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The Burden of Diarrheal Diseases in West Africa: Challenges and Solutions

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ABSTRACT

Diarrheal diseases remain a major cause of preventable morbidity and mortality in West Africa, disproportionately affecting children under five, malnourished populations, displaced communities, and residents of rapidly growing urban settlements. While global diarrheal deaths have declined, the region continues to experience high incidence, recurrent outbreaks (notably cholera), and significant indirect impacts on nutrition, cognition, school attendance, household income, and health-system capacity. Key drivers include inadequate water, sanitation and hygiene (WASH) services, food safety gaps, weak surveillance and laboratory confirmation, delayed care-seeking, limited access to oral rehydration therapy (ORT), and compounding shocks from climate variability, flooding, conflict, and population mobility. Evidence-based solutions exist: scaled ORS + zinc, rotavirus vaccination, targeted oral cholera vaccine (OCV) use during outbreaks and in hotspots, integrated WASH and nutrition programming, and strengthened primary healthcare and surveillance. This review synthesizes current evidence on burden, determinants, and high-impact interventions, and proposes a pragmatic, implementation-oriented roadmap for West African settings.

Keywords: diarrheal diseases; West Africa; cholera; rotavirus; ORS; zinc; WASH; child mortality; health systems.

INTRODUCTION

Diarrheal diseases remain a major cause of preventable illness and death in children, particularly in low-resource settings where poverty, inadequate water supply, poor sanitation, and suboptimal hygiene practices persist. Diarrhoea is transmitted mainly through the faecal–oral route, including ingestion of contaminated water and food, person-to-person spread in crowded households and childcare environments, and exposure to contaminated environments where safe disposal of human waste is limited [1]. For children under five years, the consequences are often more severe because repeated diarrheal episodes contribute directly to dehydration, micronutrient loss, growth faltering, and impaired immune function, creating a cycle in which malnutrition increases susceptibility to infection, and infection worsens malnutrition. Globally, the burden remains substantial despite progress in prevention and case management [2]. The World Health Organization (WHO) estimates nearly 1.7 billion cases of childhood diarrhoeal disease occur each year, and diarrhoea continues to be among the leading causes of death in children under five, accounting for roughly 443,832 deaths annually. UNICEF similarly reports that diarrhoea accounted for about 9% of under-five deaths in 2021, equivalent to roughly 444,000 deaths per year despite the availability of simple, effective treatment such as oral rehydration therapy. These figures highlight a persistent gap between what is scientifically and clinically preventable and what is occurring in many communities [3].

The drivers of ongoing diarrheal transmission are not limited to pathogens alone; they are rooted in structural determinants. Water, sanitation, and hygiene (WASH) remains central: where drinking water is unsafe, sanitation coverage is low, handwashing facilities are inadequate, and solid waste management is weak, diarrheal pathogens circulate more easily. Beyond infrastructure, behavioral, socioeconomic, and environmental factors matter; caregiver education, household crowding, safe food preparation, breastfeeding practices, timely health-seeking, and access to effective treatment all influence risk and outcomes [4]. The resilience of health systems like surveillance, laboratory confirmation, outbreak response capacity, availability of oral rehydration salts and zinc, and community health outreach also shapes whether diarrheal disease remains an everyday threat or escalates into outbreaks with high mortality.

Within this global context, West Africa faces an especially complex risk landscape. Rapid urbanization has produced expanding informal settlements where access to piped water, functional toilets, drainage, and routine waste collection is often limited. Cross-border mobility and trade corridors facilitate movement of people and goods, which can amplify the spread of enteric pathogens during outbreaks. Climate-sensitive livelihoods and weather variability—heavy rains, floods, droughts can disrupt water systems, concentrate populations around unsafe water sources, and increase contamination of wells and surface water [5]. In settings with uneven health-system capacity, these pressures can sustain endemic diarrhoea while also creating conditions for episodic surges such as cholera. Cholera is a critical marker of WASH fragility and outbreak vulnerability. Recent WHO reporting indicates that the global cholera situation worsened in 2024 compared with 2023, with >560,000 cases and ~6,000 deaths reported from 60 countries, reflecting increased transmission and rising fatalities. This renewed epidemic risk is highly relevant to West Africa, where rapid urban growth, displacement, and resource constraints can converge to produce recurring outbreaks and sustained transmission in high-risk communities [6].

