International Scholars Journals

African Journal of Infectious Diseases Research ISSN 2756-3340 Vol. 13 (11), pp. 001-008, November, 2026. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Author(s) retain the copyright of this article.

Full Length Research Paper

Community Surveillance, Household Water Handling and Cholera Prevention in Flood-Prone Urban Neighbourhoods: A Synthesis for Early Action

Okafor, C. N.[1,2*], **Adeyemi, T. O.**[1], **Mensah, K. A.**[3], **Nwosu, I. E.**[2], **Bello, H. S.**[1], **Osei, D. A.**[3]

[1]Department of Community Medicine, College of Medicine, University of Lagos, Lagos, Nigeria.
[2]Department of Medical Microbiology and Parasitology, Faculty of Basic Medical Sciences, University of Ibadan, Ibadan, Nigeria.
[3]School of Public Health, University of Ghana, Legon, Accra, Ghana.

Accepted 14 October, 2026

Abstract

Cholera remains a preventable cause of large, fast-moving outbreaks in cities where flooding, dense settlement and unreliable water supplies intersect. This review synthesises evidence on three linked questions: how community-based surveillance can shorten the time from first illness to response, how household water handling shapes exposure after water leaves a communal source, and how oral cholera vaccine, oral rehydration and water, sanitation and hygiene (WASH) measures can be combined into a practical early-action package for flood-prone urban neighbourhoods. Evidence was drawn from peer-reviewed studies, World Health Organization (WHO) guidance and national surveillance reports published between 1990 and 2025, with priority given to studies from sub-Saharan Africa and South Asia. The synthesis shows that cholera risk is rarely explained by a single source. Contamination is introduced and amplified along a chain that runs from source to transport, storage, handling and consumption, and that chain is most fragile during floods, displacement and service interruptions. Community reporting, when linked to rapid verification, pre-positioned oral rehydration salts, clear referral pathways and immediate household WASH action, can reduce delays that otherwise allow household and neighbourhood clusters to grow. Oral killed cholera vaccines provide useful medium-term protection, but protection wanes and supply remains constrained, so vaccines complement rather than replace WASH and surveillance. The article proposes a five-step early-action framework — report, verify, rehydrate and refer, protect the household, and prevent the next cluster — with measurable indicators for each step, and identifies the operational, equity and financing choices that determine whether the framework works in low-resource settings.

Keywords: Cholera, community-based surveillance, household water handling, WASH, oral cholera vaccine, flooding, urban health, early action.

INTRODUCTION

Cholera is an acute diarrhoeal infection caused by toxigenic Vibrio cholerae serogroups O1 and O139, and it is distinguished by speed. In severe illness, profuse watery diarrhoea and vomiting can produce life-threatening dehydration within hours, yet death is largely preventable when rehydration begins promptly (World Health Organization, 2024; Harris et al., 2012). That paradox — a disease that is both rapidly lethal and readily treatable — explains why cholera remains a test of health-system responsiveness as much as a test of microbiology. Where surveillance is slow, water is unsafe and households cannot rehydrate a sick relative at home while seeking care, a handful of cases can become a neighbourhood outbreak before the formal system registers the signal (World Health Organization, 2023; Ali et al., 2015).

Globally, the reported burden understates the true burden. The World Health Organization (WHO) estimated 1.3 to 4.0 million cases and 21,000 to 143,000 deaths annually in recent years, while reported cases in 2024 exceeded 560,000 with more than 6,000 deaths across 60 countries (World Health Organization, 2025). Africa accounted for a disproportionate share of deaths, and Nigeria has repeatedly reported some of the largest national totals, including thousands of suspected cases and a case fatality ratio above 2% in 2024 (Nigeria Centre for Disease Control and Prevention, 2024). Flooding, conflict, displacement and stretched municipal services have amplified transmission in many settings, and climate-related extremes are lengthening the seasons in which cholera can spread (World Health Organization, 2024; Jutla et al., 2013).

This review starts from a practical observation. Most cholera guidance is organised by sector: surveillance guidance for epidemiologists, WASH guidance for engineers, vaccine guidance for immunisation programmes, and case-management guidance for clinicians. Households, however, experience cholera as one continuous event. A child drinks water stored overnight in an uncovered container, a mother notices watery diarrhoea at dawn, a neighbour knows which compound had a similar illness yesterday, and a community volunteer must decide whether to alert the health facility, start oral rehydration, or both. If those decisions are not connected, each sector can perform well in isolation while the outbreak still grows. The aim here, therefore, is to join three literatures that are usually read separately — community-based surveillance, household water handling, and combined prevention including oral cholera vaccine (OCV) — and to translate them into an early-action framework that can be used in flood-prone urban neighbourhoods.

