



Received: 21-01-2025
Accepted: 01-03-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Interventions by Zambian Government to Prevent the Resurgence of Cholera in Unplanned Settlements: Lessons from Misisi Compound in Lusaka

¹Tarisai Chakanyuka, ²Brivery Siamabele, ³Moses Makungu, ⁴Priscillah Nsama, ⁵Valentine Kalonje
^{1, 2, 3, 4, 5} Department of Development Studies, University of Zambia, Lusaka, Zambia

Corresponding Author: **Tarisai Chakanyuka**

Abstract

Cholera has been one of the challenges that most developing countries have faced and, in most cases, this happens mostly during rainy season. This paper however, investigated the interventions implemented by the Zambian government to prevent the resurgence of cholera in unplanned settlements, with a specific focus of Misisi Compound in Lusaka. Cholera remains a significant public health challenge in Zambia, particularly in densely populated informal settlements characterized by inadequate sanitation, limited access to clean water, and poor waste management. Using a mixed-methods approach, the research evaluated key government strategies, including water and sanitation infrastructure development, vaccination campaigns, hygiene education, and community engagement. Findings indicate that the construction of boreholes, public toilets, and water kiosks has significantly improved access to clean water and sanitation, reducing cholera cases by 40% in Misisi Compound between 2017 and 2023. Additionally, oral cholera vaccination (OCV) campaigns achieved over 85% coverage, building herd immunity and mitigating the risk of large-scale outbreaks. Hygiene education initiatives,

facilitated through schools, NGOs, and media campaigns, have enhanced awareness and adoption of preventive practices among residents. Community involvement, through collaborations with local leaders and NGOs, has further fostered a sense of ownership and sustainability in cholera prevention efforts. However, challenges persist, including rapid urbanization, infrastructural deficits, resource mismanagement, and cultural resistance to government initiatives. These issues have hindered the full effectiveness of some interventions and underscored the need for enhanced community engagement, increased investments in infrastructure, and improved governance and accountability. The study recommended that the government should invest in developing and maintaining strong water and sanitation infrastructure, especially in informal settlements. This include ensuring constant access to clean water and expanding waste management systems to prevent pollution, promote public health education and community involvement also to increase budget and resource allocation and finally Improved monitoring to minimise misuse of resources.

Keywords: Government Interventions, Cholera, Unplanned Settlements, Resurgence

Introduction

Cholera remains a persistent global public health challenge, particularly in developing countries where access to clean water and proper sanitation is limited. The World Health Organization (WHO) estimates that cholera affects 1.3 to 4 million people annually, with a death toll ranging between 21,000 and 143,000 globally (WHO, 2021) ^[15]. Unplanned settlements are especially vulnerable to cholera outbreaks due to their overcrowded conditions, inadequate infrastructure, and poor waste management practices. These factors create an environment conducive to the rapid transmission of cholera, which spreads through contaminated water and food. In Zambia, unplanned settlements like Misisi Compound which one of the most crowded due to its proximity to the central business district of Lusaka face these exact challenges. Misisi compound, one of the largest informal settlements in the country, has long struggled with cholera outbreaks due to its high population density and lack of basic sanitation services. Recognizing the severity of this public health issue, the Zambian government has implemented a series of interventions aimed at mitigating the risk of cholera in these vulnerable communities. This paper focuses on the government interventions specifically designed to prevent the resurgence of cholera in unplanned settlements.

By examining initiatives such as water and sanitation infrastructure development, vaccination campaigns, hygiene education, and community engagement, this article evaluates the effectiveness of these measures and identifies challenges in their implementation. Misisi Compound serves as a case study to highlight the successes and gaps in the government's efforts.

Study background and context

After years of steady decline, cholera a diarrhoeal disease made a devastating return. The current global cholera situation is unprecedented due to the alarming geographic size of the outbreaks infections and an exceptionally high death rate. With the most deaths from cholera completely preventable, mortality rate over one percent usually indicates quality and access issues and speed of treatment UNICEF (2023)^[13]. Cholera is a deadly waterborne disease that continues to plague many parts of the world, especially in unplanned settlements where access to clean water and sanitation facilities is limited. In response to outbreaks of cholera, governments of the affected populations have since implemented various interventions to prevent its resurgence and protect the health of their populations (WHO, 2023)^[16]. Globally, countries such as Canada, Australia, and Brazil have recognized the importance of preventing the resurgence of cholera in vulnerable areas and have taken significant steps to address this public health issue. Canada for example, has invested in infrastructure projects to improve water quality and sanitation in Indigenous communities. These communities often face challenges in accessing clean water and adequate sanitation facilities, which puts them at a higher risk of cholera outbreaks. By working closely with Indigenous leaders and community members, Canada has been able to implement sustainable solutions such as water treatment plants, wastewater management systems and hygiene education programs (ibid). According to Mengel *et al* (2014)^[9], these efforts have not only improved the health and well-being of Indigenous populations but have also contributed to the overall prevention of cholera in Canada.

Similarly, Australia has also focused on improving water and sanitation services in remote areas to prevent the resurgence of cholera. Remote communities in Australia often struggle with limited access to clean water and proper sanitation facilities, which can lead to poor hygiene practices and an increased risk of cholera transmission. By investing in water infrastructure projects, wastewater treatment facilities and community health programs, Australia has been able to reduce the incidence of cholera in these vulnerable areas. Australia has also implemented vaccination campaigns to protect at-risk populations from contracting the disease and further contributing to the prevention of cholera outbreaks (Gething *et al.*, 2023)^[5].

In addition, efforts to prevent the resurgence of cholera in Brazil have also been focused on improving water and sanitation services in urban areas. Rapid urbanization and population growth have strained existing infrastructure, leading to inadequate access to clean water and sanitation facilities in many Brazilian cities. By investing in water treatment plants, sewage systems and public health education programs, Brazil has been able to reduce the risk of cholera outbreaks in urban centres. Furthermore, Brazil has implemented strict regulations on water quality and sanitation standards to ensure the safety of its citizens and

prevent the spread of waterborne diseases such as cholera (Johnson, 2023)^[6].

