

Assessment of Recurrent Cholera Outbreak in Bauchi State

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ABSTRACT

This research work titled “**Assessment of Recurrent Cholera Outbreak in Bauchi State**” was conducted to assess and find out why there is an annual recurrence of cholera outbreak in Bauchi State, Nigeria. The research was also aimed at finding ways that the recurrent cholera outbreak in Bauchi State can be curtailed and minimized. This annual recurrence of the deadly disease in some parts of the nation of Nigeria became a national concern. The National Assembly took a bold step in addressing the menace in 2011. In all of these annual recurrences of cholera outbreaks in Nigeria, Bauchi State was always mentioned in the list of affected states. During cholera outbreaks, people become infected by drinking water or eating food contaminated by the bacteria (*Vibrio cholerae*). This contamination takes its course through poor sanitation as well as poor personal and domestic hygiene practices. It is the bacteria present in the faeces of infected individuals that is the main source of contamination and the principal site affected by the infection is the gastrointestinal tract most especially the small intestine. I recommend the following for immediate implementation; The use of hand dug water wells for drinking water should be discouraged. The public should be sensitized on personal hygiene and food sanitation during awareness campaigns. Agencies responsible for regulating the quality of public drinking water sold by vendors in the form of sachets (pure water) should be properly checked against contamination. Public tap water supply must genuinely undergo proper treatment before the supply is made to the public. Pit latrine systems must have cover lids and must undergo regular treatments with disinfectants at all times. Pit latrine systems and suck-away for water system toilets should not be sited close to hand dug wells or boreholes meant for fetching drinking water to avoid contamination by human faeces. Proper sanitary disposal of faeces and household wastes should be done in all communities. All households must keep cleaning their toilets with disinfectants such as ‘IZAL’ and similar disinfectants. The use of cholera vaccines must be emphasized consistent among potentially endangered communities. Provision of street bins with cover lids to guard against disposal of household wastes in the open land will reduce the spread of cholera by insect vectors like house flies.

Keywords from the Research Topic:

- *Assessment:*

‘Assessment’ is a noun that may refer to evaluation or judgement about something based on an understanding of the situation.

- *Recurrent:*

‘Recurrent’ is an adjective that may refer to the occurring or appearing again or repeatedly. Happening or tending to happen again or repeatedly.

- *Cholera:*

Cholera is an acute infectious disease of the small intestine, caused by the bacterium *Vibrio cholera* and is characterized by profuse watery diarrhoea, vomiting, muscle cramps, severe dehydration, and depletion of electrolytes. (BY FARLEX, a free dictionary on line).

- *Outbreak:*

Outbreak is a noun signifying a sudden increase; violent or spontaneous occurrence, especially of disease or strife.

- *Bauchi State:*

Bauchi State is one of the thirty-six political administrative states in Nigeria.

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CHAPTER ONE INTRODUCTION

➤ *Background to the Study:*

Throughout history, populations all over the world have sporadically been affected by devastating outbreaks of cholera. Recorded evidence of cholera epidemics goes back to 1563 in a medical report from India. In the nineteenth century cholera spread from its apparent ancestral site in the Orient to other parts of the world, producing pandemics in Europe. The first pandemic was recorded in 1817, and we are now well into the seventh cholera pandemic, which started in Indonesia in 1961 and spread rapidly in Asia, Europe, and Africa, and reached South America in 1991. The disease spread rapidly in Latin America, causing nearly **400,000** reported cases and over **4,000** deaths in 16 countries of the Americas that year. Still the seventh pandemic has not receded; on the contrary, cholera has now become endemic in many parts of the world. According to the Pan American Health Organization (PAHO), a total of **1,076,372** cases and **10,098** deaths were reported in the region of the Americas by June 1995. In 1999, a total of **254,310** cases and **9,175** deaths were officially notified to WHO. However, poor surveillance and fear of international stigmatization and sanctions lead to under reporting of official numbers of affected countries. Estimates indicate numbers closer to **120,000** deaths and many more cases per year. This increasing spread of cholera in recent years may reflect a lack of international quarantine enforcement by some countries which also have primitive public water supplies and inadequate sanitary regulations, the international mobility of carriers in the world's population, and the quick transport of contaminated food and water by ships and aircraft.

The on-going Haiti cholera outbreak is the worst epidemic of cholera in recent history, according to the U.S. Centres for Disease Control and Prevention. In little over two years, as of January 2013, it has killed more than **7,900** Haitians and hospitalized hundreds of thousands more while spreading to neighbouring countries including the Dominican Republic, Cuba, Venezuela, and the United States. Since the outbreak began in October 2010, more than 6% of Haitians have had the disease.

The outbreak began in mid-October 2010 in the rural Center Department of Haiti, about 100 kilometres (62 miles) north of the capital, Port-au-Prince, killing **4,672** people by March 2011 and hospitalizing thousands more. The outbreak occurred ten months after a powerful earthquake which devastated the nation's capital and southern towns on 12 January 2010. By the first 10 weeks of the epidemic, cholera spread to all of Haiti's 10 departments or provinces.

As of 12th December 2012, hospitalizations (**2,300** per week) and deaths (**40** per week) are roughly tripled since Hurricane Sandy struck the island in what was expected to be a quiet cholera season, causing more deaths than the cyclone took in all countries combined in November 2010, the first cases of cholera were reported in the Dominican Republic and a single case in Florida, United States; in January 2011, a few cases were reported in Venezuela. The epidemic came back strongly in the 2012 rainy season, despite a localized delayed vaccine drive. In late June 2012, Cuba confirmed three deaths and **53** cases of cholera in Manzanillo in 2013 with 51 cases in Havana.

Cholera is an infection caused by the bacteria *Vibrio cholerae*. People become infected by drinking water or eating food contaminated by the bacteria, poor sanitation as well as personal and domestic hygiene practices. The bacteria present in faeces of an infected person are the main source of contamination and the principal site affected is the gastrointestinal tract. Symptoms include acute watery diarrhoea (sudden diarrhoea with profuse, watery stools), vomiting, suppression of urine, rapid (severe) dehydration, fall of blood pressure, cramps in legs and abdomen, subnormal temperature, and complete collapse. Death may occur within 24 hours of onset unless prompt medical treatment is given to the patient.

Healthy carriers of *V. Cholerae* may vary from 1.9 to 9.0%. These symptomless carriers excrete vibrio bacteria intermittently with the duration of pathogen discharge being relatively short, averaging 6 to 15 days with a maximum period between 30 to 40 days. Chronic convalescent carriers have been observed to shed virus intermittently for periods of 4 to 15 months. Survival of vibrio bacteria in the aquatic environment relates sharply to various chemical, biological and physical characteristics of a given stream or estuarine water. The viability of *V. Cholera* in surface waters has been observed to vary from 1h to 13 days. Although cholera vibrio bacteria may persist for only a short time in grossly polluted aquatic environment, faecal contamination from victims of epidemics and the carriers may continue to reinforce their population in water.

The number of cases so far in 2010 is nearly three times the total for all of last year and seven times that of 2008, according to the UN Children's Fund (UNICEF). The Red Cross estimates that women and children account for 80 per cent of this year's class. Although the spread of cholera seems to have been largely contained, new cases are still being reported from already-affected states, especially in Nigeria's northeast.

Cholera is an acute intestinal infection picked up through contaminated food or water. It can result in diarrhoea that can lead to severe dehydration and even death without prompt treatment. Cholera is an acute intestinal infection picked up through contaminated food or water.

The fatality rate from the disease is 4.5% overall in Nigeria, but the proportion of affected people dying of cholera is above 10% in states that are either severely flooded or are home to large numbers of internally displaced persons (IDPs). The rate has reached 20 per cent in Plateau, 17 per cent in Sokoto and 11 per cent in Gombe.

UNICEF is supporting efforts to promote hygiene and is supplying camps and flood-affected communities with supplies to treat cholera. The UN World Health Organization (who) attributed the unusually high cholera incidence to seasonal factors, combined with poor hygiene conditions and population movements in the area, which is regularly affected by small outbreaks. Together with health partners, the agency is providing technical support to Nigeria's Ministry of Health. In 2010, the World Health Organization reported three to five million cases of cholera, with **100,000 to 120,000** deaths.

Cholera is transmitted by eating foods or drinking water that is contaminated with the cholera bacterium. Approximately 75% of people infected with cholera do not develop any symptoms, 80% of those who develop symptoms have mild or moderate cases, while 20% of those who have symptoms have severe cases. **884 million** people currently lack access to safe water, and about **2.6 billion** people have no access to improved sanitation. Once a cholera infection reaches a severe state, a patient can die within two hours. In the aftermath of the 1994 war in Rwanda, more than **58,000** cases of cholera were reported, with **23,800** deaths, within one month. 80 percent of cases can be treated with oral rehydration salts.

In early summer, a cholera outbreak appeared in four neighbouring countries in western Africa. Although cholera is endemic in the region, there have been far more cases than usual. Treatment is simple: the loss of fluids is compensated with a salt and sugar based rehydration therapy (ORT), administered either orally or by infusion. "Due to rapid dehydration, cholera can lead to death within hours. It needs to be treated fast", explains Issiaka ABOU, MSF Head of Mission for Chad. With the number of cases rising significantly in the last few weeks, MSF has implemented several medical interventions in all four countries:

In Borno, MSF (Doctors Without Borders) is supporting the Ministry of Health's 116-bed cholera treatment centre in Maïduguri, the district most affected by the epidemic. The teams already treated more than 300 patients, of which 7 died, in one week of activity. The data collection monitoring and the exploration of others district are still going on. Oral rehydration points will also be set up to take care of the simplest cases of cholera in other districts in Borno State.

In the State of Bauchi, MSF (Doctors Without Borders) teams are treating patients in the 200-bed cholera treatment centre in the central hospital. As well, 31 oral rehydration points have been set up and outreach activities (water chlorination, hygiene promotion and education) are on-going to prevent the spread of the disease among communities. Since mid-July, more than **3,300** cases have been treated by MSF teams and Ministry of Health staff. In North-western Nigeria, specifically in Zamfara state, 8 local-government areas out of 14 have declared over 1000 cases of suspected cholera, and more than 100 deaths. MSF is supporting, through its mobile teams, the Ministry of health clinics by providing supplies, information, education and communication, training and infection control. A cholera treatment unit has also been constructed in Anka town. Additional international and national staff has been employed by MSF (Doctors Without Borders) to support the Ministry of Health in its response. MSF will also set up two cholera treatment units in two adjacent districts, and oral rehydration points will be established to take care of the simplest cases of cholera in other districts of the same State.

The 125,018 cases of cholera notified to WHO by countries of the African Region in 2005 resulted in a real total economic loss of US\$39 million, US\$ 53.2 million and US\$64. 2 million, assuming a regional life expectancy of 40, 53 and 73 years respectively. The **203,564** cases of cholera notified in 2006 led to a total economic loss of US\$91.9 million, US\$128.1 million and US\$156 million, assuming life expectancies of 40, 53 and 73 years respectively. The **110,837** cases of cholera notified in 2007 resulted in an economic loss of US\$43.3 million, US\$60 million and US\$72.7 million, assuming life expectancies of 40, 53 and 73 years respectively.

The problem has to do with the recurrence of cholera outbreaks in Bauchi State over the years which is posing much threat to public health in Bauchi State. In 2009 cholera outbreak reoccurred in 18 states of the Federation of which Bauchi State was included. Also in August 2010 another cholera outbreak was reported in Bauchi such that an Emergency Response Team (NIMRERT) was deployed to Borno and Bauchi States to provide humanitarian services and identify the source, cause, and course of the cholera infection. After all that the emergency team did in 2010, it was reported in 2011 that there was an outbreak of cholera in 15 states of the Federation of which Bauchi State is one. This research is justified by this recurrent record laid down by this deadly disease, cholera.

➤ *Statement of the Problem:*

The recurrence of cholera outbreaks in some parts of Nigeria has been a thing of concern to the Federal Government. The National Assembly even took time to address the menace. On Wednesday 21st September 2011, (at the 7th First Session of the National Assembly), the Senate noted with concern the recurrent annual outbreak of cholera in different parts of the country (Nigeria) causing deaths and hospitalization of many on a yearly basis.

In the year 2011, for instance, there have been more than 22 reported cases of cholera outbreak in 15 States of the Federation with 2,135 infections and a total casualty in excess of 234 lives. Bauchi State numbered eight in the list of affected States of the Federation with 38 reported cases and 18 deaths in 2011.

➤ *The Senate Resolved to:*

- Set up a special committee to investigate the scourge with a view to advising the Federal Government on a lasting solution to the problem.
- Invite the Minister of Health to explain the action being taken by the Government to combat this scourge.

The first index case of cholera was reported in week 21 in both Plateau and Bauchi states of Nigeria. By week 30, a total of 522 cases were reported in Plateau and 815 in Bauchi state. A national cumulative total of about 12, 000 cases and 308 deaths were reported at week 30. In week 34, some 15,100 cases and 435 deaths with a lethality rate of 3.5% were reported.

The Nigerian Institute of Medical Research (NIMR) in December 22, 2010 disclosed that in response to the most deadly and widespread cholera outbreak in Nigeria in 20 years, Prof. I.A.O Ujah, director general of the NIMR, has deployed its Emergency Response Team (NIMRERT) to provide humanitarian services and identify the source, cause, and course of the infection. The team was deployed to Borno, Bauchi, and Gombe states, all in northern Nigeria and the worst hit by the epidemic.

The cholera epidemic which was first reported in Taraba state quickly spread to 17 more states, including some in southern Nigeria. By November, more than 38,000 people had been sickened while about 1,700 had died of cholera, an official source of the federal Ministry of Health said. Reported cases almost triple those of 2009, and 80% are women and children.

Ndahi Marama, Suzan Edeh posted on the internet that the death toll in the cholera epidemic which swept through Maiduguri [capital city of Borno state] and Bauchi like a hurricane 2 weeks had risen to more than 147. About 1368 others have been hospitalized. This came just as 67 lives have been lost in Bauchi, with 1742 also infected in an outbreak that is ravaging several local government areas in Bauchi State. The epidemic which started in 6 council areas of Abadam, Dikwa, Kala-Balge, Guzamala and Kukawa communities in Borno State claimed 50 lives before spreading to Maiduguri and Jere, where not less than 100 persons contracted the disease. At press time, the casualty figure had risen to 80.

Vanguard Newspaper gathered and reported on 16 August 2010 that another outbreak of the epidemic has been reported in some local government areas of Bauchi State. It was learned that the epidemic had already claimed 67 lives and infected about 1742 persons.

Chairman of the State Primary Health Care Development Agency, Dr. Musa Dabam, who briefed newsmen on the update of the outbreak in the state, said: "The outbreak has entered its 8th week with a death percentage of 3.8 percent." Nigerian Vanguard, on September 7th, 2010, published that contrary to earlier reports that the cholera outbreak was under control in the country, latest revelations indicate that the cholera threat may be far from over. This is because findings in some of the affected areas revealed that response to the epidemic might have been overwhelmed by the magnitude and severity of the disease outbreak.

Director General of the Nigeria Institute for Medical Research, NIMR, Prof. Innocent Ujah, who briefed newsmen yesterday (15th August, 2010), said that there was a need for intensified support from public-spirited individuals and all stakeholders in the interest of the lives of those at risk. Ujah, who commended government efforts so far, however, regretted that the problem was overwhelming. He said that Government and other agencies are helping to respond but we are overwhelmed by the number of cases and the severity of the condition.

Ujah said "We are doing the best we can but it is clearly overwhelming and I think that is where we need to cry out for support to be able to overcome the seriousness of lives being lost, which have no replacement." He added that preliminary studies carried out by the NIMR team that visited two of the affected States, Borno and Bauchi said the strains found in the areas were virulent in nature." Ujah noted that already the Institute was planning to conduct more research on the strains on the molecular level with a view to ensuring better response preparedness in the future. Ujah regretted that their findings also showed that the strains were also resistant to some antibiotics. According to him, in Bauchi, findings showed 10 percent resistance to the commonest and cheapest drug, tetracycline used for the treatment of diseases like cholera. He added: "Unfortunately, we discovered that 10 percent of the people in Borno State were resistant to the drug and this is a big problem for a drug like tetracycline. 10 per cent is a large number and this means that these people must change to another drug. But in an emergency situation, you may not have the luxury of going to look for another drug." Blaming the epidemic on what he described as 'environmental disaster in the areas,' Ujah said the level of preparedness in the areas was very poor, adding: "The environment in most of the places visited is a disaster. We took samples of such areas for further investigations. It is a manifestation of unhygienic environment. There are lots of hazards and there is another problem of potable water in the communities." Advocating the need to bring back sanitary inspectors in the villages and communities, he advised that Nigerians should learn to keep to personal hygiene, particularly by simply washing their hands which alone can prevent many diseases; give intravenous fluid immediately a patient is

affected, as well as antibiotics like *tetracycline* and boil their water before drinking. In all the recurrent cholera outbreaks in recent times in Nigeria, Bauchi State has been seriously affected by the epidemic to the extent that strains of the bacteria (*Vibrio cholerae*) resistant to antibiotics have been identified. These observations listed in 1.2 above prompted this study.

