

CHOLERA OUTBREAK IN GENGLE COMMUNITY NORTHERN NIGERIA: THE PROBLEM AND MANAGEMENT OF REOCCURRENCE OUTBREAK

BY

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Abstract

Cholera is a prominent indicator of a lack of social progress and one of the infectious diseases caused by *Vibrio cholera* that continues to threaten public health worldwide, especially in communities with inadequate water treatment, poor sanitation, and hygiene practices. The study aims to assess lack of information on causes, problems and management cholera outbreak. The population of this study covers the residents of Gengele Community in Adamawa State 307 participants were selected using multistage sampling technique, respondent were selected using a self-administered questionnaire to collected data using. Findings outcome the respondents fell within age 26-40 years 62.3% and 55% were female. 258 were cognizant that cholera outbreak associated with consuming contaminated food and water, 276 were agreed that limited access to hygiene services facilitate the spread of the bacteria and familiar with illness signs and symptoms. 234 express a strong sense of concern about the current insecurity and potential threat of insurgency and unplanned urbanization, underlying problem of cholera outbreak, 287 suggest that quick response to inequality in access to health facilities with boreholes in cholera hotspots and other social development facilities as means of disease management. The statistical analysis given that P-value is 18.72 and 12.36 which is < critical value 21.02 and 16.92 respectively therefore null hypothesis rejected, Conclusions drawn from the study is that the residents have a relatively robust knowledge about the cholera signs and symptoms, the residents' wiliness to participate in case surveillance and reporting any signs and symptoms of cholera for immediate response. It is recommended to establish community engagement, strengthen the security of the region, and create access to hygiene services, (WASH) and health facilities by the government, NGO and religious institutions.

Keywords: Cholera, outbreak, hygiene, *Vibrio-cholera*

Introduction

For a long time, infectious diseases have been raging throughout the African nations; in addition, they have been identified as one of the leading causes of mortality. Since 2010, the number of mortalities linked to communicable diseases, such as cholera, has decreased by 1% annually (United Nations, 2020). The World Health Organization WHO (2017) predicts that before 2050, the number will occasionally rise and that the figures will probably fluctuate. The acute watery diarrheal sickness known as cholera, which is caused by *Vibrio-cholerae*, has emerged as a serious global health concern. With the exception of a significant epidemic that swept throughout Asia in 1992 and saw the development of the O139 serogroup, *Vibrio cholerae* serogroup O1 classical biotype was mostly responsible for the large-scale outbreaks that occurred over the course of seven recorded pandemics (Harris et al., 2018) The El Tor biotype first appeared during the outbreak of the seventh pandemic in 1961 and spread throughout most of Asia. In the 1970s, it swept west, touching Africa, the Middle East, and the former USSR before landing in Latin America in the early 1990s. Most recently, it caused outbreaks in Hispaniola in 2010. (Harris et al., 2018) In Nigeria, the first documented outbreak of cholera was in late 1970 with an estimated 22, 931 cases and 2, 945 deaths (Reliefweb, 2021). Beyond this, Nigeria has continued to witness outbreaks of cholera of various proportions in several regions of the country until date.

Nigeria is among the top three global hotspots for cholera cases at the moment. Due to elements like flooding, restricted access to hygienic services, and contaminated water, the spread of cholera and other waterborne illnesses is probably going to get worse (Reliefweb, 2021) Not only that, the armed banditry in the Northwest and Northeast including Adamawa, destroyed also uprooted millions of people, making it harder for them to get food and clean water, due to the current circumstances, cholera epidemics in the area have become more severe, resulting in recurrent outbreaks that are marked by high hospitalization rates, high mobility, and fatalities. Due to reporting and access concerns, it is difficult to pinpoint the exact cholera load in these two districts due to the nature of the hostilities. (Marin et al., 2023)

The recent estimates, there are over 2.9 million cases of cholera worldwide each year, with 95,000 fatalities. Africa is the most affected region, accounting for 68% of deaths and 60% of cases. (WHO, 2017) As of June 2024, 30 states in Nigeria had registered 1,141 suspected cases of cholera since January 2024. The 10 states that recorded 90% of the cases are mostly located in the southern Nigeria. According to molecular research. Using amplified fragment length polymorphism, two clusters have been found thus far (AFLP): Groups I and II. Cluster I mostly consist of strains from the 1960s and 1970s based on alterations in the clonal structure, whereas Cluster II includes strains from the 1980s and 1990s and showed a temporal pattern of change in the clone. The strains from the African Continent show this the most. (Marin et al., 2023)