As regards to Africa, countries such as Zambia, Nigeria, Ghana, Kenya, Tanzania, Malawi and many others have all faced significant challenges with cholera outbreaks in unplanned settlements. The study by Buliva *et al.*, (2023)^[2] reports an exponential increase in cholera cases in Africa, with ten countries experiencing significant outbreaks as of early 2023. Malawi has been particularly hard hit, enduring its most severe outbreak in two decades. Other affected countries include Mozambique, Burundi, Cameroon, the Democratic Republic of the Congo (DRC), Ethiopia and Somalia (WHO, 2023^[16]; UN News, 2023). This alarming rise is part of a broader global trend, with January 2023 cases being 30% higher than the total for the previous year (UN News, 2023).

Several factors contribute to the increasing incidence of cholera in Africa Buliva *et al.*, (2023)^[2] highlights the significant role of extreme climatic events, such as floods and droughts, which disrupt water and sanitation infrastructure, leading to contaminated water sources (WHO, 2023)^[16]. Additionally, ongoing conflicts in several regions exacerbate the problem by displacing populations and creating environments where access to clean water and proper sanitation is severely limited. The historic drought in the Horn of Africa, affecting Ethiopia, Kenya, and Somalia, has also heightened the risk of cholera outbreaks by leaving millions in dire need of humanitarian assistance (UN News, 2023).

In response to this escalating crisis, international organizations like the World Health Organization (WHO) have intensified efforts to control cholera outbreaks. These efforts include enhanced disease surveillance, prevention, and treatment measures. WHO has deployed experts to the most affected regions, established rehydration points in vulnerable communities, distributed cholera kits and other essential supplies, and supported the recruitment of additional healthcare workers (WHO, 2023^[16]; UN News, 2023). Financial aid has also been provided through international partnerships to support emergency cholera responses in countries like Malawi, Kenya, and Mozambique, aiming to bolster the availability of oral vaccines despite global shortages (UN News, 2023).

Despite these comprehensive efforts, the high case fatality ratio of cholera underscores the need for continued and intensified public health interventions. Buliva *et al.*, (2023)^[2] emphasizes that cholera is not only a health challenge but also a development issue. Investments in better sanitation infrastructure and access to safe water are crucial for sustainably controlling and eventually eradicating cholera. It is essential to scale up readiness to detect cases quickly and mount comprehensive responses to prevent further escalation of outbreaks (WHO, 2023^[16]; UN News, 2023).

Furthermore, to address the challenges posed by cholera outbreaks in unplanned settlements, these countries have implemented various interventions aimed at preventing the resurgence of the disease. One of the key strategies that have been implemented is the improvement of water and sanitation infrastructure. Access to clean water and adequate sanitation facilities is crucial in preventing the transmission of cholera, as contaminated water is a primary mode of transmission for the bacterium (Gething *et al.*, 2023)^[5].

The case of Misisi compound in Lusaka highlights similar challenges of preventing the resurgence of cholera in

unplanned settlements. Misisi compound, one of the largest and most densely populated unplanned settlement in Lusaka, the compound faces significant issues related to access to clean water and sanitation facilities. According to Kabita (2014)^[7], the lack of adequate infrastructure and poor living conditions in the area have made the residents of Misisi compound vulnerable to waterborne diseases, with cholera outbreaks being a recurrent problem.

In response to the persistent threat of cholera in Misisi compound, the Zambian government has implemented a range of interventions aimed at improving water and sanitation conditions in the area. One of the key strategies employed by the government is the enhancement of water and sanitation infrastructure in the settlement. This includes the construction of new water sources such as boreholes and the upgrade of existing facilities to provide safe and clean water to the residents to reduce the risk of cholera transmission in the community in communities (Farmer et al, 2011)^[4].

In addition, this study established that the government of Zambia improved some infrastructure and conducted vaccination campaigns in Misisi compound to protect the residents from cholera. Vaccination is an important tool in preventing the spread of the disease, as it helps to build immunity among the population. By vaccinating the residents of Misisi compound, the government aims to create a protective barrier against cholera outbreaks and reduce the impact of the disease on the community (Kabita, 2014)^[7].

Furthermore, the Zambian government has placed a strong emphasis on promoting hygiene practices in Misisi compound as a means of preventing cholera. According to Phiri (2015)^[11], this includes educating the residents on the importance of handwashing, proper food handling, and safe sanitation practices. By raising awareness about the link between hygiene and cholera prevention, the government aims to empower the community to take proactive measures to protect themselves from the disease.

Last but not the least, the government has worked closely with local community leaders and organizations to engage residents in efforts to prevent cholera in Misisi compound. By involving the community in decision-making processes and mobilizing local resources, the government seeks to create a sense of ownership and responsibility among the residents towards maintaining clean water and sanitation standards. Through collaborative efforts, the government and the community can work together to address the underlying factors that contribute to the spread of cholera in the settlement (Mengel *et al.*, 2014)^[9].

Despite these interventions, challenges remain in preventing the resurgence of cholera in Misisi compound and other unplanned settlements in Zambia (Phiri, 2015)^[11]. Limited access to clean water and sanitation facilities, poor waste management practices, and overcrowding continue to pose a threat to public health. Moving forward, it is crucial for the government to continue investing in water and sanitation infrastructure, conducting regular vaccination campaigns, and promoting hygiene practices in order to prevent the spread of cholera in unplanned settlements.

Study methods

This chapter of the research will focus on the methodology employed to investigate the interventions aimed at preventing the resurgence of cholera in unplanned

settlements, using Misisi compound in Lusaka as a case study.