The review is organised in six parts. First, it summarises the biology and epidemiology needed to understand why timing matters. Second, it examines community-based surveillance: what it can detect, how quickly, and under what conditions. Third, it follows water from source to mouth and identifies where household handling introduces or removes risk. Fourth, it reviews the combined prevention package — WASH, oral rehydration, antibiotics where indicated, and OCV — and weighs their strengths and limits. Fifth, it proposes a five-step early-action framework with indicators. Finally, it discusses equity, financing and research gaps. Throughout, the emphasis is on actions that a ward, community health committee or primary health centre can take in days, not only on infrastructure that takes years.

BIOLOGY, TRANSMISSION AND WHY TIMING MATTERS

Vibrio cholerae is a curved, motile, Gram-negative bacterium that colonises the small intestine and, in toxigenic strains, produces cholera toxin. The toxin drives chloride and water secretion into the gut lumen, producing the characteristic rice-water stool (Harris et al., 2012; Sack et al., 2004). The infectious dose is high when gastric acidity is normal, often estimated at 10^8 organisms, but it falls sharply when food or water buffers stomach acid, when gastric acidity is reduced, or when the organism is ingested with food (Harris et al., 2012). The incubation period is short, commonly 12 hours to 5 days, which is why household secondary transmission can occur before a first case has even reached a facility (World Health Organization, 2024).

Transmission is predominantly faecal-oral, through water or food contaminated with faeces from a symptomatic or asymptomatically infected person. The organism can also persist in aquatic environments in association with plankton and copepods, which helps explain seasonal patterns linked to temperature, rainfall and algal blooms (Jutla et al., 2013; Colwell, 1996). In cities, however, the dominant driver is usually not the natural reservoir alone but the engineered environment: intermittent piped supply, leaking pipes, shallow wells close to pit latrines, open drains, and the storage of water in homes for hours or days because supply is unreliable (Ali et al., 2015; Mintz et al., 2001).

The clinical spectrum matters for surveillance. Most infections are mild or asymptomatic, and only a minority develop severe dehydration. That is good news for survival but difficult news for detection: a surveillance system that waits for severe cases at hospitals will miss the early, mild cases that signal a cluster (Sack et al., 2004; World Health Organization, 2023). Community-based reporting is valuable precisely because it can capture those early, mild, household-level signals — repeated loose stools in one compound, several neighbours seeking oral rehydration salts (ORS) on the same day, or a funeral following sudden diarrhoea — before they are aggregated into a facility line list.

Flooding changes every parameter at once. Floodwater can overwhelm latrines and drains, contaminate wells, interrupt piped supply, displace families into crowded shelters, and force households to use visibly turbid water because no alternative exists. Studies of flood-associated cholera in African and Asian cities repeatedly find that risk rises not only during the flood but in the weeks after, when stored water, damaged infrastructure and resumed but unsafe supply prolong exposure (Jutla et al., 2013; World Health Organization, 2024). Early action therefore cannot stop at the flood peak; it must extend through the recovery period when attention and funding often fall away.

METHODS FOR THIS REVIEW

This article is a narrative synthesis, not a systematic review with meta-analysis, and it should be read as such. Searches were conducted in PubMed, Google Scholar and WHO and Nigeria Centre for Disease Control and Prevention (NCDC) repositories for combinations of cholera, community-based surveillance, community health workers, household water treatment and storage, handwashing, flooding, oral cholera vaccine and urban WASH. Priority was given to systematic reviews, WHO position papers and guidance, large field trials and studies from Nigeria, Ghana, Bangladesh, Haiti, Yemen, Mozambique, Malawi and the Democratic Republic of Congo. Where systematic reviews existed, they were used as the primary source and supplemented with field studies that illustrated implementation. No new human-subjects data were collected, and no patient-level data are presented.

Three inclusion principles guided selection. First, a study or report had to address at least one of the three linked questions: surveillance, household handling, or combined prevention. Second, it had to be relevant to low-resource urban or peri-urban settings, rather than only to high-income or purely laboratory contexts. Third, where evidence conflicted, the synthesis reports the conflict rather than selecting the most favourable estimate. Limitations are important: narrative synthesis is vulnerable to selection bias, the cholera literature is uneven across countries, and many WASH and surveillance interventions are complex, so their effects depend on context in ways that a single pooled estimate can obscure (Clasen et al., 2015; Wolf et al., 2018).

