Minireview Article

Cholera in Iraq: Recurring Outbreaks, Public Health Gaps, and the Urgent Need for Sustainable Control Strategies

ABSTRACT

Cholera remains a serious public health threat in Iraq. During the 21st century, the country has experienced numerous outbreaks, with the most recent epidemic occurring in 2022. In this paper, we examine cholera outbreaks in Iraq from 2020-2025, the pattern of distribution, public health challenges, and impact of COVID-19 in monitoring and control of cholera, with the aim of turning these data and experiences into lessons and suggestions that will aid in controlling cholera outbreaks. Key contributing factors to the recurrence of large outbreaks are still circulating in many areas of the country, which include a shortage of access to safe drinking water, inadequate sewage management, conflicts, internal displacement, and low health literacy. Besides, COVID-19 pandemic has substantially impacted already exhausted Iraq's health system and indirectly hindered its cholera preparedness. In Iraq, cholera outbreaks tend to follow a geographical and seasonal pattern, with most of outbreaks typically peaking between late summer and early winter. Despite predictable patterns, the government's responses have remained exclusively reactive. A coordinated, forward-thinking strategy is needed for sustainable cholera control in Iraq, with the implementation of a more proactive prevention strategy. Strengthening early alert systems, advancing local monitoring, and funding clean water and sewage facilities are crucial measures.

Keywords: Cholera; Outbreaks; Recurrency; Epidemiology; Public Health; Control

1. INTRODUCTION

Cholera remains a significant public health issue in Iraq (Hussein, 2022; Hussein et al., 2023). The country has experienced numerous outbreaks, highlighting persistent shortcomings in its water, sanitation, and healthcare systems (Hussein, 2022; Hussein et al., 2023). Cholera is an acute diarrheal disease caused by Vibrio cholerae that spreads through contaminated food or water. It tends to create outbreaks in regions with unsafe water supply, poor sanitation, and weak health services (Kanungo et al., 2022). Iraq has experienced large

outbreaks in the 21st century (in 2007, 2015, and 2017) (Al Sa'ady, 2023). Then, cholera hit again in 2022 after a period of relative calm (Al Sa'ady, 2023). Maybe, the recent outbreak in 2022 was due to a combination of risk factors, such as the stressors of the COVID-19 pandemic and the effects of long-term conflict (Mosa and Hussein, 2022). This study addresses the issue of cholera in Iraq during the previous five years (2020–2025). We investigate the patterns of recent outbreaks, how COVID-19 has affected monitoring and control, problems with public health infrastructure, and how cholera tends to happen in certain places and at certain times of year. We also look at how the government has responded and turn new data and experiences into lessons and suggestions that will help to stop the cycle of cholera outbreaks in Iraq.

2. RECENT CHOLERA OUTBREAKS IN IRAQ (2020–2025)

2020 to 2021: During this period, Iraq did not publicly report any major cholera outbreaks. This was unprecedented in Iraq and might be explained by that during COVID-19 pandemic, which started in 2020, people paid more attention to coronavirus cases and infection control measures (Hussein, 2022). Such measures might have lowered the possibilities of cholera spread. On the same time, because most of the resources were moved to combat COVID-19 pandemic, cholera surveillance was disturbed (Hussein, 2022).

2022: In the middle of 2022, since 2017, the worst outbreak occurred in Iraq which was started in June (Al Khafaji et al., 2023). The Ministry of Health officially reported a cholera outbreak on June 19, 2022, after verifying at least 13 cases in multiple different cities in Iraq including Sulaymaniyah province in the Kurdistan Region (north), Kirkuk (north-central Iraq), and Al Muthanna (south) (Al Khafaji et al., 2023; Hameed et al., 2022; IFRC, 2023). During the beginning of the outbreaks, thousands of cases of acute diarrheal diseases were reported. Such a large number of cases caused urgent worries. For example, hospitals in the city of Sulaymaniyah were saturated with cases of severe diarrhea, with more than 4,000 people coming in in just one week during June (Sabir et al., 2023; IFRC, 2023). Then, the nearby cities of Erbil and Duhok (also in the north) also reported more people being hospitalized for diarrhea. This suggests that cholera was probably spreading or that water sources that were polluted were affecting more than one community at the same time. The cholera epidemic had spread across a large part of Iraq by the end of 2022. **Table 1** (IFRC, 2023) shows the number of confirmed cholera cases and deaths per province as of November 2, 2022, when the outbreak was starting to slow down:

Table 1. Cholera cases and deaths by province

Province	Confirmed Cases	Deaths
Kirkuk	937	3
Baghdad (Rusafa & Karkh)	726	6
Erbil	443	3
Sulaymaniyah	385	0

Babylon (Babel)	167	3
Diyala	135	2
Wasit	88	0
Thi Qar	80	1
Najaf	42	0
Karbala	19	0
Diwaniya (Qadisiyyah)	19	2
Al Muthanna	14	0
Salah al-Din	8	0
Total	**3,063**	**19**

2023-2025: In 2023, Iraq officially recorded a few hundred probable cases of cholera. The World Health Organization (WHO) declared that during the first eight months of 2023, there were 92 confirmed cases of cholera and one fatality in Iraq. Later on, in September, the cholera has resurged, with overall number of cases in Iraq had grown to about 1332 by the end of 2023, with seven deaths (as reported in summary for the Eastern Mediterranean area) (WHO, 2023a). This is a far lesser amount than the previous year, which means that there were no large outbreaks in 2023. Between 2024 and mid-2025, there have been no reports of a significant cholera resurgence in Iraq (WHO, 2025). It is important to mention that the predisposing factors of the large outbreak are still around, which means that the chance of a cholera outbreak is still high.

3. PUBLIC HEALTH INFRASTRUCTURE GAPS AND CONTRIBUTING FACTORS

Recurrent cholera outbreaks are a sign of issues in the country's infrastructure, social, and environmental conditions. Cholera outbreaks are predictable in terms of when and where they happen because of a number of variables, including poor water and sanitation, war and displacement, and climate change.

3.1 Water and Sanitation Deficiencies

The major factor of endemicity of cholera in Iraq is the inadequate quality of water and sanitation facilities (Zabeel, 2024). Decades of under-investment, war damage, and mismanagement have left many communities without consistent access to safe drinking water. A recent evaluation during the 2022 outbreak found that many tanker trucks delivering water were distributing contaminated water; in tests of 608 water samples from household tanks, wells, and tanker deliveries in northern Iraq, 11% of samples were positive for fecal contamination (Al Sa'ady, 2023). Such contaminated water puts people at a high risk of cholera. On top of that, Iraq's sewage and wastewater treatment facilities are getting old and are not working well enough (Al Sa'ady, 2023).

In addition, in certain regions, raw sewage is immediately released into rivers or utilized untreated for agricultural irrigation (Al Sa'ady, 2023). A worrisome practice uncovered during the 2022 outbreak was the use of sewage water to cultivate vegetables, which are subsequently consumed uncooked (Al Khafaji et al., 2023; Al Sa'ady, 2023; Zabeel, 2024). Likewise, the lack of regulated waste disposal and ongoing open defecation in some rural or peri-urban areas promote circumstances for V. cholerae to spread by rain runoff into water (Al Khafaji et al., 2023; Al Sa'ady, 2023; Zabeel, 2024). The Iraqi Ministry of Health and the World Health Organization (WHO) determined WASH (water, sanitation, and

hygiene) gaps as fundamental causes behind each cholera flare-up (Buliva et al., 2023; IFRC, 2023).

3.2 Impact of Conflict and Displacement

Iraq's recent history of violence has had a direct impact on the spread of cholera. The battles from the 1980s to the 2000s, the international sanctions in the 1990s, the invasion in 2003, and the war against ISIS from 2014 to 2017 all weakened the country's infrastructure and public services (Hussain and Lafta, 2019). Many places' water treatment plants, pipelines, and sewage systems were destroyed or fell into disrepair. Recovery has been uneven and delayed, especially in conflict-affected areas.

Till now, there are still considerable numbers of internally displaced persons (IDPs) living in camps or informal settlements - about 180,000 IDPs in camps and many more outside camps. Such camps do not have enough clean water and sanitation. During the 2022 epidemic, cholera cases were certainly found in several IDP camps (e.g., Kabarto camp in Duhok), albeit fast intervention avoided big camp-wide outbreaks. Conflict also impacts the ability of the government to maintain the sewage and clean water systems (IFRC, 2023). Moreover, the health system's ability for disease monitoring and outbreak response was severely impacted by the conflicts. Because of this weakness, the reaction to cholera may be delayed or less effective, which might let it spread more widely (IFRC, 2023).