Although global mortality from diarrhoeal diseases has declined substantially over recent decades, largely due to improved case management through oral rehydration therapy (ORT), expanded immunization such as rotavirus vaccination, and incremental gains in water, sanitation, and hygiene (WASH), the burden among children under five remains unacceptably high. This burden falls disproportionately on low-income households and communities with fragile infrastructure. In West Africa, rapid urbanization, expansion of informal settlements, intermittent access to safe water, inadequate sanitation systems, poor drainage, and climate-related shocks collectively sustain environments in which enteric pathogens readily circulate [7]. The challenge is not merely persistence, but inequity: children in overcrowded homes, flood-prone neighborhoods, and households dependent on unsafe or unreliable water supplies experience recurrent infections with cumulative nutritional and developmental consequences. Preventive practices like handwashing at critical times, safe water storage and treatment, and hygienic preparation of complementary foods are often inconsistent, even where basic infrastructure exists. Concurrently, limited access to timely care, stockouts of ORS and zinc, and delayed outbreak detection convert preventable illness into severe disease or death. Yet many high-risk settings still lack context-specific evidence on how WASH conditions, caregiver behaviors, and health-system constraints interact locally. Without such evidence, interventions risk being fragmented and poorly targeted, undermining integrated strategies urgently needed to protect vulnerable children [8]. This study aims to assess the burden of diarrhoeal disease among children under five years in a West African setting and to identify key WASH-related and household-level risk factors, including water source and storage practices, sanitation access, hygiene behaviors, and household crowding, in order to generate context-specific evidence for targeted prevention and control strategies. The study is significant because under-five children bear a disproportionate share of diarrhoeal morbidity and mortality, and reducing diarrhoea is critical to improving child survival, growth, and cognitive development by disrupting the infection–malnutrition cycle. By identifying the most influential local WASH determinants, the findings will guide governments and partners in prioritizing cost-effective investments, particularly in underserved and informal communities. Understanding routine transmission pathways will also strengthen outbreak preparedness and cholera risk reduction. In addition, the study can inform health-system improvements in caregiver education, timely treatment with oral rehydration salts and zinc, surveillance, and equity-focused policies targeting the most vulnerable households

Epidemiology and burden in West Africa

In West Africa, diarrheal diseases remain a major public-health burden, falling most heavily on children under five because they have higher exposure (crawling and hand-to-mouth behaviors), smaller physiological reserves that accelerate dehydration, and frequent co-existing malnutrition and micronutrient deficits. Large multi-country analyses using Demographic and Health Survey data consistently link under-five diarrhea to structural determinants—poverty, low maternal education, unsafe water sources, poor sanitation, and rural–urban living conditions—showing that risk is patterned by inequity rather than biology alone [9]. Beyond young children, severe outcomes cluster in malnourished children (greater severity and fatality), older adults (dehydration compounded by comorbidities), displaced populations in overcrowded camps with unsafe water, residents of urban informal settlements where fecal contamination and poor drainage are common, and communities facing floods or droughts that disrupt water and sanitation infrastructure. Even where mortality declines, recurrent morbidity drives growth faltering, stunting, cognitive and educational losses, and high healthcare utilization with repeated antibiotic exposure [10]. Cholera illustrates the outbreak dimension: WHO reported continued expansion of the seventh cholera pandemic in 2024 with deaths rising versus 2023, underscoring how fragile WASH systems and shocks can rapidly amplify fatalities. UNICEF similarly warns that rainy-season flooding can sharply increase the number of children at risk across West and Central Africa. Economically, households face direct medical costs (consultations, IV fluids, admissions), direct non-medical costs (transport, caregiver time), and indirect losses (missed work and schooling, long-term earnings reductions via stunting), with the heaviest burden concentrated among the poorest, reinforcing entrenched inequities [11].