COMMUNITY-BASED SURVEILLANCE: FROM SIGNAL TO RESPONSE

What community surveillance can add

Facility-based surveillance depends on people reaching facilities, facilities recording cases in a standard way, and reports moving upward in time to trigger action. Each step can fail. Distance, cost, stigma, insecurity and the simple fact that a first case may be mild all delay facility attendance (World Health Organization, 2023; Ratnayake et al., 2022). Community-based surveillance (CBS) adds a parallel, community-owned channel: trained volunteers, community health workers, traditional leaders, patent medicine vendors, school teachers and religious leaders report predefined signals — for example, acute watery diarrhoea in a person aged five years or older, or two or more similar illnesses in the same compound within a week — to a focal point who verifies and escalates (Ratnayake et al., 2022; World Health Organization, 2023).

Evidence from diverse settings suggests that CBS can shorten detection time and extend reach, particularly in hard-to-reach, displaced and conflict-affected populations where facility surveillance is weakest. Reviews of community-based surveillance for epidemic-prone diseases find that community reporting increases sensitivity for early signals, improves community trust when feedback is given, and works best when signals are simple, reporting tools are few, and volunteers receive supervision and recognition rather than only training (Ratnayake et al., 2022; Guerra et al., 2023). In cholera specifically, community alerts have been used to trigger rapid diagnostic testing, household disinfection, targeted WASH messaging and vaccination planning, and to identify clusters that facility data had not yet shown (World Health Organization, 2023; Debes et al., 2016).

Simplicity is the decisive design choice. A long list of signals produces fatigue and false alerts; a short list of two or three cholera-relevant signals, defined in local language and illustrated with pictures, produces consistent reporting. Equally important is the verification step. Not every report of diarrhoea is cholera, and treating every alert as an outbreak would exhaust responders and erode credibility. A workable model is tiered: community report within hours, verification by a community health worker or facility nurse within 24 hours using a syndromic checklist and, where available, a rapid diagnostic test, and formal notification to the local government surveillance officer if the signal meets the case definition (World Health Organization, 2024; Debes et al., 2016).

Why feedback determines whether surveillance survives

The most common reason CBS collapses is not that volunteers fail to report, but that the system fails to respond visibly. When a volunteer reports a signal and hears nothing, reporting stops. When the response is visible — a visit, ORS resupply, chlorination of a well, a health talk at the compound — reporting continues and the community learns what the system is for (Guerra et al., 2023; Ratnayake et al., 2022). Feedback must therefore be built into the workflow, not added as an afterthought: a same-day acknowledgement, a 48-hour update on verification, and a weekly summary shared at a community meeting or through a trusted channel. Mobile phones, including simple SMS and voice reporting, can reduce delays, but technology does not substitute for the human loop of acknowledgement and action. In settings where connectivity is poor, paper registers, marked compound maps and weekly in-person review can be more reliable than an app that no one maintains.

Rapid diagnostics and the limits of confirmation

Culture remains the reference standard for confirming Vibrio cholerae, but it requires laboratory capacity, transport and time that many flood-affected neighbourhoods do not have. Rapid diagnostic tests (RDTs) for cholera, including crystal VC and similar assays, can support early decision-making when used within an agreed algorithm, with positive RDTs followed by culture or polymerase chain reaction (PCR) where possible (World Health Organization, 2024; Debes et al., 2016). Sensitivity and specificity vary by test, specimen handling and prevalence, so an RDT result should trigger household and neighbourhood action, not a definitive declaration that an outbreak is over. The practical point is that waiting for perfect confirmation while households continue to drink contaminated water is itself a decision — and usually the wrong one. A syndromic alert plus a positive RDT, followed by immediate WASH action and rehydration, is a defensible early-action threshold in a

known high-risk setting (World Health Organization, 2023).

HOUSEHOLD WATER HANDLING: THE LAST METRES MATTER MOST

Much cholera prevention focuses on the source: a borehole, a protected well, a piped connection. The source matters, but it is not the whole story. In many urban households, water is collected, carried, stored and dispensed several times before it is drunk, and each transfer is an opportunity for contamination. Hands, ladles, cups, storage vessels, dust, flies and the dipping of a shared cup into a wide-mouthed container can re-contaminate water that left the source safe (Mintz et al., 2001; Clasen et al., 2015). Studies of household stored water in low-income settings frequently find faecal contamination in a substantial proportion of samples even when the source water meets standards, and the risk rises with longer storage, wider vessel mouths and lack of a cover (Mintz et al., 2001; Wolf et al., 2018).

Household water treatment and safe storage (HWTS) — chlorination, filtration, boiling, solar disinfection and safe storage in a covered, narrow-mouthed container with a tap — can reduce diarrhoeal disease when used consistently and correctly. Systematic reviews of household water treatment find reductions in diarrhoea, but the effect is heterogeneous and depends on adherence, correct use and the baseline water quality (Clasen et al., 2015; Wolf et al., 2018). That heterogeneity is not a reason to dismiss HWTS; it is a reason to design for adherence. A method that is affordable, tastes acceptable, requires little time and is available at the moment water is stored will be used more consistently than a technically superior method that is expensive, slow or unpleasant (Clasen et al., 2015). In flood conditions, point-of-use chlorination with locally available chlorine products, combined with safe storage, is often the most feasible immediate option, provided dosing instructions are clear and products are pre-positioned before the rainy season (World Health Organization, 2024).