➤ *Objectives of the Study:*

The general objective of this study is to assess the Recurrent Cholera Outbreak in Bauchi State”; specifically, the researcher intends:

- To determine whether the people living within Bauchi Metropolis have adequate knowledge of general hygiene, food sanitation, cholera and its causes.
- To assess the major causes of the recurrence of cholera outbreak in Bauchi State (Case Study of Bauchi Metropolis).
- To determine and ascertain the role of Bauchi State Government in combating the recurrence of cholera outbreak in the State (Case Study of Bauchi Metropolis).
- To make suggestions on how the recurrence of cholera in the Bauchi State can be curtailed and minimized.

➤ *Research Questions:*

The researcher outlined the following questions as it relates to the stated objectives above (recurrent cholera outbreak in Bauchi State – a case study of Bauchi Metropolis):

- Are the affected populations knowledgeable enough in their personal hygiene and food sanitation?
- Have there been efforts by the Bauchi State Government to educate those who lack knowledge of hygiene and food sanitation through awareness campaigns?
- What have been the major causes of recurrent cholera outbreak in Bauchi Metropolis?
- What is Government doing to curtail the recurrence of cholera outbreak in Bauchi Metropolis?
- What are ways that can best be employed by The Bauchi State Government to curtail the recurrence of cholera outbreak to its barest minimum in Bauchi Metropolis.?

➤ *Hypotheses:*

- (H₀) Recurrent cholera outbreaks in Bauchi State (Case Study of Bauchi Metropolis) are caused by poor hygiene and the provision of inadequate potable water among the people.
- (H₁) Recurrent cholera outbreaks in Bauchi State (Case Study of Bauchi Metropolis) are not caused by poor hygiene and the provision of inadequate potable water among people.
- (H₀) Quite a number of people lack sufficient knowledge of hygiene and food sanitation.
- (H₁) Quite a number of people have sufficient knowledge of hygiene and food sanitation.
- v. (H₀) Government interventions have minimized the recurrence of cholera outbreaks within Bauchi State (Case Study of Bauchi Metropolis).
- (H₁) Government interventions have not minimized the recurrence of cholera outbreaks within Bauchi State (Case Study of Bauchi Metropolis).

➤ *Rationale of the Study:*

The rationale of the study is to find out the major causes of the recurrence of cholera outbreaks in Bauchi State (specifically the metropolis as a case study) to determine whether the affected population has adequate knowledge of cholera, hygiene and food sanitation. The study is also meant to ascertain the role of Bauchi State Government in combating the recurrence of cholera outbreak in Bauchi State. At the end I would then draw out recommendations on how the recurrence of cholera outbreaks in the Bauchi State can be curtailed and minimized. It is expected that the results and the recommendations would be made available to Bauchi State government for implementation.

➤ *Scope of the Study:*

Bauchi State has been purposely selected from among the 36 States of the Federation of Nigeria and the Federal Capital Territory for the research work because of its cholera recurrence records. The State capital of Bauchi, Bauchi Local Government Area has been purposely selected from among the twenty (20) Local Government Areas in Bauchi State. The following reasons led to the selection of Bauchi metropolis:

- Bauchi Local Government Area has the highest density of primary health care providers where the public can quickly have access to in times of emergency like cholera outbreaks.
- Most of these primary health care providers (24 in all) are located within the metropolis.
- The resources and time for the purpose of data collection is limited, so Bauchi Metropolis has been selected.
- All the bodies and Agencies that control health care services in the State are located in the metropolis so it is easier to make surveys of the study in the metropolis.

- Those in the metropolis have more access to Government aided awareness and help concerning combating cholera outbreaks than those in other areas due to proximity to the seat of governance.

CHAPTER TWO RESEARCH METHODOLOGY

➤ Introduction:

Bauchi State is one of the thirty-six (36) political administrative states in Nigeria. It was in October 1996 that Gombe State was carved out of the then old Bauchi State. The new Bauchi State now has 20 Local Government Areas namely; Alkaleri, Bauchi, Bogoro, Dambam, Darazo, Dass, Ganjuwa, Gamawa, Giade, Itas/Gadai, Jama'are, Katagun, Kirfi, Misau, Ningi, Shira, Warji, Tafawa Balewa, Toro and Zaki.

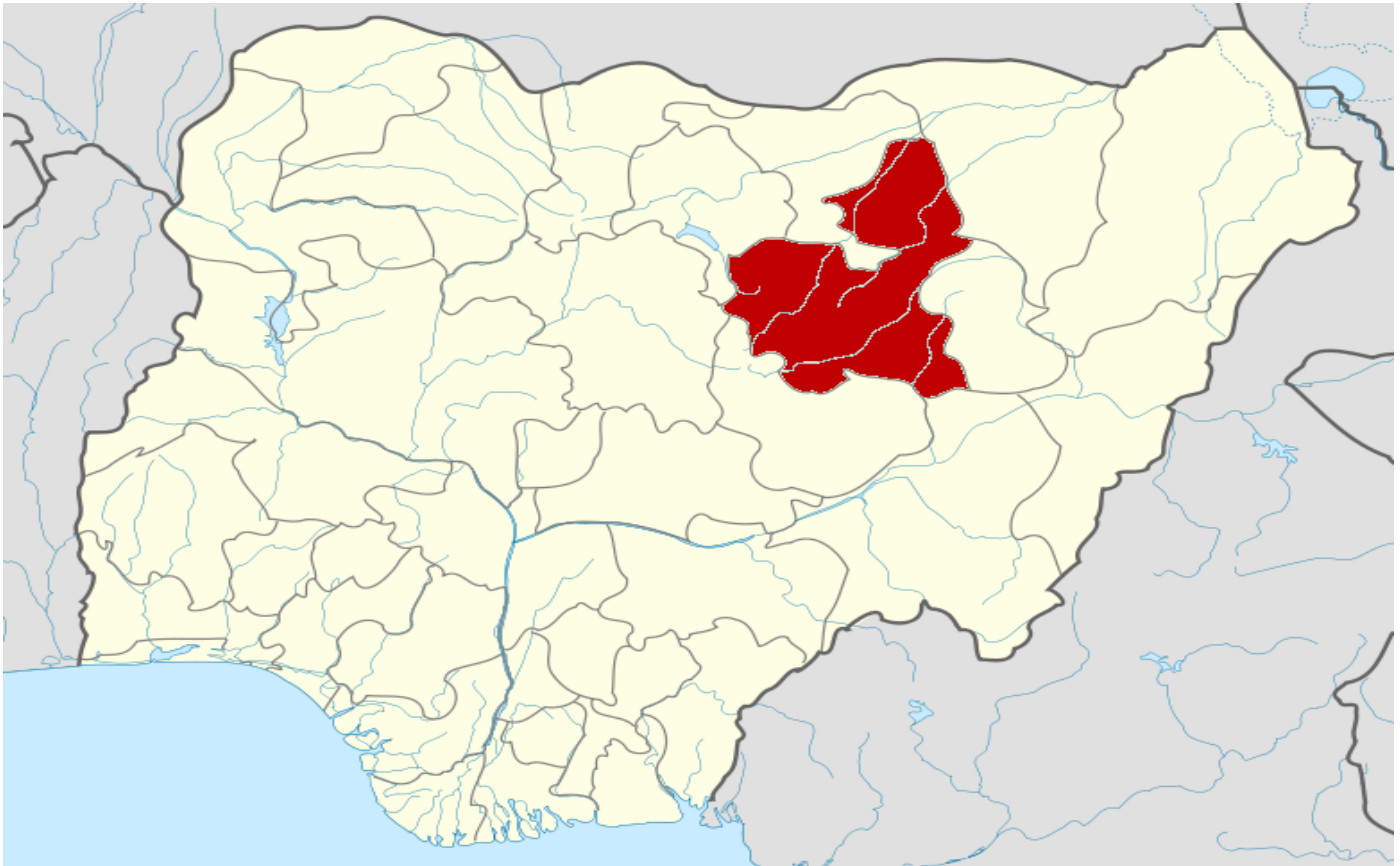


Fig 1 Location of Bauchi State in the Map of Nigeria painted Red.

SOURCE: Images of map of Bauchi State.

Bing.com/images

The present Bauchi State's southern and northern limits are demarcated by latitudes $9^{\circ}30'$ North and $12^{\circ}30'$ North, respectively, its western and eastern limits are bounded by longitudes $8^{\circ}45'$ East and $11^{\circ}0'$ East, respectively. These mark the points of longest and widest stretches of the state. Within these coordinates, however, the state's total land area covers about 49,259 sq. km. This is about 4.9m ha out of Nigeria's 92.4m ha (Nig, FOS, 1987).

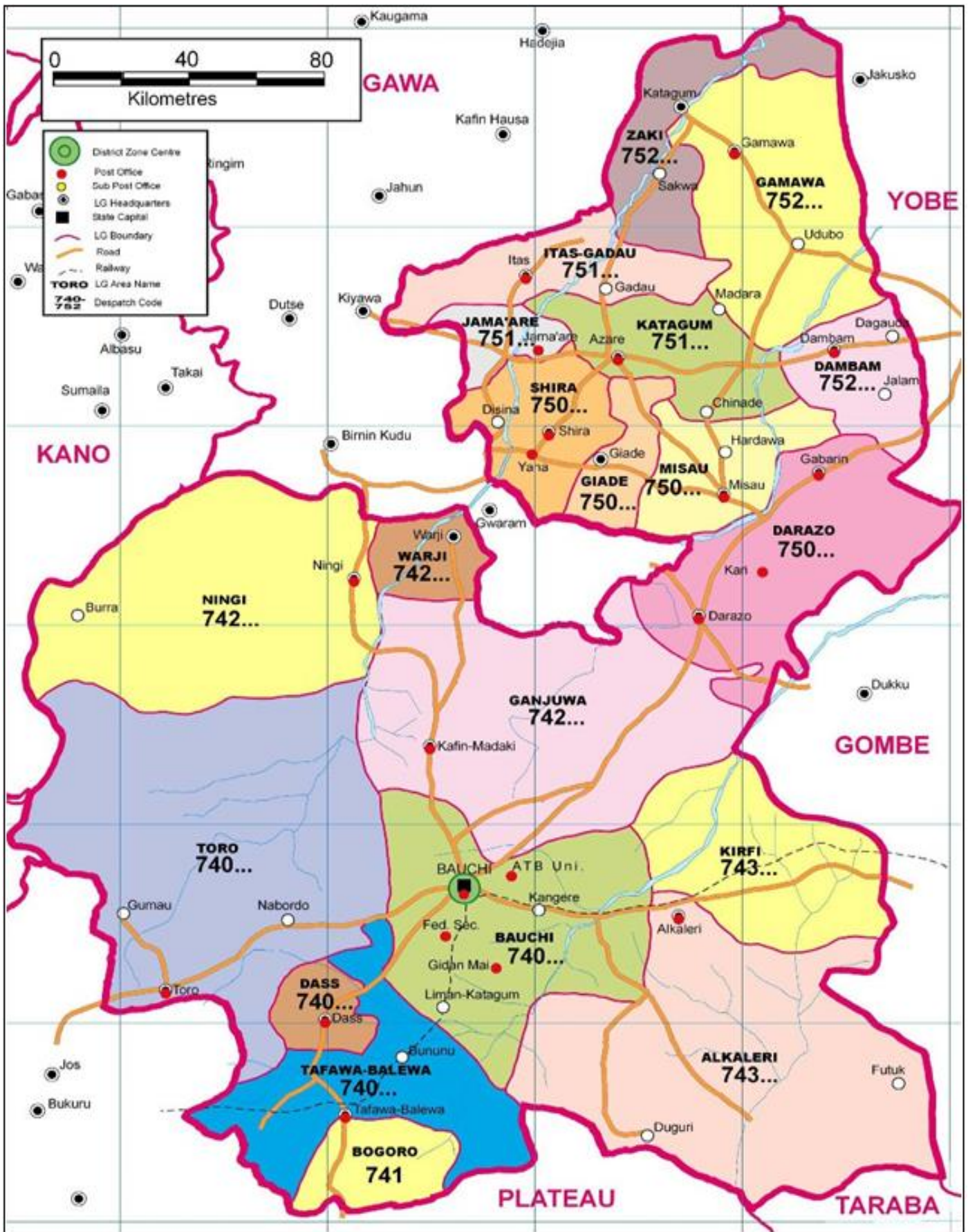


Fig 2 Detailed Map of Bauchi State showing all the Local Government Areas.

Source: Images of map of Bauchi State.

Bing.com/images

The Bauchi Metropolitan Area has been chosen for the purpose of this study which involves administering the questionnaires. For the purpose of data collection, purposive sampling method has been adopted. Two different questionnaires have been developed for two categories of people as respondents. These are:

- One hundred and fifty (150) Questionnaires for six different locations within Bauchi Metropolis. Some randomly selected household members within these locations would be administered with one questionnaire each. Twenty five (25) households from each of the six settlement areas have been selected. These locations (settlement areas) are listed below:

- ✓ Gwallameji settlement area.
- ✓ Yelwan Tudu/Lebura settlement area.
- ✓ Federal Low-Cost Houses settlement area.
- ✓ Muda Lawan settlement area.
- ✓ Fadamar Mada settlement area.
- ✓ Unguwar Jahun settlement area.

- Fifteen Questionnaires for the Supervisory Ministry Staff: That is three questionnaires for (3) heads of departments and twelve (12) supervisory staff two from each settlement area.

➤ *Sample Size Determination:*

- A total of one hundred and fifty (150) copies of the first questionnaire containing eighteen (18) objective questions is desired to be shared among the six selected major settlement areas within Bauchi Metropolis.
- Correction for non-response adjustment was made using the formula $N_s = n/0.9$
- From (ii) above, $n = 150$. $N_s = 150/0.9 = 166.67 \approx 167$
- Fifteen (15) copies of the second set of questionnaires have been developed for the Supervisory Ministry Staff: three questionnaires for three (3) heads of departments and twelve (12) supervisory staff two from each of the six settlement areas. $N_s = 15/0.9 \approx 17$

➤ *Reason For Selection Of Bauchi Metropolis:*

The study area, Bauchi State Metropolitan Area, was chosen for the following four reasons:

- Bauchi Local Government Area has the highest concentration of Primary Health Care Providers in the entire state (see table 5). These health care providers are more concentrated within Bauchi Metropolis. The use of the State Metropolis might provide more adequate result for the purpose of this study.
- For easy access and proximity to the target people meant for sampling for administering the questionnaire.
- This will save time since there is limited time for the research work.
- This will also help in reducing the cost of the research work due to limited financial resources.

➤ *Data Collection:*

The major tools used for the data collection are the questionnaires, interview and documentation. Two different questionnaires have been developed with the aim of achieving the set objectives.

➤ *Scientific Tool used for Data Analysis:*

The first aspect of the data analysis will be by statistical means. First of all, the responses of the respondents are collated and recorded statistically. Secondly most of the responses on each of the items would be represented on pie charts and bar charts for easy interpretation. The questionnaires to be used contain only closed-ended questions which are objectives in nature.

A simple ratio of the total responses to each option would be calculated statistically in numeric figures and percentages to deduce the outcome. At the end of each analysis, the result would be deduced followed interpretation of the analysis.

Bauchi State has a total of fifty-six (56) Hospitals and Clinics belonging to Government and private organizations. They serve as primary health care providers. Below is a table signifying their distribution among the twenty Local Governments in Bauchi State.