The study was undertaken in Misisi compound in Lusaka District in Lusaka province of Zambia. It is located between 15.4656° S latitude and 28.2804° E longitude. The study area serves as a critical focal point for examining government interventions aimed at preventing the resurgence of cholera in unplanned settlements. Misisi compound is one of the most densely populated informal settlements in Zambia. It is characterized by inadequate sanitation facilities, poor waste management, limited access to clean water, and overcrowded living conditions. These factors contribute significantly to the risk of cholera outbreaks and underscore the importance of understanding the specific interventions and strategies implemented by the government to address this public health challenge in such high-risk environment.

This study employed a mixed-methods design, combining both qualitative and quantitative methods. The study utilised both primary and secondary data sources. Among the secondary data sources was the Zambia Multi-Sectoral Cholera Elimination Plan and ministerial statements on cholera interventions. Primary data from key informants and officials was collected through qualitative methods such as in-depth interviews and focus group discussions. The process of interviewing participants was made possible by an interview guide which allowed for some of the questions to be predetermined; and also made it possible to pose prompting questions during the interview. In essence, the interview guide gave the researcher discretion to ask prompting questions.

Data from residents was collected using a semi structured questionnaire. This instrument allowed for some of the questions to have fixed responses because the researchers wanted to collect factual responses, coupled with the Study's quest to obtain descriptive statistics. A semi structured questionnaire also provided for the other questions to be open ended in order to gain insight into the perceptions or attitudes of the respondents, (Kalonje, 2018)^[8].

Qualitative data was analyzed using thematic analysis which involved grouping the responses in terms themes relevant to the aim of the study. Thematic Analysis is a type of qualitative analysis which is used to analyze classifications and present themes (patterns) that relate to the data (Sivakumar, 2011).

Quantitative data was analyzed using the social sciences statistical package (SPSS) software. The analysis began by coding all the questionnaires by allocating a number to each possible response. Having done so, the edited and coded raw data was entered into the computer and processed. SPSS was used to analyze the data and to establish patterns and associations within the quantitative data. The processed information was then presented in form of frequency tables. The study employed a combination of quantitative and qualitative sampling techniques to gather comprehensive data on the interventions implemented by the government to prevent the resurgence of cholera in Misisi compound, Lusaka. For the quantitative component, the research utilized a stratified random sampling method to ensure that different segments of the population are adequately represented. For the qualitative component, the research adopted a purposive sampling method. This involved the selection of 15 key informants from organisations involved in

cholera prevention efforts. Face to face interviews and focus group discussions were conducted with officials from the following institutions: Ministry of Health (MOH), community leaders, Local Government Ministry (LGM) and Lusaka City Council (LCC), Zambia marketeer association of Zambia (ZANAMA), Zambia national service (ZNS), Ministry of water Development. These individuals were chosen based on their knowledge and experience with the interventions and their potential to provide in-depth insights.

Study Results

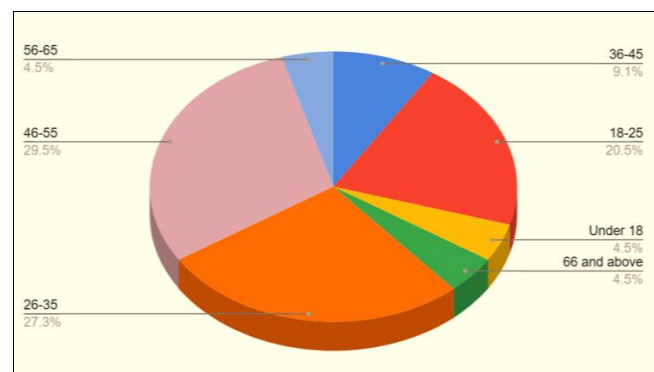
Research Demographic Characteristics

To obtain findings for this study, the Author administered questionnaires to residents in Misisi compound, people at the market, conducted focus group discussions and interviewed key informants from different selected institutions and conducted observations in the area.

The data, collected through a questionnaire, was summarized using descriptive statistics, with key demographic variables such as age, gender, education level, occupation, and duration of residence in the area. These findings were visually represented through pie charts and figures, making it easier to interpret the composition of the population under study. The analysis provided a comprehensive understanding of the respondents' background, which was critical in contextualizing the overall research outcomes.

Age of Participants

The study inquired about the respondents age because it is crucial as cholera affects different age groups in distinct ways. This percentage distribution was presented in Figure 3.



Source: Field work, 2024

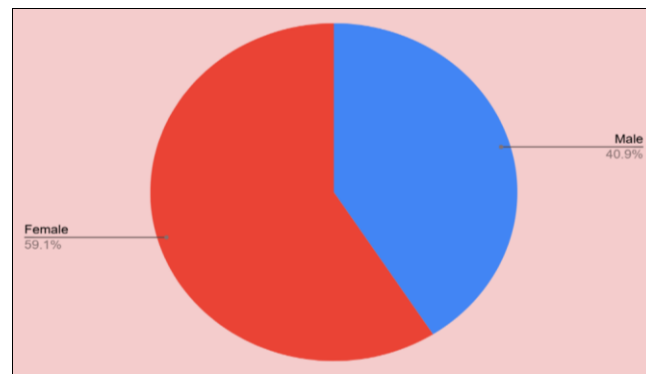
Fig 1: Age of respondents

The results, as depicted in Figure 1, showed that the majority of residents in Misisi compound fell within the age range of 46-55 years, representing 29.5% (n=13) of the sample. Those in the 26-35 age group accounted for 27.3% (n=12), while 20.5% (n=9) of the residents were between 18-25 years old. Additionally, 9.1% (n=4) of the participants were in the 36-45 age group, and 4.5% (n=2) were between 56-65 years old. Another 4.5% (n=2) were under 18, and finally, 4.5% (n=2) were over 66 years old.