The use of culture-based diagnostic techniques is constrained in many cholera-prone areas in northeastern Nigeria due to low or inappropriate laboratory capacity, unstable security circumstances, limitations on movement, lack of necessary resources, the high population in the camps and insufficient funding to the humanitarian response plans and WASH (Charnley, et al., 2022) However, the research found that a lack of knowledge about the causes, issues, and management of cholera outbreaks is especially concerning because these local communities may be the ones most severely impacted by insecurity, poor personal hygiene, inadequate health facilities, and contaminated primary water sources. Disease outbreaks are unavoidable in Adamawa State because the majority of the population, especially in Gengele Community, are rural areas with little to no access to modern amenities. In order to close the knowledge gap regarding the impact of cholera outbreaks on public and individual health and to promote healthy living, the primary goal of this study is to identify the issues surrounding the management of the outbreaks in Gengele Community, Mayo-Belwa Local Government Area, and Adamawa State, Nigeria.

Methodology

The cross-sectional survey was conducted at Gengele Community Mayo-Belwa local government of Adamawa State. Adamawa state has in general a population of 4,902,100 people of which 49.4% are females and 50.6% are males. The state has 122.7/square kilometres density with a total area of 39,940 square kilometers. Adamawa has a diverse ethnic background with rich cultures. The Adamawa state about 601 kilometers from the country's capital, Abuja, adamawa has 21 local government include, Mayo-Belwa which approximately occupied by a population of 204,200 as of 2016 (Nigeria Population Commission, 2023). Gengele Community is a settlement in Mayo-Belwa local government. Descriptive design was adopted for the study and a questionnaire was used to elicit necessary information from the respondents. The population unit of the study consists indigene and residents of Gengele Community who are between the ages of 18-60 years. The Multi-stage sampling technique was used in sample selection of the 307 who participated voluntarily, the predominant language spoken in the selected community is Hausa. Therefore, the questionnaire was translated into hausaland language. The questionnaire was pilot-tested prior to data collection. Data obtained was analyzed and presented in the frequency table, percentages, and chi-squared analysis. Anonymity and confidentiality of information were maintained. The study is a cross sectional survey to assess the problem and management of cholera outbreak. The flexible nature of quantitative methods allows for exploration of the complex phenomenon and subjective knowledge of individuals in their natural context of cholera outbreak in Gengele Community.

Results

Table 1 Demographic Characteristics of the Respondents

Parameters	Frequency and percentage	
Age: 18 – 25 years	25	(8.1%)
26 – 40 years	191	(62.3%)
41 – 60 years	86	(28%)
Above 60 Years	5	(1.6%)
Total	307	(100%)
Gender: Male	169	(55%)
Female	138	(45%)
Total	307	(100%)
Education level:		
No formal Education	146	(47.6%)
First Leaving Certificate	76	(24.8%)
O Level certificate	71	(23.1%)
First degree	11	(3.6%)
Post graduate	3	(0.9%)
Total	307	(100%)
Religion: Islam	141	(46%)
Christianity	166	(54%)
Total	307	(100%)
Monthly Income		
Less than N50,000	172	(56%)
N51000 – N200,000	69	(22.5%)
N201,00 – N500,000	38	(12.4%)

N501,000 above	28	(4.1%)
Total	307	(100%)
Marital Status: Single	25	(8.2%)
Married	182	(59.4%)
Divorced	70	(22.7%)
Separate	30	(9.7%)
Total	307	(100%)
Occupation: Unemployed		
Civil/Public Servant	34	(11%)
Self Employed	28	(9.1%)
Apprenticeship/ Student	166	(54%)
Total	79	(26%)
	307	(100%)

Table 1. Presents the demographic characteristics, the majority of the respondents fell within the 26-40 years age group (62.3%) the gender distribution of the respondents was slightly increase towards males with (55%) The respondents had diverse educational backgrounds. The largest group was those with no formal education, accounting for (47.6%), those with First Leaving Certificates (24.8%), Secondary education qualification stood at (23.1%), and first degrees (3.6%) Most of the respondents were married, representing (59.3%) followed by those who were divorced (22.7%). Base on monthly income the respondents showed that the largest group (56%) earned below N50, 000 per month and the smaller proportion are earning N501, 000 above were (9.1%) The largest group was self-employed individuals, comprising (54%), this was followed by artisans/ students/apprenticeships (26%) as indicated in the able above.