Table 1 Distribution of Hospitals and Clinics in Bauchi State

S/N	Local Government Area	Number of Hospitals & Clinics	Percentage
1	Alkaleri Local Government Area	2	3.57
2	Bauchi Local Government Area	24	42.29
3	Bogoro Local Government Area	1	1.79
4	Dass Local Government Area	1	1.7
5	Dambam Local Government Area	1	1.79
6	Darazo Local Government Area	1	1.79
7	Gamawa Local Government Area	1	1.79
8	Ganjuwa Local Government Area	2	3.57
9	Giade Local Government Area	1	1.79
10	Itas – Gadau Local Government Area	2	3.57
11	Jama'are Local Government Area	2	3.57
12	Katagum Local Government Area	7	12.5
13	Kirfi Local Government Area	1	1.79
14	Misau Local Government Area	1	1.79
15	Ningi Local Government Area	4	7.14
16	Shira Local Government Area	1	1.79
17	T/ Balewa Local Government Area	2	3.57
18	Toro Local Government Area	1	1.79
19	Warji Local Government Area	0	0
20	Zaki Local Government Area	1	1.79
	TOTAL	56	100

Bauchi Local Government Area of Bauchi State has twenty-four ($24/56 \times 100 = 42.85\%$) out of the entire hospitals in Bauchi State. Bauchi Local Government Area has a population of 356,923 based on 1991 population census and 493,730 based on the 2006 population census results.

- The List of Private and Government Hospitals and Clinics in the Bauchi Local Government Area is seen in Tabular form below:

Table 2 Distribution of Hospitals and Clinics within Bauchi L. G. A

S/N	Name of Hospital/ Clinic	Address	Ownership Status.
1	People's Clinic	Aminu Street Bauchi	Private
2	Mai Jama'a Clinic	Wunti Street Bauchi	Private
3	Under-5 Health Care Center	Jahun Rd Bauchi	Government
4	Urban Mat & Child Welfare Clinic	Kofar Ran, Bauchi	Government
5	Reemee Medicare Nig. Ltd.	6-Rimi Rd, GRA Bauchi	Private
6	Ni'ima Consultant Hospital Bauchi.	Off Airport Rd, Bauchi	Private
7	D.S.S. Clinic Bauchi	Maiduguri Rd, Bauchi	Private
8	ATBU Teaching Hospital Bauchi.	Bauchi Metropolis	Government
9	33FAB MRS, Bauchi	33FAB Barracks Bauchi	Government
10	211TK Bn MRS	Bauchi Metropolis	Government
11	301 SPAR GS Bauchi.	Bauchi Metropolis	Government
12	ACCS MIR	Bauchi Metropolis	Government
13	Alheri Medical Center Bauchi	Ilelah Street Bauchi	Private
14	Bauchi State Police Clinic	Bauchi Metropolis	Government
15	ATB Health Center	Bauchi Metropolis	Government
16	Police Clinics Bauchi	Bauchi Metropolis	Government
17	Railway Hospital Bauchi	Railway Compound	Government
18	Rahlycon Clinics Sabuwan Kasuwa	Railway Rd Bauchi	Private
19	Fed. Poly. Medical Center Bauchi	TafawaBalewa Rd.	Government
20	General Hospital Bayara	Bayara, T/B Rd.	Government
21	Family Planning Clinic Bauchi	Kofar Wase, Bauchi	Government
22	Alwadata Consultant Clinic Bauchi	Ahmadu Bello Way Bauchi	Private
23	ATA. Poly Medical Centre	Wuntin Dada, Bauchi	Government
24	Ibrahim Bako Primary Health Care	Ibrahim Bako Rd Bauchi	Government

➤ *Population of the Study:*

According to the 2006 census, Bauchi State has a population of 4,676,465 people (representing 3.34% of the total population of Nigeria). Out of the existing 20 Local Government areas in Bauchi State, Bauchi Local Government Area has a population of 356,923 based on 1991 population census and 493,730 (based on the 2006 population census results). The Bauchi Metropolitan Area has been chosen for administering the questionnaires.

➤ *Sampling Procedure:*

The Bauchi Metropolitan Area has been chosen for the purpose of this study which involves administering the questionnaires. For the purpose of data collection, purposive sampling method has been adopted. Two different questionnaires have been developed for two categories of people as respondents. These are:

- One hundred and fifty (150) Questionnaires for six different locations within Bauchi Metropolis. Some randomly selected household members within these locations would be administered with one questionnaire each. Twenty-five (25) households from each of the six settlement areas have been selected. These locations (settlement areas) are listed below:
 - ✓ Gwallameji settlement area.
 - ✓ Yelwan Tudu/Lebura settlement area.
 - ✓ Federal Low-Cost Houses settlement area.
 - ✓ Muda Lawan settlement area.
 - ✓ Fadamar Mada settlement area.
 - ✓ Unguwar Jahun settlement area.
- Fifteen Questionnaires for the Supervisory Ministry Staff: That is three questionnaires for (3) heads of departments and twelve (12) supervisory staff two from each settlement area.

CHAPTER THREE RESULTS, ANALYSIS AND FINDING

➤ *Results of Data Derived from the First Questionnaire:*

I wish to indicate to the readers that out of one hundred and sixty seven (167) of the first questionnaires [containing twenty (20) items,] issued out to the respondents, a total of one hundred and fifty five (155) copies were successfully retrieved. Below is the complete result of the analysis:

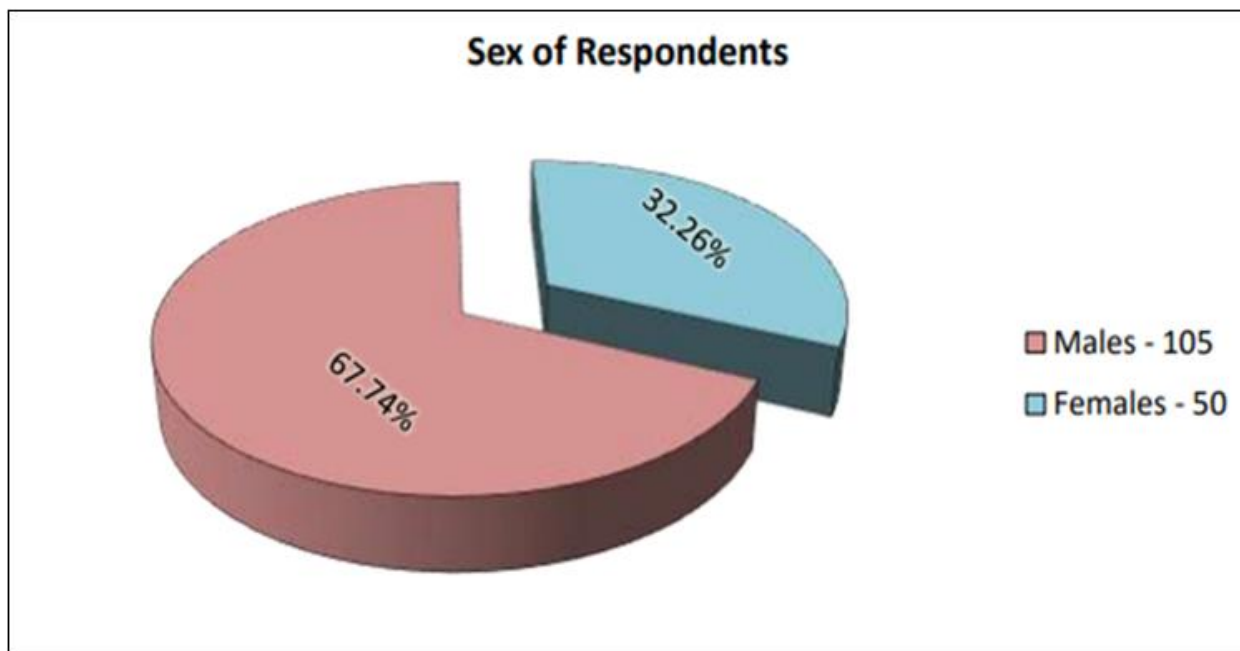


Fig 3 Sex Distribution of Respondents to the first Questionnaire.
Source: Data Derived from First Questionnaire, Bauchi – (2013)

This figure shows a pie chart with 67.74% of males as respondents to the questionnaires. More men are involved because they were more easily accessible at the time of data collection. All the respondents are adults above the age of 18 years old.

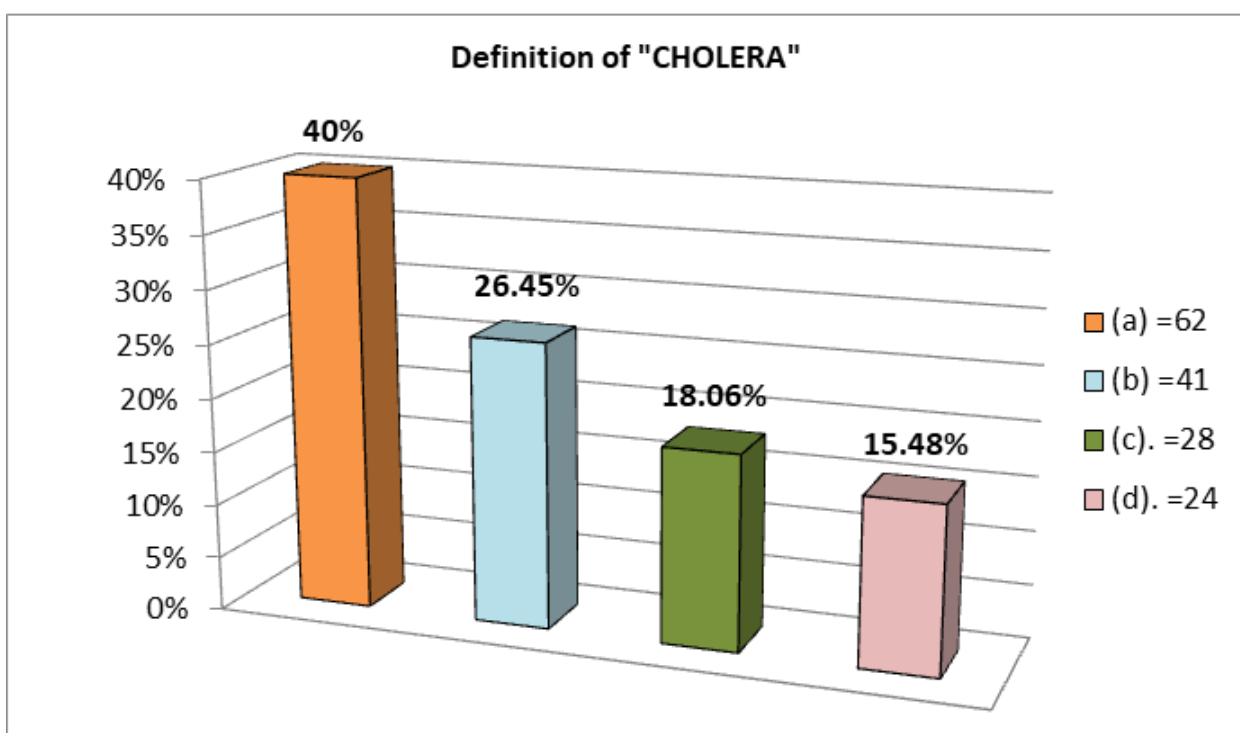


Fig 4 (Question 1): What is "CHOLERA"?
Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options for Figure 4:

- ✓ An intestinal infection that causes rapid dehydration.
- ✓ It is another word for dysentery or diarrhoea.
- ✓ It is a type of fever that causes vomiting.
- ✓ Those that did not Respond at all.

In the above figure 6, the right answer to the options is (a). Only 40% of the respondents seem to know what cholera means. Majority of them don't seem to know the deadly nature of Cholera and this is disastrous for the community during outbreak. Knowledge of cholera and what it can do will save many lives when an outbreak occurs. This calls for awareness campaign amongst the people.

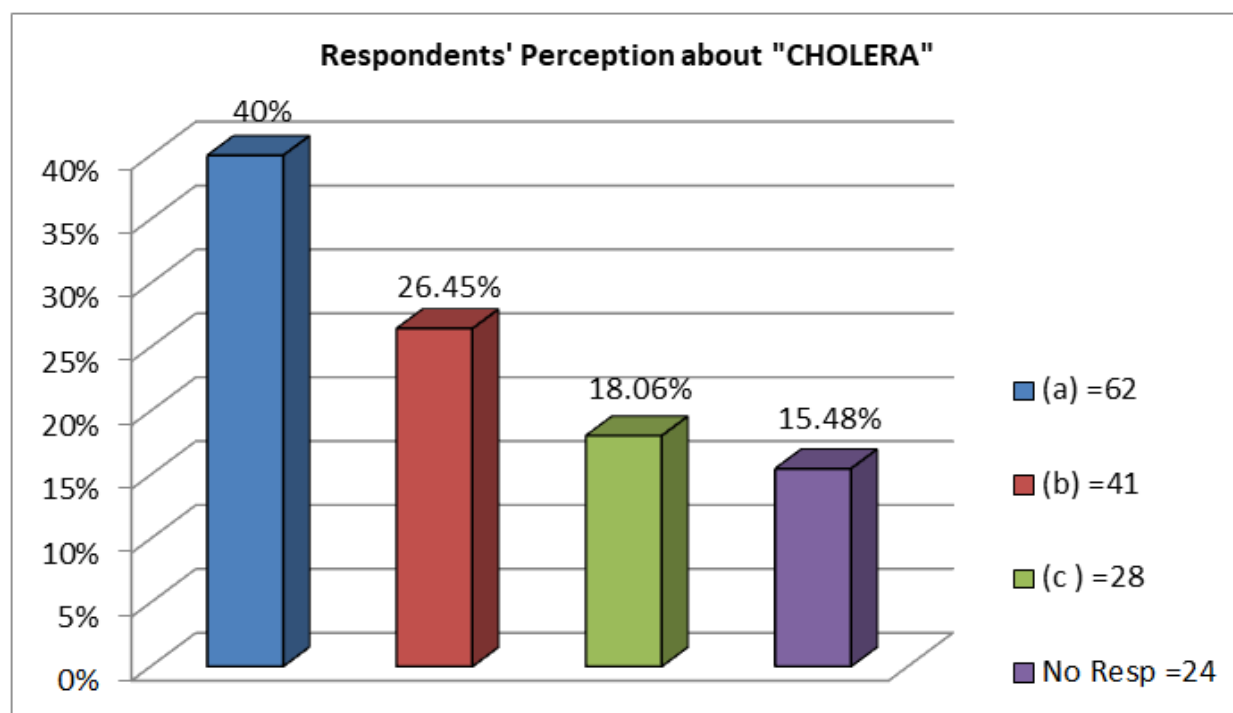


Fig 5 (Question 2): What is your Perception about what "Cholera" can cause?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options for Figure 5:

- ✓ Cholera can kill within a few hours from infection time.
- ✓ Cholera is a simple ailment that can be treated with ease.
- ✓ Cholera can kill within two days from infection time.
- ✓ In the above figure 7, the right option is @
- ✓ Cholera can kill within a few hours from infection time". Only 40% of the respondents believe that cholera is a deadly disease that can kill within a short time while the remaining larger percentages of respondents don't know. In such community, there is tendency that higher mortality might occur during cholera outbreak.

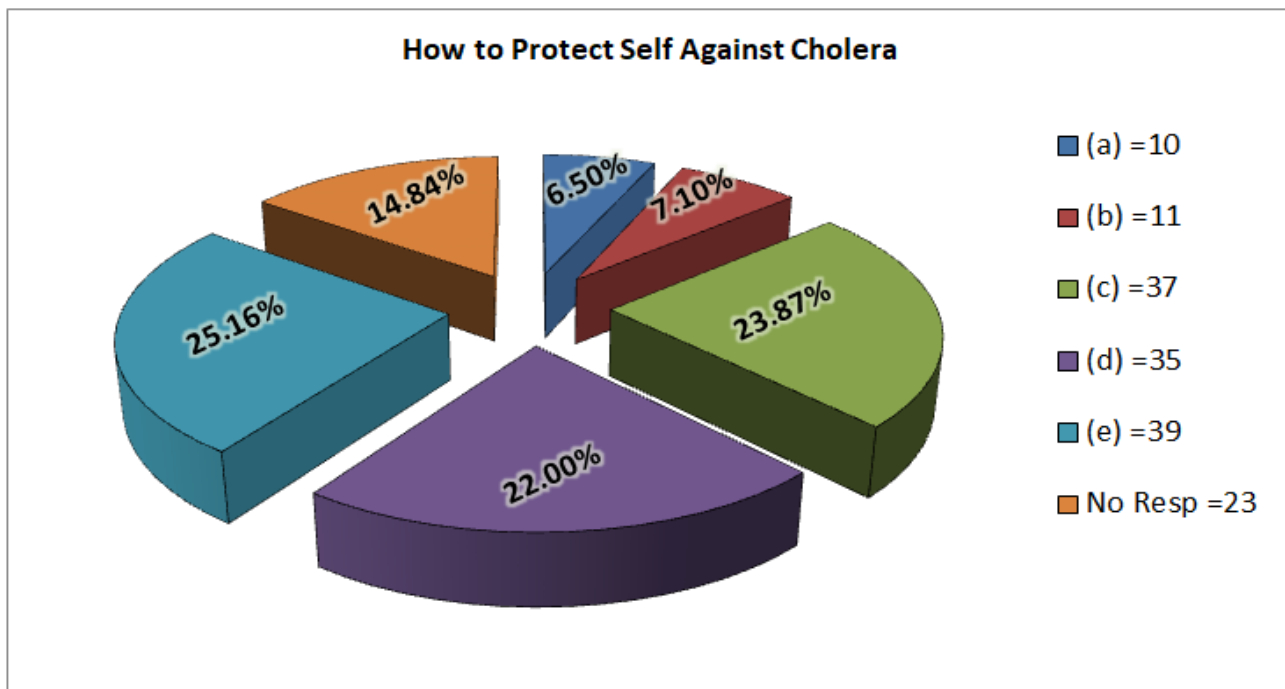


Fig 6 (Question 3) How can you Protect yourself against Cholera Infection?
 SOURCE: Data derived from first questionnaire, Bauchi – (2013)

➤ Options for Figure 6:

- Through constant bathing and wearing of clean clothes.
- Through eating food and drinking water at the right time.
- Through washing of hands clean before taking meal only.
- Through keeping away food suspected to be contaminated.
- Through personal hygiene and environmental sanitation.