Sex of Research participants

The study also inquired about the gender of respondents because gender plays a significant role in cholera prevention strategies as men and women may have different roles and

different levels of exposure, the results are shown in figure 2.



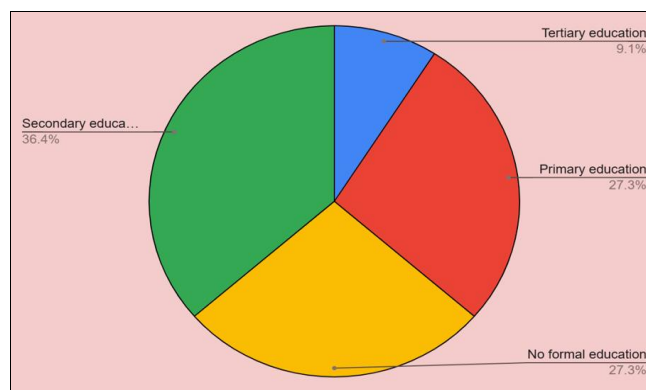
Source: Field work, 2024

Fig 2: Gender of respondents

The gender distribution shows a relatively balanced pattern of male (40.9%) and female (59.1%) respondents. This balance is important to understand the impact of the cholera intervention on different genders, as it allows a comprehensive analysis of social needs and responses to the strategies implemented.

Education Levels of Participants

The study also inquired on the participant's highest level of education that they have attained. Finding out about the levels of education was important in understanding knowledge and practices around hygiene, sanitation and disease prevention. Higher levels of education typically correlate with better understanding of preventive measures. This percentage distribution was presented in Figure 3.



Source: Field work, 2024

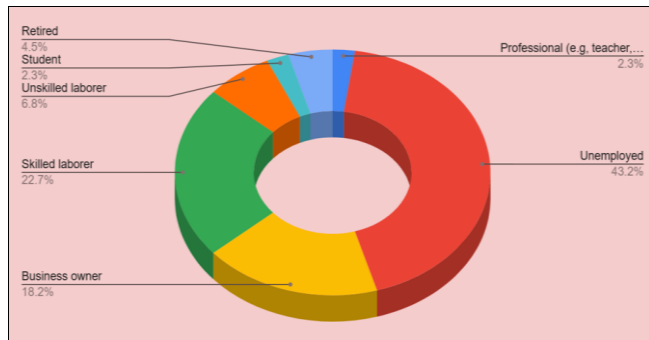
Fig 3: Educational level

According to the findings, 27.3% (n=12) of the respondents have completed primary school and the other 36.4% (n=16) have completed secondary school. A smaller proportion, 9.1% (n=4), have reached tertiary education and 27.3% (n=12) of respondents had no formal education. This distribution reflects different levels of literacy and education in the community, which affects the effectiveness of cholera prevention measures.

Occupation of Participants

In terms of occupation, the data showed a wide range of occupations among the respondents. Occupation provides an insight into the daily routines and potential cholera exposure

risks of individuals in unplanned settlements. The data is presented below:



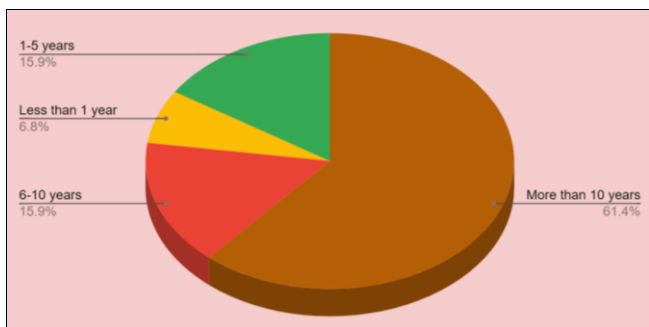
Source: Field work, 2024

Fig 4: Occupation

According to the pie chart above unemployed individuals made up 43.2% (n=19), with skilled laborers represented by 22.7% (n=10), unskilled laborers by 6.8% (n=3), business owners by 18.2% (n=8), retired individuals by 4.5% (n=2), students by 2.3% (n=1), and professionals by 2.3% (n=1). This diversity of occupations reflected the socio-economic structure of Misisi where a large portion of the population was involved in informal work. Tailoring interventions to specific occupational groups can enhance their effectiveness.

Duration of Residency of participants

The length and time residents have lived in the settlement can affect their familiarity with local water sources, sanitation infrastructure and existing health campaigns. Long term residents might may have developed coping strategies, while newcomers may lack knowledge of safe practices. The information is shown below.



Source: Field work, 2024

Fig 5: Duration of residency

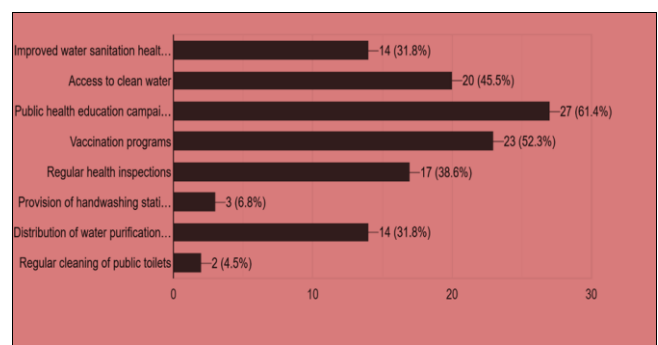
Most of the respondents have lived in Misisi housing for more than 10 years, looking at the pie chart above, this is being represented by 61.4% (n=27) representing a stable population that is deeply rooted in the community. The pie chart is also showing that 15.9% (n=7) have lived in the area between 6-10 years; 15.9% (n=7) is showing residents that have lived in Misisi between 1-5 years and 6.8% (n=3) is

showing the residents that have lived in the area for less than a year. The longevity of majority of the residents living in Misisi compound indicates that the population has extensive experience with the challenges and interventions associated with cholera prevention.

