observational Checklist

A. General information

1. Sources of water (1) Well ⬜ (2) Borehole ⬜ (3) River ⬜ (4) Tap ⬜

2. Ownership of well   (1) No well ⬜   (2) Private well ⬜   (3) Public well ⬜

3. Ownership of toilet   (1) No toilet ⬜   (2) Private toilet ⬜   (3) Public toilet ⬜

4. Types of toilet   (1) VIP ⬜   (2) Pit Latrine ⬜   (3) Water Cistern ⬜

B. Assessment of Wells, Toilets and Drainages of Respondent's Households:

5. Assessment of wells

Table 1

S/N	Characteristics of Well	Yes	No	Comments
5.1	Apron			
5.2	Parapet			
5.3	Inner wall Ringed			
5.4	Inner wall cemented			
5.5	Fixed bucket or container for drawing water			
5.6	Cover			
	Well Conditions			
5.7	Is the well fully covered?			
5.8	Is the well parapet cracked or broken?			
5.9	Is the well located close to a latrine?			
5.10	Is the well at least 15meters (20 Adult steps) distance from latrine?			
5.11	Presence/traces of faecal matter around the well?			

127

6. Assessment/Observation of Toilets

Table 2

S/N	Toilet Conditions	Yes	No	Comments
6.1	Is toilet within the building?			
6.2	Is the toilet at least 15meters (20 Adult steps) away from the well?			
6.3	Toilet has roof structure			
6.4	Toilet cover present			
6.5	Toilet hole fully covered			
6.6	Toilet cracked or broken			
6.7	Toilet needs cleaning			
6.8	Flies present around the toilet			
6.9	Water available for washing hands			
6.10	Soap available for washing hands			
6.11	Toilet soiled with feacal matter			
6.12	Toilet has bad odour			

7. Observation of waste disposal/drainage

Table 3

S/N	Waste disposal and drainages	Yes	No	Comments
7.1	Presence of waste bins			
7.2	Types of waste bin. Tick (√): Basket ☐ Drum ☐ Leather ☐			
7.3	Clean waste bin			
7.4	Drainage channel present in the premises			
7.5	Drainage channel blocked			
7.6	Drainage channel needs cleaning			

128

Inform consent form (English version)

Knowledge, Perception and Practices relating to Cholera among Sabo community residents in Ibadan North Local Government Area, Oyo State.

IRB Research Approval Number:

This Approval will elapse on:

Title of Research: *Knowledge, Perception and Practices relating to Cholera among Sabo community residents in Ibadan North Local Government Area, Oyo State.*

Name and Affiliation of Researcher: ABALAKA Bernice Ibe, a Postgraduate student in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan is carrying out this study.

Purpose of research: The purpose of this study is to investigate the Knowledge, Perception and Practices relating to Cholera among Sabo community residents in Ibadan North Local Government Area, Oyo State.

Research Procedure: The study will involve the use of a questionnaire to elicit information from study participants. A total of 418 Men and Women Household heads in Sabo community selected through a multistage sampling technique will be requested to fill the questionnaire.

Expected Duration of research and Participants' involvement: Each research participant is expected to fill the questionnaire which will not take more than 30-45 minutes. You will be asked a number of questions and your answers will be recorded in the questionnaire the questionnaire will be collected back from you immediately after the interview. The research is expected to last for two months in Sabo community.

Risk: There are no major risks involved in participation in the study. This research will not cause any physical harm; it will not involve the utilization of any invasive procedures or collection of biological samples. However, it will take part of your time and you may however find some of the questions uncomfortable.

Cost to participants: Participation in this research will not have any financial cost to you but will require only about 30-45 minutes of your time.

Benefit: The results of the research may not be beneficial to you as an individual. It will however, be useful for the formulation of policies and the design of educational interventions for preventing the outbreak of cholera in Sabo community.

Confidentiality: All identifiers will be removed from the questionnaire and confidentiality will be ensured through protection of data collected from you.

129

Voluntariness: Your participation in this study is voluntary. You have the right to choose to participate in the study or not without any penalty.

Alternatives to Participation: You are at liberty to participate in the study. Your decision not to participate will not be used against you in anyway.

Undue Inducement/Influence: Please be informed that no payment will be made to any participant for participating in this research. Individuals who consent to participate in the study will be appreciated verbally.