The correct options for the above figure 8 are (d) and (e) of which 22% and 25.16% of the respondents respectively chose. This shows clearly that more than 50% of the respondents are ignorant about these two particular ways of preventing cholera outbreak.

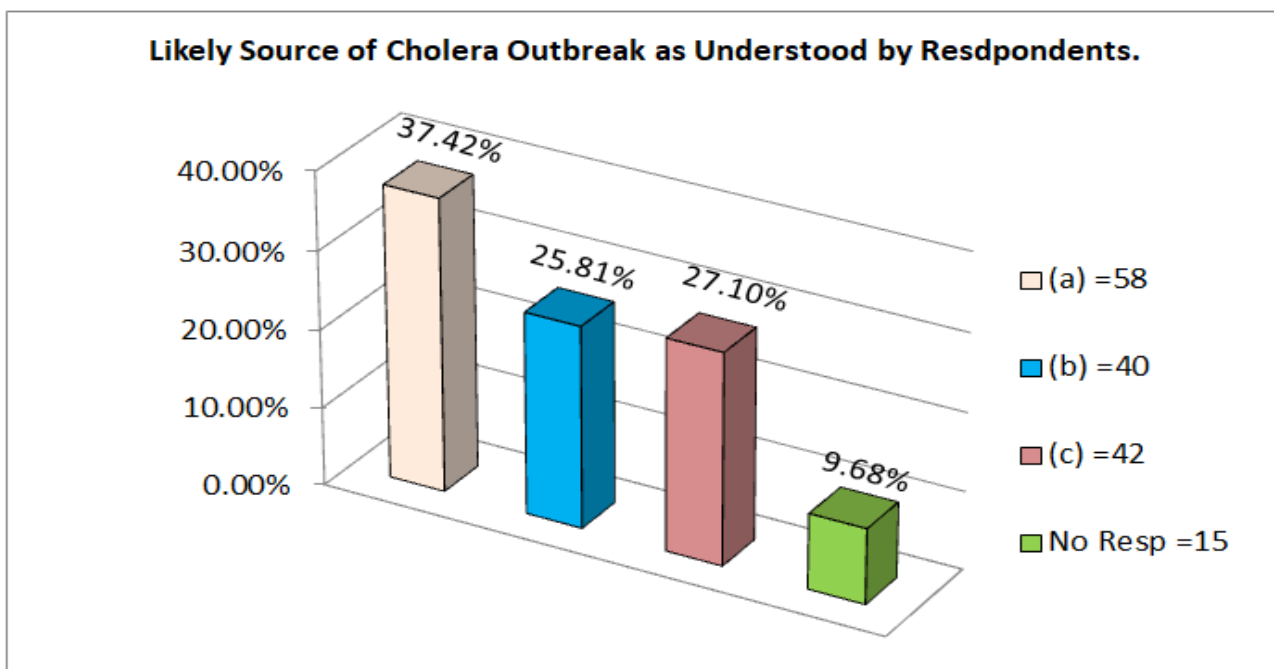


Fig 7 (Question 4): What do you Think is the Main source of Cholera Infection?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

• Options for Figure 7:

- ✓ All unclean drinking water.
- ✓ Food that is not well cooked.
- ✓ Food or water contaminated with faeces of infected person.

The correct option for this is “(c) Food or water contaminated with faeces of infected person.” but only 27.10% of the respondents chose the option. Majority believe that it is the consumption of unclean drinking water that causes cholera outbreak. This is ignorance at work. How do they access whether a drinking water if clean or unclean?

WHO (2004); MENTIONED THAT “In the long term, improvements in water supply, sanitation, food safety and community awareness of preventive measures are the best means of preventing cholera, as well as other diarrhoeal diseases.”

One of the ways to curb this menace is through community awareness.

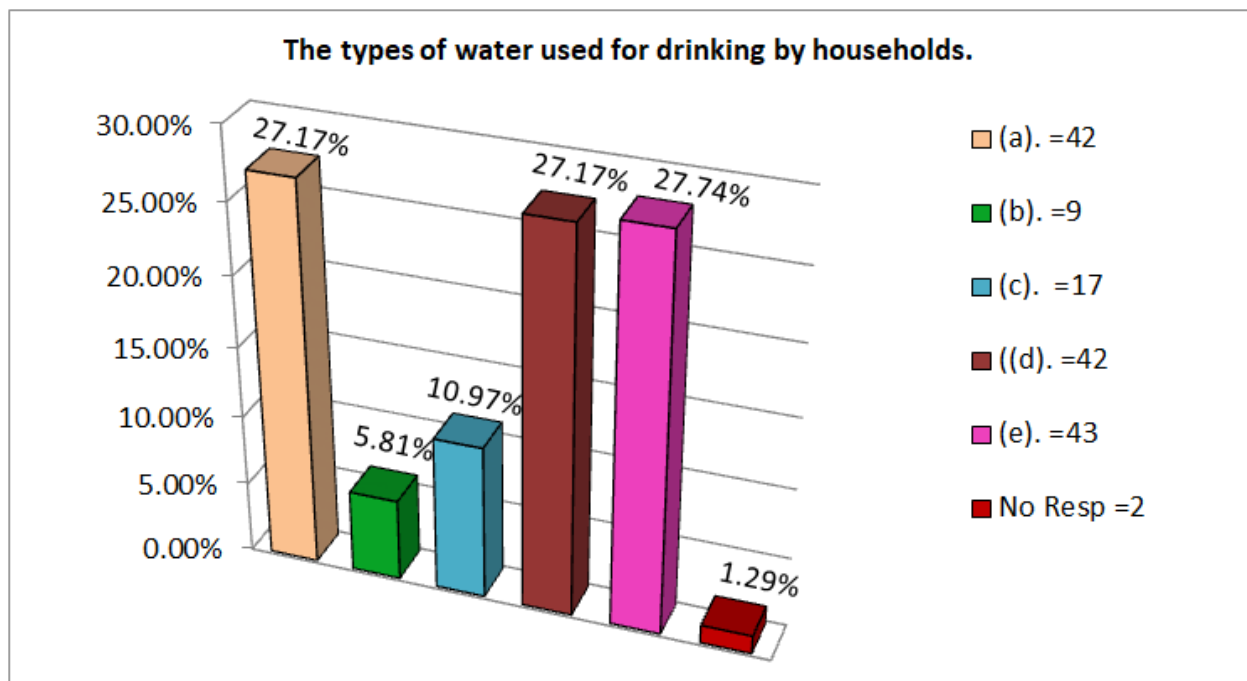


Fig 8 (Question 5): Which Type of Water do you use for Drinking in your Household?
 Source: Data Derived from first Questionnaire, Bauchi – (2013)

• Options for Figure 8:

- ✓ Public tap water .
- ✓ Motorized borehole water.
- ✓ Manual borehole water
- ✓ Hand dug well water.
- ✓ Pure water sachets.

Figure 10 displays a bar chart portraying the respondents’ indication of the type of water they are using as drinking water in their household. 27.74% said they use packaged water (pure water sachets) as drinking water. 27.17% said they use well water and 27.17% said they use public tap water treated from a treatment reservoir. We are quite aware that cholera is transmitted through contaminated drinking water and food. The main source of the contamination is through human faeces that contain the bacteria (*Vibrio cholerae*).

Ajoke (2012) reported in her research work that in Nigeria, the infection is endemic and outbreaks are not unusual. In the last quarter of 2009, it was speculated that more than 260 people died of cholera in four Northern states with over 96 people in Maidugari, Biu, Gwoza, Dikwa and Jere council areas of Borno state. Most of the Northern states of Nigeria rely on hand dug wells and contaminated ponds as a source of drinking water. Usually, the source of the contamination is other cholera patients when their untreated diarrhoea discharge is allowed to get into water supplies.

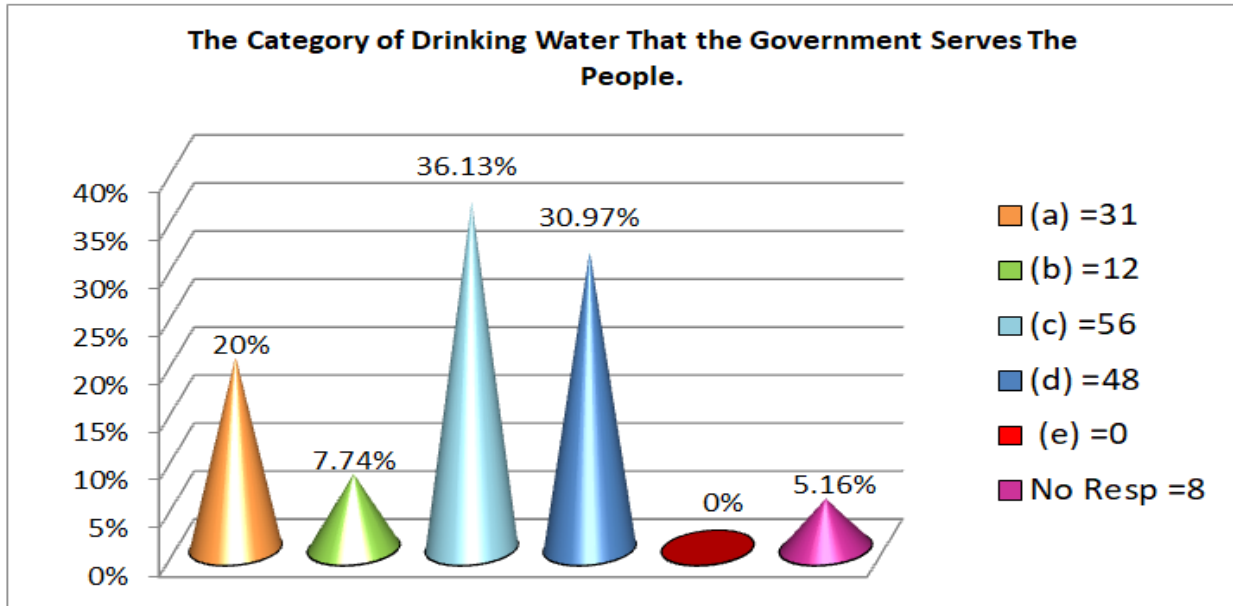


Fig 9 (Question 6): Which type of Drinking Water does Bauchi State Government Serve the Public?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options for Figure 9:

- ✓ Public tap water.
- ✓ Motorized/manual borehole water.
- ✓ Hand dug well water.
- ✓ 'a' and 'c' above.
- ✓ None of the above.

The highest percentage of the respondents chose “hand dug well water” as the type of drinking water readily supplied by Bauchi State Government to its people. Well water may not be classified as portable clean water especially where the population density of people is high. Most of the community members use pit toilets which in turn gives rise to contamination of well water by leaching process.

Sack (January 2004); “...reported that Cholera is typically transmitted by either contaminated food or water. In the developed world, seafood is the usual cause, while in the developing world it is more often water.”

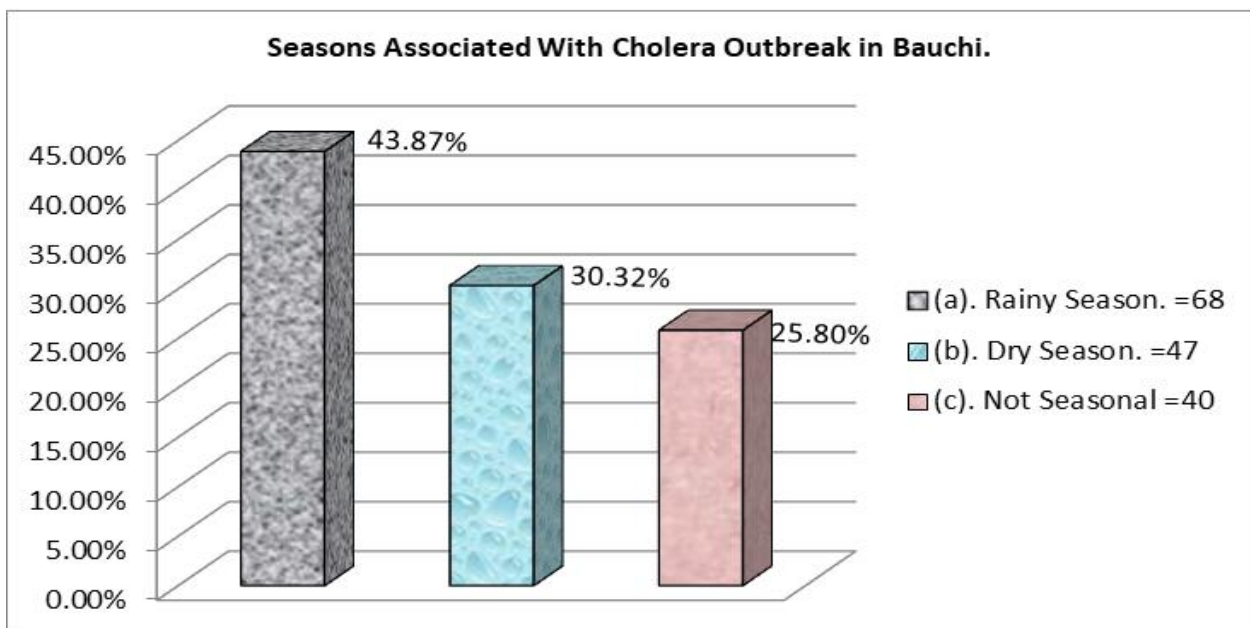


Fig 10 (Question 7): Which of the Seasons within a year is Associated with Cholera Outbreaks in Bauchi?
 Source: Data Derived from first Questionnaire, Bauchi – (2013)

• *Options for Figure 10:*

- ✓ Rainy Season.
- ✓ Dry Season.
- ✓ Not Seasonal.

From the above figure 12 data it is clear that rainy season is associated with cholera outbreak in Bauchi.

Doty (October 10, 1910) said *surveillance* and prompt reporting allow for rapid control of cholera epidemics. Cholera exists as a seasonal disease in many endemic countries, occurring annually mostly during rainy seasons. Surveillance systems can provide early alerts to outbreaks, therefore leading to coordinated response and assist in preparation of preparedness plans. Efficient surveillance systems can also improve the risk assessment for potential cholera outbreaks. Understanding the seasonality and location of outbreaks provide guidance for improving cholera control activities for the most vulnerable. For prevention to be effective, it is important that cases are reported to national health authorities.