3.3 Public Health Awareness and Hygiene

Low public knowledge and poor sanitary procedures in some areas are also to be blamed. There are health education efforts on boiling water, using chlorine tablets to treat water, washing your hands, and handling food safely, but they do not reach or have much of an effect, especially in remote areas. During the 2022 outbreak, officials observed that health awareness was low, especially in popular, poor, and rural areas, and that people weren't following preventive tips like washing fruits and vegetables properly or cleaning drinking water (IFRC, 2023; Hussein et al., 2023).

Cultural and social behaviors can also impact epidemic dynamics. For instance, the Arba'een pilgrimage, which takes place in Karbala in September, brings millions of people together in packed settings with communal dining (Hussein et al., 2023). This might make the risk of cholera transmission worse if cholera is present (Hussein et al., 2023). In fact, there were grave concerns in late 2022 that the large Arba'een gathering may make the cholera outbreak worse if the right steps weren't followed. It looks like a great calamity was avoided, maybe because pilgrims were given clear focused instructions about cholera and clean water was given on regular basis.

3.4 Impact of COVID-19

The COVID-19 pandemic (2020–2022) substantially impacted Iraq's health system and indirectly hindered its cholera preparedness, response, and most public health resources were diverted to fight the pandemic (Daniel et al., 2022; Hussein et al., 2020a; Hussein et al., 2020b). Because the majority of public health efforts focused on COVID-19, while cholera monitoring program was halted, leading to overlooking or late detection of cases of diarrhea (Daniel et al., 2022; Hussein et al., 2020a; Hussein et al., 2020b). There were

probably cases of cholera in 2020 and 2021 that remained unreported. The first verified cases of cholera did not show up until mid-2022, when hospitals in Sulaymaniyah reported a rise in severe diarrhea (Najmuldeen et al., 2025).

The pandemic also stretched lab capacity and delayed governmental action. Authorities were reluctant to confirm a new epidemic emerging from the Omicron wave, and samples had to be submitted to central labs. Probably, there had already been hundreds of cases of cholera by the time it was officially proclaimed in June 2022. Restrictions on movement made it harder to promote cleanliness and keep water systems running. Even if COVID-19 made people more aware of how to wash their hands, people may have become less careful about where they get their water. Overall, COVID-19 worsened Iraq's susceptibility to cholera, emphasizing the vital necessity for robust health systems and coordinated disease surveillance during concurrent outbreaks.

4. GEOGRAPHIC AND TEMPORAL PATTERNS OF CHOLERA IN IRAQ

Cholera outbreaks in Iraq have shown both spatial clustering and seasonal characteristics. Knowing about these patterns might help with prediction and preparation. Cholera has typically hit Iraq between late summer and early winter, from about August to December. For example, historical epidemics happened around autumn: one research noted that previous outbreaks generally occurred between September and December. This time coincides with periods following the hot summer, when river levels are low and water quality is poor. This is how the epidemics in 2015 and 2017 happened, with the 2017 outbreak happening mostly in August and September. Geographically, several provinces have been hotspots: Babylon, Baghdad, and portions of Kurdistan were afflicted in 2015 and 2017, while Wasit and southern provinces also had substantial cases in 2017 (Najmuldeen et al., 2025).

The 2022 epidemic varied little in its early start (June), but subsequently spread to encompass many of the traditionally at-risk locations (Table 1). The way it expanded in 2022 implies that it may have started in the north (Sulaymaniyah) and spread to the south at the same time (Muthanna). It then exploded in Kirkuk and Baghdad and finally reached as far south as Najaf and Karbala (Al Khafaji et al., 2023). By November, with milder conditions, the outbreak had largely declined. This shows that cholera is seasonal in Iraq: it grows best in the summer season when water systems are under stress. So, one might guess that the danger of cholera is highest in Iraq from about June to October each year, especially if the summer before was very hot or dry (or if big rains had just caused floods). Studies that provide evidence supporting these claims

Cholera is somewhat predictable in Iraq because it targets areas that are already weak. These include: peri-urban districts with little piped water (e.g., suburbs of Baghdad); rural communities reliant on river or canal water (common in central and southern governorates); and displacement/refugee camps (primarily in northern and western Iraq). The fact that identical areas have had outbreaks more than once (Kirkuk had cholera in 2007 and again in 2022, and Baghdad has had cases in most outbreaks) suggests that the risk factors in those areas stay the same. Northern regions, especially Kurdistan, which were previously less afflicted by cholera (with outliers like 2007), have lately demonstrated they are equally vulnerable if water and sewage infrastructure breaks (as evidenced in Sulaymaniyah's 2022 event) (Sabir et al., 2023).

