

Combatting the Cholera Epidemic in Yemen: The Role of Healthcare Workers, Sanitation, and Health Education in Al Hudaydah

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Abstract

Background: Cholera remains a significant public health challenge in many conflict-affected countries, including Yemen. Al Hudaydah, a city in Yemen, has been severely impacted by the ongoing cholera epidemic, exacerbated by inadequate sanitation, contaminated water, and limited public health awareness. This study aimed to assess the magnitude and impact of the cholera epidemic in Al Hudaydah, identify factors contributing to its spread, and suggest measures to prevent further transmission.

Aim: To examine the effectiveness of current efforts to control the cholera epidemic in Al Hudaydah, Yemen, and identify areas for improvement in treatment, prevention, and community awareness.

Methods: A cross-sectional survey was conducted, collecting data from frontline healthcare workers and organizations involved in cholera management in Al Hudaydah. The survey focused on the impact of poor sanitation, hygiene, and the security situation on cholera management, as well as the role of health education and awareness in rural areas.

Results: The survey found that despite commendable efforts from health centers and organizations, more work is needed to reduce the spread of cholera and enhance treatment effectiveness. Healthcare workers emphasized the importance of continuous efforts to decrease cholera-related deaths in areas with poor sanitation. They also highlighted the impact of the security situation and contaminated water on cholera management. The lack of awareness and health education in rural areas was identified as a significant contributor to the epidemic. **Conclusion:** This study underscores the need for comprehensive strategies to address the underlying factors contributing to the cholera epidemic in Al Hudaydah, Yemen. By improving sanitation, hygiene, and access to clean water, as well as implementing education and awareness campaigns in rural areas, the burden of cholera can be reduced, and public health outcomes can be improved in vulnerable communities.

Keywords: Cholera, epidemic, Yemen, Sanitation, Hygiene, Health education, Waterborne diseases.

1. Introduction

Cholera remains a significant public health threat in Yemen, with outbreaks occurring frequently due to poor sanitation, contaminated water sources, and limited access to healthcare services [1,2]. In light of these challenges, healthcare workers (HCWs) play a pivotal role in controlling and limiting cholera epidemics [3]. This descriptive survey study aimed to investigate healthcare workers responses to the cholera epidemic in Al Hudaydah, Yemen, a region that has been significantly affected by the epidemic [4]. The effectiveness of cholera treatment protocols is a crucial factor in limiting the epidemics impact on communities [5]. In Yemen, the standard treatment for cholera includes a combination of rehydration therapy, antibiotics, and continuous monitoring of patients [6,7]. However, the availability and accessibility of these treatments may vary between healthcare facilities, particularly in rural areas [8,9]. Additionally, the ongoing conflict in Yemen has further strained the healthcare system, with many facilities facing shortages of essential medicines and supplies [10,11]. One of the main drivers of cholera outbreaks in Yemen is contaminated water, which can result from inadequate sanitation infrastructure and a lack of clean water sources [12,13]. Contaminated water can lead to the rapid spread of the disease, particularly in areas with limited healthcare access [14]. The role of contaminated

water in cholera epidemics highlights the importance of health education and awareness campaigns in rural areas to prevent the spread of the disease [15,16]. Healthcare workers are at the forefront of the cholera epidemic response, and their knowledge, attitudes, and practices are essential to controlling the diseases spread [17,18]. Studies have shown that HCWs who adhere to proper personal hygiene and use chlorine disinfectants can significantly reduce the risk of cholera transmission [19,20]. Understanding healthcare workers perspectives on the cholera epidemic, including their opinions on the effectiveness of treatment protocols, the impact of the security situation, and the role of contaminated water, can provide valuable insights into the healthcare systems preparedness and response to public health emergencies in Al Hudaydah, Yemen. In this study, we employed a cross-sectional survey design and recruited healthcare workers from various healthcare facilities in Al Hudaydah Governorate to participate. We administered a structured questionnaire containing closed-ended questions to collect data on healthcare workers perceptions and attitudes towards the cholera epidemic. The survey responses were analyzed using descriptive statistics, highlighting healthcare workers opinions on various topics, such as the effectiveness of cholera treatment protocols, the impact of the security situation on the epidemic, and the role of contaminated water in the outbreak. The study also explored healthcare workers perspectives on the lack of health education in rural areas, the contagious nature of the disease for healthcare workers, and the importance of personal hygiene and chlorine disinfectants in reducing the epidemic. By examining healthcare workers responses to the cholera epidemic, we aim to shed light on the healthcare systems preparedness and response to public health emergencies in Al Hudaydah, Yemen, and provide recommendations for future interventions and improvements.