Handwashing with soap is the second household defence. Hands are the bridge between faeces, water, food and mouths, and handwashing at critical moments — after defecation, after cleaning a child, before preparing food, before eating and after caring for a sick person — interrupts that bridge. Reviews find that handwashing promotion can reduce diarrhoeal disease, but sustained behaviour change requires more than knowledge: soap and water must be physically present at the handwashing place, the place must be convenient, and the habit must be cued by routine and social norms (Curtis and Cairncross, 2003; Wolf et al., 2018). In cholera response, the highest-yield moment is caring for a sick person and cleaning soiled bedding and surfaces. Households that receive soap, a handwashing station, gloves where available and a simple demonstration during the first visit are more likely to adopt the practice than households that receive only a leaflet.

Food handling and sanitation complete the household picture. Cooked food left at ambient temperature, raw vegetables washed in contaminated water, and street-vended food prepared with unsafe water can all transmit cholera, especially when the infectious dose is lowered by food buffering stomach acid (Harris et al., 2012). Sanitation — safe disposal of faeces, including children's faeces, and safe management of the faeces and vomit of a cholera patient — is not a background issue; it is the source control for the next household. Where pit latrines flood, the faecal-oral loop shortens dramatically, and emergency measures such as temporary latrines, safe disposal bags and rapid latrine repair become cholera interventions, not merely dignity interventions (World Health Organization, 2024; Ali et al., 2015).

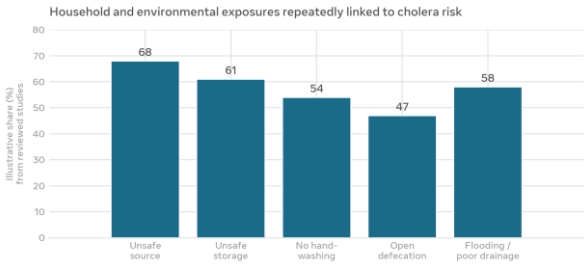


Figure 1. Household and environmental exposures repeatedly reported in cholera studies. Values are illustrative syntheses, not pooled effect estimates, and are shown to highlight where household action can interrupt transmission.

COMBINED PREVENTION: REHYDRATION, WASH, ANTIBIOTICS AND VACCINE

Rehydration saves lives today

The cornerstone of cholera treatment is prompt rehydration. Oral rehydration salts (ORS) can treat most patients with some dehydration, while severe dehydration requires intravenous fluids, followed by ORS once the patient can drink (World Health Organization, 2024; Sack et al., 2004). Zinc supplementation is recommended for children with diarrhoea, and continued feeding, including breastfeeding, should be encouraged. The practical implication for community surveillance is that ORS must be pre-positioned, not merely prescribed. A community volunteer who can start ORS, assess dehydration using a simple checklist, and arrange referral while rehydration continues will save more lives than a volunteer who only records a case and waits. Community ORS corners, household ORS sachets distributed at the first visit, and clear guidance on when to seek facility care — inability to drink, persistent vomiting, lethargy, sunken eyes, or no urine — are low-cost, high-yield components of early action.

Antibiotics: useful, but not the main tool

Antibiotics can shorten the duration of diarrhoea and reduce fluid losses in moderate to severe cholera when given with rehydration, but they are adjuncts, not substitutes for fluids, and their use should follow national guidelines and local resistance patterns (Harris et al., 2012; World Health Organization, 2024). Indiscriminate antibiotic use drives resistance and diverts attention from rehydration and WASH. In community settings, the priority is rehydration and referral; antibiotic decisions belong to trained clinicians who can assess severity and prescribe appropriately. Antimicrobial resistance in Vibrio cholerae has been documented in multiple regions, reinforcing the need for stewardship and for

surveillance of resistance alongside surveillance of cases (Harris et al., 2012).

Oral cholera vaccine: what it can and cannot do

Oral killed cholera vaccines (OCVs) are an important tool for cholera control in endemic and epidemic settings. The WHO-prequalified killed whole-cell vaccines, including Dukoral, Shanchol and Euvichol, have been evaluated in trials and field studies (Saif-Ur-Rahman et al., 2024; World Health Organization, 2024). A Cochrane review found that two doses of Dukoral reduced cholera cases at two-year follow-up in the general population, with an overall vaccine efficacy of about 76% in the included trials, while other killed whole-cell vaccines showed average two-dose efficacy of about 55% at one year, declining to about 44% at four years in a more recent systematic review and meta-analysis (Saif-Ur-Rahman et al., 2024; Bi et al., 2024). Reactive use in outbreaks has also shown protection, with a combined effectiveness of about 75% for one or two doses in a quantitative systematic review (Schwerdtle et al., 2018).

