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CHOLERA CONTAINMENT IN KENYA: CHALLENGES & LESSONS

Public Health

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ABSTRACT

Kenya's official outbreak response has shifted over time toward a more integrated, multi-sectoral approach that prioritizes stronger health systems, rapid detection, and community-driven prevention. While the country continues to face serious challenges- such as a health worker-to-population ratio below WHO's recommended 2.3 per 1,000, high attrition rates, low salaries, and rural-urban imbalances - there have been deliberate efforts to expand the workforce, improve motivation through better training, supervision, and working conditions, and introduce both monetary and non-monetary incentives to retain skilled staff. Over the last decade, the health workforce has more than doubled, yet gaps in coverage, especially in underserved counties, remain a key barrier to effective outbreak containment. Kenya's network of health facilities has grown, with thousands of dispensaries, health centers, and hospitals, but many still lack essential amenities such as disability-friendly infrastructure, functional ambulances, and specialist care services. Efforts to contain outbreaks more quickly now rely heavily on the Integrated Disease Surveillance and Response (IDSR) system and Event-Based Surveillance (EBS), which enable earlier case detection and intervention. The introduction of tools such as the mobile "m-Dharura" platform has allowed thousands of community health volunteers, healthcare workers, and other stakeholders to report suspected health risks in real time, triggering faster public health action. Prevention strategies increasingly integrate improvements in water, sanitation, and hygiene (WASH), targeted cholera vaccination drives, and rapid deployment of treatment kits and clean water supplies during emergencies such as floods. Public awareness campaigns, including the use of vernacular radio, local volunteer mobilization, and Kenya Red Cross-led initiatives in informal settlements, have been instrumental in overcoming cultural and trust barriers, ensuring that preventive messages and resources reach the most at-risk populations. Together, these measures aim to detect and contain outbreaks more rapidly, strengthen resilience in the healthcare system, and build lasting community trust in public health responses, though persistent infrastructure and resource challenges mean there is still significant work ahead.

KEYWORDS

INTRODUCTION

Cholera outbreaks have placed a heavy burden on Kenya's public infrastructure, especially its public health system. Between 2014 and 2017, repeated outbreaks spread across multiple counties, including Nairobi, Mombasa, and Turkana, as well as refugee camps. Over 3,900 suspected cases and 76 deaths were recorded in 2017 alone (WHO Regional Office for Africa, Disease Outbreak - Cholera - Kenya - 11 December 2017). Outbreaks were linked to unsafe water, poor sanitation, and mass gatherings.

Poor sanitation and weak health systems not only worsen the spread of cholera, but also impose economic costs. Inadequate sanitation and hygiene drain KSh 27.4 billion (US$324 million) annually, or 0.9% of GDP (Mogasale et al.). Cholera adds further losses through healthcare expenses, productivity reduction, and premature deaths. Informal settlements like Kibera - Africa's second-largest slum - are especially vulnerable. Kibera lacks toilets, clean water, and waste disposal, forcing residents to use "flying toilets." (Lusambili). These conditions fuel diarrhoea, cholera, typhoid, malaria, and respiratory infections, disproportionately affecting women and children. Child mortality is significantly higher here compared to other regions. (Kenya National Public Health Institute)

To improve disease control, Kenya has adopted the Integrated Disease Surveillance and Response (IDSR) system to monitor illnesses such as malaria, cholera, and tuberculosis (Kenya National Public Health Institute). Yet under-reporting, poor infrastructure, and weak laboratory capacity limit its effectiveness.

Kenya faces major challenges in the health workforce and infrastructure, limiting access to quality healthcare (Prince and Otieno). A key issue is the low health worker-to-population ratio, with poor working conditions and widespread dissatisfaction.Service availability is also inconsistent. About 91% of facilities provide outpatient care, but only 16% offer inpatient services and 5% newborn care. Radiology services are scarce, with advanced imaging nearly absent. Laboratory coverage is better, with 87% of facilities offering basic services, though only 54% provide comprehensive testing. Maternity care remains limited: only 5% of facilities can conduct C-sections or blood transfusions. Dental, oncology, and psychiatric services are among the least available. Basic amenities are poor, with only 49% of facilities having ambulances, 45% piped water, and 4% disability-friendly infrastructure. (Kenya Ministry of Health, Health Labour Market Analysis for Kenya; Onyango and Wanyoike)

This paper reviews the challenges in effectively containing and eliminating possibilities for cholera to spread in Kibera, and what lessons these gaps hold both for Kenya and other countries dealing with frequent outbreaks of the disease.