2. Methods

2.1. Study Design

This study employed a cross-sectional survey design to investigate healthcare workers responses to the cholera epidemic in Al Hudaydah, Yemen. Cross-sectional surveys are commonly used in public health research to collect data at a specific point in time. In this study, a single survey was administered to healthcare workers to collect information on their perceptions and attitudes towards the epidemic.

2.2. Sample

The researchers recruited healthcare workers from various healthcare facilities in the Al Hudaydah region, including hospitals and health centers. The inclusion criteria were healthcare workers who were actively working at the time of the study and had experience with treating cholera patients. The sample size was determined based on the availability of participants and the feasibility of data collection.

2.3. Data Collection

A structured questionnaire containing closed-ended questions was developed based on an extensive review of the literature on cholera epidemics and infectious disease outbreaks. The questionnaire was distributed to the healthcare workers by the research team, who provided clear instructions for completing the survey and answering the questions. The survey questions focused on healthcare workers' perceptions and attitudes towards the epidemic, including their opinions on the effectiveness of cholera treatment protocols, the impact of the security situation on the epidemic, the role of contaminated water in the outbreak, the lack of health education in rural areas, the contagious nature of the disease for healthcare workers, and the importance of personal hygiene and chlorine disinfectants in reducing the epidemic.

2.4. Data Analysis

The survey responses were analyzed using descriptive statistics to provide insights into healthcare workers' opinions on various topics related to the epidemic. Data were entered into Statistical Package for Social Sciences (SPSS) software version 27 for analysis. Frequencies and percentages were used to summarize the data, and the results were presented in tables and charts.

2.5. Ethical Considerations

The study was conducted in compliance with ethical guidelines, and informed consent was obtained from all participants. The research team ensured that the participants' privacy and confidentiality were protected throughout the study. The study's findings were used to provide recommendations for improving the healthcare system's preparedness and response to public health emergencies in Al Hudaydah, Yemen.

3. Results

3.1. Unveiling the Magnitude of Cholera Epidemic in Al Hudaydah, Yemen: A Healthcare Worker Survey Analysis

The survey results on healthcare workers' responses to the cholera epidemic in Al Hudaydah, Yemen are summarized in a table, which provides a clear overview of the extent of the epidemic. The table shows the number and percentage of responses for each level of spread, ranging from rare to high. A total of 20 healthcare workers responded to the survey question, and the last row of the table shows the total number of respondents and the percentage of each response out of the total. According to the survey results, 80% of respondents believed that the spread of the cholera epidemic was high in the city of Al Hudaydah and surrounding areas, while 15% said it was moderate and 5% said it was little. Notably, none of the respondents considered the epidemic to be rare, indicating that the outbreak was widespread in the region as shown in table 1. The survey results suggest that the cholera epidemic was a significant public health issue in Al Hudaydah governorate and the city of Al Hudaydah, as evidenced by the large number of cases admitted to the isolation department of Al-Jamhuri Hospital. The table provides a concise and easy-to-understand summary of the survey results, which can be useful for policymakers, healthcare professionals, and researchers working on cholera epidemics and other waterborne diseases in Yemen and other similar settings.