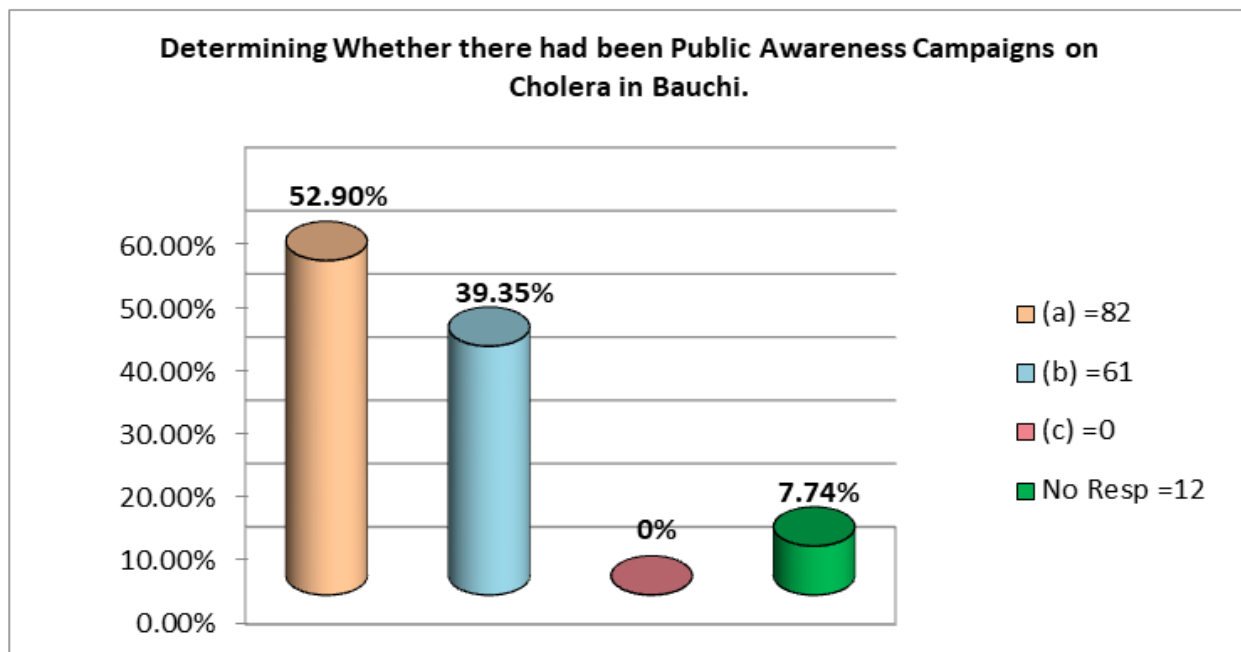


Fig 11 (Question 8): Has there been Public Awareness Campaign within Bauchi Metropolis on preventive measures for recurrent cholera outbreak and personal hygiene?

Source: Data Derived from first Questionnaire, Bauchi – (2013)

• *Options for Figure 11:*

- ✓ Yes, several times.
- ✓ Not often.
- ✓ I do not know anything like that.

From the data above majority of the people of Bauchi State are aware that Public Awareness Campaign do take place within Bauchi Metropolis several times. 39.35 % object to that but they still agree that the campaign takes place not often.

From what **Clemens** (1996) wrote, it can only be achieved by public awareness campaign. He said “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. 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 sterilisation of utensils either by boiling or by using chlorine bleach. Studies have also indicated that the use of soap and hand washing promotion can achieve a 26 to 62% decrease in the incidence of diarrhoea in developing countries.”

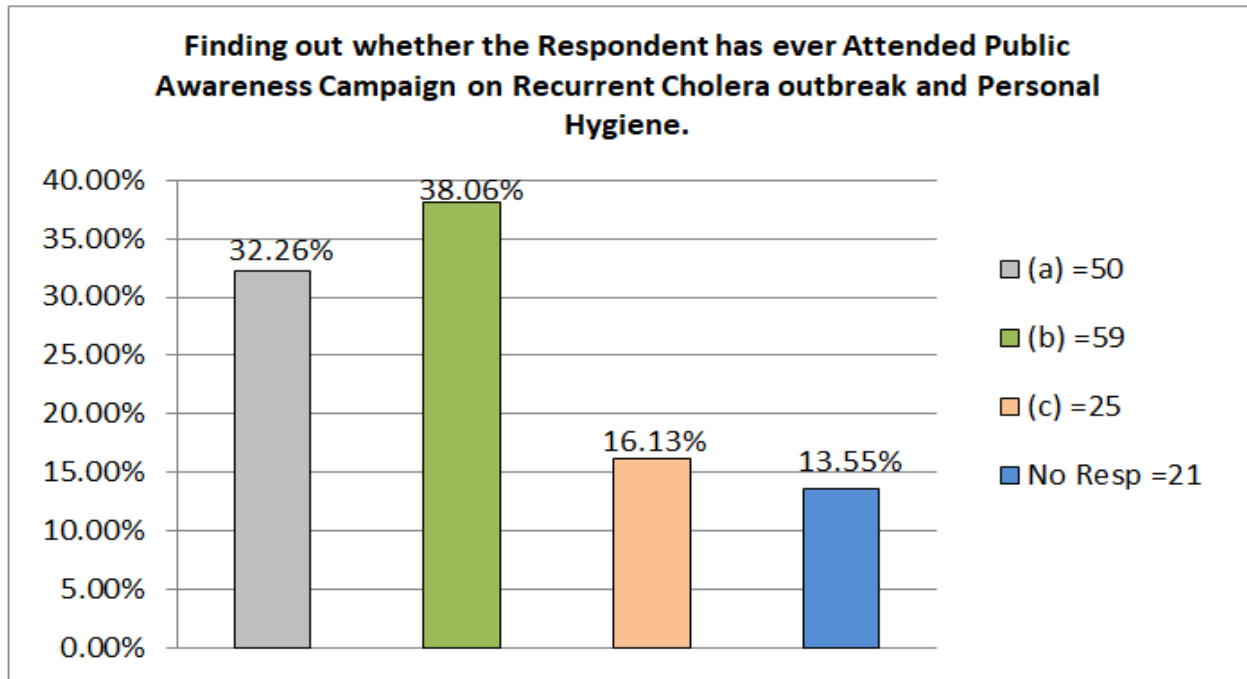


Fig 12 (Question 9): Have you ever attended Public Awareness Campaign on preventive measures for recurrent cholera outbreak and personal hygiene?

SOURCE: Data derived from first questionnaire, Bauchi – (2013)

Options for Figure 12:

- ✓ Yes, several times.
- ✓ Once in a while.
- ✓ I have never attended such.

Public awareness campaign has been one of the universally accepted means of combating cholera outbreaks. The highest percentage of the respondents say there has been public awareness campaign on recurrent cholera outbreaks and personal hygiene. How was the campaign being organized and what is is their highest level of education? As long as the campaign menu is inadequate, the people will still remain in their ignorance and keep on suffering recurrent cholera outbreaks.

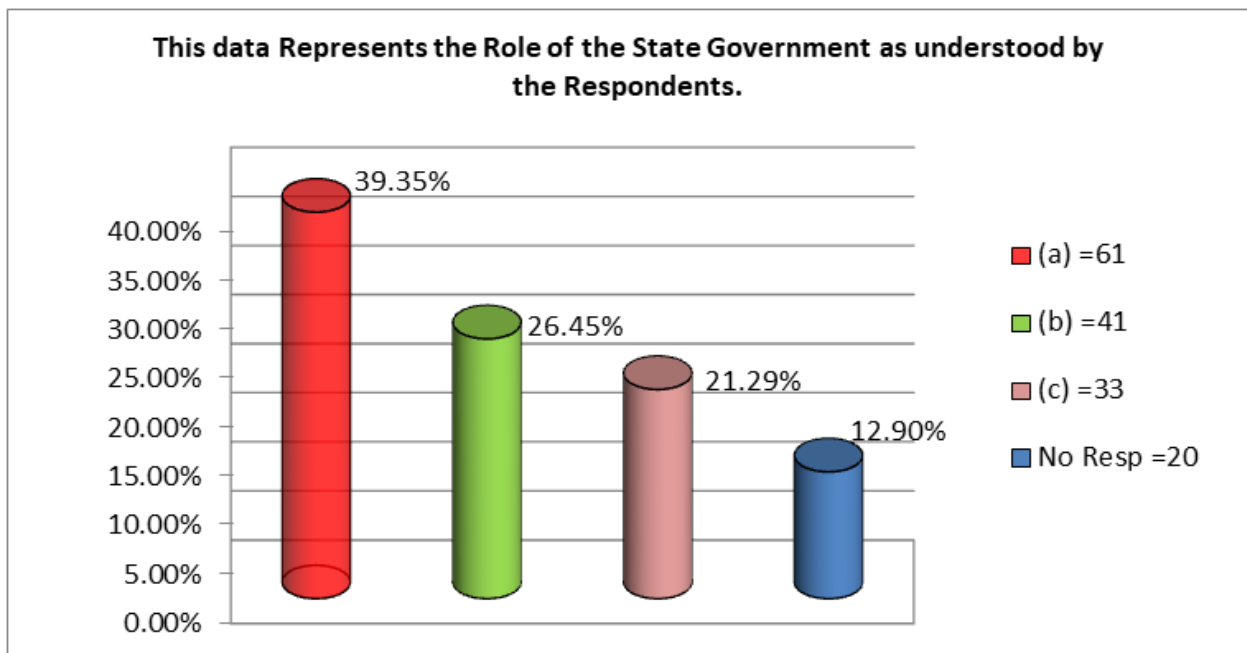


Fig 13 (Question 10): In your understanding, was it Bauchi State Government that has been organizing the public awareness campaign or some other organizations?

Source: Data Derived from First Questionnaire, Bauchi – (2013)

• Options for Figure 13:

- ✓ It is Bauchi State Government.
- ✓ It is some NGOs/private health care providers.
- ✓ I do not know the organizers.

Majority of the respondents believe that it is Bauchi State Government that organises the campaign exercises. The best preventive measure is to sensitize the public and give them the basic knowledge.

Clemens (1996) wrote, “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. 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 sterilisation of utensils either by boiling or by using chlorine bleach. Studies have also indicated that the use of soap and hand washing promotion can achieve a 26 to 62% decrease in the incidence of diarrhoea in developing countries.”

The basic educate connotes what **Clemens** (1996) has outlined above.

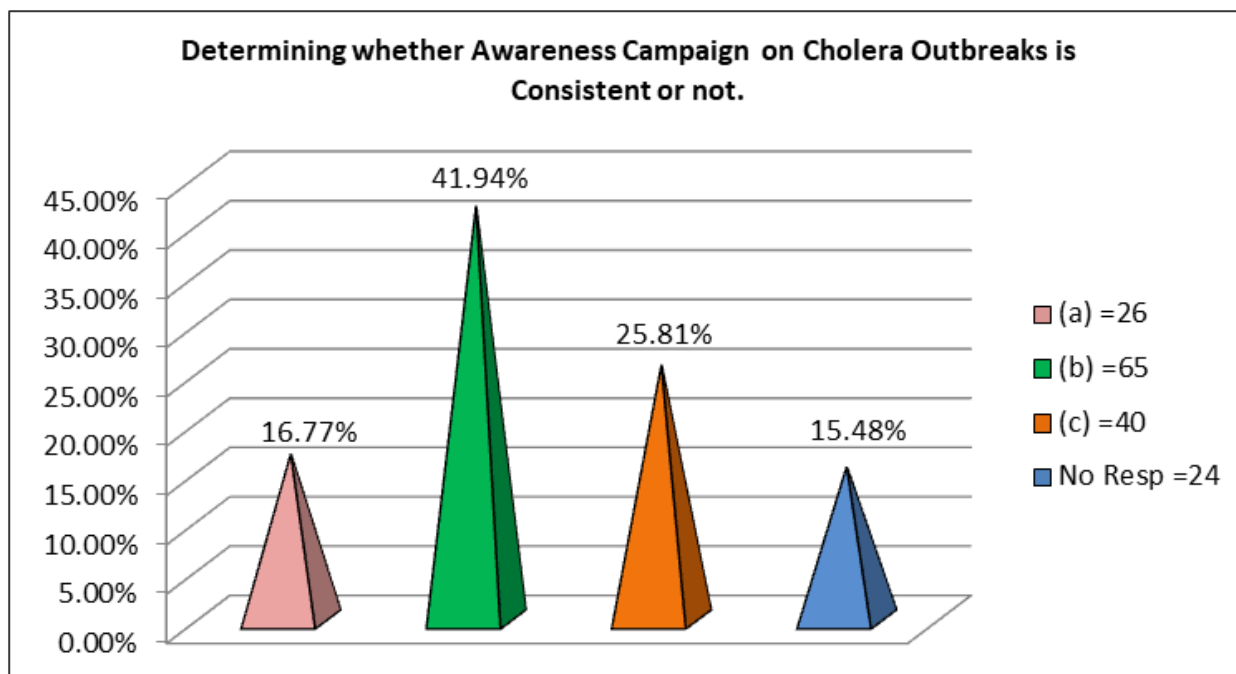


Fig 14 (question 11): Is this public awareness campaign consistent and regular?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

• Options for Figure 14:

- ✓ Yes, it is consistent and regular.
- ✓ No, I see it happen only when there is an outbreak.
- ✓ No, only once in a while.

The above data shows respondents’ responses as to whether public awareness campaign in Bauchi has been consistent and regular or not. Majority chose “(b). No, I see it happen only when there is an outbreak.” This indicates that the government of Bauchi State takes action only when there is outbreak or suspected outbreak of cholera in the State.

The program for public awareness campaign should be regular and consistent because of the vulnerability of Bauchi State to cholera outbreaks and its seasonal recurrence.

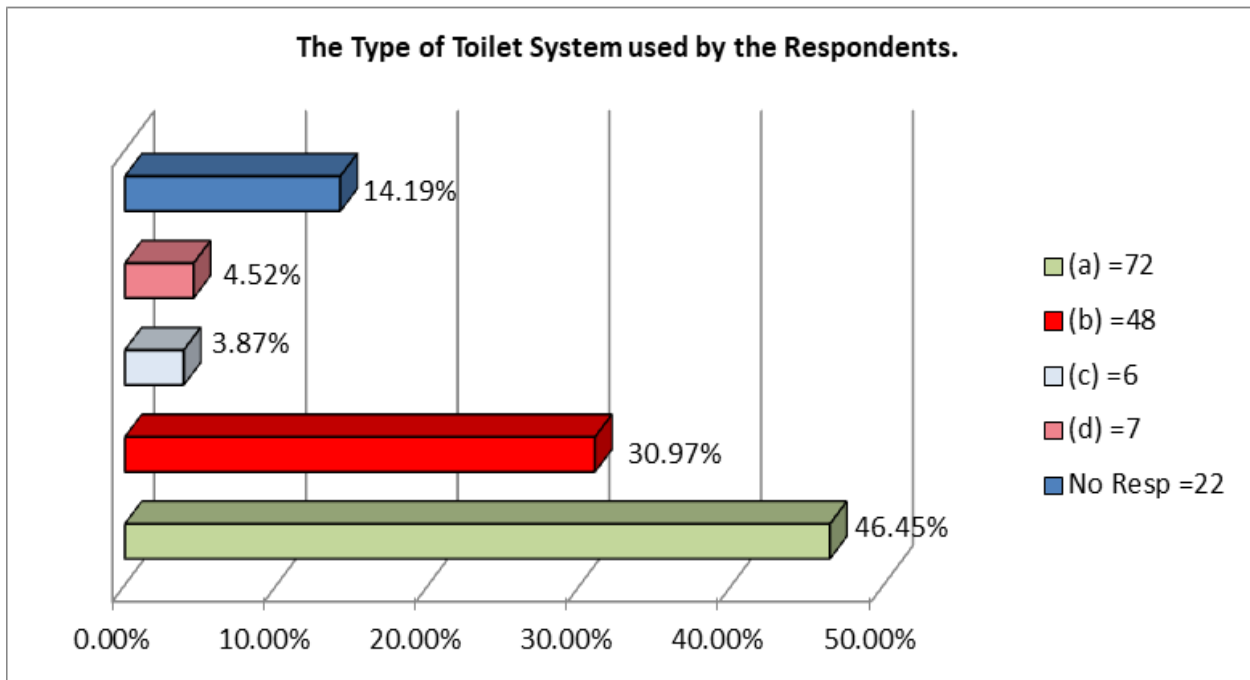


Fig 15 (Question 12): What type of Toilet do you use in your Household?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options for Figure 15:

- ✓ Water system toilet.
- ✓ Pit latrine.
- ✓ Bucket system toilet.
- ✓ We have no toilet.

The highest number of respondents says they use water system toilets in their household followed by those that use pit latrine. As long as pit toilets and hand dug wells are located within same vicinity, there is likelihood that contamination of the well water by faeces cannot be avoided. 42% of the respondents in figure 10 indicated that they use hand dug well water for drinking.

