REVIEW ARTICLE

Barriers and Enablers in Implementing Cholera Prevention Interventions: A Systematic Review

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ABSTRACT

Background: Cholera remains a significant health issue, especially in the densely populated areas where there are issues of water supply, which may not be consistent, poor waste disposal, and poor hygiene practices. Health authorities have tried to develop hygiene awareness, but cholera still affects communities. This systematic review aimed to identify barriers and enablers in cholera prevention interventions in resource-limited settings.

Methodology: Based on PRISMA methods, a search was performed using such databases as Google Scholar, PubMed, Scopus, and Web of Science of studies from February 2022 to December 2024. This effort identified 464 documents for analysis, from which 15 were chosen to be analysed.

Results: The results suggest that community engagement is a key enabler of cholera prevention, as it increases trust and communication between health authorities and local populations regarding participation. However, challenges such as inadequate funding, poor infrastructure, and weak governance impede these efforts. Better response capabilities require strong governance and multi-sector partnerships. Sanitation and hygiene vaccine campaigns are critical in promoting sanitation and hygiene, reducing transmission rates.

Conclusion: Finally, the importance of community participation, good governance, and sound infrastructure for positive cholera interventions is analysed. Funding and sanitation can pose barriers you will need to address. One should spend on infrastructure and education to make public health and resilience stronger in the face of future outbreaks, they should be the top rung.

INTRODUCTION

Vibrio cholerae causes a severe diarrhoeal infectious disease, cholera. This microorganism is enterotoxigenic, which means that it produces an enterotoxin that interferes with the intestines and

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results in vomiting and high amounts of watery stool. Unsafe water and food, poor sanitation and overcrowding are closely linked to cholera risk[1]. The incubation period for it is typically from a few hours to five days. Vibrio cholerae usually lives in stagnant water, rivers and ponds in coastal areas and there are more than two hundred serotypes of this bacterium. Often, surface water in proximity of human populations is contaminated and can lead to cholera if drunk. Some 2.9 million cholera cases are recorded worldwide each year. The potential losers number up to three billion people if it is not brought under control immediately. The World Health Organization lists in 2016 the number of reported cases (132,121) and the number of deaths (2,420). Of these cases, 54% were in Africa, 13% in Asia and 32% in Hispaniola6. This gives a poor indication of living conditions etc. Therefore, collaborative efforts amongst stakeholders need to be reconsidered to combat cholera successfully. Improving global access to clean water, good sanitation and proper hygiene is what will make this fight successful.

Cholera outbreaks were very significant in Zambia in 1991, 1992, and 1999. At these outbreaks, about 8,058 people were admitted for treatment. The range of deaths from 2.3% to 33. percent. There is another outbreak which started in October 2017 until 2018, and it has 5,900 cases, 114 deaths, and it did not end in 2017. Despite water chlorination, distributing information on cholera, and promotion of hand washing and boiling water, cholera cases steadily continued to increase. There could be factors like red tape or bureaucratic delays that could have gotten in the way of the provision of the essential drugs and services for cholera prevention or treatment5.

Challenges and Experiences of Managing Cholera Outbreaks in Zambia

WASH Infrastructure

Many communities do not have safe drinking water and appropriate sanitation facilities. Using polluted water for drinking and cooking raises risks of cholera transmission.

Urbanization and Population Density

Poor sanitation in terrible conditions has resulted from speedy urbanization, almost all of which has occurred in Lusaka's crowded and jammed-up informal settlements. People increase happens before infrastructure development, leading to complications with public health interventions8.

Socio-Economic Factors

Many people live in poverty, which can restrict access to healthcare and safe water. Unsafe water sources are the source of several families' lives, and an underfunded healthcare system struggles with deficiencies and inadequate facilities7?

Environmental Challenges

Lack of climate unpredictability or frequent floods and droughts disturb water supply and quality. Floods can pollute water sources, mainly affecting the rural areas which rely on spring water sources8.

Cultural and Behavioural Factors

Hygiene practices can be at odds with cultural beliefs about water use to the point where it becomes a struggle to promote cholera prevention. Approval of health measures is essential to community engagement5.