Consequences of participants' decision to withdraw from research and procedure for orderly termination of participation: Participants can choose to withdraw from the study any time they wish without reprove. However, any information gathered prior to withdrawal may be used in reports or publication.

What happens to participant and community after the study: To ensure study participants are not left in the dark, the results of the study will be sent to the Oyo State Ministries of Education and Health. The results of the study will also be made available to the opinion leaders of your community (Sabo).

Any apparent potential conflict of interest: There is no conflict of interest pertaining to this study.

Statement of person obtaining informed consent:

I have fully explained the nature and scope of the research to……..…………………………….In addition I have given sufficient information including risks and benefits to enable him/her make an informed decision to participate or not participate.

Date: _____   **Signature:** _____

Name: _____

Statement of person (i.e. Interviewee) giving informed consent: The research has been fully explained to me and I understand the study process and the nature of the research. I understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research to judge that I want to take part in it. I am aware that I have the right to freely stop being part of this study at any time. I have received a copy of this consent form to keep for myself. I hereby agree to participate in the study by answering the questions contained in the questionnaire

Date: _____   **Signature:** _____

PLEASE KEEP A COPY OF THIS SIGNED INFORMED CONSENT FORM

130

Inform consent (Hausa version)

Ilimi, Ji da kuma Ayyukan da suka shafi Kwalara a tsakanin mazu zaman a cikin a'lumma Sabo, gidan arewa gwamnatin na Ibadan, Jihar Oyo.

Lamba Amincewa Bincike na IRB:

Wannan amincewar za ta kare a ranan:

Labarin bincike: *Ilimi, Ji da kuma Ayyukan da suka shafi Kwalara a tsakanin mazu zaman a cikin a'lumma Sabo, gidan arewa gwamnatin na Ibadan, Jihar Oyo.*

Sunan mai bincike: ABALAKA Bernice Ibe dalibin baban makaranta a Sashen Harkokin Kiwon Lafiya da Ilimi, Kwalejin Kula da lafiya, Jami'ar Ibadan yana gudanar da wannan binciken.

Dalilin bincike: Manufar wannan binciken shine domin gane Ilimi, Ji da kuma Ayyukan da suka shafi Kwalara a tsakanin mazu zaman a cikin a'lumma Sabo, gidan arewa gwamnatin na Ibadan, Jihar Oyo.

Hanyar Binciken: Kusan mutane dari hudu da goma sha takwas maza da mata na gidan aure a cikin al'ummar Sabo da aka zaba ta hanyar samfurin samfurori da yawa za a buƙaci su cika tambayoyin.

Tsarancin lokaci na bincike da kuma Mahalarta shiga: Kowane mai bincike yana sa ran cika tambayoyin da ba zai wuce minti talatin zuwa arbayin da biyar ba. Za a tambayeka tambayoyi da yawa kuma za a rubuta amsoshinka a cikin tambayoyin da za a karɓa daga wurinku nan da nan bayan hira. Ana gudanar da bincike ne na watanni biyu a cikin al'ummar Sabo.

Hadarin: Babu manyan hadarin da ke cikin shiga cikin binciken. Wannan bincike ba zai haifar da wata cuta ta jiki ba; ba zai haɗa da yin amfani da duk wani hanzari ko tarin samfurori ba. Duk da haka, zai dauki bangare na lokacinka kuma zaka iya samun wasu tambayoyin da baka ji dadi da shi ba.

Kudin ga mahalarta: Kasancewa a cikin wannan bincike ba zai bayar da wani kuɗi ba amma zai bukaci doki minti talatin zuwa arbayin da biyar na lokacinku.

Amfani: Sakamakon bincike bazai amfani da kai a matsayin mutum ba. Duk da haka, zai kasance da amfani ga tsarin manufofi da kuma tsara kayan aikin ilimi don hana cutar kutsawa a a'lummar Sabo.

Tabbatarwa: Dukkan abubuwa da zaya sa ganowa da mutane za a cire su daga tambayoyin kuma za a tabbatar da sirri ta hanyar kare bayanan da aka tattara daga gare ku.

131

Gudanar da kanka: Ku shiga wannan binciken ne na son rai. Kuna da 'yancin ka zabi shiga cikin binciken ko a'a ba tare da wani hukunci ba.

Sauye-sauye zuwa Kasancewa: Kana da 'yanci don shiga cikin binciken. Ba za a yi amfani da shawararka ba za ka yi amfani da kai ba.