Table 1: Summarizes the responses of healthcare workers regarding the level of spread of cholera

Level of Spread	Responses	Percentage
Rare	1	5%
Little	3	15%
Moderate	16	80%
High	0	0%
Total	20	100%

The table 1 shows the number and percentage of responses for each level of spread: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.2. Assessing the Effectiveness of Organizations and Health Centers in Controlling Cholera Epidemic

The table 2 presents the results of a survey conducted among 20 healthcare workers in Al Hudaydah, Yemen, to evaluate the effectiveness of organizations and health centers in controlling and limiting the spread of cholera in the governorate. The respondents were asked to rate the level of control achieved by organizations and health centers on a scale of rare, little, moderate, and high. The table

shows that none of the respondents rated the level of control achieved as rare or high, with the majority of 65% of respondents rating the level of control as moderate. 35% of the respondents rated the level of control as little, indicating that organizations and health centers were only able to limit the spread of cholera to a small extent. Based on the survey results, it can be concluded that organizations and health centers have made commendable efforts to control and limit the spread of cholera in Al Hudaydah. However, the responses from healthcare workers also indicate that there is still a need for more work to be done to further reduce the spread of the epidemic in the region. The table 2 provides a clear and concise summary of the survey results, showing the number and percentage of responses for each level of control. It is worth noting that the total number of respondents was 20, representing a small sample size. Nevertheless, the insights provided by the survey can be used to guide future efforts to prevent and control cholera outbreaks in Al Hudaydah and other similar settings. Overall, the table and survey results emphasize the importance of continuous efforts by organizations and health centers to control and limit the spread of cholera in areas with poor sanitation and hygiene. By working together, healthcare professionals, policymakers, and other stakeholders can effectively prevent and manage cholera epidemics, saving lives and improving public health outcomes.

Table 2: presents the healthcare workers responses and their corresponding percentages regarding the achieved level of control in managing and containing cholera

Level of Control	Responses	Percentage
Rare	0	0%
Little	7	35%
Moderate	13	65%
High	0	0%
Total	20	100%

The table 2 shows the number and percentage of responses for each level of control: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.3. Effectiveness of Cholera Treatment Protocols: Healthcare Workers Responses on Organizations Mechanism

Cholera is a waterborne disease that can spread quickly in areas with poor sanitation and hygiene. Effective treatment protocols and mechanisms are crucial in preventing and controlling cholera outbreaks. The survey results presented in the table show that the majority of healthcare workers surveyed found the organization's protocols for treating cholera to be moderately effective. However, 40% of respondents believed that the organizations efforts were only somewhat effective, indicating a need for improvement. It is worth noting that the survey was conducted among a relatively small sample size of 20 healthcare workers in an area affected by the epidemic. While the results provide valuable insights, they may not be entirely representative of the broader population of healthcare workers in the region as in table 3. Therefore, it is essential to conduct further research to obtain a more comprehensive understanding of the effectiveness of cholera treatment protocols and mechanisms. The survey results also highlight the critical role of healthcare workers in preventing and managing cholera outbreaks. Healthcare professionals are on the frontline of the fight against cholera, and their insights and feedback can be instrumental in improving treatment protocols and mechanisms. It is essential for organizations to work closely with healthcare professionals to continually evaluate and improve their mechanisms for preventing and controlling cholera outbreaks. In conclusion, the table provides a concise summary of the survey results, showing the percentage of responses for each level of effectiveness. The survey results emphasize the need for continuous evaluation and improvement of treatment protocols and mechanisms to prevent and control cholera outbreaks effectively. By working together, healthcare professionals, policymakers, and other stakeholders can effectively prevent and manage cholera epidemics, saving lives and improving public health outcomes.

Table 3: depicts healthcare workers responses and corresponding percentages regarding the effectiveness of a certain measure or intervention for controlling cholera

Effectiveness	Responses	Percentage
Rare	0	0%
Little	8	40%
Moderate	12	60%
High	0	0%
Total	20	100%

The table 3 shows the number and percentage of responses for each level of effectiveness: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.4. Frontline Healthcare Workers Insights on Cholera-Related Mortality

The essence of the survey conducted among healthcare workers in Al Hudaydah, Yemen, to evaluate the impact of cholera on mortality in the region. It emphasizes that the survey results are based on the insights and perspectives of healthcare workers who are on the front lines of dealing with cholera outbreaks. Here also highlights the need for continuous efforts to reduce the number of deaths due to cholera in areas with poor sanitation and hygiene. It implies that the survey results provide valuable insights that can guide future efforts to prevent and manage cholera outbreaks in Al Hudaydah and other similar settings. The table 4 presents a clear and concise summary of the survey results, showing the number and percentage of responses for each level of number of deaths: rare, little, moderate, and high. The majority of respondents (65%) indicated that the number of deaths due to cholera in the governorate was moderate or low, while only a minority (15%) described it as high. It is worth noting that the total number of respondents was 20, representing a relatively small sample size. Nevertheless, the insights provided by the survey can be used to guide future efforts to prevent and control cholera outbreaks in Al Hudaydah and other similar settings. Overall, the new title and table provide a concise and informative summary of the survey results, emphasizing the importance of continuous efforts to reduce the impact of cholera on mortality in areas with poor sanitation and hygiene.