Community interventions on cholera resurgence

This section shows the of various government interventions aimed at preventing the resurgence of cholera in unplanned settlements. These interventions range from improving health status to public health education, good sanitation and vaccination programs, each contributing differently to the outcomes.

In response to the question on the observed interventions in the community, most of the respondents mentioned access to clean water followed by public health education campaigns and regular cleaning of public toilets as shown in the graph below.



Source: Field work, 2024

Fig 6: Interventions Observed

As can be seen from the table above, improving access to clean water was the most observed intervention, reported by 63.8% of respondents. Public health education campaigns followed closely, seen by 53.2%, while improved sanitation facilities (42.5%) and regular cleaning of public toilets (46.8%) were also common. Other interventions such as handwashing stations (38.3%) and distribution of water purification tablets (25.5%) were moderately observed. Less common interventions included regular health inspections (31.9%) and vaccination programs, which were the least observed, noted by only 21.3% of respondents as shown in the figure.

This indicates that efforts to improve water access, such as installing wells and upgrading water supply systems, had been implemented. Public health training programs were another significant intervention, recognized by 61.4% of respondents. This high percentage highlights the importance of public education in promoting better health practices. As one respondent expressed, "Public health education programs have really helped us understand how to prevent diseases in our community", a participant noted. These educational initiatives are crucial for encouraging behavioral changes that reduce the spread of disease, making them a vital part of the overall public health strategy.



Source: Field work, 2024

Photo 1: Water kiosk at the market, photo taken by author on 21st June, 2024

In addition, only 31.8% of respondents were aware of WASH (Water, Sanitation, and Hygiene) services. However, this indicates that, while important, WASH services are *"not as widely recognized as they should be, they do not put buckets of water or anything like that we just take care of ourselves usually without the help of the government or any other institution,"* as one participant put it. The data suggests that these measures for promoting clean living and water resource management have not reached their full potential in terms of implementation or visibility.

Vaccination programs also emerged as a key intervention, with 52.3% of respondents acknowledging their importance. One participant remarked, *"Vaccination programs are essential to keeping us safe from diseases."* These programs play a crucial role in preventing illnesses that thrive in environments with poor water quality and sanitation, complementing other health and hygiene efforts.

Regular visits from health workers were recognized by 38.6% of respondents, who acknowledged their importance in maintaining public health standards. One respondent said, *"Health workers coming to check on us ensures everything is kept in order"*, another respondent noted, *"they only check on us when there is an outbreak and they don't even come to other parts of the community, they only end on the houses near the market"*. These visits are vital for ensuring that facilities, water systems, and sanitation procedures remain in compliance and prevent problems that could lead to hygiene issues.

Furthermore, only 8% of respondents were aware of the distribution of water tablets. Handwashing stations, although a key intervention in preventing the spread of disease, were not widely recognized either. One participant admitted, *"We don't see enough handwashing stations around here."* Another participant said *"they have never observed any cholera intervention and that the government does not do anything they say they will do."*

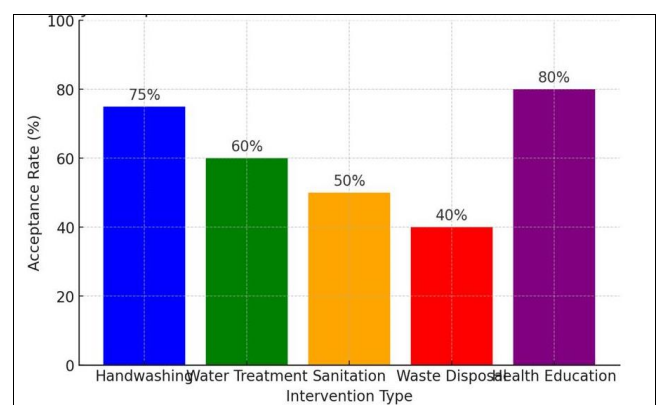
Respondents highlighted the following, *"The government has worked to extend clean water supplies to unplanned settlements in a few selected areas not the whole community. If they can build more communal latrines and sewage*

systems it will reduce open defecation. Public health campaigns teach communities about hygiene practices like handwashing and safe food handling but they only come when there is a disease outbreak instead of them sensitizing us before things get bad. They will wait for cholera to come back again then they will come just for a few days to talk to us and that will be it."

Some key informants noted, *"new disease monitoring systems have been set up to quickly find and respond to cholera outbreaks and in high-risk areas, the government has started oral cholera vaccination campaigns to protect people."* In addition to the findings, the researcher noted that at the time, no interventions were found that can be sustainable to the people of Misisi compound.

Community acceptance of these interventions

The effectiveness of prevention measures largely depends on community acceptance and adherence. The bar chart below illustrates the levels of acceptance for various cholera prevention interventions, including handwashing, water treatment, sanitation, waste disposal, and health education. The data reveals varying levels of community engagement, with some interventions being more widely accepted than others.



Source: Field work, 2024

Fig 7: Community acceptance of the interventions

According to the data, handwashing has a relatively high acceptance rate of 75%. This suggests that most residents recognize the importance of proper hand hygiene in preventing cholera. *"I always encourage my kids to wash their hands with soap and water before they touch food,"* one of the residents noted. Another respondent said, *"I never let my child eat food without washing their hands, we even make sure fruits and vegetables are washed well before we consume them to avoid getting sick"*. Public health campaigns and outreach programs have likely contributed to this level of awareness. However, while the acceptance rate is encouraging, ensuring consistent practice remains a challenge, particularly in households with limited access to soap and clean water.