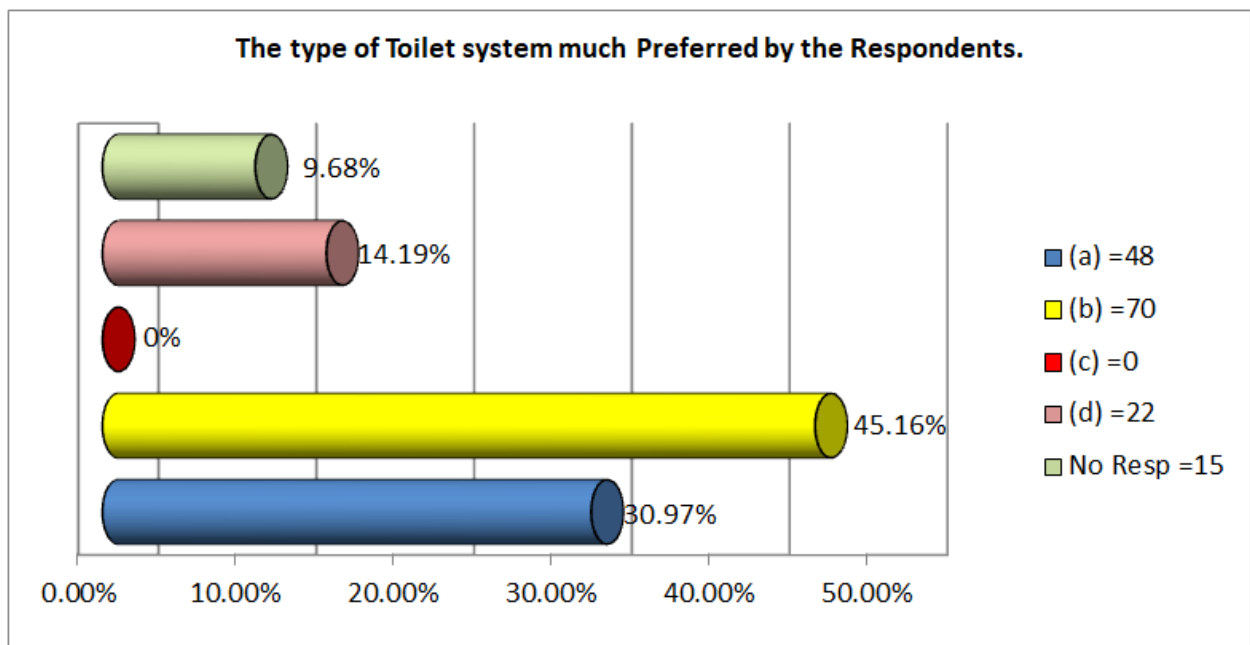


Fig 16 (Question 13): Which type of toilet do you think is much preferred and safe to use?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options for Figure 16:

- ✓ Water system toilet.
- ✓ Pit latrine.
- ✓ Bucket system toilet.
- ✓ Defecating far in the bush.

The data in this figure shows that majority of the respondents prefer pit latrines. If cover lids for pit latrines are not properly managed, it can cause cholera outbreaks.

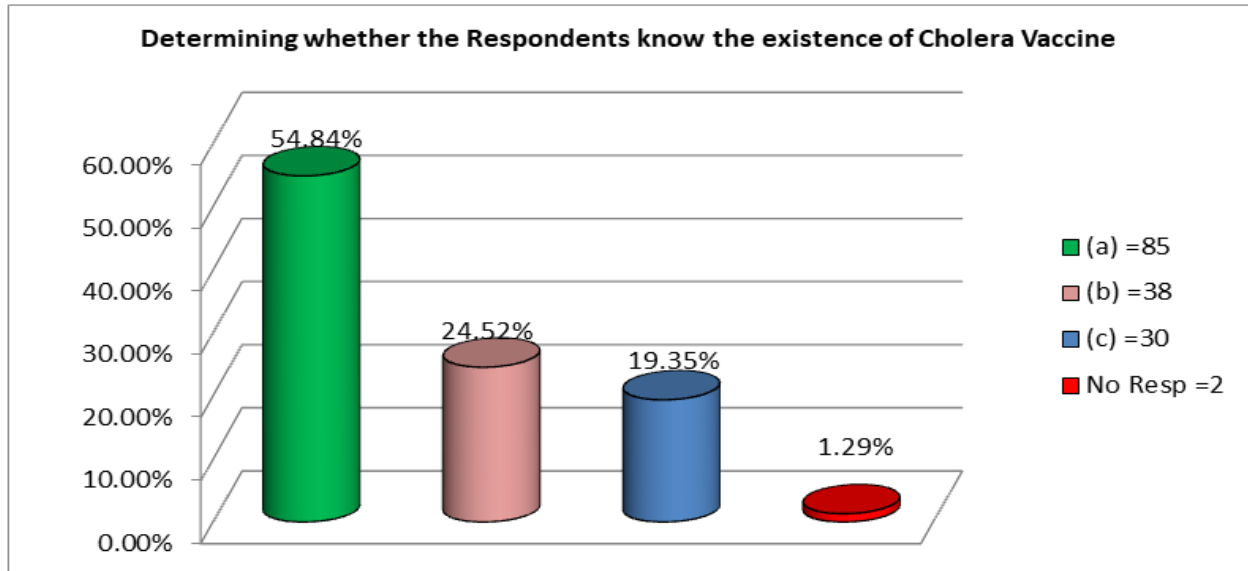


Fig 17 (Question 14): Do you know whether vaccine against cholera exists?
Source: Data derived from First Questionnaire, Bauchi – (2013)

Options for Figure 17:

- ✓ Yes, sure.
- ✓ I am not sure.
- ✓ Cholera vaccine does not exist.

Knowledge is power. Knowing that there is recurrence of cholera outbreak in Bauchi, the populace should be able to go for the periodic vaccination against cholera if they know about it. In this data, 54.84% are aware the vaccine exists and that is good.

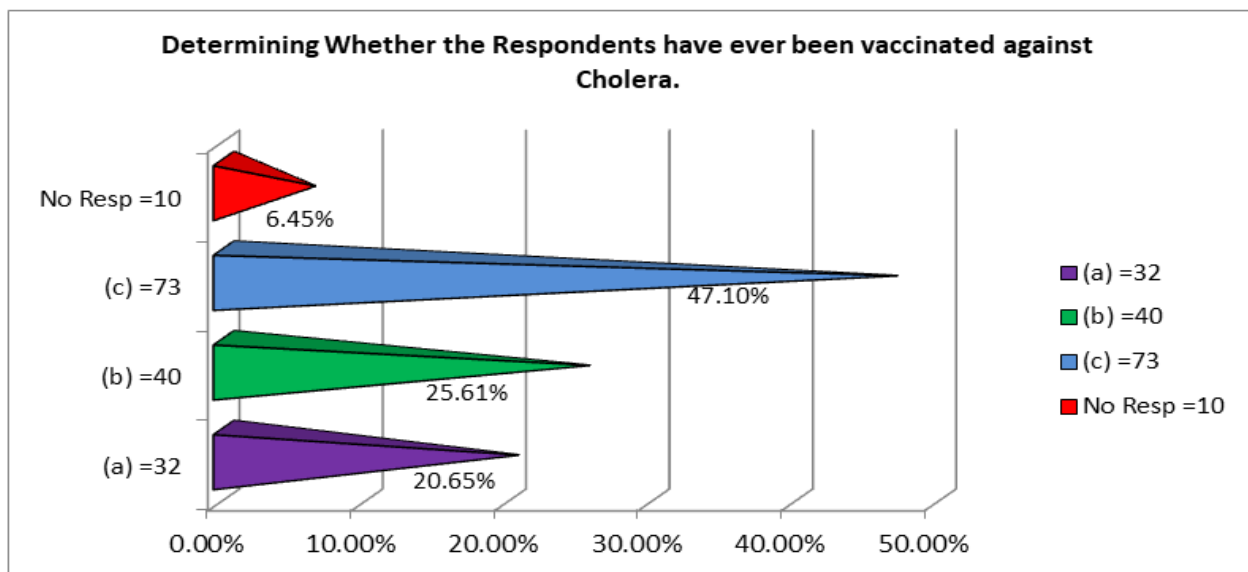


Fig 18 (Question 15): If you think vaccine for cholera exists, have you ever been vaccinated against it?
Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options of Figure 18:

- ✓ Yes, but long time ago.
- ✓ Yes, but long time ago.
- ✓ Never.

Majority of the respondents have never been vaccinated. This shows that vaccination against cholera has not been effectively done in Bauchi state.

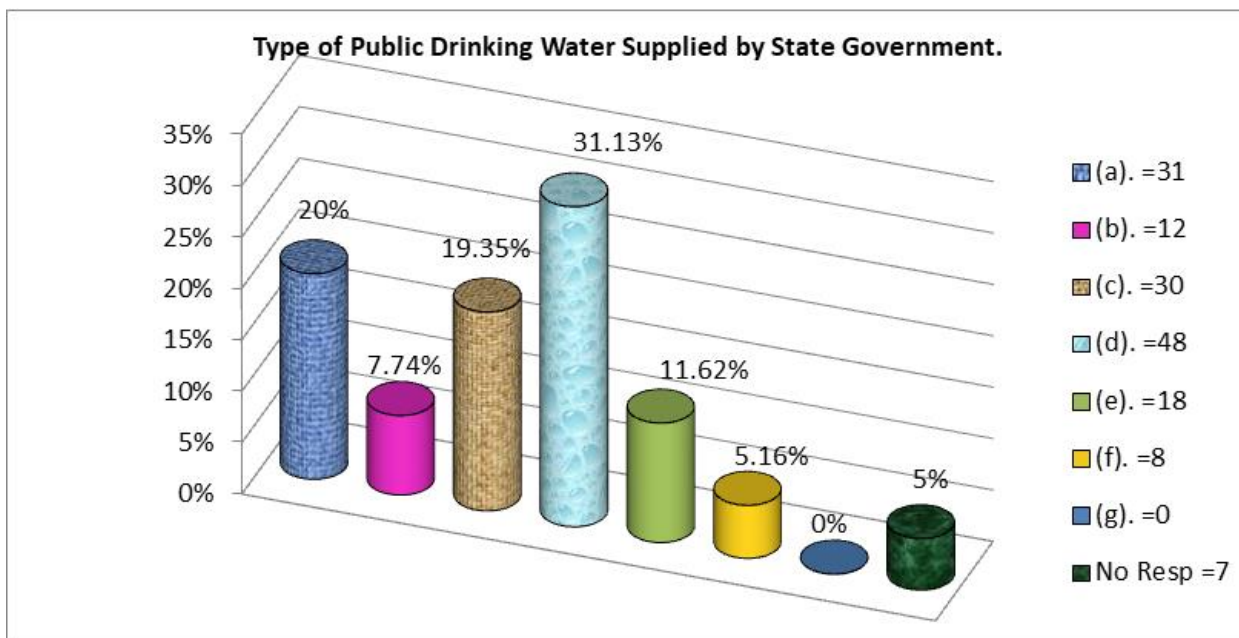


Fig 19 (Question 16): Which type of water do you use as drinking water in your household?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

Options for Figure 19:

- ✓ Public tap water.
- ✓ Motorized borehole water.
- ✓ Manual borehole water.
- ✓ Well water.
- ✓ A natural stream water.
- ✓ Packaged water (pure water) sachets.
- ✓ None of the above.
- ✓ Number not Responded.

Figure 22 above is represented as a cylindrical bar chart portraying what people feel the that Government of Bauchi State provides as drinking water to the general public. The largest percentage (31.12%) said the government provided hand dug well water to them. This alone can be a source of possible contamination. Table 2 on page 22 signifies that all the possible sources of cholera outbreaks from 1991 to 1999 have always been traced to the use of well water for drinking. Only 20% of the respondents said the government has provided tap water from a treated reservoir. This means this tap water is either not consistent or most of the people do not have access to it.

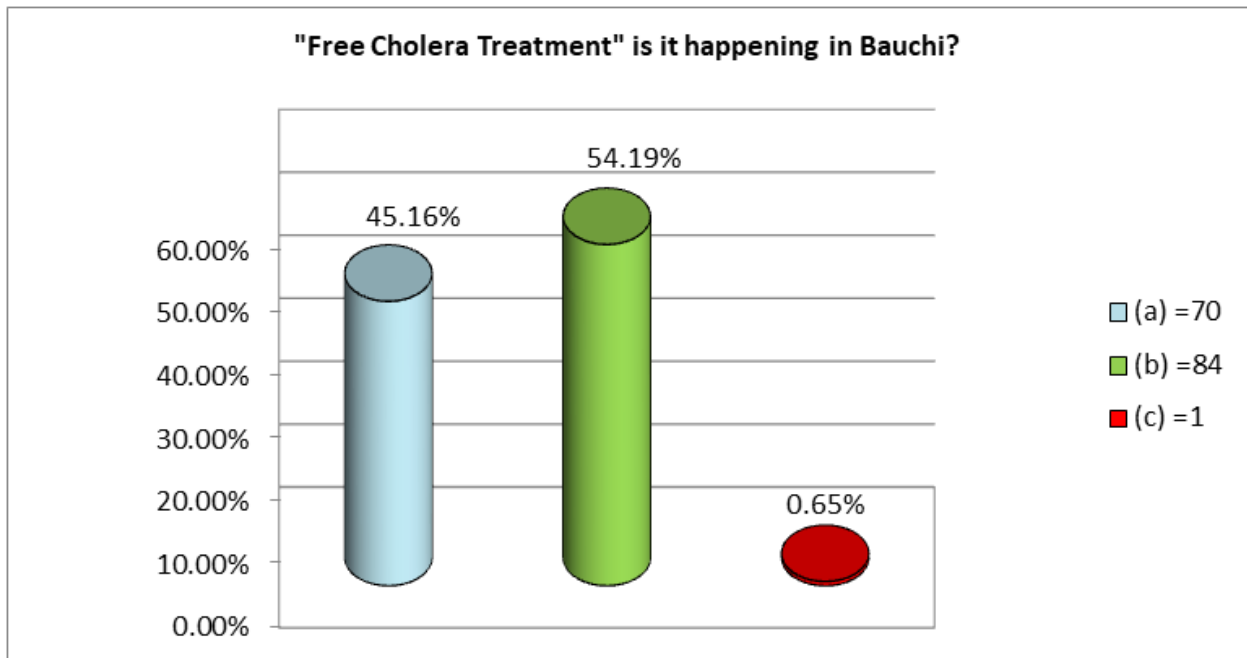


Fig 20 (Question 17): Have you or someone you know ever experienced free treatment from cholera outbreak in Bauchi State?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

• Options of Figure 20:

- ✓ Yes.
- ✓ No.

From this data, majority of the respondents said treatment against cholera outbreak is not free. This shows that most of those affected by its outbreak could lose their lives because of poverty.

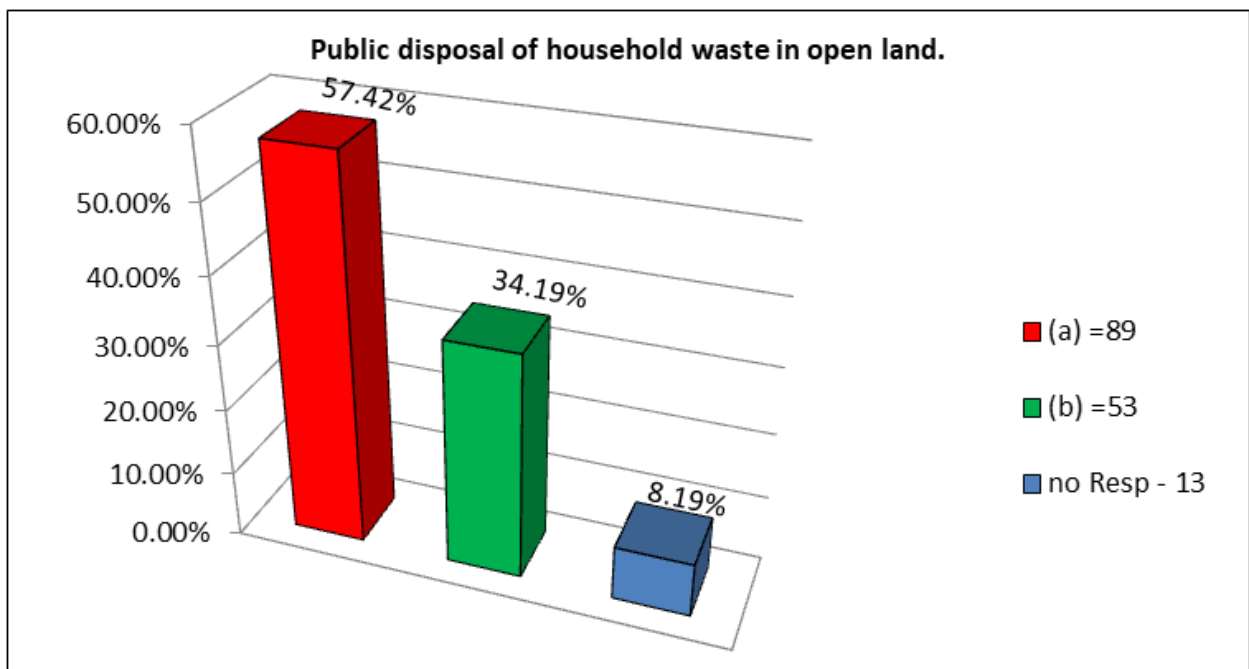


Fig 21 (Question 18): Disposing of your household waste as in an open land?
 Source: Data Derived from First Questionnaire, Bauchi – (2013)

• Options of Figure 21:

- ✓ We dispose refuse in the open land.
- ✓ We dispose refuse in the open land.