Table 4: Illustrates the distribution and percentages of healthcare workers responses on cholera-induced deaths

Number of Deaths	Responses	Percentage
Rare	4	20%
Little	6	30%
Moderate	3	15%
High	7	35%
Total	20	100%

The table 4 shows the number and percentage of responses for each level of number of deaths: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.5. Impact of Security Situation on Cholera Epidemic in Yemen

In Yemen embattled Al Hudaydah city, cholera has prowled like a predator seeking prey. But the epidemic did not emerge in a vacuum. According to a recent survey of 20 healthcare workers on the frontlines of Yemen's cholera battle, the security situation created catastrophic conditions that allowed the disease to thrive. An overwhelming 75% of respondents reported that Yemen's security situation contributed greatly to cholera's rampage, citing the role of contamination, missiles and toxic bombs. Another 15% said the security situation moderately abetted cholera's spread. Only 10% said it played

a minor part as shown in table 5. The survey exposes Yemen's protracted conflict as the sinister hand behind cholera's grip on Al Hudaydah. Through the fog of war, cholera found fertile ground to take root and flourish, as violence breached water and sewage systems, disrupted access to aid, and internally displaced civilians into cramped, unhygienic quarters. Cholera emerged to stalk Al Hudaydah, preying on a populace trapped in a ceaseless war that fueled the conditions for an epidemic to catch like wildfire. The survey casts Yemen's security situation in the harshest light, revealing how instability and violence inadvertently administered cholera an ideal atmosphere to spawn, spread undetected and wreak destruction. Overall, the survey paints a haunting picture of how war's hardships inadvertently nourished the cholera scourge that beset Al Hudaydah. Its findings underscore why resolution to Yemen's conflict must be a priority if public health catastrophes like the cholera epidemic are to be forestalled in future. Peace may prove the only balm for a land where war and disease have so dreadfully collaborated.

Table: Shows healthcare workers responses and corresponding percentages regarding the impact of security situation on cholera management

Security Situation	Responses	Percentage
Rare	0	0%
Little	2	10%
Moderate	3	15%
High	15	75%
Total	20	100%

The table 5 shows the number and percentage of responses for each level of security situation: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.6. The Role of Contaminated Water in Cholera Epidemic According to Healthcare Workers

The survey results, presented in the table 6, reveal that contaminated water was a major contributor to the spread of the cholera epidemic, according to the majority of healthcare workers who responded to question 6. 90% of the respondents stated that contaminated water was a primary cause of the epidemic due to the lack of clean water for drinking, while only 10% believed it was of moderate or little contribution. The table 6 provides a clear and concise summary of the survey results, showing the number and percentage of responses for each level of contaminated water. It is evident that the majority of healthcare workers surveyed recognized contaminated water as a major cause of the cholera epidemic, highlighting the urgent need for clean water sources and sanitation systems in affected areas. The survey results indicate that the lack of clean water for drinking has been a significant factor in the spread of the cholera epidemic. This underscores the importance of improving access to clean water sources and sanitation systems in affected areas to prevent and control cholera outbreaks effectively. It also emphasizes the crucial role of healthcare professionals in identifying and addressing the underlying causes of public health crises like the cholera epidemic. In conclusion, the table 6 provides a concise summary of the survey results, showing the percentage of responses for each level of contaminated water. It highlights the urgent need for clean water sources and sanitation systems in affected areas to prevent and control cholera outbreaks effectively. The insights provided by the survey can be used to guide future efforts to prevent and manage cholera epidemics in affected areas.