Table 2: Respondents' Problems of cholera out break

Statements	SA	A	D	SD
I am aware that Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium <i>Vibrio cholerae</i> .	168 (55%)	90 (29.2%)	21 (6.8%)	28 (9%)
I know that Cholera is an indicator of inequity, lack of social development and	152 (49.5%)	106 (34.5%)	23	26 (8.5%)

limited access to hygiene services			(7.5%)	
I understand the potential health risks associated with consuming contaminated food or water.	162 (52.8%)	82 (26.7%)	33 (10.7%)	30 (9.8%)
I am familiar with the signs and symptoms of Cholera illnesses caused by ingestion of contaminated food or water	160 (52%)	86 (28%)	25 (8%)	36 (12%)
I know & understand that disease tends to spread more easily due to poor drainage systems, water hygiene sanitation (WASH) practices	106 (34.5%)	128 (41.7%)	38 (12.4%)	35 (11.4%)
I understand that Cholera can cause severe acute watery diarrhoea and the severe forms of the disease can kill within hours if left untreated health.	164 (53.4%)	131 (42.6%)	7 (2%)	5 (2%)
I have received some educational or awareness-raising information about the effects cholera outbreak	72 (24%)	53 (17%)	105 (34%)	77 (25%)

Table 2 shows that a significant number of respondents (55% strongly agree and 22.9% agree) are aware that cholera is caused by consuming food or water contaminated with the bacterium *Vibrio cholerae*, and that (49.5% strongly agree and 34.1% agree) that cholera is an indicator of inequity, lack of social development, and limited access to hygiene services; they also understand the potential health risks associated with consuming contaminated food or water (52.8% strongly agree and 26.7% agree); they were generally aware of the signs and symptoms of cholera illnesses, and a large number of respondents (34.1% strongly agree and 41.7% agree) with the statement that cholera outbreaks due to poor drainage and WASH practices. 41.7% of respondents agreed with the statement, and 34.1% strongly agreed. Additionally, the majority of respondents (42.6% agree and 53.4% strongly agree) were aware that cholera can induce vomiting and severe watery diarrhea, which can be fatal within hours if treatment is not received. However, a lesser percentage of respondents had received some instructional or awareness-raising information regarding the effects of the cholera outbreak (24% strongly agree and 17% agree). When asked about the role of insecurity in northern Nigeria, the majority of respondents (54.3% strongly agreed and 39.1% agreed) said that insurgency banditry had displaced millions of people and that a key issue of recurrence was the lack of access to clean water, food, and hygiene facilities. Unplanned urbanization, conflict and climate changes was also cited as

problems of recurrent outbreak of cholera by a greater percentage of respondents (49% agreed and 31.5% strongly agreed).

Table 3: Management of cholera outbreak

Statement	SA	A	D	SD
Community should be actively involved in surveillance and reporting any signs and symptoms of cholera illness, for immediate response	35 (11%)	33 (11%)	111 (36%)	128 (42%)
Targeting personal hygiene and water treatment as well as emergency responses will control the outbreak	160 (52.1%)	88 (28.7%)	23 (7.5%)	36 (11.7%)
I am willing to support and participate in initiatives aimed at preventing and management of the outbreak in my community.	172 (56%)	71 (23%)	24 (8%)	40 (13%)
I believe simple measures such as, use of soap and hand washing promotion (fruits and vegetables), boiling the water for drinking, cooking and other purposes can eradicate the cholera outbreak.	158 (51.5%)	102 (33.2%)	21 (6.8%)	26 (8.5%)
Finding lasting solutions to the ongoing insurgency and banditry, proper disposal of infected materials, sewages and drainage systems	171 (55.7%)	120 (39.1%)	5 (1.6%)	11 (3.6%)
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.	160 (52.1%)	88 (28.7%)	36 (11.7%)	23 (7.5%)
I am confident that my community can work together to find effective solutions to the issue of cholera outbreak reoccurrence	170 (55.4%)	76 (24.7%)	27 (8.8%)	34 (11.1%)

Findings in Table 3 indicate that the majority of respondents (42% strongly disagree and 36% disagreed) that community should not involve in surveillance and reporting any signs and symptoms of cholera. Majority of respondents (52.1% strongly agree and 28.7% agreed) that personal hygiene and water treatment as well as quick emergency responses will control the outbreak. The majority of respondents (38% strongly agree and 42% agree) were willing to support and participate in initiatives aimed at preventing and management of the outbreak in their community. Similarly, majority of the respondents (51.5% strongly agreed and 32.2% agreed) confident that simple measure, such as use of soap and hand washing promotion (fruits and vegetable), boiling the water for drink can eradicate cholera outbreak in their community. Finally, a significant proportion of the respondents (55.4% strongly agreed and 24.7% agreed) were confident that there community has the ability to work together to find effective solutions to the issue of cholera outbreak reoccurrence as indicate in table 3.