METHODS

Search Strategy

A complete search strategy based on numerous vital databases such as Google Scholar, PubMed, Scopus, and Web of Science was performed to adhere to PRISMA standards. Key barriers and enablers of cholera prevention interventions were identified through studies investigating these. The search utilized a carefully prepared search string, which combined the words ″Enablers″, ″Cholera″ (or synonyms, ″Barriers″, ″Adherence″ and ″barriers″). This study covers modern information and barriers and enablers of implementation of interventions for cholera outbreaks, taking this search when it occurred between February 2022 and December 2024. Four hundred and sixty-four documents were extracted, and 15 were used for this research. Also,

the references were managed with the help of EndNote software and sources for the study were identified.

Inclusion and Exclusion Criteria

The search was limited to only English-language peer-reviewed publications about chorale programs, excluding those not in English to minimize the language barrier that could be a barrier for an overall review. Furthermore, peer-reviewed articles only in English were considered, and articles in other languages were excluded. In addition, this study used special types of designs, such as qualitative studies, blended strategies, and critiques. Regarding inclusion standards of thoughts, we followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA).

Study Selection and Quality Assessment

Using the PRISMA tips, amongst other guiding factors, the examination choice was made. Where 463 articles and 128 duplicates were deleted. The question was not broached for 335 closing titles and abstracts were screened, and 214 articles were excluded. Additionally, 120 articles were then considered for full-textual content research, of which 106 had been rejected as posts removed from this point of evaluation because posts didn't document the next of curiosity. After going through the articles eligible for the study in detail, a total of 15 articles were selected, of which only 15 were finally considered for final evaluation.

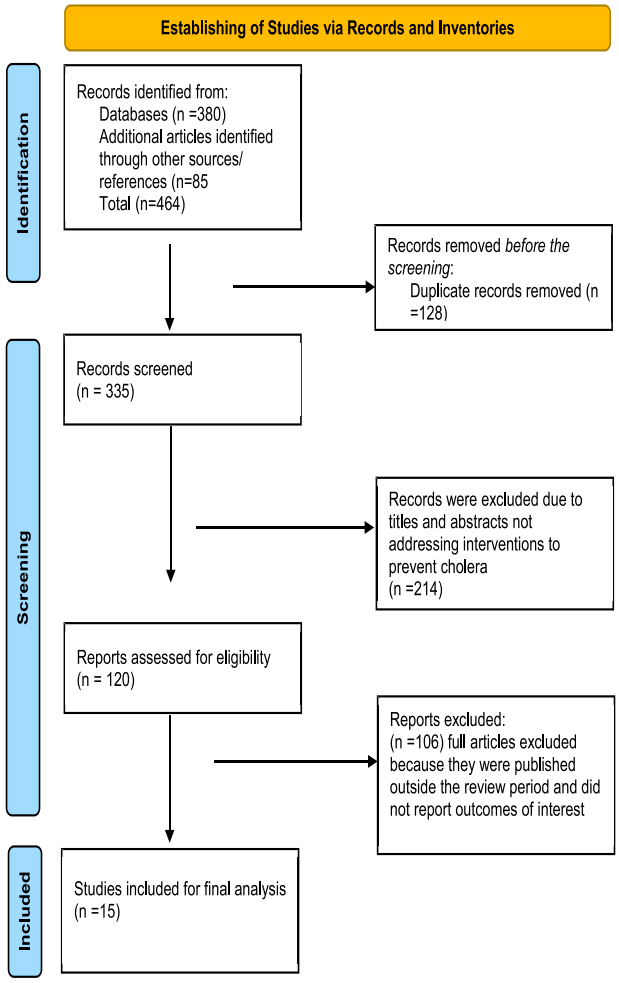

Fig 1. PRISMA chart on choosing studies relating to interventions for alleviating cholera outbreaks

Ethical Considerations

Ethical standards were followed diligently in the systematic review to guarantee the integrity and rigor of the findings as the data were extracted and summarized. Ethical compliance, including informed consent and approval from Institutional review boards, was assessed in all studies. Data extraction was systematic and unbiased due to predefined criteria and standardized forms. Conflicts of interest were possible, and participants' confidentiality was maintained.

