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Practical Paper

Environmental, social, and WASH factors affecting the recurrence of cholera outbreaks in displacement camps in Northeast Nigeria: a rapid appraisal

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ABSTRACT

In 2021, Nigeria witnessed a severe cholera outbreak that affected Borno state, in which more than 1,600,000 internally displaced persons (IDPs) resided at the time. This rapid appraisal explored factors that facilitate the recurrence of cholera outbreaks in sites hosting IDPs in Northeast Nigeria. Semi-structured interviews were conducted with water, sanitation, and hygiene (WASH), management, and healthcare personnel working in ten displacement camps in Borno state. The interviews were complemented by transect walks and field observations, measurements of free residual chlorine levels, and publicly available data published by the International Organization for Migration Displacement Tracking Matrix. The recurrence of cholera outbreaks appears to be facilitated by substantial interactions between IDPs and host communities, and suboptimal WASH services in camps. Of particular concern, IDP camps are exposed to extreme weather-related events that damage facilities and subsequently affect WASH practices. WASH services in camps may likewise be severely hindered by an influx of new arrivals. In conclusion, we emphasize the importance of expanding WASH activities to host communities and developing site-specific WASH interventions and chlorination targets. Practical recommendations are needed for the prevention and control of outbreaks following extreme weather-related events and population influxes.

Key words: acute watery diarrhoea, epidemics, faecal–oral diseases, forcibly displaced people, water-related diseases, West Africa

HIGHLIGHTS

- Challenges to the prevention and control of cholera in displacement camps are especially pronounced following shocks.
- Strategies are likely to be more effective when targeting both camps and host communities.
- Site-specific chlorination targets are needed to maintain adequate free residual chlorine levels throughout the year.
- Interventions must be contextualized and developed through a participatory approach.

INTRODUCTION

Cholera is an acute diarrhoeal disease caused by toxigenic *Vibrio cholerae* bacteria and spread through faecal–oral transmission (Deen *et al.* 2020). It has long caused devastating outbreaks among forcibly displaced people (Shannon *et al.* 2019). Substantial progress has been made in the control of cholera outbreaks in refugee camps following the establishment of the Sphere standards (The Sphere Project 2000), and improved cholera preparedness and coordination (Shannon *et al.* 2019). However, Shannon *et al.* (2019) argue that this improvement has been less pronounced in camps for internally displaced persons (IDPs) where preparedness and response measures are more likely to be compromised due, for example,

to restrictions in access to the camps. Our study explored factors that facilitate the recurrence of cholera outbreaks in sites hosting IDPs in Northeast Nigeria, despite ongoing humanitarian activities.

Cholera is endemic in Nigeria (Ali *et al.* 2015). The country has frequently recorded cases and experienced major outbreaks since 1970 (Salako *et al.* 2021). Many interdependent factors were found to drive cholera transmission in Nigeria (Elimian *et al.* 2020). These include social factors operating at individual and community levels, and environmental factors. As of October 2021, more than two million IDPs resided in Northeast Nigeria (Displacement Tracking Matrix [DTM] Nigeria 2021a), of which 40% were in camps and camp-like settings periodically affected by cholera outbreaks. For instance, in 2015, an outbreak affected IDP camps in Maiduguri, leading to 385 cases and 13 deaths (Abubakar *et al.* 2016). Again, in 2017, an outbreak started in the Muna Garage camp and spread to six Local Government Areas (LGAs) in Borno state, leading to around 5,340 cases and 61 deaths (Ngwa *et al.* 2020).

In 2021, Nigeria witnessed a major cholera outbreak (Huhn 2021). Borno state, which hosted 1,639,028 IDPs by October 2021 (DTM Nigeria 2021a), was particularly affected. Between July 11, 2021 and March 13, 2022, most suspected cholera cases within Borno occurred in Maiduguri Metropolitan Council (MMC), Jere, Konduga, and Gwoza LGAs (Borno State Ministry of Health 2022). This outbreak prompted our fieldwork to explore factors that facilitate the recurrence of cholera outbreaks in displacement camps in Northeast Nigeria and suggest recommendations to the International Organization for Migration (IOM) Water, Sanitation, and Hygiene (WASH) Cholera Preparedness and Response Plan. In this Practical Paper, we report on findings derived from a rapid appraisal conducted in ten displacement camps and present recommendations for WASH implementing agencies operating in Northeast Nigeria.

METHODS

Study design

This study followed a rapid appraisal approach (Chambers 1981; Beebe 1995). Rapid appraisals combine interviews, direct observation, and the collection of information in advance (Beebe 1995). They are characterized by a systems perspective and an iterative process for data collection and analysis (Beebe 1995).

In this study, we used four data sources: semi-structured interviews, participatory transect walks and field observations, measurements of free residual chlorine (FRC) levels at points of distribution and consumption, and publicly available data published by the DTM (DTM Nigeria 2021b). The DTM is an IOM program that gathers, analyses, and disseminates data on IDPs and returnees (DTM Nigeria 2021a). These include demographic data, as well as data on WASH, health, and educational services accessible to IDPs. The DTM data cover the state of all sites hosting IDPs in Northeast Nigeria, not only those managed by the IOM.

Study setting

This study was conducted in Borno state, Nigeria. It covered ten displacement camps (selected among 245 sites hosting IDPs) located in five LGAs that were affected by the cholera outbreak: MMC, Jere, Konduga, Gwoza, and Bama (Figure 1). Sites were selected in consultation with the IOM, based on logistical and security constraints.