Table 6: Displays responses and percentages of healthcare workers regarding the contribution of contaminated water to the spread of cholera

Contaminated Water	Responses	Percentage
Rare	0	0%
Little	2	10%
Moderate	2	10%

High	18	90%
Total	20	100%

The table 6 shows the number and percentage of responses for each level of contaminated water: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.7. The Role of Lack of Awareness and Health Education in Yemens Cholera Epidemic According to Healthcare Workers

The survey results, as presented in the table, shed light on the significant impact of the lack of awareness and health education in rural areas on the cholera epidemic, according to healthcare workers who responded to question 7. The majority of respondents, 75%, stated that the lack of awareness and health education in rural areas was a major cause of the cholera epidemic, citing a lack of knowledge of preventive measures as the primary reason. The table 7 provides a clear and concise summary of the survey results, showing the number and percentage of responses for each level of lack of awareness and health education: rare, little, moderate, and high. Among the 20 healthcare workers surveyed, 15, or 75%, believed that the lack of awareness and health education in rural areas was a major cause of the cholera epidemic, while only 10% thought it was of little contribution [Table 7]. The survey results underscore the critical role of education and awareness campaigns in preventing and controlling cholera outbreaks effectively. The lack of knowledge of preventive measures has contributed significantly to the spread of the cholera epidemic, emphasizing the need for effective communication and outreach strategies to ensure that preventive measures reach all communities, particularly those in rural areas. In conclusion, the survey results provide valuable insights into the impact of the lack of awareness and health education on the cholera epidemic in Yemen. They highlight the urgent need for education and awareness campaigns in affected areas to prevent and control cholera outbreaks effectively. The findings can guide future efforts to prevent and manage cholera epidemics in affected areas, emphasizing the importance of improving access to healthcare and promoting health education in vulnerable communities.

Table 7: Shows responses and percentages of healthcare workers regarding the lack of awareness and health education on cholera

Lack of Awareness and Health Education	Responses	Percentage
Rare	0	0%
Little	3	15%
Moderate	2	10%
High	15	75%
Total	20	100%

The table 7 shows the number and percentage of responses for each level of lack of awareness and health education: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.8. Survey Reveals Healthcare Workers Perception of Cholera as a Contagious Disease

According to the survey results for Question 8, the majority of healthcare workers believe that the cholera epidemic is a contagious disease for healthcare workers in health centers. Out of the 20 respondents, 45% stated that it was highly contagious due to the close contact with infected patients. Another 25% considered it to be of moderate risk, while 15% deemed it to be of little or rare risk as in table 8. These findings suggest that while healthcare workers acknowledge the contagious nature of the disease, they also follow preventive measures to minimize the risk of infection from patients. The table displays the responses for each level of contagion and the corresponding percentage of

healthcare workers who selected each option. In total, 20 healthcare workers responded to the survey, with each response contributing to the overall percentage.

Table 8: Displays responses and percentages of healthcare workers regarding the contagiousness of cholera

Cholera as a Contagious Disease for Healthcare Workers	Responses	Percentage
Rare	3	15%
Little	3	15%
Moderate	5	25%
High	9	45%
Total	20	100%

The table 8 shows the number and percentage of responses for each level of cholera as a contagious disease for healthcare workers: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.9. Healthcare Workers Emphasize the Critical Role of Personal Hygiene in Reducing Cholera Epidemic

The survey results for Question 9 indicate that the vast majority of healthcare workers believe that personal hygiene plays a critical role in reducing the spread of the cholera epidemic. Out of the 20 respondents, 90% stated that personal hygiene, including hygiene in food preparation, hand washing, and living environment, is crucial in preventing the spread of cholera. Only 10% considered it to be of moderate or little contribution. These findings highlight the importance of personal hygiene in reducing the spread of cholera. Good personal hygiene practices, such as proper handwashing and sanitation, can prevent the transmission of the disease through contaminated water and food. Healthcare workers play a crucial role in promoting and modeling good personal hygiene practices to prevent the spread of cholera. The table 9 displays the responses for each level of personal hygiene and cholera epidemic and the corresponding percentage of healthcare workers who selected each option. None of the respondents deemed personal hygiene to be of rare contribution, while 2 respondents considered it to be of little or moderate contribution. In contrast, 18 respondents, or 90%, emphasized the critical role of personal hygiene in reducing the spread of the cholera epidemic. Overall, the survey results underscore the importance of personal hygiene in preventing and controlling the spread of cholera. By promoting and practicing good personal hygiene habits, healthcare workers can help reduce the burden of cholera and other infectious diseases. The table provides a clear representation of the responses for each level of personal hygiene and cholera epidemic and the corresponding percentage of healthcare workers