Data Analysis and Synthesis

The approaches to data analysis involved synthesizing information from 15 selected papers using a thematic evaluation method. Qualitative content analysis was used to conduct a detailed coding process that led to the identification of themes. Regarding the relevant studies, a comprehensive literature search was conducted to identify them as they meet the inclusion criteria. The extracts of the key concepts and the findings of each study are made. There were two phases in the coding process: open coding to feature the significant excerpts and assign the preliminary codes, and axial coding to group the related codes into broader themes and find out the data patterns. The coding framework was refined throughout team discussions to get themes to reflect the data under study. The approach enabled systematic analysis of the thematic analysis, thereby creating a credible understanding of the investigational topic.

RESULTS

Study Characteristics

For the final analysis, a total of 15 articles had been included. They were downloaded from the tables hereunder, which are the exclusive countries' table: Liberia (n=1), Cameroon (n=1), Nigeria (n=2), Kenya (n=1), Zambia (n=1) India (n=1) Bangladesh (n=1), Tanzania (=1), the UK (n-1), Malawi (n=1), Swaziland (n=1), Dubai (n=1) America (n=1) and India (n=1). These studies employed a survey (n=2), combined method (n=1), random control trial (n=5), systematic evaluation (n=4), qualitative look-at (n=2), and case-control (n=1).

Demographics

The systematic review titled "Barriers and Enablers to Implementation Interventions to Prevent Cholera Outbreaks" focused on studies in cases of cholera endemic areas in sub-Saharan Africa, South Asia, and the Caribbean. It focused on diverse populations, particularly vulnerable ones, such as adults and expectant women. The representation of men and women was balanced and focused on women's roles in promoting hygiene. The participants were also from low-income urban slums and rural areas and were able to reveal who had access to clean water and sanitation. Cultural attitude to health was also reviewed, including local beliefs' impact on their acceptance of preventive measures. Overall, this assists in defining areas for intervention targeted at specific barriers and enablers across the community.

Table 1 Characteristics of Included Studies

No	Author/country Period	Study type	Sample characteristics Setting and study area	Study objectives	Study findings	Outcomes
01	Akel et al.,[1] (Lebanon)	Cross-sectional study	face-to-face interviews	To confirm a tool to explore the Knowledge Attitude and Practice towards prevention of cholera among overall population in Lebanon.	The results suggested that Knowledge Attitude and Practice had adequate structural validity and were inside consistent	This study detected noteworthy gaps in the knowledge, attitudes, and practices, which varied according to participant features

No	Author/country Period	Study type	Sample characteristics Setting and study area	Study objectives	Study findings	Outcomes
02	Elimian et al.[7], (Nigeria)	Retrospective analysis	20 studies were appraised	To describe the epidemiology, diagnostic performance of rapid diagnostic test (RDT) kits and the factors associated with mortality during cholera the epidemic.	This study reviewed, 93 598 cholera cases and 3298 deaths (CFR: 3.5%) were reported in 33 of 37 states in Nigeria.	Cholera infection remains a serious public health risk in Nigeria with a high mortality rate.
03	Malaeb et al.[9], 2022 (Dubai)	Survey	In-depth interviews with individuals	To isolate information, methods, and practices as obstacles to preventive measures during an outbreak of cholera	The results showed that most of the respondents did not have adequate information on defensive measures for cholera outbreaks	The study notes the significance of addressing obstacles to the application of cholera prevention interventions
04	Pezzoli, 2020 Kenya.	Desk review	studies were appraised	To assess the role vaccines in cholera control.	The study indicated that vaccines were critical in the control of cholera.	The study reviews additional effort is needed to improve timeliness of response and contextualize strategies for OCV delivery in different locations.
05	Rhee et al.,[12] (Nepal)	Systematic review	literature scoping review	To assess the degree of prevailing available signal on cholera and to characterize the epidemiologic data of cholera.	The study additionally identified precise interventions that had been powerful in stopping cholera outbreaks, such as the use of OCVs, safe drinking water, advanced sanitation and hygiene practices, and the usage of oral cholera vaccines	The study shows the to provide capacity building for a nationwide cholera surveillance with reliable diagnosis to estimate the burden of cholera.