Major etiologies and transmission pathways

In West and Central Africa, pediatric gastroenteritis and diarrheal disease are driven by a mix of infectious agents and structural transmission conditions that sustain exposure. Among infectious causes, viruses remain important: rotavirus is still a leading etiology of severe childhood gastroenteritis, especially in pre-vaccine contexts and in settings where vaccine coverage is low or uneven, with country-level surveillance (e.g., Nigeria) continuing to show a substantial viral contribution that can fluctuate by season and locality [12]. Bacterial pathogens also account for a large share of severe and outbreak-prone disease, notably *Vibrio cholerae* in epidemic cholera, alongside enterotoxigenic *E. coli* (ETEC), *Shigella*, *Salmonella*, and *Campylobacter*, which spread efficiently through contaminated water, food, and person-to-person contact. Parasitic infections further compound the burden, particularly *Giardia*, *Cryptosporidium*, and *Entamoeba histolytica*, often linked to chronic or recurrent diarrhea and poor growth. These pathogens are amplified by structural drivers: unsafe drinking water and intermittent supply that necessitate household storage (increasing contamination risk), low sanitation coverage with open defecation, inadequate hygiene due to limited soap and handwashing facilities, food safety gaps in informal markets and street foods with weak cold-chain systems, and overcrowding in urban slums or displacement settings. WASH monitoring, anchored by the WHO/UNICEF Joint Monitoring Programme (JMP), consistently highlights large inequalities in access that map closely onto diarrhea risk in the region [13].

Why diarrheal diseases remain high in West Africa: core challenges

Diarrheal diseases remain persistently high in West Africa because multiple structural and contextual barriers reinforce one another across prevention, care, and preparedness. First, WASH infrastructure is chronically underfunded: limited piped water coverage, inadequate sewerage, weak fecal sludge management, and poor drainage leave communities exposed to routine fecal contamination, especially when seasonal flooding overwhelms latrines and sanitation systems [14]. Governance challenges worsen these gaps, as responsibilities are often fragmented across local authorities, utilities, and health sectors, while informal settlements are frequently excluded from service expansion. Second, health systems face capacity constraints that delay effective treatment, late presentation, weak referral pathways, and frequent stock-outs of oral rehydration salts (ORS) and zinc reduce timely case management. Overstretched facilities may lack consistent triage, dehydration assessment skills, and pediatric emergency capacity for IV fluids and monitoring. Third, surveillance and diagnostics remain limited: community episodes are under-reported, laboratory confirmation of pathogens and antimicrobial resistance is scarce, and climate/WASH risk signals are not well integrated into preparedness, with cross-border coordination gaps hindering outbreak detection and response [15]. Finally, behavioral and socioeconomic constraints, poor recognition of dehydration danger signs, financial barriers to early care, misinformation about feeding, and antibiotic overuse driven by expectations and limited diagnostics sustain transmission and worsen outcomes, while climate shocks, conflict, and mobility increasingly amplify cholera and acute watery diarrhea dynamics.

Evidence-based solutions (what works, and how to operationalize it)

Evidence-based diarrheal control hinges on a few proven, scalable interventions and the practical systems that make them routine. At the case-management level, the highest mortality gains come from rapid dehydration prevention and treatment: low-osmolarity ORS, zinc supplementation, and continued feeding (including breastfeeding) to avert dehydration and sustain nutrition. Zinc is a simple add-on that shortens episode duration/severity and reduces recurrence; typical program dosing is 10 mg/day for infants <6 months and 20 mg/day for children ≥6 months for 10–14 days [16]. Operationally, this requires uninterrupted ORS+zinc availability at facilities and within communities, plus training CHWs and primary care teams to assess dehydration, initiate treatment, and refer severe cases early. Prevention is strengthened through vaccination with the rotavirus vaccine to reduce severe diarrhea and hospitalizations, and the oral cholera vaccine for outbreak response/hotspot control, implemented alongside surveillance and WASH. The WASH package with greatest impact prioritizes safely managed water (e.g., chlorination, protected sources), improved sanitation and fecal sludge management, handwashing with soap, and food hygiene; institutional WASH in health facilities and schools further reduces transmission. Because diarrhea and malnutrition amplify each other, integrating vitamin A where indicated, acute malnutrition management, and optimal infant and young-child feeding improves outcomes. Antimicrobial stewardship and diagnostics are essential: most watery diarrhea needs no antibiotics, which should be reserved for dysentery, severe suspected cholera in outbreaks, or confirmed bacterial infection [17]. Finally, district dashboards, event-based surveillance linked to rainfall/flood alerts, pre-positioned supplies, and cross-border coordination enable rapid, seasonal, regional response.