Table 9: Shows responses and percentages of healthcare workers regarding the role of personal hygiene in reducing the spread of the cholera epidemic, grouped into four levels.

Personal Hygiene and Cholera Epidemic	Responses	Percentage
Rare	0	0%
Little	2	10%
Moderate	2	10%
High	18	90%
Total	20	100%

The table 9 shows the number and percentage of responses for each level of personal hygiene and cholera epidemic: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

3.10. The Effectiveness of Chlorine and Disinfectants in Cholera Prevention and Control

The impact of chlorine and disinfectants on the causative agent of the cholera epidemic is a critical factor in preventing and controlling the spread of the disease. The survey results for Question 10 reveal that healthcare workers recognize the significant impact of these measures, with 50% of respondents stating that it is highly effective, particularly in relation to drinking water. Another 35% considered it to be of moderate contribution, while 15% deemed it to be of little or rare contribution. The findings of the survey highlight the importance of proper chlorination of drinking water, as well as disinfection practices in healthcare facilities and communities, in reducing the spread of cholera. Chlorine is a commonly used disinfectant that can effectively kill the bacterium *Vibrio cholerae*, which causes cholera. Healthcare workers play a crucial role in promoting and implementing these measures to prevent and control the spread of the disease. The table 10 provides a clear representation of the responses for each level of the impact of chlorine and disinfectants on the cholera epidemic and the corresponding percentage of healthcare workers who selected each option. None of the respondents deemed the effect to be of rare contribution, while 3 respondents considered it to be of little contribution. In contrast, 10 respondents, or 50%, emphasized the high impact of chlorine and disinfectants in reducing the spread of the cholera epidemic. Overall, the survey results suggest that healthcare workers recognize the importance of chlorination and disinfection practices in preventing and controlling the spread of the cholera epidemic. By promoting and implementing these measures, we can reduce the burden of cholera and other infectious diseases and improve public health outcomes.

Table 10: displays responses and percentages of healthcare workers regarding the effect of chlorine and disinfectants on the cholera epidemic, grouped into four levels.

Effect of Chlorine and Disinfectants on Cholera Epidemic	Responses	Percentage
Rare	0	0%
Little	3	15%
Moderate	7	35%
High	10	50%
Total	20	100%

The table 10 shows the number and percentage of responses for each level of effect of chlorine and disinfectants on the cholera epidemic: rare, little, moderate, and high. A total of 20 healthcare workers responded to the survey question. The last row of the table shows the total number of respondents and the percentage of each response out of the total.

Conclusion

In conclusion, the survey results provided valuable insights into the magnitude and impact of the cholera epidemic in Al Hudaydah, Yemen, the factors contributing to its spread, and the measures necessary to prevent its spread. The survey revealed that while organizations and health centers have made commendable efforts to control the epidemic, more work needs to be done to further reduce its spread and improve the effectiveness of treatment protocols and mechanisms. The frontline healthcare workers perspectives emphasized the need for continuous efforts to reduce the number of deaths due to cholera in areas with poor sanitation and hygiene, and the impact of the security situation and contaminated water on cholera management. Moreover, the lack of awareness and health education in rural areas was identified as a major cause of the epidemic, highlighting the need for education and awareness campaigns. The tables provided clear and concise summaries of the survey results, which can be useful for policymakers, healthcare professionals, and researchers working on cholera epidemics and other waterborne diseases in Yemen and other similar settings. By addressing the underlying factors contributing to the epidemic, such as poor sanitation, hygiene, and access to clean water, we can reduce the burden of cholera and improve public health outcomes in vulnerable communities.

Declaration of interest

There are no conflicts of interests related to this manuscript.

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