Figure 21: Respondents were asked to mention whether they dispose of waste matter in the open land or not. They individually chose from the two options provided. Waste matter from households disposed in the open can be hazardous because flies and other vectors that may aid the transmission of cholera will take advantage of waste dumps that are infested by the bacteria. 57.42% said they dispose their household wastes in the open land. Cholera can be transmitted by house flies and cockroaches as vectors and even heavy rain falls.

Figure 24: displays a bar chart portraying the respondents' indication on the type of water they are using as drinking water in their household. 27.74% said they use packaged water (pure water sachets) as drinking water. 27.17% said they use well water and 27.17% said they use public tap water treated from a treatment reservoir. We are quite aware that cholera is transmitted through contaminated drinking water and food. The main source of the contamination is through human faeces that contain the bacteria (*vibrio cholerae*).

Ajoke (2012) reported in her research work that in Nigeria, the infection is endemic and outbreaks are not unusual. In the last quarter of 2009, it was speculated that more than 260 people died of cholera in four Northern states with over 96 people in Maidugari, Biu, Gwoza, Dikwa and Jere council areas of Borno state. Most of the Northern states of Nigeria rely on hand dug wells and contaminated ponds as a source of drinking water. Usually, the source of the contamination is other cholera patients when their untreated diarrhoea discharge is allowed to get into water supplies.

➤ *Results of Data Derived from the Second Questionnaire:*

I wish to indicate to the readers that out of seventeen (17) of the first questionnaires [containing twenty (7) items,] issued out to the respondents, all the seventeen (17) copies were successfully retrieved. Below is the complete result and the analysis:

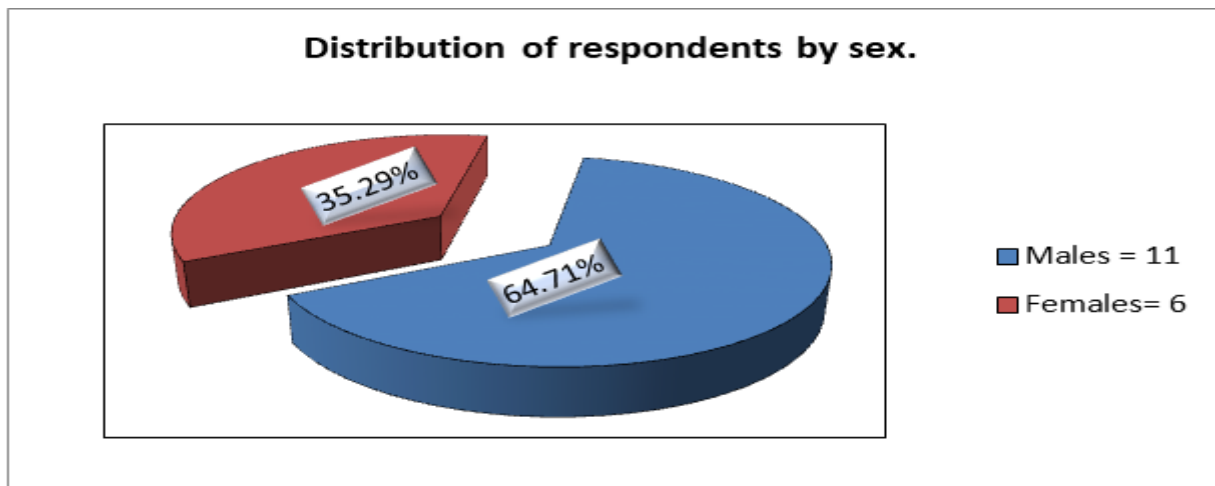


Fig 22 Gender distribution of the Respondents to second questionnaire.
Source: Data Derived from Second Questionnaire, Bauchi – (2013)

The number of the male supervisors that responded to second questionnaire out-numbered the female staff. All of them are senior staff in that Agency.

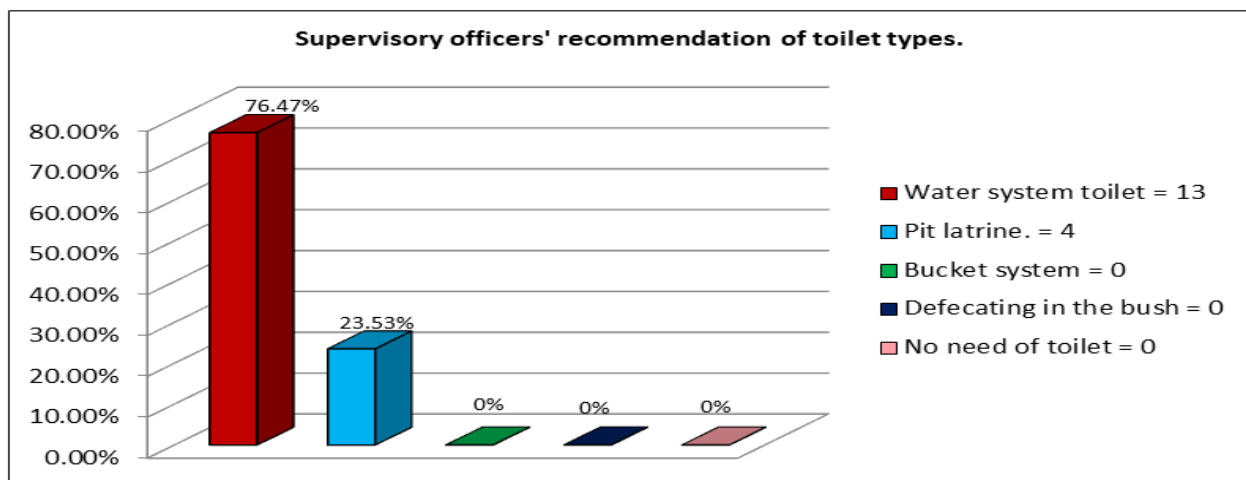


Fig 23 (Question 1): What type of toilet do you recommend for households within Bauchi?
Source: Data Derived from Second Questionnaire, Bauchi – (2013)

Options of Figure 23:

- ✓ Water system toilet.
- ✓ Pit Latrine.
- ✓ Bucket system toilet.
- ✓ Defecating in the bush.
- ✓ No need of toilet.

76% of the supervisors recommended water system toilets for public use. From figure 18, the public respondents recommended the use of pit latrine for their household. This result shows that the public are not sensitized properly on toilet use.

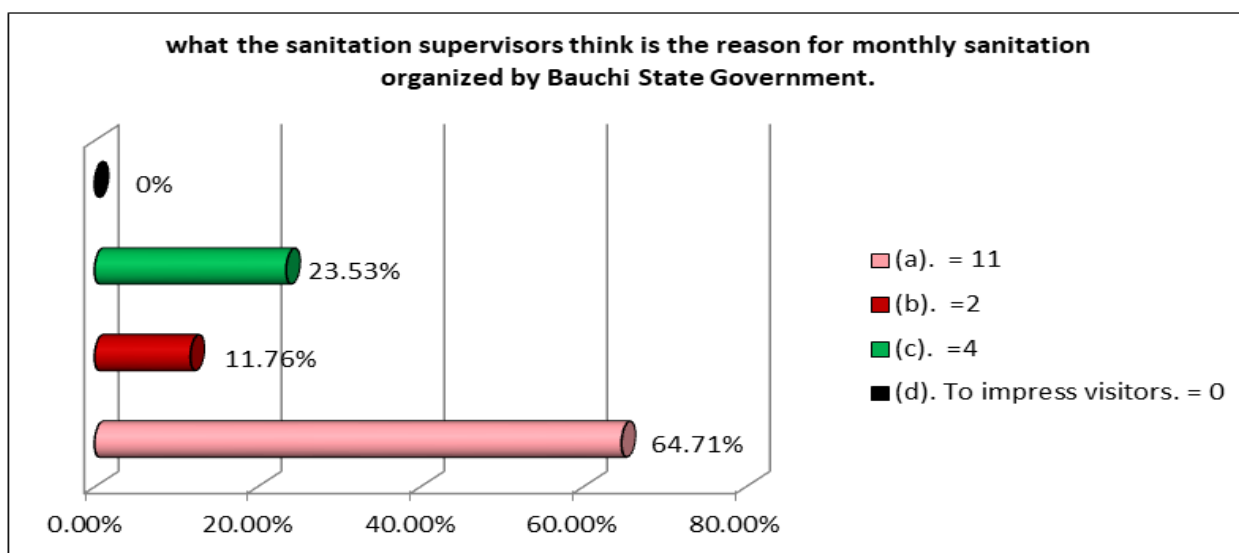


Fig 24 (Question 2): Why do you think Bauchi State Government embarks on monthly sanitation exercises?
Source: Data Derived from Second Questionnaire, Bauchi – (2013)

Options of Figure 24:

- ✓ To guard the public against infections and diseases. = 11
- ✓ To just keep Bauchi town clean and make it more beautiful. =2
- ✓ To encourage people to imbibe the spirit of cleanliness. =4
- ✓ To impress visitors. = 0

This figure is to find out whether the sanitation supervisors know the actual reason behind the monthly sanitation organized in Bauchi. Majority of the respondents chose the correct answer, “To guard the public against infections and diseases.”

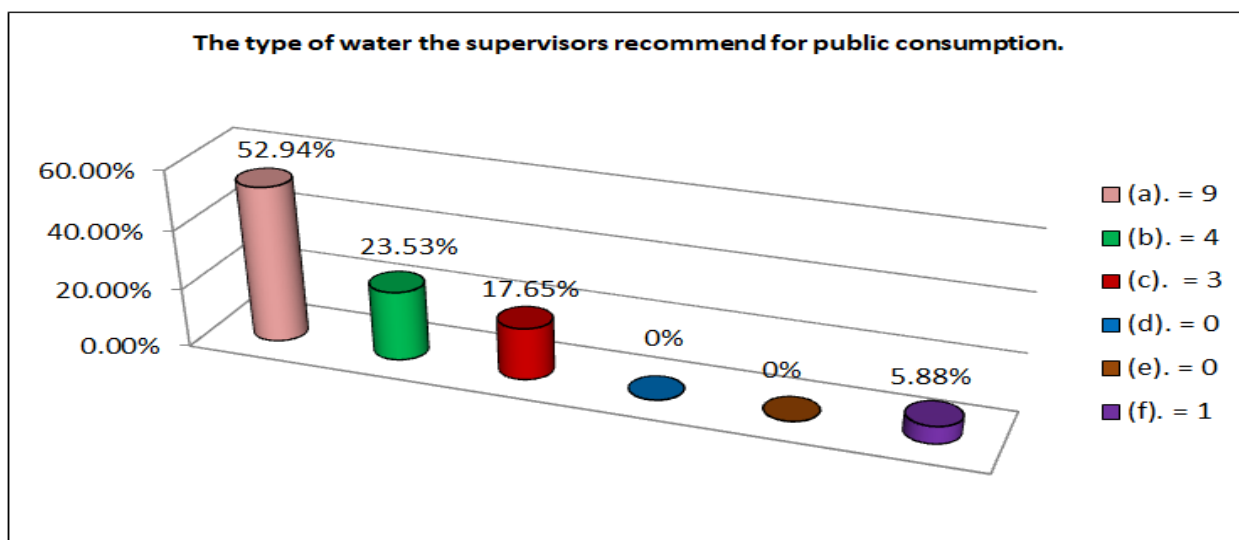


Fig 25 (Question 3): Which type of drinking water do you recommend for the people of Bauchi State?
Source: Data derived from Second Questionnaire, Bauchi – (2013)

Options of Figure 25:

- ✓ Public tap water.
- ✓ Motorized borehole water.
- ✓ Manual borehole water.
- ✓ Well water.
- ✓ A natural stream water.
- ✓ Packaged water (pure water) sachets.

The supervisors chose public tap water as their own recommendation. This could be because there is water treatment plant in Bauchi metropolis. It is the source of public tap water in Bauchi town. In the absence of water treatment plant, public tap water cannot be better for consumption.

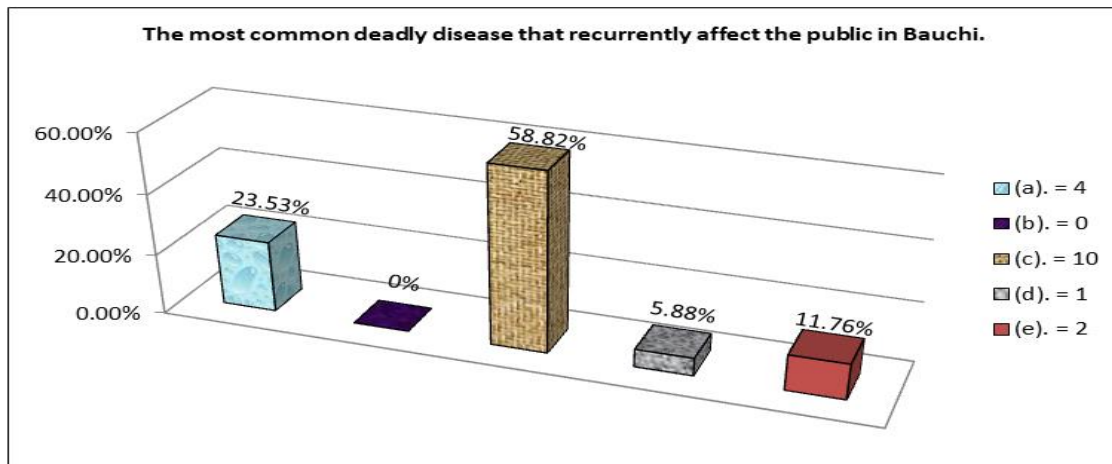


Fig 26 (Question 4): What are the most common deadly diseases that recurrently affect the public in Bauchi?
 Source: Data Derived from Second Questionnaire, Bauchi – (2013)

Options of Figure 26:

- ✓ Measles
- ✓ Leprosy
- ✓ Cholera
- ✓ Malaria
- ✓ Tuberculosis.

Majority of the supervisors know that the most commonly deadly disease that recurrently affects the public is cholera. Unfortunately we still have 24% of the supposed supervisors believing that Measles is the most deadly recurrent disease. Some even chose tuberculosis and malaria.

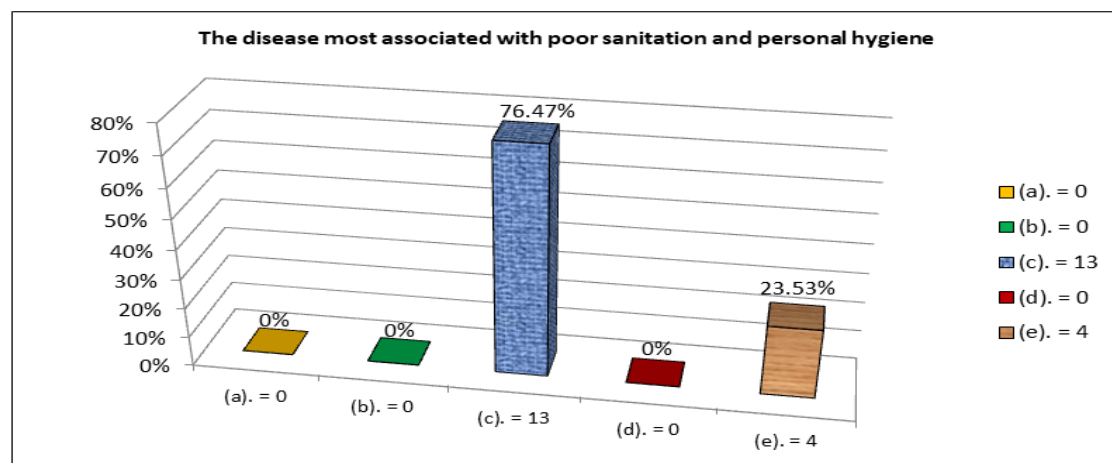


Fig 27 (Question 5): Indicate the disease that is mostly associated with poor sanitation and personal hygiene from the ones listed below?
 Source: Data Derived from Second Questionnaire, Bauchi – (2013)

• Options of Figure 27:

- ✓ Measles
- ✓ Leprosy
- ✓ Cholera outbreak
- ✓ Malaria fever
- ✓ Tuberculosis.
- ✓ Typhoid fever

The supervisors chose Cholera outbreak as the disease that is most associated with poor sanitation and personal hygiene. Only 24% chose Tuberculosis. This shows that still a few numbers of the officers are ignorant of what cholera outbreak is capable of doing.