Cholera Burden in East Africa

Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium Vibrio cholerae. It remains a global health threat and is widely regarded as an indicator of inequity and lack of social development. It causes an estimated 1.3–4.0 million cases annually, with 21,000–143,000 deaths (WHO). Cholera can spread rapidly due to short incubation periods (12 hours–5 days) and the fact that carriers, even if asymptomatic, shed bacteria for 1–10 days. The presence of cholera highlights weak water, sanitation, and hygiene (WASH) systems and broader socio-economic vulnerabilities.

Cholera's clinical presentation varies from mild to life-threatening:

- Mild/moderate cases: Most infections are mild or asymptomatic, yet carriers contribute to transmission (WHO Regional Office for Africa, Urgent Resolve to End Cholera Outbreak in Kenya).
- Severe cases (~10%): Acute watery diarrhoea, vomiting, fatigue, muscle cramps, and dehydration.
- Critical progression: If untreated, severe cases can cause shock and death within hours due to rapid dehydration.
- Special risk groups: Children under five are particularly vulnerable to severe disease and recurrent infections.

Cholera remains both an epidemic and endemic disease across mainly Africa and Asia. Unsafe drinking water, poor sanitation, limited hygiene practices, and contaminated food supplies cause faster transmission. Informal urban settlements, refugee camps, and humanitarian emergencies are the main areas that one is vulnerable to cholera (UNICEF Supply Division). Increased cross-border movement and urban overcrowding have expanded the reach of outbreaks. Surveillance data underestimates the true burden due to weak health systems, stigma, and concerns that declaring outbreaks could harm tourism or trade.

Economic Burden

Cholera is not only a health emergency but also an economic challenge: The average cost per patient exceeds US$1000 (Mogasale et al. model). Annual estimated economic loss of cholera in Africa is US$39–64.2 million. 2.8 million cases and 91,000 deaths annually across endemic countries (WHO Regional Office for Africa, Cholera). In 2016, Africa had 71,000 reported cases (54% of global burden), 1,760 deaths (42% of global total), CFR in Africa (2.5%) higher than global average (1.8%), indicating limited healthcare access. (Mogasale)

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Cholera is both a medical emergency and a development issue. While treatment is simple and effective, outbreaks continue due to structural inequalities in water, sanitation, and healthcare access. ORS, IV fluids, antibiotics, and OCV campaigns can quickly reduce mortality. Strengthened surveillance and cross-border coordination prevent large-scale spread. Sustainable WASH infrastructure, particularly in informal settlements like Kibera, is essential to eliminate cholera. Kenya's case demonstrates how urban poverty, mobility, and weak infrastructure perpetuate cholera, underscoring the need for both medical interventions and structural reforms.

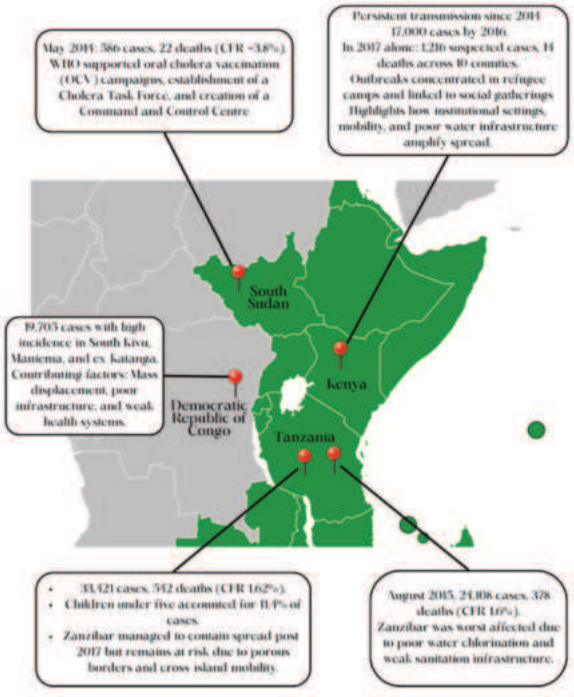

Figure 1: Some of the Largest Outbreaks in Africa Since 2014 (WHO Regional Office for Africa, Cholera)