No	Author/country Period	Study type	Sample characteristics Setting and study area	Study objectives	Study findings	Outcomes
06	Trolle et al.,[14] (Nigeria)	A systematic review of peer-reviewed literature	A total of 56 studies were reviewed	To identify the boundaries and enablers to implementing interventions aimed at preventing cholera outbreaks in low- and centre-profit nations (LMICs)	The study identified numerous enablers that may help triumph over these boundaries, which include strong leadership and governance, effective communique and records sharing, and the involvement of community stakeholders in the layout and implementation of interventions	The observation highlights the complicated nature of implementing interventions aimed toward stopping cholera outbreaks in LMICs and the importance of addressing the multiple limitations and enablers that influence their effectiveness
07	Sodjinou et al.,[13] (West Africa)	Cross-sectional study	Reports.	To describes the 2021 cholera outbreaks and assess their public health consequences.	The study identified low access to safe water and proper sanitation, cross border movements a were the main contributing factors.	The study also points out the outbreak several countries in west Africa.
08	Bach-Mortensen et al.,[3] (UK)	A systematic review	Thirty-one studies were included	To come up with the obstacles and enablers to implementing proof-based total interventions to stop the cholera outbreak	The main obstacles recognised were a lack of resources, including funding, supplies, and staff; inadequate community engagement and participation in stop activities; and inadequate information and skills among healthcare providers	The study highlighted the significance of addressing those demanding situations, its far essential to interact with crucial stakeholders, which includes funders, researchers, policymakers, and practitioners, to discuss how those wishes may be met
09	Phiri et al.,[11] (Zambia)	Mixed methods descriptive	126 key informants, including healthcare workers	To identify factors related to recurring Cholera outbreaks.	The study discovered cholera is a common seasonal disease that it happens in the rainy season.	The findings also show that household's main source of water were lakes and rivers.

Studies were totaled to review barriers and enablers to the implementation of interventions that have been hypothesized to prevent cholera outbreaks.

Community Engagement

Without community engagement, there can never be a successful implementation of cholera prevention interventions. Local populations are accepted, and the uptake of new practices can be significantly increased through the involvement of local populations in planning and executing these initiatives?. Community engagement is critical to achieving sustainable interventions since it creates a feeling of ownership and responsibility among the participants. Information suggests community involvement enables effective cholera prevention – communication and behavioural change. Community members can actively help identify the causes of cholera and take preventive measures; monitoring of these prevention measures will continue the efforts to contain outbreaks[3].

Limited Resources

Barriers to implementing cholera prevention measures include limited resources, particularly in infrastructure, financial support, and human capital. A lack of resources means an inability to deliver such services and respond effectively to outbreaks. The widespread spread of disease is hard to curtail in cases where communities do not have access to safe water and adequate sanitation facilities[13]. In addition, the promotion of poor hygiene practices, such as hand washing, is impeded by the fact that soap and clean water are not readily available. Treating infected people takes time, as cholera needs clean water and oral rehydration solutions. Consequently, to prevent cholera, priority must be given to the investment in water and sanitation infrastructure, hygiene education, and disease surveillance.

Political Instability

It can also severely disrupt cholera prevention efforts when they are unstable politically. Cholera is a waterborne disease that spreads quickly in areas lacking sanitation and clean water, particularly in volatile times. Successful implementation of effective prevention measures, such as providing safe water, proper sanitation, and hygiene promotion in a stable environment, is possible. In politically unstable regions, these may be interrupted[1 4] . Part of prevention in the emergency must generate political commitment, strengthen the cooperation of governments with NGOs, and make the most use of modern technologies to upgrade and improve water and sanitation facilities. Barriers to cholera prevention can be identified and addressed by collaborating, resources are mobilized effectively, and interventions are operated.

Vaccinations

In infections which are common, vaccination is an important aspect for prevention of cholera. This is critical both for reducing the severity of outbreaks especially in areas where cholera is not endemic but where there is risk of cholera because of travel or migration. According to studies, vaccination can reduce by 90 per cent the number of cases of cholera. Other preventive measures are also supported through vaccination campaigns by fostering improved sanitation and hygiene practices. Nevertheless, these campaigns should be used alongside other interventions to achieve the greatest decrease in cholera transmission[1°].