To add on, health education has the highest acceptance rate at 80%. This reflects the community's willingness to engage with information about cholera prevention. Educational campaigns conducted by health officials and non-governmental organizations have played a crucial role in raising awareness about transmission, symptoms, and preventive measures. Despite this, knowledge alone does not always lead to behavioural change, especially when other

barriers such as poverty and inadequate infrastructure persists. Some respondents noted, “we always listen to what the health campaigns say, even as a community when they come we are very excited because we know they want the best for us”. One health worker also said, “when we come as team during this time, people are eager to learn because they want to keep themselves safe from cholera, we educate the public on everything they need to know to prevent it or when they come in contact with the disease they are educated on what to do but the only problem we face sometimes is adequate resources to carry out these campaigns because the community is very big and we sometimes do not manage to go to every area around.”

Water treatment, which includes boiling or chlorinating drinking water, has an acceptance rate of 60%. While many residents understand the benefits of treating water, some face financial and logistical challenges in consistently following this practice. The cost of chlorine, fuel for boiling water, and the inconvenience of obtaining clean water contribute to lower adherence levels. Additionally, some households still rely on untreated water sources due to a lack of access to safe drinking water. “I always use chlorine in my water and when I don’t have chlorine I boil the water, even in the toilet I sprinkle some chlorine powder that is given to us to just help kill more bacteria but sometimes the chlorine runs out fast as we are only given a bit, if they could give us more it would be better”, said a respondent.

Sanitation, which involves proper toilet use and maintenance of a clean household environment, has an acceptance rate of 50%. This figure suggests that while half of the community is actively practicing good sanitation habits, the other half still struggles with issues such as inadequate toilet facilities and improper waste disposal. Many households in Misisi Compound rely on shared pit latrines, which can be unhygienic and increase the risk of disease transmission. “We have to share toilets because there are not enough toilets for all of us, you will find a situation where one toilet is being shared by about six families and this makes it easier for such diseases to spread quickly”, one respondent noted.

The lowest acceptance rate is observed in waste disposal, at only 40%. This indicates that a significant portion of the community does not properly manage solid waste, leading to environmental contamination and increased cholera risks. The lack of regular waste collection services, combined with limited public disposal sites, has contributed to widespread dumping of garbage in open areas. The presence of waste near living spaces has been linked to higher rates of diarrhea and other waterborne diseases, particularly among children. Addressing this issue requires improved waste management infrastructure and stronger enforcement of public sanitation regulations. “It is a bit hard to sometimes follow the good sanitation habits because we do not have places to properly dispose of trash, so you just find people throwing trash anywhere when it is night time and the morning we will just wake up and find trash around”, community leader.



Source: Field work, 2024

Photo 2: Showing lack of bins and ineffective waste management



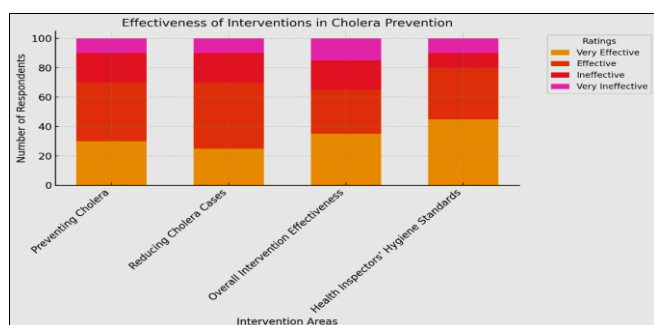
Source: Field work, 2024

Photo 3: Showing lack of bins in the community

The data from the bar chart highlights the varying levels of community acceptance of cholera prevention measures in Misisi Compound. While handwashing and health education enjoy strong acceptance, challenges remain in ensuring widespread adoption of water treatment, sanitation, and waste disposal practices.

Effectiveness of these interventions

The chart represents respondents' views on the effectiveness of interventions in cholera prevention across four key areas: Preventing cholera, reducing cholera cases, overall intervention effectiveness, and the role of health inspectors in maintaining hygiene standards.



Source: Field work, 2024

Fig 8: Effectiveness of the interventions

The chart above is showing that, preventing cholera received a significant number of "Effective" ratings, but 20% found it ineffective. Reducing cholera cases also saw high effectiveness, but 20% viewed it as ineffective. Participants noted, "Data shows a decline in cholera cases in areas where these actions have been taken. Studies show that having better access to clean water leads to fewer cholera cases, surveys indicate that health education campaigns have changed people's behavior for the better. New monitoring systems have allowed quicker responses to potential outbreaks and high vaccination rates in certain communities have made them less vulnerable to cholera."

Overall intervention effectiveness had balanced feedback, with 35% rating it as "Very Effective." Health inspectors received the most positive feedback, with 45% rating their performance as "Very Effective." This data suggests that interventions are viewed positively, but there are areas for improvement.

Study Discussions of the Findings

One of the most important interventions is improving access to clean water, which was agreed upon by 45.5% of respondents. Providing clean water reduces the transmission of water-borne diseases such as cholera, which can spread rapidly in polluted environments. To increase water security, the government has implemented measures such as improving water supply systems and installing wells. Residents have seen positive results from this project and say they have clean water everyday life has been so much better, these findings align with global prevention strategies, where improved water in high-risk areas has proven effective in cholera control WHO, (2020) [14]. This intervention is important because contaminated water sources are one of the main routes of cholera transmission. Improving water infrastructure not only addresses current health problems, but also builds resilience to future outbreaks. Although some respondents said this, other respondents said they have not seen any improvement and there has not been access to clean water. Most of the houses that had access to clean water said they had taken the matter into their own hands and had taps installed with their money without help from the government. According to the observations by the researchers most of the community

actually did not have full access to clean water, they instead go and pay to fetch water by a water kiosk at the market. Secondly, public health education is a cornerstone of the government's strategy and 61.4 percent of those questioned recognized its importance. These educational programs focus on cholera prevention, promoting good hygiene and teaching about disease prevention measures. Participants said these programs helped them better understand cholera prevention, promoting hand washing, cooking and waste management. By training the residents especially in unplanned high-risk situations, authorities can make long-term behavioural changes that can prevent the spread of cholera. In addition, vaccination programs were recognised by participants as a cholera prevention strategy, respondents emphasized the importance of cholera vaccination programs. Vaccination is an important protective layer, especially in areas where people live without adequate access to clean water and sanitation. Although vaccines alone cannot prevent cholera outbreaks, they are recognized as an important preventive measure that complements other public health efforts. Despite the celebration, challenges such as vaccine distribution and community outreach remain an issue, as some residents said cholera remains endemic due to widespread environmental factors. These findings align with the study the high burden of cholera in children by Deen *et al.*, (2020) [3] that talked about how vaccines help in preventing cholera.