Challenges in Cholera Containment

Water, Sanitation & Hygiene (WASH)

Safe water, sanitation, and hygiene (WASH) are essential for health, dignity, and community resilience, as unsafe water contributes to illnesses such as diarrhoea and exposes populations to chemical contaminants like arsenic, fluoride, and nitrates. Inadequate WASH is linked to 70–88% of the disease burden and plays a major role in the spread of neglected tropical diseases, including trachoma, schistosomiasis, and soil-transmitted helminths. In 2022, 57% of the global population (4.6 billion) used safely managed sanitation, 33% (2.7 billion) had sewer connections with treated wastewater, and 21% (1.7 billion) relied on in situ safe disposal, while 88% (7.2 billion) had at least basic sanitation. Despite progress, diarrhoea remains a leading but preventable killer, responsible for 395,000 child deaths under age five in 2019. Open defecation continues to fuel cycles of disease, malnutrition, and poverty, with the highest child mortality and inequality found in countries where it is most widespread. (World Health Organization, Water, Sanitation and Hygiene (WASH))

Although diarrhoeal deaths linked to poor WASH halved between 1990 and 2015 due to improvements in water and sanitation, diarrhoeal disease remains the second leading cause of death among children under five, claiming 370,000 lives in 2019. Expanding access to safely managed services, such as piped and treated water and regulated sanitation, is therefore critical to reducing preventable illness and deaths (World Health Organization, Water, Sanitation and Hygiene (WASH)). It is estimated that about 70% - 88% of disease burden is attributable to unsafe water supply, sanitation and hygiene (WHO Regional Office for Africa, Cholera). Diarrhoeal disease is the second leading cause of death in children under five years old, and was responsible for the deaths of 370,000 children in 2019. (World Health Organization, Diarrhoea). Each year, around 1.4 million people die from inadequate drinking-water, sanitation, and hygiene, with most deaths occurring in low- and middle-income countries. Unsafe sanitation alone causes about 564,000 deaths, mainly from diarrhoeal disease, and also contributes to neglected tropical diseases such as intestinal worms, schistosomiasis, and trachoma, as well as malnutrition.

As Kibera is an informal settlement, the residents face additional challenges. The high cost of water, generally 4-5 times the price per litre charged by Nairobi Water and 8 Sewerages Company, restricts the amount of water used by a household, increasing the risk of water borne diseases and poor hygiene standards (Jeon et al.). To cope with inadequate provision of sanitation services, Kibera residents who had no access to latrines and could not afford the charges defecated near the river and in the drainage canals. At night, those who could not access latrines defecated in polythene papers and threw them onto the open drains, in the river and garbage heaps. Human waste disposal on the open drains, river and garbage heaps poses threat to human health particularly children who often play around the dumping sites. (Muthee)

Distance to water points, regularity of supply and time spent are however serious concerns especially for households with young children since when water is at a distance and needs to be carried (or purchased), this is a source of significant friction against . A study by Muthee in 2008 showed that water is not always available whenever needed by the majority (64.6%) of the residents in Kibera. The residents experience water shortages and normally buy water from vendors and kiosk owners. More than four fifths (91.3%) of the respondents pointed out that when there is no water at their usual drawing points, they walk long distances to look for water. Only 5% of the respondents indicated that they use the already stored water. (Muthee)

Household size, water storage, and water consumption significantly influence water-related health outcomes. Larger households of four or more members face a higher risk of childhood diarrhoea, likely due to greater exposure to pathogens, reduced child supervision, and poorer hygiene (Muthee). Water storage, though necessary in areas with intermittent supply, increases contamination risks if containers are uncovered or mishandled, particularly by children (Okaka and Odhiambo). Access and consumption patterns also matter: households relying on vendors or kiosks, or consuming less than 20 litres per person daily, are more prone to childhood diarrhoeal morbidity, especially when latrines are lacking. While some Kibera residents believed chlorinated water supplied by AMREF was safe (Muthee), limited access to affordable and convenient water sources forces poorer households to reduce consumption below hygienic needs, worsening health outcomes.