Abun haɓaka / Rashin hankali: Don Allah a sanar da cewa babu wani biyan kuɗi ga kowane ɗan takara don shiga cikin wannan bincike. Kowane mutum wanda ya yarda ya shiga cikin binciken za a gode da shi.

Abubuwan da mahalarta suka yanke shawarar janye daga bincike da kuma hanyoyin da za a dakatar da sa hannu: Masu shiga zasu iya zaɓar su janye daga binciken duk lokacin da suke so ba tare da tsautawa ba. Duk da haka, duk wani bayanin da aka tattaro kafin janyewa zai iya amfani da shi a cikin rahoto ko kuma bugawa.

Abin da ke faruwa ga ɗan takara da kuma al'umma bayan binciken: Don tabbatar da cewa mahalarta nazarin ba a bar duhu ba, za a aika sakamakon binciken zuwa ga Ma'aikatan Ilimi da Lafiya na Oyo. Sakamakon binciken za a iya samu ga shugabannin shugabannin ku (Sabo).

Duk wani mummunan rikice-rikice na sha'awa: Babu rikici na sha'awa game da wannan binciken.**Bayanin mutum wanda yake samun izinin sanarwar:**

Na yi cikakken bayani game da yanayin da yaduwar bincike akan........ ....Bayan haka na ba da cikakkun bayanai ciki har da haɗari da kuma amfanin da zai taimaka masa ko mata ta yanke shawara shiga ko a'a shiga.

Kwanan wata: _____ Sa hannu: _____

Sunan: _____

Bayanin mutum (watau Mai bayar da amsa) ba da izinin sanarwar: An yi cikakken bayani game da bincike kuma na fahimci tsarin bincike da kuma yanayin bincike. Na fahimci cewa nawa ne na son rai. Na sani sosai game da manufar, hanyoyi, hadari da kuma amfani da bincike don yanke hukunci cewa ina so in shiga ciki. Na san cewa ina da 'yancin daina dakatar da kasancewar wannan binciken a kowane lokaci. Na karbi kwafin wannan takarda don ci gaba da kaina. Na yarda yanzu na shiga cikin binciken ta wajen amsa tambayoyin da ke kunshe a cikin tambayoyin

Kwanan wata: _____ Sa hannu: _____

DON ALLAH AJIYE WANAN BABI NA GASKIYA

132

S/N	Knowledge of causes, symptoms, prevention and treatment of Cholera	Response			Maximum Score
Q10	What is the main organism or germ that causes cholera?	*Vibrio cholerae*			1
Q11	Do flies have any role to play in the spread of cholera?	**Yes**	**No**	**Don't Know**	
		Correct	Incorrect	Incorrect	1
Q12	**Conditions/materials/practices that can promote spread of cholera**	**True**	**False**	**Don't Know**	
	Through contaminated food	Correct	Incorrect	Incorrect	1
	Through Witchcraft	Incorrect	Correct	Incorrect	1
	Contact with blood	Incorrect	Correct	Incorrect	1
	Dirty drainage	Correct	Incorrect	Incorrect	1
	Contaminated water	Correct	Incorrect	Incorrect	1
	Unwashed fruits	Correct	Incorrect	Incorrect	1
	Infected feacal matter	Correct	Incorrect	Incorrect	1
					9
Q13	**Common symptoms of mild cholera**	**True**	**False**	**Don't Know**	**Maximum score**
	Dehydration	Correct	Incorrect	Incorrect	1
	Vomiting	Correct	Incorrect	Incorrect	1
	Nausea	Correct	Incorrect	Incorrect	1
	Diarrhea	Correct	Incorrect	Incorrect	1
	Cough	Incorrect	Correct	Incorrect	1
	Abdominal pain	Correct	Incorrect	Incorrect	1
	High blood pressure	Incorrect	Correct	Incorrect	1
	Weight loss	Incorrect	Correct	Incorrect	1