Likewise, water, sanitation and hygiene (WASH) services were endorsed by 31.8% of respondents as an intervention that has been implemented but has yet to reach its full potential. These services focus on ensuring safe water management, improving sanitation infrastructure and promoting sanitation. Although WASH programs are important in reducing the risk of water-borne diseases, the low visibility and implementation in some areas indicates that more needs to be done to be more effective. Maintaining good hygiene facilities such as public toilets and hand washing stations are few and far between, which affects the persistence of health problems in the area. The findings align with Ali *et al.*, (2020) [1], which talked about regions that have infrastructure development lagging, saying the resurgence of cholera remains a significant threat.

Furthermore, visits and inspections of health workers were found to be a recognised strategy by 38.6% of respondents. Health workers play an important role in ensuring that health standards are met, that water systems work and that residents follow healthy habits. These observations help to detect potential problems early and ensure that cholera prevention measures are in place. However, awareness of handwashing stations is low and personal care is poor. According to some participants, the toilets show that these inspections are not extensive or frequent enough to prevent cholera outbreaks.

Last but not the least, distribution of water purification tablets is underutilized intervention only 8% of respondents were aware of this strategy, indicating that although the program exists, it is not widely accessible. Treatment plants are a simple and cost-effective way to ensure safe drinking water, especially in areas with slow or underdeveloped infrastructure. Increasing the uptake and awareness of these practices will greatly reduce the risk of cholera preventive measures in unplanned settlements.

In conclusion, Government strategies to prevent the resurgence of cholera in unplanned settlements focus on a

number of areas, including improving access to water, improve sanitation and educate people. The combination of these efforts has helped reduce cholera cases, although challenges remain, health education and vaccination programs are very effective, but areas of sanitation, such as maintaining public toilets and providing hand washing stations limit the overall success of these designs. In order to strengthen cholera prevention, more attention should be paid to improving health infrastructure, organizing the visits of health workers and increasing the participation of the community in maintaining the health standards. Preventing cholera in unplanned settlements requires a holistic approach that combines infrastructure improvements with sustainable health practices and community participation.

Effectiveness of these interventions

To assess the effectiveness of the strategies implemented by the government to prevent the resurgence of cholera in unplanned settlements, it is important to evaluate the results of the main interventions. The findings of this study show that although much has been done, the effectiveness of these strategies varies. Some of the projects have been very successful, especially in improving public awareness, while others face challenges due to limited availability of infrastructure, finance and community involvement.

Public health education programs emerged as the most effective government strategy with 72.7% of respondents confirmed their influence. These programs were effective in educating people about cholera prevention, hygiene practices and the importance of hygiene. By promoting and encouraging behavioural change, public health education has played an important role in reducing the transmission of cholera in unplanned settlements. Respondents reported that these campaigns have helped local communities understand the spread of cholera and prevent the disease through simple practices such as hand washing, waste management and safe cooking. These results are in agreement with findings by WHO, (2021) ^[15] whose study showed that cholera cases start to reduce after public health educational campaigns. While awareness of these programs has increased, their long-term effectiveness depends on sustained efforts and community involvement. Behavioural change is a simple process, and for education to completely eliminate cholera, it must be accompanied by better infrastructure and access to basic health resources.

Secondly, access to clean water was identified by 47.7% of respondents as an effective intervention to reduce cholera cases. Ensuring that water is safe is one of the most important factors in preventing water-borne diseases such as cholera. The government has made efforts to improve water systems in unplanned settlements, including installing wells and improving water supply infrastructure. The study by MOH, (2020) showed similar findings when it came to access to clean water in cholera prevention, these projects have effectively provided safe drinking water to many communities and reduce the risk of cholera but while access to clean water is good, the study also found that the intervention was not implemented uniformly in all areas. Some residents are still dependent on unsafe water sources, which puts them at risk of epidemics. In addition, maintenance issues, such as broken pipes and inadequate water treatment, continue to pose challenges. In order for interventions such as clean water to be more effective, infrastructure needs to be improved and maintained

regularly.

Vaccination programs were also found to be effective with 61.4% of respondents expressing their importance. Vaccination is a preventive measure, especially in high-risk areas where clean water and sanitation are inadequate. In areas where vaccination programs were implemented, residents reported fewer cases of cholera, indicating that the programs had a significant impact. These results are in agreement with findings by WHO, (2021) ^[15]. However, despite their effectiveness, this study shows that vaccination programs alone are not sufficient to completely eradicate cholera, some participants even said that they do not believe in things like vaccines and choose not get vaccinated and even if people are vaccinated, they cannot be very effective if the source of the problem is not tackled. Therefore, although vaccines provide short-term protection, long-term eradication requires additional measures. It is a comprehensive approach that doesn't address the root cause of cholera.

In addition, water, sanitation and hygiene (WASH) services are another important component of the cholera prevention strategy. These services focus on improving sanitation, promoting hygiene and providing access to safe drinking water. The study established that only 31.8% of respondents identified WASH services as a key intervention. Even though the Government said that WASH services have been well implemented across the country and in Misisi compound, the data shows that WASH services are not fully implemented or found in all contexts, which reduces the overall effectiveness. For WASH services to be more effective, they must be maintained and well managed. Many respondents expressed concern about the lack of public toilets, poor sanitation in these areas and the lack of hand washing stations. These gaps in service delivery undermine the overall effectiveness of WASH interventions, as inadequate sanitation infrastructure contributes to the persistence of cholera in unplanned settlements.