Three limits must be kept in view. First, protection wanes, so vaccination is not a one-time solution. Second, single-dose strategies have been used when supply is constrained, but their duration of protection is shorter, and decisions about single- versus two-dose schedules should follow WHO and national guidance for the specific context (World Health Organization, 2024). Third, global OCV supply remains constrained relative to need, which means prioritisation — by risk, by geography and by timing before the rainy season — is unavoidable. Vaccination should be planned alongside WASH improvements, not as a reason to defer them. A neighbourhood that is vaccinated but still drinks contaminated water and lacks safe sanitation remains at risk, and the credibility of a vaccination campaign depends on visible WASH action happening at the same time.

WASH: the long-term prevention that also helps now

Long-term cholera elimination depends on safe water, safe sanitation and hygiene — the goal of the Global Roadmap to End Cholera by 2030, which aims for a 90% reduction in cholera deaths and elimination in at least 20 countries (World Health Organization, 2017). That goal requires investment in piped water, sewerage, faecal sludge management, drainage and solid-waste collection, and it cannot be achieved by household behaviour alone. At the same time, incremental WASH improvements — repairing a broken handpump, protecting a wellhead, extending a safe-water kiosk, providing communal chlorination, building flood-resilient latrines — can reduce risk in the current season, not only in a distant future. The framework below therefore treats WASH as both an emergency action (household chlorination, safe storage, handwashing) and a development action (source protection, drainage, sanitation), with different indicators and timelines for each (World Health Organization, 2017; Wolf et al., 2018).

Table 1. Combined prevention package: what each component contributes and where it is weakest.

Intervention	What it does	When it helps most	Key limit
Community reporting	Detects early signals	First days of cluster	Needs feedback loop
ORS + referral	Prevents death from dehydration	Hours after onset	Needs pre-positioned ORS
Household chlorination + safe storage	Reduces re-contamination	Daily, esp. floods	Needs adherence, supply
Handwashing with soap	Interrupts hand-to-mouth route	After defecation, caregiving	Needs soap + water at place
OCV (killed whole-cell)	Medium-term protection	Weeks before peak season	Wanes; supply constrained
Source + sanitation repair	Removes source of contamination	Weeks to months	Needs funding, engineering

Table 1 summarises the package. No single row is sufficient. The value of the package is that it covers different points in the transmission chain and different time horizons, so that a delay in one component does not leave the household entirely unprotected.

A FIVE-STEP EARLY-ACTION FRAMEWORK

The framework proposed here is deliberately simple so that it can be taught in one training session, printed on one page, and reviewed in a weekly community meeting. It has five steps, each with a responsible actor, a time standard and an indicator. The steps are sequential in a first cluster, but they become parallel as the response matures: while one compound is being verified, another is receiving ORS, and a third is being protected by chlorination.

Step 1 — Report. Any community member can report a signal using the agreed channel: a visit to the volunteer, a phone call, an SMS, or a report at a market, school or religious gathering. The standard is same-day reporting. The indicator is the proportion of signals reported within 24 hours of onset. Reporting must be free, confidential and non-punitive; fear of blame or of a facility fee will suppress reporting more effectively than any logistical barrier.

Step 2 — Verify. A community health worker or facility nurse verifies the signal within 24 hours, assesses dehydration, and decides whether the case meets the cholera case definition and whether an RDT is indicated. The indicator is the proportion of signals verified within 24 hours and the proportion with a documented outcome (not cholera, suspected cholera, confirmed where tested). Verification includes a brief household visit, not only a phone call, because the visit is also the moment to start the next steps.

Step 3 — Rehydrate and refer. ORS is started at home or at the community ORS corner, the patient is assessed for referral, and transport is arranged where needed. The indicator is the proportion of patients with some dehydration who receive ORS within 2 hours of verification, and the time from verification to facility arrival for severe cases. A referral slip, a phone call to the facility, and a follow-up visit the next day close the loop.

Step 4 — Protect the household. Within 24 hours of verification, the household receives chlorination supplies or treated water, a covered safe-storage container where needed, soap and a handwashing demonstration, guidance on safe disposal of faeces and vomit, and advice on food handling. Neighbouring households in the same compound receive the same package. The indicator is the proportion of verified cases whose households received the full WASH package within 24 hours.