133

		True	False	Don't Know	Maximum score
	Muscle cramps	Incorrect	Correct	Incorrect	1
					9
Q14	**Symptoms of severe cholera**	**True**	**False**	**Don't Know**	**Maximum score**
	Convulsion	Incorrect	Correct	Incorrect	1
	Coma	Correct	Incorrect	Incorrect	1
	Shock	Correct	Incorrect	Incorrect	1
	Excessive sleep	Incorrect	Correct	Incorrect	1
	Constipation	Incorrect	Correct	Incorrect	1
	Acute renal failure	Correct	Incorrect	Incorrect	1
					6
Q15	**Effective ways of preventing/controlling cholera**	**True**	**False**	**Don't Know**	**Maximum score**
	Use of rubber plates for eating	Incorrect	Correct	Incorrect	1
	Eating non-contaminated food	Correct	Incorrect	Incorrect	1
	Safe drinking water	Correct	Incorrect	Incorrect	1
	Taking vaccine for cholera	Correct	Incorrect	Incorrect	1
	Avoid buying food from street hawkers	Correct	Incorrect	Incorrect	1
	Thorough hand washing after using the toilet	Correct	Incorrect	Incorrect	1
	Cleaning drainage around the house	Correct	Incorrect	Incorrect	1
	Covering food properly	Correct	Incorrect	Incorrect	1
	Boiling water before drinking	Correct	Incorrect	Incorrect	1
	Not eating uncooked vegetables	Correct	Incorrect	Incorrect	1
	Not defecating in the open	Correct	Incorrect	Incorrect	1
	Keeping toilets clean	Correct	Incorrect	Incorrect	1
	Avoiding people who have cholera	Incorrect	Correct	Incorrect	1

		Incorrect	Correct	Incorrect	
	Adding alum to water and filter before drinking	Incorrect	Correct	Incorrect	1
	Avoiding blood transfusion	Incorrect	Correct	Incorrect	1
					15
Q16	**Treatment for Cholera**	**True**	**False**	**Don't Know**	**Maximum score**
	Taking Oral Rehydration Salt	Correct	Incorrect	Incorrect	1
	Use of paracetamol	Incorrect	Correct	Incorrect	1
	Taking antibiotics	Correct	Incorrect	Incorrect	1
	Intravenous fluids	Correct	Incorrect	Incorrect	1
	Using zinc capsules	Correct	Incorrect	Incorrect	1
	Use of herbs (maganin gargajia)	Incorrect	Correct	Incorrect	1
	Anointing oil (Habatu sauda)	Incorrect	Correct	Incorrect	1
	Pray using the holy book (qur'an)	Incorrect	Correct	Incorrect	1
	Going to the hospital to receive treatment for cholera	Correct	Incorrect	Incorrect	1
					9
			Total Maximum Score		**48**

PERCENTILE	QUATITATIVE ASSESSMENT/EVALUATION	CODE
<50%	POOR	1
50-74%	FAIR	2
75-100%	GOOD	3

135

Perception Scale/Marking Scheme

S/N	Perception relating to Cholera	Nature of Response			Maximum Score
Q17	**Perceived seriousness of Cholera**	**Agree**	**Undecided**	**Disagree**	
	Cholera is a serious disease	Appropriate	Inappropriate	Inappropriate	1
	Without treatment, symptoms of cholera disappear after some days	Inappropriate	Inappropriate	Appropriate	1
	Cholera is a mild disease	Inappropriate	Inappropriate	Appropriate	1
	Cholera cannot kill or lead to death	Inappropriate	Inappropriate	Appropriate	1
	Cholera can't prevent one from working	Inappropriate	Inappropriate	Appropriate	1
	Cholera is only serious in children not among adults like us	Inappropriate	Inappropriate	Appropriate	1
					6
Q18	**Perceived vulnerability to Cholera**	**Agree**	**Undecided**	**Disagree**	
	I cannot have cholera because flies do not come near my food	Inappropriate	Inappropriate	Appropriate	1
	I cannot get cholera from the water we use in the community	Inappropriate	Inappropriate	Appropriate	1
	I cannot get cholera because I don't over feed	Inappropriate	Inappropriate	Appropriate	1
	No member of my family can have cholera because we use Water Cistern toilet	Inappropriate	Inappropriate	Appropriate	1

	Only very young children get cholera	Inappropriate	Inappropriate	Appropriate	1
					5
		Total Maximum Score			**11**

PERCENTILE	QUATITATIVE ASSESSMENT/EVALUATION	CODE
$\leq 75\%$	UNFAVOURABLE/RISKY	1
$\geq 75\%$	FAVOURABLE/NON RISKY	2

Operational definitions

- Appropriate: In line with biomedical word view
- Inappropriate: Not in line with biomedical word view