Likewise, Monitoring of health workers, Periodic visits and inspections were identified by 38.6% of respondents as an important strategy for maintaining health standards and preventing cholera outbreaks. These visits by health workers ensure that public facilities such as water systems and sanitation infrastructure are in good working order and that citizens follow good hygiene practices. Screening of health workers was effective in identifying and correcting potential health problems before they escalated and spread more. These findings also align with the study by UNICEF, (2019) ^[12] that stated monitoring mechanisms are an important strategy in preventing cholera and maintaining health standards.

However, the effectiveness of these screenings is limited by the number of visits and resources available to health professionals. In some places, the respondents said that there are not enough visits by health workers and therefore, health problems are not being addressed. To improve the effectiveness of this strategy, more resources and personnel are needed to ensure that inspections by health workers are carried out regularly and consistently not only when a threat arises.

Furthermore, inadequate health services identified major challenges to the effectiveness of the strategies associated with the health professions. Only 4.5% of the respondents indicated that cleaning the toilets is an important task. Many respondents expressed dismay at the lack of maintenance of

these buildings, which remain dirty and prone to the spread of cholera. The lack of hand washing stations, known to only 11.4% of respondents, exacerbates this problem. Without adequate health infrastructure, cholera prevention efforts will be severely hampered.

From the above discussion, it can be inferred that the strategies used by the government to prevent the resurgence of cholera in unplanned settlements have achieved varying degrees of success. Public health education programs and vaccination efforts have been particularly effective in raising awareness and providing immediate protection against cholera. However, the overall effectiveness of the government's cholera prevention strategies is limited by gaps in infrastructure, particularly in the areas of water access and sanitation. For these strategies to be fully effective in eradicating cholera, the government must address the underlying challenges of inadequate sanitation facilities, inconsistent WASH services and insufficient health worker visits.

Conclusions

The study showed that the Zambian government has implemented several key strategies to deal with cholera outbreaks. Some of these include improving access to clean water by building wells, improving sanitation facilities, implementing vaccination programs and starting public health education programs. These strategies are important to reduce early outbreaks of cholera in high-risk areas such as Misisi compound.

Although interventions have positive outcomes, their effectiveness varies. For example, vaccination programs and partially improved access to clean water were greatly appreciated by the community and helped reduce cholera cases. Challenges such as limited sanitation facilities, inadequate maintenance of public toilets and inconsistencies in community sanitation practices have limited the eradication of cholera. Public health education programs were effective. However, to change health behaviours in these highly populated areas, more outreach is needed.

In addition, the main challenges identified are the rapid urbanization that has outstripped the government's ability to provide adequate infrastructure, limited funding for long-term maintenance of water and sanitation projects and weak community participation. Furthermore, low adoption of hygiene practices, due to poor waste management systems and overcrowding, undermines the effectiveness of interventions.

Acknowledgements

The authors wish to express their sincere appreciation to everyone that played a key role in the completion of this manuscript.

References

1. Ali M, Nelson AR, Lopez AL, Sack D. Challenges to Ending Cholera: The Many Roads to Success. *Neglected Tropical Diseases*. 2020; 14(7).
2. Buliva E, Elnossery S, Okwarah P, Tayyab M, Brennan R, Abubakar A. Cholera prevention, control strategies, challenges and World Health Organization initiatives in the Compoundern Mediterranean Region: A narrative review. *Heliyon*, 2023.
3. Deen J, Seidlien V, Sur D, Agtini M, Clemens JD, Sack DA. The high burden of cholera in children: *Neglected Tropical Diseases*, 14(6). Comparison of incidence from endemic areas in Asia and Africa, 2020.
4. Farmer P, Almazor CP, Bahnsen ET, Barry D, Bazile J, Bloom BR, *et al*. Meeting cholera's challenge to Haiti and the world: A joint statement on cholera prevention and care. *Neglected tropical diseases*. 2011; 5(5).
5. Gething PW, Ayling S, Mugabi J, Muximpua OD, Kagulura SS, Joseph G. Cholera risk in Lusaka: A geospatial analysis to inform improved water and sanitation provision. *PLOS Water*. 2023; 2(8).
6. Johnson SM. Cholera Epidemic, Government's Interventions and Public Responses in the 1970s, *Ìbàdàn, Nigeria* (Doctoral dissertation, University of Saskatchewan), 2023.
7. Kabita K. Knowledge, attitude and practice of cholera outbreaks in nchelenge district, 2014.
8. Kalonje V. The role of the national housing authority (nha) in Alleviating housing problems for low income earners in Lusaka, zambia (Masters Dissertation, University of Zambia), 2018.
9. Mengel MA, Delrieu I, Heyerdahl L, Gessner BD. Cholera outbreaks in Africa. *Cholera outbreaks*, 2014, 117-144.
10. Ministry of Health Zambia. National Cholera Elimination Plan. Lusaka, Zambia. Government Printers, 2020.
11. Phiri A. Creating a model in community-based disaster risk management for informal settlements: A case of MISISI Settlement, Lusaka-Zambia (Doctoral dissertation), 2015.
12. United Nations Children's Fund (UNICEF). Ending Cholera - A Global Roadmap to 2030. New York, New York, United States, 2019.
13. United Nations Children's Fund (UNICEF). Ending Cholera - A Global Roadmap to 2030. New York, New York, United States, 2023.
14. World Health Organization. Climate Change and Cholera: Assessing the Linkages. Geneva, Switzerland, 2020.
15. World Health Organization. Climate Change and Cholera: Assessing the Linkages. Geneva, Switzerland, 2021.
16. World Health Organization (WHO). Ending Cholera: A Global Roadmap to 2030. Geneva, Switzerland, 2023.