Low Levels of Awareness and Knowledge

Low awareness and knowledge about cholera as well as its transmission can impede the adoption of preventive measures. Different communities may not know enough about the causes, transmission modes, and symptoms of the disease, hence making it difficult to roll out hygiene education and behaviour change initiatives. Such knowledge gaps are necessary for informing interventions like hand washing and water treatment[11].

Strong Leadership and Governance

Cholera prevention requires relevant leadership and governance. Mobilization of resources, efficient use

of resources, implementation of rules and strategy appropriately, requires strong leadership. A robust governance is needed for controlling the cholera outbreak, it needs the commitment of governments and other global agencies, as well as local organizations as evidence by research results. At the other end of the spectrum are comprehensive strategies that deal with the underlying causes of cholera to cut back on its burden and support public health?.

Cultural and Social Barriers

Hygiene measures are largely taken as a result of cultural and beliefs. Practices like hand washing, safe food handling, proper waste disposal or using cows as carriers of hygiene can face opposition from local customs. In addition, beliefs about funerals for cholera victims are also traditional, and may have contamination carryovers. How important it is to alter these cultural perceptions and to associate cholera with its seriousness to destroy sensitive communities. The cultural shift needed to prevent cholera can be achieved through community engagement in dialogue and education8.

DISCUSSION

Fifteen research documents were reviewed and a variety of obstacles and enablers to the implementation of interventions against the prevention of cholera outbreaks were discovered.

Community Engagement

The study established community engagement and participation as critical enablers for cholera prevention intervention implementation. These interventions involve community members in planning and executing such interventions, which helps in gaining their acceptance and helps in improving communication and behaviour change. This aligns with a study that suggested that using community networks to communicate with populations benefits the trust building between health authorities and their population, an essential step in persuading the population adoption of preventative measures.[9] Community involvement in figuring out what cholera causes and how it's transmitted, how to engender interventions, and sustaining those interventions until the outbreak is over actually helps buy into it.

Limited Resources

Studies stress that local capacity deficiencies, such as a lack of human resources and inadequate training, cause serious hindrances to the cholera response.[8] This is in addition to the fact that some communities may not receive our breaks as far as they may have health centres and treatments that suit the problem. There is a tendency to associate challenges to cholera intervention implementation with poor governance and restrictive support structures. Studies indicate that structural challenges such as not investing in sufficient water, sanitation, and hygiene (WASH) infrastructure can cause cholera outbreaks.[6, 14] Inadequate personnel and insufficient training of health workers reduce response effectiveness. According to some researchers, weak governance leads to a loss of skilled personnel due to the mobilization and retention of trained human resources and, hence lack of preparedness for the cholera crisis.[1] These findings highlight how good governance is vital to increasing the human resource capabilities that can be deployed in response to and preventing cholera.

Strong Leadership and Governance

The study warns that proper governance is fundamental in thwarting the spread of cholera, requiring strong political backing and linking government with NGOs. A further improvement of these efforts can be achieved using innovative technology to improve water and sanitation facilities. Through collaboration between stakeholders, such as NGOs and community groups, and through addressing the challenges to cholera prevention interventions, it is possible to avoid vulnerability to cholera infections better. Multi-sector partnerships promote sustainable health interventions, collaborative networks contribute to ensure information flow and resource allocation for timely response to cholera outbreaks.[2] Moreover, the

study suggests that cholera prediction models that are reliable can help in resource mobilization such as vaccination, water purification, sanitation tools, antibiotics, and oral rehydration solutions to at risk places. This is in line with[13]who emphasize that robust prediction models are a powerful part of preparedness as they can identify high risk areas to be intervened in a timely manner.