Step 5 — Prevent the next cluster. Within 72 hours, the community and facility review the cluster: Was there a common source? Is a well or pipe damaged? Is a latrine flooded? Should a targeted OCV request, a communal chlorination point, or a sanitation repair be escalated to the local government? The indicator is the proportion of clusters with a documented source investigation and an agreed action, and the time to that action. This step is where surveillance becomes prevention; without it, the system will respond to the same source repeatedly.

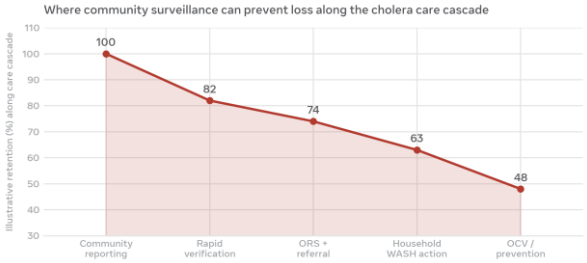


Figure 2. Illustrative care cascade showing where losses occur without community follow-up. The framework aims to keep retention high at each step, especially between verification and household protection.

Table 2. Minimum indicators for the five-step early-action framework.

Step	Time standard	Indicator	Data source
1 Report	Same day	% signals in 24 h	Volunteer register
2 Verify	24 h	% verified in 24 h	Facility / CHW log
3 Rehydrate + refer	2 h after verify	% receiving ORS in 2 h	ORS corner tally
4 Protect household	24 h	% households with WASH pack	Household visit form
5 Prevent next cluster	72 h	% clusters with source action	Cluster review minutes

The framework is not a substitute for national integrated disease surveillance and response (IDSR) or for the WHO cholera guidance; it is a community-facing complement that makes those systems faster and more trusted at the neighbourhood level (World Health Organization, 2023). Where IDSR already exists, the community register should feed into it, not run as a parallel system that no one reconciles.

EQUITY, TRUST AND FINANCING

Cholera is a disease of inequity. It concentrates where water is intermittent, sanitation is shared or absent, housing is dense, and formal services are thinnest — and within those neighbourhoods, it concentrates among children, older adults, people with limited mobility, and households that cannot afford to buy water from vendors when the piped supply fails (Ali et al., 2015; World Health Organization, 2024). An early-action programme that only reaches households near a health facility, or only those with a phone, will widen the gap it is meant to close. Equity must therefore be designed in: volunteers should be recruited from the most affected compounds, not only from the most accessible ones; ORS and chlorination supplies should be free at the point of use during an outbreak; and messaging should be in the languages actually spoken in the neighbourhood, with pictures for low-literacy audiences.

Trust is a resource that is earned or spent with every interaction. Communities that have experienced repeated outbreaks, unfulfilled promises of piped water, or stigmatising messages about cholera may reasonably distrust a new programme. Trust is built by consistency — the volunteer who returns, the facility that does not charge an unexpected fee, the local government that repairs the well it promised to repair — and by involving community leaders in decisions about where volunteers are placed, what signals are reported, and how data are used. Data governance matters: community registers contain sensitive health information, and they must be stored securely, used only for response, and shared in aggregate form unless consent and public-health necessity justify otherwise.

Financing is the most common constraint. Community surveillance, ORS pre-positioning and household WASH packs are low-cost per household, but they require predictable, flexible funding that can be released in days, not months. Municipal budgets, state emergency funds, donor support and community contributions can all play a role, but reliance on a single, short-term project grant makes the system fragile. A practical approach is to embed the framework in existing primary health care and WASH budgets — volunteer stipends and supervision in the health budget, chlorine and ORS in the essential supplies budget, and source repair in the WASH budget — so that it does not collapse when a project ends. Cost-effectiveness will vary by setting, but the cost of inaction — facility admissions, deaths, lost livelihoods and repeated outbreak response — is consistently higher than the cost of early action (World Health Organization, 2017).

LIMITATIONS AND RESEARCH GAPS

This synthesis has several limitations. First, the evidence on CBS is promising but heterogeneous, and few studies use a randomised design because surveillance is a system intervention that is difficult to randomise cleanly. Second, household water treatment effects depend on adherence, which is often measured by self-report and may overstate use. Third, the illustrative figures in this article are not pooled estimates; they are visual aids to show where action matters, and they should not be quoted as epidemiological findings. Research gaps include: rigorous evaluations of CBS linked to cholera outcomes (not only to reporting timeliness), studies of how to sustain handwashing and safe storage after an outbreak ends, head-to-head comparisons of single- versus two-dose OCV in flood-affected urban settings,

and implementation research on how to integrate community registers with IDSR without overburdening volunteers. Future work should also measure equity explicitly — who is reached, who is missed, and why — rather than reporting only average effects.