Those who cannot afford/access these facilities resort to “Flying Toilets”. These “Flying Toilets” are plastic bags of solid waste that are dumped onto rooftops or in sewers due to a lack of better methods. The consequences of “Flying Toilets” include: residents being unable to harvest rainwater, major cause of epidemic outbreaks such as cholera and typhoid, cause of the most common diseases such as malaria, skin diseases, diarrhoea, intestinal worms and trachoma (mainly environmentally related diseases), child mortality rate of 112 per 1000 children, infant mortality rate of 156 per 1000 infants, blocked trenches and in-house stench due to the waste dumped outside (Lusambili).

Epidemiological Surveillance

The Integrated Disease Surveillance and Response (IDSR) system in Kenya is central to monitoring and controlling priority diseases. It collects, analyzes, interprets, and disseminates health data to guide interventions. Clinicians play a critical role as first points of contact: they must detect priority diseases such as malaria, cholera, TB, HIV/AIDS, notify authorities, facilitate specimen collection for lab confirmation, manage cases, and implement preventive measures. Priority diseases are selected based on epidemic potential (e.g., cholera, measles), high morbidity and mortality (e.g., malaria, pneumonia), simple identification, need for international surveillance, or existing eradication/control programs (e.g., polio, NNT). Reporting is stratified—immediate (cholera, measles), weekly (malaria, dengue), or monthly (cancer, leprosy)—to prevent spread through rapid tracing and monitoring. (Kenya National Public Health Institute)

Case definitions are standardized for health staff and simplified for Community Health Workers to aid detection. Surveillance thresholds determine responses: an alert threshold signals the need for

investigation, while an action threshold triggers confirmed responses such as immunization campaigns, awareness drives, or improved infection control.

Event-Based Surveillance (EBS) complements IDSR by collecting and assessing unstructured health information for early warnings. Kenya, trained by Africa CDC in 2018, adopted a one-health, multi-sectoral approach, integrating human, veterinary, and environmental sectors (Mercy et al.). The mobile platform "m-Dharura" supports EBS data reporting and visualization, engaging over 11,000 community health volunteers, veterinary officers, healthcare workers, schools, EOCs, and partners. By April 2023, the system had logged over 26,000 acute public health risk signals, highlighting its role in strengthening community-level disease detection and response (Mercy et al.).

Case Study: Kenyan Floods 2024 (Kenya Red Cross)

- Kenya suffered widespread flooding in the weeks of April and May 2024, with 294 fatalities, 101,132 households affected, 162 missing persons, 45 health facilities affected, 55,109 households displaced and 2,458 water sources destroyed as of June 2024. Tana River, Garis and Mandera were among the most affected counties.
- In western Kenya, farms were flooded and roads were damaged to the point where agricultural chains were disrupted . In northern Kenya, farms were flooded which caused immense damage to crops, farm fences, irrigation and water supply pipes and delayed progress on borehole excavation. In central Kenya, roads, equipment, stoves, kilns etc. have been severely damaged.
- 35 Million Early Warning Messages were sent via SMS to the Kenyan population. 24,296 households were supported with food and 36,933 WASH items were distributed.

Building Public Awareness About Preventative Practices

Kenya has faced a major cholera outbreak in 2023, with 11,181 cases and 196 deaths across 26 counties as of July 18, 2023, resulting in a Case Fatality Rate of 1.7% (George). In response, the Ministry of Health launched a nationwide cholera vaccination campaign targeting children under one year across all 47 counties, with priority given to the eight most affected areas including Homa Bay, Kajiado, Marsabit, Nairobi, Wajir, Mandera, Machakos, and Garissa. The campaign has been supported through strengthened coordination, WASH (water, sanitation, and hygiene) initiatives, community engagement, risk communication, case management, and laboratory confirmations in collaboration with county governments and partners (Kenya Ministry of Health, Government Announces Nationwide Cholera Vaccination Campaign to Tackle Ongoing Outbreak). Public participation and adherence to health measures have been emphasized, with the media playing a vital role in awareness creation (George).

Public health campaigns in Kenya have proven effective in influencing knowledge, attitudes, and practices (KAPs), especially in informal settlements. However, challenges such as limited resources, infrastructure constraints, and anxieties within communities often hinder full effectiveness. For instance, during COVID-19, testing access remained limited despite strong public willingness, showing the need for broader accessibility and policies addressing community concerns (Scholfield et al.).