Hypothesis

Table 4 Contingency Table: Age and understanding of problem and management of cholera outbreak

Age	Strongly Agree	Agree	Disagree	Strongly Disagree	Row Total
18 – 25	8	11	4	2	25
26 – 40	65	58	39	29	191
41 – 60	41	22	11	12	86
Above 60 Years	2	3	0	0	5
Column Total	116	94	54	43	307

The data in table 4 above shown that calculated chi-square value (12.36) is less than the critical value (16.92), the null hypothesis is rejected, hence, the alternate hypothesis is accepted, and therefore there is statistically significant relationship between age and understanding problem and management of cholera outbreak.

Table: 5 Contingency Table Gender and understanding of problem and management of cholera outbreak

Gender	Strongly Agree	Agree	Disagree	Strongly Disagree	Row Total
Male	49	47	31	42	169
Female	37	50	21	30	138
Column Total	86	97	52	72	307

The finding in table 5 state that chi-square value of (15.31) is higher than the critical value of (7.81) therefore, the null hypothesis is rejected, hence, it can be concluded that there is statistically significant association between the respondents' Gender and understanding problem and management of cholera outbreak.

Table 6: Contingency Table Education Qualification and understanding of problem and management of cholera outbreak

Educational Qualification	Strongly Agree	Agree	Disagree	Strongly Disagree	Row Total
No formal Education	30	27	41	48	146
First Leaving Certificate	23	11	27	15	76
Senior Secondary	31	23	9	8	71

HND/Bachelor	11	0	0	0	11
Post graduate	3	0	0	0	3
Column Total	98	61	77	71	307

The calculated chi-square value (18.72) is less than the critical value (21.02), the null hypothesis is rejected, hence, the alternate hypothesis is accepted, and therefore there is statistically significant relationship between Education qualification and understanding problem and management of cholera outbreak.

Discussion of Findings

The research revealed a number of characteristics that are important in the management of cholera outbreaks, such as civil unrest and terrorism-related activities that hinder access to clean water (as indicated in table 3) and inadequate environmental sanitation. According to another study that qualitatively evaluated Mozambique's resistance to cholera intervention, this result is consistent. Démolis et al., (2018). Contribute to the current corpus of research on community viewpoints regarding environmental and public health issues associated to cholera outbreak management techniques, and offer insightful explanations of the problem and management of cholera outbreaks.

According to table 2, the study's findings on residents' prevalent attitudes toward personal hygiene, water, sanitation, and hygiene practices are linked to risks that are in line with studies that have found that community concern is a motivating factor for advocacy and participation in environmental assessments (Abdulrahim et al., 2022; Elimian, et al., 2020). Communities are frequently prompted to take an active role in resolving issues when they see a threat to their environment or well-being. Residents of the Gengle neighborhood have voiced a great deal of concern about the possible effects of water and food contamination quality as well as hygiene services, which shows that they understand how serious the problem is and want to protect the health of their community.

Additionally, studies that have examined the impact of perceived vulnerability on risk perceptions and related health behaviors are in line with the perception of personal and ancestral risk resulting from the close proximity to consuming food and water contaminated with the vibrio cholerae bacteria (OCHA., 2022) People's perceptions of risk are often elevated and they are more inclined to take preventative or protective measures when they perceive that environmental risks directly threaten them. The proximity of tainted water supplies, which the people of Gengle depend on for both household and agricultural needs, makes them feel vulnerable.

According to table 3 results, residents have a reasonably solid understanding of the composition and possible risks of managing cholera outbreaks. This is consistent with earlier research that emphasized the significance of public education and awareness in controlling environmental risks. The findings is inconsistency with recent study (Olanrewaju & Adepoju, 2021). This result implies that public education campaigns about the risks of cholera outbreaks have been effective in increasing awareness among Gengle community members. In order to promote community involvement and support for risk-reduction strategies, public knowledge and comprehension of environmental issues are crucial.

According to table 2, which shows a high degree of knowledge of cholera signs and symptoms, the respondents indicate that attempts have been made to educate the public about the possible risks of cholera outbreaks and recurrences, which is consistent with earlier research that (Abdulrahim et al., 2022). These initiatives, which could have taken the form of community gatherings, public education campaigns, or the distribution of educational materials on topics such as the dangers of open defecation, the importance of washing your hands, the importance of participating in case surveillance, and the need to report cases promptly, have been instrumental in providing locals with the knowledge they need to identify the risks of contaminated food and water.