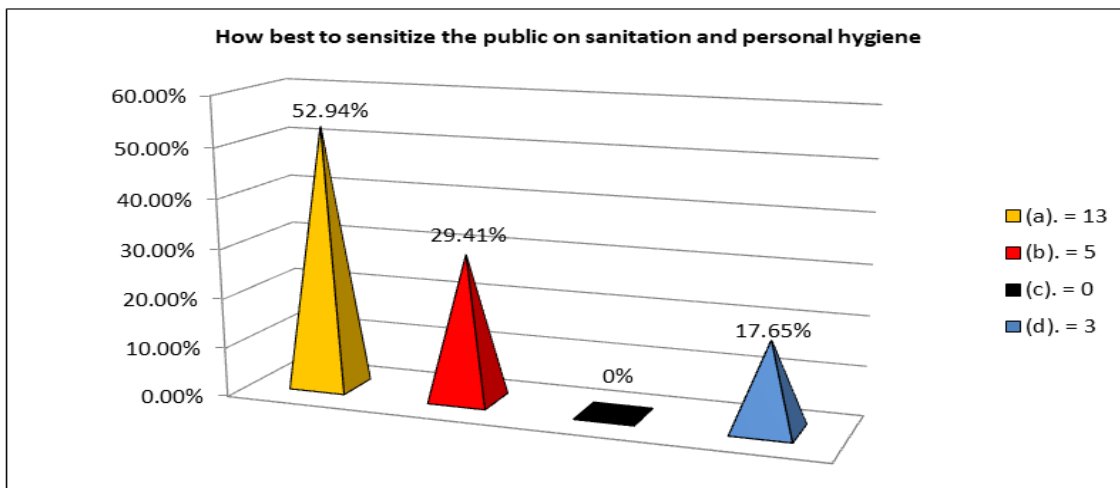


Fig 28 (Question 6): How best do you sensitize the public on sanitation and personal hygiene?
 Source: Data Derived from Second Questionnaire, Bauchi – (2013)

• Options of Figure 28:

- ✓ Public awareness campaign.
- ✓ Through Media.
- ✓ By house-to-house campaign.
- ✓ Through the use of fliers.

The above data clearly shows that majority of the supervisors believe in Public awareness campaign as the best method for sensitizing the public. Some chose media; what are the types of media to be employed? Do all have access to media communication systems?

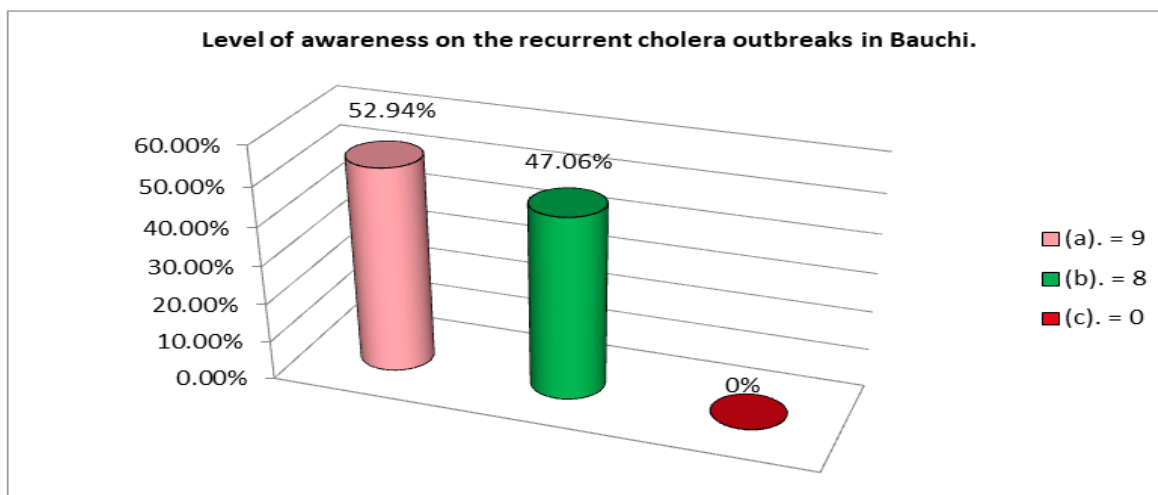


Fig 29 (Question 7): Are you aware of the recurrent cholera outbreaks in Bauchi?
 Source: Data Derived from Second Questionnaire, Bauchi – (2013)

- *Options of Figure 29:*

- ✓ Yes
- ✓ Not recurrent
- ✓ No

53% of the respondents they aware of the recurrence of cholera outbreaks in Bauchi while 47% agree that there are outbreaks but not recurrently. I do not want to dabble into the politics involved, but I believe that those that said is not recurrent are trying to save the image of Bauchi State in the face of people.

➤ *Findings:*

- The Government of Bauchi State has been doing well in the supply of sanitary equipment and the manpower, but some locations have been neglected. The help concentrates mostly within the township.
- Majority of the people use hand dug well water for drinking. Some of the respondents to the first questionnaire said the Government provided them with well water for drinking.
- The recurrence of cholera outbreak in Bauchi State has been associated with rainy season. This means public drinking water do get contaminated with rain water that washes on the ground into wells. Also 'leaching' of rain water from infected pit toilets and such-away of water system toilet into hand dug wells used for drinking water by the public.
- Most of the people knows that whenever there is a recurrence of cholera outbreak, some of them do not know the gravity of the outbreak. About 27% do not know what cholera is all about.
- Majority of the inhabitants of Bauchi State have either heard or attended an awareness campaign on the prevention of recurrent cholera outbreak. The group that have never heard or attended the campaign are up to 39.35% which is alarming.
- Majority of the people of Bauchi use water system toilets, but 30.97% still use pit toilets most of which do not have lid covers. A few do not have toilets at all. Bucket system toilet still exists in Bauchi.
- Majority of the people of Bauchi State dispose of their household wastes in the open land.
- Not all of those that are working as instructors during awareness campaigns are fully knowledgeable in the field.

CHAPTER FOUR

SUMMARY OF RESULT AND CONCLUSION

The major causes of the recurrence of cholera outbreak in Bauchi State can be assumed to be as follows considering the result gotten from the data.

- There is lack of adequate potable drinking water within Bauchi metropolis and its environments. Many people are still drinking water from hand dug well without any sense of treating the well water or disinfecting the water to make it fit for drinking. The supervisors never recommended the use of well water yet some large number of the households in Bauchi is still drinking water from hand dug well. The Bauchi State Government have made efforts to reach out to the people with potable drinking water through public taps and other means like hand dug well and boreholes, but all is not well since 36.13% said the Bauchi State Government have provided only hand dug well water for them to use as drinking water within the metropolis. Only few talked of treated tap water supply.
- Lack of proper household waste disposal system within the community is one of the needs among communities. During cholera outbreaks they become good breeding grounds for the bacteria where insect vectors like house flies and cockroaches can easily have access to it and spread the germs.
- It has been noticed that there is little laxity in enforcing sanitation and querying environmental mismanagement of wastes that could be hazardous to health. Government agencies responsible for sanitation exercise and enforcing same upon the community are selective in their choices of where to do awareness campaigns.
- Awareness campaigns on public sanitation and prevention of cholera has not been intensified or given wide publication,

This study has made us to discover that there are several reasons that are responsible for the annual recurrence of cholera outbreaks in Bauchi State. The people of Bauchi State still use hand dug well water for drinking. I recommend that more research be done on the possible means of combating the menace of cholera in Bauchi especially those of the resistant serotypes, but I have made my recommendations based on my present findings. The Health Minister, Prof Christian Chukwuma, made mention of Borno and Bauchi (in Daily Trust of 17-06-2013) on internet publication that they have the highest record of cholera outbreaks in the country. This can be corrected through the positive attitude of the government of Bauchi State towards implementation of all the recommended methods.

➤ *Recommendations:*

The following nine recommendations will be of great help to Bauchi State Government to help it combat and curtail the predicament of recurrent cholera outbreak in the State:

- The use of hand dug wells for drinking water should be discouraged or the public be sensitized on how it should be treated regularly when in use for drinking in the absence of alternative potable source of water.
- The public awareness campaigns be organized regularly so as to sensitized and train people on how to sterilize water suspected to be contaminated.
- The Federal Agencies responsible for regulating the quality of public drinking water sold by vendors in the form of sachets (pure water) should periodically and properly checked against contamination.
- Public tap water supply must genuinely undergo proper treatment before the supply is made to the public. This calls for the Government to employ more professionals in water treatment plants and public supply of the drinking water.
- Pit latrine systems must have cover lids and must undergo regular treatments at all times. Pit latrine systems and suck-away for water system toilets should not be sited close to hand dug wells or boreholes meant for fetching drinking water to avoid contamination by human faeces. During rainy seasons the untreated infected faeces are washed by the rain into the hand dug well directly or through leaching under the ground from latrines containing infected faeces to the well water.
- Proper sanitary disposal of faeces should be done in all communities and all households must adhere to the rules and have toilets. These toilets must have regular cleaning and disinfection with chemicals like IZAL.
- Awareness campaign must be intensified for the people in areas of personal hygiene, food sanitation and household waste disposal. This should be a regular exercise and not until there is outbreak of cholera in the state.
- The use of cholera vaccines must be consistent among potentially endangered communities within Bauchi State.
- Provision of street bins with cover lids to guard against disposal of household wastes in the open land will reduce the spread of cholera by insect vectors like house flies.

➤ *Supervisory Bodies for Environmental Sanitation in Bauchi should be having Regular Trainings and Workshops on new ways to:*

- Curb recurrence of cholera outbreaks in Bauchi State.
- Organizing awareness campaigns on environmental health.
- Understanding the nature of cholera and how it is spread.

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FIRST QUESTIONNAIRE

INTERNATIONAL UNIVERSITY- BAMENDA
New life Building, Commercial Avenue,
P.O. Box 444, Bamenda, Cameroon, Central Africa.

DATE:

Motto: Service to mankind for the Glory of God

.....
.....
.....

Dear Sir/Ma,

My name is ELISHA ZIRA DIA (IUB/MPH/2012/2013/B001), a post-graduate student of International University Bamenda, Cameroon.

I wish to crave your indulgence to kindly supply me with the required information by filling the attached questionnaire.

Sir, for every information you give here I assure you that it be treated with high sense of confidentiality and to be used for academic exercise only.

Thank you in anticipation for your kind response sir.

Yours faithfully,

ELISHA ZIRA DIA

FILL THE REQUIRED INFORMATIONS BELOW PLEASE

NAME (Optional):SEX AGE:

Tick the correct option or Options:

1. What is “CHOLERA”?

- (a). An intestinal infection that causes rapid dehydration.
- (b). It is another word for dysentery or diarrhoea.
- (c). It is a type of fever that causes vomiting.

2. What is your perception about what “Cholera” can cause?

- (a). Cholera can kill within a few hours from infection time.
- (b). Cholera is a simple ailment that can be treated with ease.
- (c). Cholera can kill within two days from infection time.

3. How can you protect yourself against Cholera infection?

- (a). by constant bathing and wearing of clean clothes.
- (b). by eating food and drinking water at the right time.
- (c). by washing of hands clean before taking meal only.
- (d). by keeping away food suspected to be contaminated.
- (e). by personal hygiene and environmental sanitation.

4. What do you think is the main source of Cholera infection?

- (a). All unclean drinking water.
- (b). Food that is not well cooked.
- (c). Food or water contaminated with faeces of infected person.

5. Which type of water do you use for drinking in your household?

- (a). Public tap water .
- (b). Motorized borehole water.
- (c). Manual borehole water
- (d). Hand dug well water.
- (e). Pure water sachets.

6. Which type of drinking water does Bauchi State Government serve the public?

- (a). Public tap water .
- (b). Motorized/manual borehole water.
- (c). Hand dug well water.
- (d). ‘a’ and ‘c’ above.
- (e). None of the above.

7. Which of the seasons within a year is associated with cholera outbreaks in Bauchi?

- (a). Rainy season.
- (b). Dry season.
- (c). Not seasonal.

8. Has there been Public Awareness Campaign within Bauchi Metropolis on preventive measures for recurrent cholera outbreak and personal hygiene

- (a). Yes, several times.
- (b). Not often.
- (c). I do not know anything like that.

9 Have you ever attended Public Awareness Campaign on preventive measures for recurrent cholera outbreak and personal hygiene?

- (a). Yes, several times.
- (b). Once in a while.
- (c). I have never attended such.

10. In your understanding, was it Bauchi State Government that has been organizing the public awareness campaign or some other organizations?

- (a). It is Bauchi State Government.
- (b). It is some NGOs/private health care providers.
- (c). I do not know the organizers.

11. Is this public awareness campaign consistent and regular?

- (a). Yes, it is consistent and regular.
- (b). No, I see it happen only when there is an outbreak.
- (c). No, only once in a while.

12. What type of toilet do you use in your household?

- (a). Water system toilet.
- (b). Pit latrine.
- (c). Bucket system toilet.
- (d). We have no toilet.

13. Which type of toilet do you think is much preferred and safe to use?

- (a). Water system toilet.
- (b). Pit latrine.
- (c). Bucket system toilet.
- (d). defecating far in the bush.

14. Do you know whether vaccine against cholera exists?

- (a). Yes, sure.
- (b). I am not sure.
- (c). Cholera vaccine does not exist.

15. If cholera exists, have you ever been vaccinated against it?

- (a). Yes, but long time ago.
- (b). Yes, recently.
- (c). Never.

16. Which type of water do you use as drinking water in your household?

- (a). Public tap water.
- (b). Motorized borehole water.
- (c). Manual borehole water.
- (d). Well water.
- (e). A natural stream water.
- (f). Packaged water (pure water) sachets.
- (g). None of the above.

17. Have you or someone you know ever experienced free treatment from cholera outbreak in Bauchi State?

- (b). Yes.
- (c). No.

18. Disposing of your household w in an open land?

- (a). We dispose refuse in the open land.
- (b). We dispose refuse in the open land.

SECOND QUESTIONNAIRE

INTERNATIONAL UNIVERSITY- BAMENDA
New life Building, Commercial Avenue,
P.O. Box 444, Bamenda, Cameroon, Central Africa.

DATE:

Motto: Service to mankind for the Glory of God

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.....
.....

Dear Sir/Ma,

My name is ELISHA ZIRA DIA (IUB/MPH/2012/2013/B001), a post-graduate student of International University Bamenda, Cameroon.

I wish to crave your indulgence to kindly supply me with the required information by filling the attached questionnaire.

Sir, I wish to assure you that every information you give here will be treated with high sense of confidentiality and to be used for academic exercise only.

Thank you in anticipation for your kind response sir.

Yours faithfully,

ELISHA ZIRA DIA

FILL THE REQUIRED INFORMATIONS BELOW PLEASE.

NAME (Optional):SEX AGE:

Tick the correct option and specify others please:

1. What type of toilet do you recommend for households?

- (a). Water system toilet.
- (b). Pit latrine.
- (c). Bucket system toilet.
- (d). Defecating in the bush.
- (e). We recommend no toilet.

2. Why do you think Bauchi State Government embarks on monthly sanitation exercises?

- (a). To guard the public against infections and diseases.
- (b). To just keep Bauchi town clean and make it more beautiful.
- (c). To encourage people to imbibe the spirit of cleanliness.
- (d). To impress visitors.

3. Which type of drinking water do you recommend for the people of Bauchi State?

- (a). Public tap water.
- (b). Motorized borehole water.
- (c). Manual borehole water.
- (d). Well water.
- (e). A natural stream water.
- (f). Packaged water (pure water) sachets.

4. What are the most common deadly diseases that recurrently affect the public in Bauchi?

- (a). Measles
- (b). Leprosy
- (c). Cholera
- (d). Malaria
- (e). Tuberculosis.

5. Indicate the disease that is mostly associated with poor sanitation and personal hygiene from the ones listed below?

- (a). Measles
- (b). Leprosy
- (c). Cholera outbreak
- (d). Malaria fever
- (e). Tuberculosis.
- (f). Typhoid fever

6. How best do you sensitize the public on sanitation and personal hygiene?

- (a). Public awareness campaign.
- (b). Through Media.
- (c). By house-to-house campaign.
- (d). Through the use of fliers.

7. Are you aware of the recurrent cholera outbreaks in Bauchi?

- (a). Yes
- (b). Not recurrent
- (c). No