Mass media broadcasting, particularly vernacular radio, has been found to be a powerful tool for health education. A study on malaria campaigns showed that radio programs effectively delivered prevention and treatment messages, influenced community behavior, and reached grassroots populations affordably. Radio remains a trusted, accessible, and participatory medium, particularly in rural Kenya, where it significantly shapes public attitudes and practices toward disease prevention (Gertrude).

The Kenya Red Cross Society also plays a key role in community health campaigns, especially in informal settlements such as Kibera, Kawangware, and Mathare, where WASH challenges persist. By mobilizing local volunteers, the organization ensures culturally relevant communication and greater trust among residents, making campaigns more effective in tackling outbreaks such as cholera. Locally-led engagement helps communities understand, accept, and participate in preventive measures, demonstrating the importance of grassroots mobilization in health promotion.

"We aim to mobilise communities and educate them on the spread and prevention of communicable diseases through various platforms such as radio programmes, news channels and social media posts, especially for youth engagement. As Community Health Promoters (CHP's) you must establish risks, be able to engage the community and utilise public resources to create focus groups which enable members of the community to talk openly about their struggles with people facing similar problems. Our CHP's sensitise community leaders in at-risk areas because they are the ones with the most influence. They are able to support us and get their community involved in the various activities we carry out, whether it be the zero-dose vaccination programme or the measles campaign et cetera. "
- Public Health Supervisor, Kenya Red Cross Society (Personal communication)

Health Infrastructure

Kenya's healthcare system faces serious challenges due to low health worker satisfaction, driven by a poor health worker-to-population ratio, weak health indicators, and rising mental strain. Poor working conditions, low pay, limited career growth, and inadequate resources have led to low motivation, high attrition, and migration of workers from rural to urban areas, further straining service delivery. Human resource management must address these issues by improving training, supervision, remuneration, and incentives, particularly in underserved regions, to enhance motivation and retention. With the growing burden of infectious diseases such as HIV/AIDS, TB, malaria, and cholera, the demand for skilled and well-supported health workers in public facilities is becoming increasingly urgent.

Motivating the health workers is key to the success of a medical facility. Firstly, public health employees are the bridge between healthcare and citizens - they are critical in fulfilling the government's responsibilities to its citizens and communities. Secondly, citizens must be able to rely on government facilities to respond to their medical needs effectively which heavily relies on health workers being able to provide these services. Thirdly, the government will face an increasing demand and financial constraints to meet the public's needs. The World Health Organization estimates a global shortage of around 4 million health workers. Sub-Saharan Africa needs almost a 140% increase in the health workforce (Ngure)

Training and developing the health workers performance means improving their attitude motivation, subsequently increasing their skills and/or knowledge. Training as a non-financial incentive affects employee performance.

A study carried out in 2014 by Onyango and Wanyoike showed that there is a strong positive relationship between training and development of an employee's performance. It also showed that salaries that an employer sets for an employee is based on their education level and/or their experience in the field. The study also concluded that non-monetary incentives may affect the motivation of health workers positively if the necessary circumstances are met. Non-monetary incentives are not only essential to compensate for the lack of monetary incentives but they also satisfy employees in terms of social interaction, belongingness, recognition, respect, attention, gratitude, autonomy and good performance. (Onyango and Wanyoike)

HRH ratios in Kenya fall below the WHO recommended standard. WHO strongly recommends that staffing levels for key health workers, such as doctors, nurses and midwives, remains above 2.3 per 1000 persons while Kenya's is 1.5 per 1000 persons. There was a shortage of workers in 2008 as reported by the Ministry of Health - only 33,317 filled positions out of the approved 47,247 - an overall vacancy of 29%, compared to 2006 which had a vacancy rate of 20.4%. (Ngure)

In a 2023 report, the Ministry of Health estimates that Kenya had about 189,932 active health workers across 13 major health occupations in 2021, equating to a density of 30.14 doctors, nurses, midwives, and clinical officers per 10,000 people—around 68% of the SDG index threshold (45 per 10,000 people) needed for progress on SDG 3. Including all occupational groups, the ratio rises to 38.71 health workers per 10,000 people (about one per 250), though not all directly address basic health needs. The workforce has grown significantly, with doctors, nurses/midwives, clinical officers, pharmacists, and pharmacy technologists more than doubling from 77,417 in 2010 to 162,233 in 2020, a 106% increase (around 11% annually). (Kenya Ministry of Health, Health Labour Market Analysis for Kenya)

Health services are provided through a network of over 10,000

government-recognised health facilities countrywide, with the public sector system accounting for about 51 percent of these facilities.