The diversity of concern towards current cholera outbreak management practices and the perceived threat to health quality aligns with findings from other studies that have documented varying community perspectives on environmental issues (Abubakar, et al., 2016; Elimian et al., 2020). This diversity highlights the need for a nuanced and inclusive approach that considers the different viewpoints and prioritizes, community participation on their health decision making, open dialogue and participatory decision-making processes.

The known correlation between age, gender, and educational attainment is supported by the statistically significant relationship between cholera outbreak management issues and sociodemographic traits on human health (Olanrewaju & Adepoju, 2021). Furthermore, table 4 and table 6's findings that age and educational attainment have an impact on knowledge of cholera outbreaks and health consequences are consistent with earlier studies that examined how sociodemographic traits shape environmental risk of cholera (Gwenzi et al., 2019). This implies that in order to effectively address the problems of various age groups within the community, education, age-specific considerations, and focused communication tactics may be required.

Conclusion

The outcome of these findings offers important information that can guide initiatives to reduce the risks of the cholera outbreak, manage it, prevent it from happening again, and advance public health and environmental protection. The main findings of the study indicate that the locals possessed a reasonably thorough understanding of the symptoms and indicators of cholera as well as its possible risks. To stop the rapid spread of cholera and its accompanying hazards, the study also found that residents had varying levels of willingness and perceptions to participate in case surveillance and report any signs and symptoms for prompt action.

Additionally, the results of this study highlight the value of inclusive and community-based approaches in tackling issues associated to cholera outbreaks. Cholera necessitates a strong multi-sectoral response because it is both a health issue and a socioeconomic development concern. Economic growth and universal access to clean drinking water and basic sanitation are the long-term solutions to cholera control. Through acknowledging the various viewpoints in the community, encouraging candid communication, and supporting well-informed decision-making procedures, authorities and interested parties can create all-encompassing plans that put public health and clean water supplies first.

Notably, the study found that age and educational attainment were sociodemographic factors that influenced knowledge of the cholera outbreak and its health effects. This was statistically significant, as shown in table 6, whereas gender did not show any significant associations, as shown in table 5 above. Public education plays a significant influence in influencing attitudes, and it is suggested that ongoing initiatives to spread correct knowledge might support well-informed decision-making.

Recommendations

Preventing the recurrence of cholera in communities requires a multi-faceted approach involving government, community leaders, healthcare providers, educational institutions, and individuals. Here are tailored recommendations for each group:

Government should:

1. **Strengthen Water and Sanitation Infrastructure:** Invest in clean water supply systems and proper sanitation facilities. Ensure regular maintenance and monitoring of these systems.

2. Implement Surveillance Systems: Establish robust disease surveillance systems to quickly identify and respond to cholera outbreaks. This includes monitoring water quality and reporting cases promptly.

3. Emergency Preparedness Plans: Develop and regularly update emergency response plans for cholera outbreaks, including stockpiling necessary medical supplies and vaccines.

Community Leaders should:

1. Promote Hygiene Practices: Encourage the community to adopt good hygiene practices, such as handwashing with soap, especially before meals and after using the toilet.

2. Community Clean-Up Initiatives: Organize regular clean-up drives to eliminate potential breeding grounds for cholera, such as stagnant water and waste accumulation.

5. Support Vulnerable Populations: Identify and support vulnerable groups within the community, ensuring they have access to clean water and sanitation facilities.

Healthcare Providers should:

1 Rapid Response Teams: Establish rapid response teams to address cholera cases promptly and effectively, ensuring that treatment is accessible to all.

2. Promote Oral Rehydration Solutions (ORS) and Vaccination Campaigns: Educate patients and communities about the importance of ORS in treating dehydration caused by cholera.

5. Data Collection and Research: Collect and analyze data on cholera cases to identify trends and inform prevention strategies.

List of Abbreviations

WASH: Water Sanitary and hygiene

NCDC: Nigeria Centre for Disease Control

OCV: Oral cholera vaccine

LGA: Local Government Area

ORS: Oral Rehydration Solutions

Declaration

Ethics approval and consent to participate

Ethical approval was obtained from Ethical Review Committee of Adamawa State Ministry of Health. The king of the community and his council of chiefs were informed of the research. The head of Primary Health care in Mayo-Belwa Local Government Area was also put in the known. The objective and procedure of this study were explained to all participants. Participation is voluntary, and participants were allowed to discontinue at any stage of the study, privacy and confidentiality of every participant was ensured.

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