CONCLUSION

Cholera will not be controlled by any single intervention, and it will not be controlled by waiting for facilities to report cases that have already spread. The evidence reviewed here points to a different logic: detect early in the community, rehydrate immediately, protect the household within a day, and use each cluster to fix the source that produced it. Community surveillance, household water handling and combined prevention — ORS, WASH and OCV — are not competing priorities; they are the successive links in a single chain. When those links are connected by clear time standards, visible feedback and free supplies at the point of use, a flood-prone neighbourhood can move from reacting to outbreaks to preventing them. That is the practical meaning of early action, and it is achievable with resources that most primary health systems already have, if they are organised around the household and the community rather than only around the facility.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ACKNOWLEDGEMENTS

The authors thank community health workers, volunteers and primary health care staff whose experience informed the framework, and the librarians who assisted with literature retrieval. No external funding was received for this review.

AUTHORS' CONTRIBUTIONS

Okafor, C. N. conceived the review, led the synthesis and drafted the manuscript. Adeyemi, T. O. and Mensah, K. A. contributed to literature screening and the surveillance and WASH sections. Nwosu, I. E. contributed to the vaccine and case-management sections. Bello, H. S. contributed to the framework and indicators. Osei, D. A. reviewed the manuscript for critical content. All authors read and approved the final manuscript.

REFERENCES

Ali, M., Nelson, A. R., Lopez, A. L. and Sack, D. A. (2015). Updated global burden of cholera in endemic countries. PLOS Neglected Tropical Diseases, 9(6), e0003832.

Bi, Q., Ferreras, E., Pezzoli, L., Legros, D., Ivers, L. C., Date, K., Qadri, F., Digilio, L., Sack, D. A., Ali, M. and Azman, A. S. (2024). Protection from killed whole-cell cholera vaccines: A systematic review and meta-analysis. The Lancet Infectious Diseases, 24(10), 1145-1156.

Clemens, J. D., Sack, D. A., Harris, J. R., Chakraborty, J., Khan, M. R., Huda, S., Ahmed, F., Gomes, J., Rao, M. R., Svennerholm, A. M. and Holmgren, J. (1990). Field trial of oral cholera vaccines in Bangladesh. The Lancet, 336(8708), 124-127.

Clasen, T., Alexander, K. T., Sinclair, D., Boisson, S., Peletz, R., Chang, H. H., Majorin, F. and Cairncross, S. (2015). Interventions to improve water quality for preventing diarrhoea. Cochrane Database of Systematic Reviews, (10), CD004794.

Colwell, R. R. (1996). Global climate and infectious disease: The cholera paradigm. Science, 274(5295), 2025-2031.

Curtis, V. and Cairncross, S. (2003). Effect of washing hands with soap on diarrhoea risk in the community: A systematic review. The Lancet Infectious Diseases, 3(5), 275-281.

Debes, A. K., Ateudjieu, J., Guenou, E., Ebong, C., Tchoupo, M., Ketchup, C., Nsaibirni, R., Atekem, M., Ngwengi, S., Goura, A. P. and Sack, D. A. (2016). Clinical and environmental surveillance for Vibrio cholerae in resource-constrained areas. The American Journal of Tropical Medicine and Hygiene, 95(2), 339-345.

Guerra, J., Acharya, S., Lwin, K. S., Hossain, M. S., Poudyal, N., Upreti, S. R., Gurung, S. and others (2023). Community-based surveillance for epidemic-prone diseases: Lessons from implementation. BMJ Global Health, 8, e011234.

Harris, J. B., LaRocque, R. C., Qadri, F., Ryan, E. T. and Calderwood, S. B. (2012). Cholera. The Lancet, 379(9835), 2466-2476.

Jutla, A., Whitcombe, E., Hasan, N., Haley, B., Akanda, A., Huq, A., Alam, M., Sack, R. B. and Colwell, R. R. (2013). Environmental factors influencing epidemic cholera. The American Journal of Tropical Medicine and Hygiene, 89(3), 597-607.

Mintz, E. D., Reiff, F. M. and Tauxe, R. V. (2001). Safe water treatment and storage in the home: A review. JAMA, 273(12), 948-953.

Nigeria Centre for Disease Control and Prevention (2024). Cholera Situation Reports, Epidemiological Weeks 1-38, 2024. Abuja: NCDC.

Ratnayake, R., Tamm, C., Dunning, J., Checchi, F., Finger, F., Edmunds, W. J. and Funk, S. (2022). Community-based surveillance for epidemic-prone diseases: A systematic review. PLOS Neglected Tropical Diseases, 16(7), e0010593.

Sack, D. A., Sack, R. B., Nair, G. B. and Siddique, A. K. (2004). Cholera. The Lancet, 363(9404), 223-233.