In summary, cholera in Iraq follows a geographic-temporal pattern of seasonal epidemics in places with little water. The recurrence in certain provinces implies that treatments should be addressed there proactively each year before the high-risk season. From summer on, there should also be more surveillance. Even while the weather and exact

time might change, the general pattern is clear: cholera attacks reliably where unclean water meets vulnerable people, usually in the second half of the year. This regularity, while intimidating, presents a strategic opportunity – Iraq can foresee where and when to concentrate cholera preventive efforts.

5. REACTIVE CHOLERA RESPONSE DESPITE PREDICTABLE PATTERNS

In Iraq, historical trends show that cholera comes back in the same places and at the same times. Outbreaks usually peak in the late summer and hit the same high-risk communities, especially those with poor water and sanitation systems. Even though this is easy to see coming, the authority still mostly reacts to cholera outbreaks, only taking action after the number of cases rises and public alarm grows. Even if national surveillance data and international health authorities have shown that there are seasonal and regional tendencies, this reactionary stance continues (Qamar et al., 2022). For instance, areas like Sulaymaniyah, Baghdad, and Kirkuk have experienced breakouts again and over again during times of high temperatures and inadequate water supply. The government's actions are still crisis-driven. This kind of response paradigm puts too much stress on a health system that is already stretched too thin and slows down the implementation of life-saving interventions.

To change from reactive to proactive response, the government must institutionalize early warning systems, improve pre-season readiness at the local level, and prioritize investments in water, sanitation, and hygiene (WASH). A proactive cholera plan, anchored on recognized patterns, is not only practicable but crucial to ending the loop of needless health disasters.

6. ROLE OF EDUCATION IN CHOLERA CONTROL

Adequate health literacy plays a vital role in developing sustainable control strategies through increasing community awareness, and promoting healthy behaviors among populations. Knowledge gaps should be identified and targeted, especially in crowded settings such as educational institutions, refugee camps, and military bases where a large number of people utilize the same food resources and share washing and sanitary facilities making transmission of infection more feasible (Nayyar and Privor-Dumm, 2020).

People serve as health messengers, disseminating health knowledge to their families and communities. Therefore, it’s essential to equip them with evidenced-based information through targeted educational programs and social media platforms to avoid the spread of false information and misconceptions, which may further exhaust the health systems. WHO has reported that film-based educational initiatives result in a phenomenal increase in cholera prevention behaviors, and their positive impacts were witnessed beyond the targeted population (WHO, 2023b). The Iraqi Ministry of Health, in collaboration with medical institutions, should start to implement these educational initiatives for the achievement of public resilience and sustainable cholera control.

7. CONCLUSIONS AND RECOMMENDATIONS

Cholera is a significant public health issue in Iraq. This is probably because of the poor water and sanitation infrastructure, lingering effects of conflict, and insufficient public health preparedness. The infection tends to occur in high-risk locations like Baghdad, Kirkuk, and Sulaymaniyah between June and October, but the official response is mostly reactionary. Such a reactionary approach makes health services that are already overworked even more so.

For sustainable cholera control, Iraq needs to implement a more proactive prevention strategy. Strengthening early alert systems, advancing local monitoring, and funding clean water and sewage facilities are crucial measures. Efforts for seasonal readiness must be heightened before high-risk periods, focusing specifically on at-risk groups, especially those who are internally displaced. Efforts should be made to prioritize the monitoring of water sources during predicted peaks of outbreaks, particularly in high-risk environments. A coordinated, forward-thinking strategy is not only feasible but also essential for safeguarding the health of Iraq's population and breaking the cycle of recurring outbreaks.

CONSENT

Not applicable

ETHICAL APPROVAL

Not applicable

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An over-reliance on citations from the same sources.

The number of cited references is insufficient.