Political Instability

In a politically stable environment, it is easier to prevent cholera, according to the study. Prevention is effective when it includes the provision of safe and clean water, proper sanitary facilities, promotion of good hygiene practice, and vaccination campaign. Researchers have found that the vaccination program worked best when the political environment was particularly stable, so people could widely embrace the intervention and work in community on it in cooperation.[14]

Vaccinations

This study identifies vaccination campaigns as an enabler for other prevention interventions in the form of improvement in practices regarding better sanitation and hygiene. Although observations related to these vaccination campaigns must be conducted under other apparent preventive techniques such as improved sanitation and hygiene practices. While this observation is not unexpected, it does accord well with a study of oral cholera vaccination campaigns[1°] that showed that given the availability of vouchers, these campaigns increased adoption of other prevention practices (sanitation and hygiene improvement) and substantially reduced the transmission of cholera.

Practical implications of barriers and enablers

Policy Makers

Public health strategies heavily depend on the barriers and enablers of cholera prevention. For policymakers to design targeted interventions, it is essential to recognize these factors. Key barriers include inadequate water and sanitation infrastructure, limited access to healthcare, and socio-economic disparities. However, community engagement, education, and good disease surveillance can enhance the ability of outbreaks to respond suggestions to invest in sustainable water and sanitation facilities in vulnerable communities and strengthen hygiene education campaigns. Collaboration with local organizations for community trust and participation and strengthening of healthcare systems for rapid response in the event of outbreaks can improve strategies to prevent cholera.

Health Workers

Therefore, health practitioners need to understand the barriers and enablers to cholera prevention so that they can provide the best health care for their patients and develop community health initiatives. All these pose barriers to managing cholera cases and educating the public because prevention is not yet something they can achieve. Established community health networks function as enablers to use their effectiveness in preventing outbreaks. To circulate this information to the people, that is; to promote hygiene education and the safe use of water, practitioners should establish close relationships with the local communities. In addition, they must persuade in favour of better sanitation infrastructure and work in synergy with public health officials to execute timely mitigation. Health practitioners can drastically cut cholera incidence and community health outcomes by addressing the barriers and accommodating the enablers.

RECOMMENDATIONS

Several practical recommendations can be implemented to address the barriers and enablers in cholera prevention.

- Governments must invest in sustainable water purification systems and improved sewage systems in those deprived communities.
- Organized educational campaigns should be run in places where outbreaks are common to spread the word about hygiene (hand washing and safe food handling) to prevent outbreaks.

- Taking advantage of community leaders and local organizations to help them trust and respond to health messages to people there.
- Training cholera detection and response to healthcare workers.
- Finally, this will help identify cases and outbreaks that can be followed with rapid response measures.

CONCLUSION

Reviewing barriers and enablers to cholera prevention focuses on community engagement, effective governance, and strong infrastructure in successful interventions. Community participation's value is in building trust and ownership around proactive cholera prevention actions. However, financial resource shortages, poor sanitation structure, and lack of access to healthcare hamper these attempts. Strong political commitment, collaboration between governmental and non-governmental organizations, and effective governance are essential to implement comprehensive health strategies. Reducing cholera transmission requires integrating vaccination campaigns with improved sanitation and hygiene practices, underlining the necessity of an overall more complex approach. The findings call for targeted investment in infrastructure, education, and community involvement for policymakers and health practitioners. Stakeholders can address barriers and leverage enablers to develop such a holistic strategy to combat cholera through improving public health and community resilience in the face of future outbreaks.

Declarations

Consent for Publication

Not relevant.

Ethics Approval and Consent to Participate

All the fifteen (15) research protected in this systematic overview obtained ethical clearance, with consent to take part in the observation.

Availability of Data and Materials

Data sharing is not appropriate to this article because no datasets had been generated throughout the contemporary study.

Competing Interests

The writers affirm that they have no opposing interests.

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Authors' Contributions

All four authors contributed to the 'have a look design', information review, evaluation, and synthesis. The main author (KM) prepared a preliminary manuscript, and all authors added to the revision of the manuscript. All authors have read and permitted publication of the very final manuscript.

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ABBREVIATIONS

CDC - Centres for Disease Control and Prevention,

HH - Household,

HI - Health Information,

IEC - Information, Education, Communication (strategies),

MoH - Ministry of Health,

OCV - Oral Cholera Vaccine,

WHO- World Health Organisation,

ORS - Oral Rehydration Salt,

WASH- Water and Sanitation, and Hygiene.

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