Saif-Ur-Rahman, K. M., Mamun, R., Hasan, M., Mehedi, H. M. H., Hossain, M. S. and others (2024). Oral killed cholera vaccines for preventing cholera. Cochrane Database of Systematic Reviews, (1), CD008206.

Schwerdtle, P., Onekon, C. K. and Recoche, K. (2018). A quantitative systematic review and meta-analysis of the effectiveness of oral cholera vaccine as a reactive measure in cholera outbreaks. Prehospital and Disaster Medicine, 33(1), 89-97.

Wolf, J., Hunter, P. R., Freeman, M. C., Cumming, O., Clasen, T., Bartram, J., Higgins, J. P. T., Johnston, R., Medlicott, K., Boisson, S. and Prüss-Ustün, A. (2018). Impact of drinking water, sanitation and handwashing with soap on childhood diarrhoeal disease. Tropical Medicine and International Health, 23(12), 1351-1368.

World Health Organization (2017). Ending Cholera: A Global Roadmap to 2030. Geneva: WHO.

World Health Organization (2023). Cholera: Global Surveillance and Outbreak Response Guidance. Geneva: WHO.

World Health Organization (2024). Cholera Fact Sheet. Geneva: WHO. Available at: https://www.who.int/news-room/fact-sheets/detail/cholera

World Health Organization (2024). Cholera: Interim Guidance on Case Management, Surveillance and Prevention. Geneva: WHO.

World Health Organization (2025). Cholera Kills More People for Second Consecutive Year, While Prevention and Treatment Available. Geneva: WHO. Available at:

https://www.who.int/news/item/12-09-2025-cholera-kills-more-people-for-second-consecutive-year-while-prevention-and-treatment-available

World Health Organization (2025). Global Situation Report for Cholera, 2024. Weekly Epidemiological Record, 100(36), 451-466.

Azman, A. S., Parker, L. A., Rumunu, J., Tadesse, F., Grandesso, F., Deng, L. L., Lino, R. L., Baya, L. B., Llosa, A. E., Cohuet, S., Pezzoli, L., Luquero, F. J. and others (2016). Effectiveness of one dose of oral cholera vaccine in response to an outbreak in South Sudan. The Lancet Infectious Diseases, 16(11), 1283-1290.

Luquero, F. J., Grout, L., Ciglenecki, I., Sakoba, K., Traore, B., Heile, M., Diallo, A. A., Itama, C., Perea, W. and others (2014). Use of Vibrio cholerae vaccine in an outbreak in Guinea. The New England Journal of Medicine, 370(22), 2111-2120.

Qadri, F., Ali, M., Chowdhury, F., Khan, A. I., Saha, A., Khan, I. A., Begum, Y. A., Bhuiyan, T. R., Chowdhury, M. I., Uddin, M. J., Khan, J. A. M. and others (2015). Cholera in Dhaka: An update on burden and control. The Lancet Infectious Diseases, 15(5), 563-573.

Ngwa, M. C., Liang, S., Kracalik, I. T., Morris, L., Blackburn, J. K., Mbam, L. M., Ba, P. O. and others (2016). Cholera in Cameroon: A review of cholera outbreak reports. The American Journal of Tropical Medicine and Hygiene, 95(2), 354-361.

Elimian, K. O., Musah, A., Mezue, S., Oyebanji, O., Yennan, S., Jinadu, A., Williams, N., Ogunbode, O., Egwu, O., Okonkwo, N., Nwadiuto, I. and others (2020). Descriptive epidemiology of cholera in Nigeria, 2018-2019. BMC Infectious Diseases, 20, 756.

Adagbada, A. O., Adesida, S. A., Nwaokorie, F. O., Niemogha, M. T. and Coker, A. O. (2012). Cholera in Nigeria: A review of epidemiological trends. The Pan African Medical Journal, 12, 21.

Gaffga, N. H., Tauxe, R. V. and Mintz, E. D. (2007). Cholera: A new homeland in Africa? The American Journal of Tropical Medicine and Hygiene, 77(4), 705-713.

Huq, A., Sack, R. B., Nizam, A., Longini, I. M., Nair, G. B., Ali, A., Morris, J. G., Khan, M. N. H., Siddique, A. K., Yunus, M., Albert, M. J. and Colwell, R. R. (2005). Critical factors influencing the occurrence of Vibrio cholerae in the environment of Bangladesh. Applied and Environmental Microbiology, 71(8), 4645-4654.

Rebaudet, S., Sudre, B., Faucher, B. and Piarroux, R. (2013). Environmental determinants of cholera outbreaks in inland Africa. PLOS Neglected Tropical Diseases, 7(10), e2445.