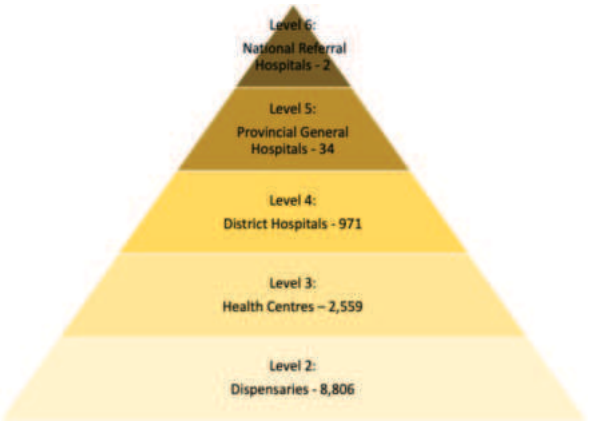

Figure 2: The Number of Facilities Per Level as of September 2023 (Kenya Ministry of Health, Health Labour Market Analysis for Kenya)

In addition, pharmacies (Level 1) provide the basic medication for chronic diseases such as diabetes and hypertension, as well as less recurrent diseases such as colds, coughs or diarrhoea. (Turin)

Primary Health Care (PHC) is envisaged as the gateway to attaining Universal Health Coverage (UHC). The establishment of Primary Health Care Networks (PCNs) is expected to help achieve this objective by scaling up and improving delivery of primary health care. To achieve this objective, there is a need to have an equitable coverage of Level 2 & Level 3 facilities in the country. The figure below shows the distribution of primary healthcare facilities throughout Kenya. (Wamai)

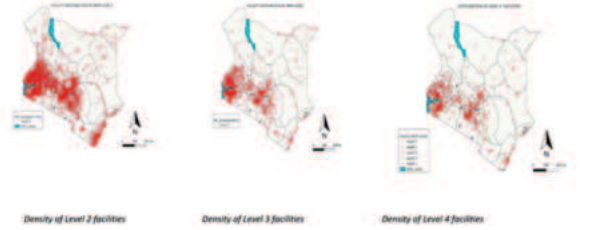

Figure 3: The density of level 2, 3 and 4 facilities across Kenya ((Kenya Ministry of Health, Health Labour Market Analysis for Kenya)

Lessons for Other Countries

Kenya's response to cholera outbreaks offers valuable lessons for other countries managing similar crises. A central element has been the rapid deployment of oral cholera vaccines across all 47 counties, with priority given to high-burden areas such as Nairobi, Homa Bay, and Wajir. This demonstrates the importance of acting swiftly yet strategically—directing resources where they are most needed. Crucially, Kenya has paired vaccination with long-term Water, Sanitation, and Hygiene (WASH) improvements. By investing in safe drinking water, sanitation, and handwashing campaigns, the government and partners have tackled the root conditions that allow cholera to persist. This underscores that medical interventions alone are insufficient without sustainable infrastructure. Kenya has also emphasized multi-sectoral collaboration. The Ministry of Health has worked with county governments, NGOs, humanitarian agencies, and the Kenya Red Cross to strengthen surveillance, laboratory capacity, and patient management. Such coordination shows the value of pooling expertise and avoiding duplication. Community engagement has been another pillar of Kenya's success. In informal settlements like Mathare and Kibera, local volunteers have played a critical role in spreading prevention messages, building trust, and encouraging safe hygiene practices among locals. Similarly, vernacular radio has been used to reach rural populations with accessible health information. These approaches highlight the importance of community-driven and culturally tailored communication. Finally, Kenya has framed cholera prevention as a shared responsibility, calling on citizens to adopt safe practices and support vaccination drives. This collective approach strengthens accountability and sustainability. In summary, Kenya's experience shows that effective cholera control relies on fast action, targeted interventions, community trust, and long-term WASH investment. Other countries can learn that defeating cholera requires not just emergency response, but building resilient health systems rooted in community participation and cross-sector collaboration.