Implementation roadmap for West Africa

A pragmatic implementation roadmap for West Africa can be sequenced into three priority tiers. Priority 1 (0–12 months) focuses on *stopping deaths now* by ensuring universal availability of oral rehydration salts (ORS) plus zinc across all primary care facilities and community health worker (CHW) kits, alongside mass caregiver messaging on dehydration danger signs and immediate ORS use at home. Facilities should adopt simple triage protocols to rapidly identify and treat dehydration, and where feasible, user fees for childhood diarrhea services should be removed to

eliminate delays in care-seeking [18]. Priority 2 (1–3 years) aims to *reduce severe disease* by improving rotavirus vaccine coverage and timeliness through microplanning, defaulter tracing, and strengthened outreach, while building routine diarrhea/cholera hotspot mapping to guide resources. In settings with recurrent outbreaks or heightened risk, oral cholera vaccine (OCV) can be targeted to hotspots and vulnerable populations when supply permits. Priority 3 (3–10 years) addresses *structural transmission prevention* by expanding safely managed water and sanitation with explicit inclusion of informal settlements, investing in fecal sludge management and drainage in flood-prone urban areas, and institutionalizing WASH in schools and health facilities as standard, financed infrastructure rather than short-term projects [19].

Research and policy gaps

Key research and policy gaps remain in tackling cholera and other acute watery diarrheal diseases, especially in rapidly urbanizing settings. First, burden estimation should move beyond under-five mortality to capture adult disease, long-term disability, household and health-system costs, and broader economic losses metrics that better justify prevention investments [20]. Second, countries need stronger pathogen-specific surveillance (routine laboratory confirmation, genomic tracking where feasible, and resistance profiling) to guide vaccine deployment, refine diagnostics, and inform antibiotic stewardship policies. Third, urban informal settlements require intervention packages that are scalable and financeable, including fit-for-context sanitation options, fecal sludge management, safe water access, and durable community–utility partnerships that can be sustained after pilots end. Fourth, climate-informed early warning systems should be integrated into national preparedness, linking rainfall, flooding, temperature, and water-quality signals with rapid response triggers for hotspots at the district level. Fifth, implementation science is needed to understand how to sustain high coverage and correct use of ORS plus zinc at scale—addressing supply chain reliability, provider adherence to guidelines, caregiver knowledge, and private-sector practices so effective case management is not only available, but consistently used when and where it matters most [21].

CONCLUSION

In conclusion, this review highlights that reducing the toll of cholera and other acute watery diarrheal diseases demands a shift from episodic outbreak response to resilient, data-driven prevention and care. Robust burden estimates that include adult morbidity, disability, and economic costs can strengthen the investment case for sustained WASH and preparedness financing. Pathogen-specific surveillance, paired with antimicrobial resistance monitoring, should underpin smarter vaccine strategies, diagnostic use, and antibiotic stewardship. Because transmission is increasingly concentrated in urban informal settlements, scalable sanitation, fecal sludge management, and safe water delivery models must be embedded in realistic financing and governance arrangements. Climate-informed early warning systems offer a practical pathway to anticipate surges and trigger timely, targeted action in hotspots before outbreaks accelerate. Finally, implementation science is essential to close the "last-mile" gap by sustaining ORS+zinc availability, correct prescribing, and caregiver uptake across public and private sectors. Aligning these priorities can accelerate equity, reduce avoidable deaths, and strengthen health security.

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