CONCLUSION

Kenya has definitely faced and overcome a great number of challenges throughout its various and recurring cholera outbreaks. It has been seen that we require more local aid and improved infrastructure as well as easier access to healthcare in urban-poor and rural areas. Level 3 and 4 facilities desperately need an upgrade in order to sustain the demand of the population. Cholera also has a huge economical impact on Africa due to the large population and lack of planning of healthcare systems. Safe water, sanitation, and hygiene (WASH) are vital for public health, dignity, and resilience, yet unsafe water and poor sanitation still drive much of the global disease burden. Between 70–88% of diseases are linked to inadequate WASH, including diarrhoea, trachoma, schistosomiasis, and soil-transmitted helminths. Each year, 1.4 million people die from poor WASH, with diarrhoeal diseases alone killing 370,000 children under five in 2019. While deaths have halved since 1990 due to improvements in access, diarrhoea remains the second leading cause of under-five mortality. Globally, in 2022, 57% of people had safely managed sanitation, but open defecation persists, fueling disease, malnutrition, and poverty, particularly in low- and middle-income countries.

In Kenya's informal settlements like Kibera, inadequate infrastructure and high water costs force households into unsafe practices. Many residents defecate in rivers, drains, or plastic bags (“flying toilets”), which contaminate the environment and drive epidemics such as cholera and typhoid. Children face heightened risks, with mortality rates as high as 112 per 1,000. Water scarcity worsens conditions: most households rely on expensive vendors, walk long distances, or reduce consumption below hygienic levels. Larger households, unsafe storage, and low water use increase exposure to diarrhoea and related illnesses. Overall, poor sanitation costs Kenya an estimated KSh 27.4 billion annually (0.9% of GDP) through healthcare costs, lost productivity, and time spent accessing services.

To address such challenges, Kenya relies on the Integrated Disease Surveillance and Response (IDSR) system, which tracks priority diseases like cholera, malaria, and measles. IDSR uses standardized case definitions, tiered reporting (immediate, weekly, monthly), and surveillance thresholds to trigger timely interventions. It is complemented by Event-Based Surveillance (EBS), supported by the mobile platform m-Dharura, which engages over 11,000 community health volunteers and health workers in detecting and reporting risks. By 2023, this system had captured over 26,000 public health signals, strengthening Kenya's capacity for early detection, rapid response, and epidemic prevention.

Overall, Kenya must continue to advocate for safe hygiene practices, provide adequate sanitation and waste disposal facilities, and push locals to get vaccinated against cholera to effectively eliminate the disease. Kenya must also remain a role model for neighbouring countries facing similar problems such as Tanzania, DRC, South Sudan and Uganda.

REFERENCES

1. George, Githuka. 'Notes from the Field: Ongoing Cholera Outbreak — Kenya, 2014–2016'. MMWR. Morbidity and Mortality Weekly Report, vol. 65, 2016. www.cdc.gov, https://doi.org/10.15585/mmwr.mm6503a7.
2. Gertrude, Grace. Vernacular Radio and Health Promotion: Examining Programmes, the Use and Impact of Vernacular Radio in Malaria Control in Emuhaya District, Kenya. Nov. 2015.
3. Jeon, Sangick, et al. 'A Mobile Water Project: Mobile-for-Development Meets Human-Centered Design'. Arguing about Justice, Presses universitaires de Louvain, 2011, https://books.openedition.org/pucl/1813.
4. Kenya Ministry of Health. Government Announces Nationwide Cholera Vaccination Campaign to Tackle Ongoing Outbreak. 8 Feb. 2023, https://www.health.go.ke/government-announces-nationwide-cholera-vaccination-campaign-tackle-ongoing-outbreak.
5. Health Labour Market Analysis for Kenya. Nairobi, Kenya, Sep. 2023, p. 160, https://labourmarket.go.ke/media/resources/Final_Kenya_HLMA_Report_2023_v8.pdf.
6. Kenya National Public Health Institute. 'Clinician's Handbook for IDSR Priority Diseases, Conditions and Events'. Feb. 2024, https://www.nphi.go.ke/sites/default/files/2024-02/IDSR%20Clinicians%20Handbook.pdf.
7. Kenya Red Cross. '2024 March-April-May Rains Floods Update'. https://www.redcross.or.ke/wp-content/uploads/2024/06/MAM-SitRep-18th-June-2024.pdf.
8. Lusambili, Adelaide. 'It Is Our Dirty Little Secret': An Ethnographic Study of the Flying Toilets in Kibera Slums, Nairobi. 2011.
9. Mercy, Kyeng, et al. 'Africa CDC's Blueprint to Enhance Early Warning Surveillance:

Accelerating Implementation of Event-Based Surveillance in Africa'. Journal of Public Health in Africa, vol. 14, no. 8, Aug. 2023, p. 2827. PubMed Central, https://doi.org/10.4081/jphia.2023.2827.
10. Mogasale, Vittal, et al. 'Model-Based Estimation of the Economic Burden of Cholera in Africa'. BMJ Open, vol. 11, no. 3, 2021, https://doi.org/10.1136/bmjopen-2020-044615.
11. Model-Based Estimation of the Economic Burden of Cholera in Africa. vol. 11, no. 3, 2021, https://bmjopen.bmj.com/content/11/3/e044615.
12. Muthee, Veronica Mukuhi. An Investigation of Water and Sanitation Risk Factors Associated with Childhood Diarrhea Morbidity in Kibera, Nairobi Kenya. 2008. Kenyatta University, PhD Thesis.
13. Ngure, Kigathi Patrick. Factors Influencing Retention of Health Workers in the Public Health Sector in Kenya: A Case Study of Kenyatta National Hospital. 2018, http://ir.jkuat.ac.ke/handle/123456789/4452. Jomo Kenyatta University of Agriculture and Technology, PhD Thesis.
14. Okaka, Fredrick Okoth, and Beneah DO Odhiambo. 'Relationship between Flooding and out Break of Infectious Diseasesin Kenya: A Review of the Literature'. Journal of Environmental and Public Health, vol. 2018, no. 1, 2018, p. 5452938.
15. Onyango, James Watta, and Daniel M. Wanyoike. 'Effects of Training on Employee Performance: A Survey of Health Workers in Siaya County, Kenya'. European Journal of Material Sciences, vol. 1, no. 1, Mar. 2014, pp. 11–15.
16. Prince, Ruth J., and Phelgona Otieno. 'In the Shadowlands of Global Health: Observations from Health Workers in Kenya'. Global Public Health, vol. 9, no. 8, Sep. 2014, pp. 927–45, https://doi.org/10.1080/17441692.2014.941897.
17. Scholfield, Steven, et al. 'A Cross-Sectional Survey on the Effectiveness of Public Health Campaigns for Changing Knowledge, Attitudes, and Practices in Kenyan Informal Settlements during the COVID-19 Pandemic'. PLOS ONE, vol. 18, no. 12, Dec. 2023, p. e0294202, https://doi.org/10.1371/journal.pone.0294202.
18. Turin, Dustin R. 'Health Care Utilization in the Kenyan Health System: Challenges and Opportunities'. Inquiries Journal, vol. 2, no. 09, 2010. www.inquiriesjournal.com, http://www.inquiriesjournal.com/articles/284/health-care-utilization-in-the-kenyan-health-system-challenges-and-opportunities.
19. UNICEF Supply Division. Oral Rehydration Salts and Zinc. https://www.unicef.org/supply/oral-rehydration-salts-and-zinc. Accessed 16 Aug. 2025.
20. Wamai, Richard G. The Kenya Health System—Analysis of the Situation and Enduring Challenges.
21. WHO. Water, Sanitation and Hygiene (WASH). https://www.who.int/health-topics/water-sanitation-and-hygiene-wash. Accessed 5 Aug. 2025.
22. WHO Regional Office for Africa. Cholera. https://www.afro.who.int/health-topics/cholera. Accessed 8 Aug. 2025.
23. Disease Outbreak - Cholera - Kenya - 11 December 2017. 11 Dec. 2017, https://www.afro.who.int/health-topics/cholera/outbreak/11-december-2017-kenya.
24. Urgent Resolve to End Cholera Outbreak in Kenya. 23 May 2015, https://www.afro.who.int/news/urgent-resolve-end-cholera-outbreak-kenya.
25. World Health Organization. Diarrhoea. https://www.who.int/health-topics/diarrhoea#tab=tab_1. Accessed 5 Aug. 2025.
26. Water, Sanitation and Hygiene (WASH). https://www.who.int/health-topics/water-sanitation-and-hygiene-wash#tab=tab_1. Accessed 5 Aug. 2025.