Data collection

Fieldwork took place in December 2021 and January 2022. It consisted of semi-structured interviews, participatory transect walks and field observations, and measurements of FRC levels. Semi-structured interviews were conducted (bilaterally and in groups) with camp management representatives, and with WASH and healthcare personnel working in ten displacement camps. Visits were organized by the IOM WASH Project Assistants who arranged for interviews with the WASH personnel working in the camps. Interviews with management representatives and healthcare personnel were held if present in the camp at the time of the visit. In total, 17 WASH, 9 management, and 4 healthcare personnel were interviewed, 30% of which were female. The interviews assessed outbreaks of faecal–oral diseases, particularly cholera, in relation to environmental health conditions in the camps. They inquired about past experiences with cholera outbreaks, living conditions and livelihood opportunities, population movement and interactions between IDPs and host communities, extreme weather-related events, and finally WASH facilities and services in the camps. When needed, translation from Hausa to English was provided by the IOM WASH Project Assistants during the interviews. Field observations included the state of the water collection points and latrines, the presence of stagnant water bodies, as well as evidence of overcrowding, open defecation, and solid waste in and

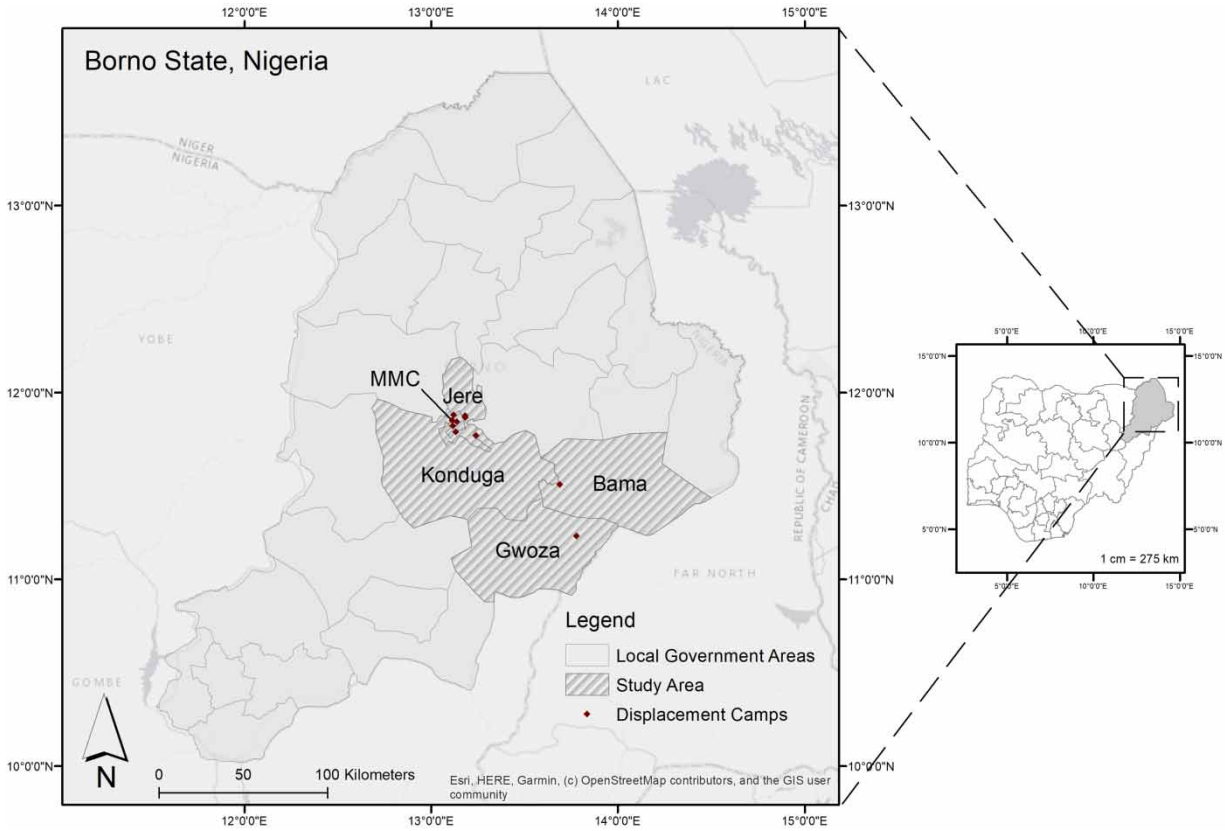

Figure 1 | Map of Borno state, Nigeria with Local Government Areas and assessed displacement camps (in red). MMC denotes Maiduguri Metropolitan Council. Please refer to the online version of this paper to see this figure in colour: http://dx.doi.org/10.2166/washdev.2023.055.

around the camps. FRC was measured at several points of distribution (6 boreholes managed by the IOM) and consumption (25 household-level water storage containers) in three camps in Jere, Konduga, and Bama using the Pool Tester Chlorine and pH Visual Kit SP610 from Palintest [Gateshead, United Kingdom]. In Jere and Konduga, households of suspected cholera cases were targeted for the FRC measurements, whereas in Bama households were randomly selected. The number of tested water samples was small, hence the FRC measurements can only give an indication of water quality.

Data analysis

Camps and camp-like settings hosting IDPs, such as collective settlements and transitional centres, are managed in the same way by the IOM WASH Program in Northeast Nigeria. Throughout this study, all are referred to as 'displacement camps'. Thematic analysis was carried out on qualitative data gathered from the interviews and transect walks. Data drawn from the DTM, and those pertaining to FRC measurements, were reported through descriptive statistics. Findings derived from the interviews, transect walks and field observations, FRC measurements, and the DTM were narratively synthesized. Quoted interview segments were lightly edited to provide necessary context and ensure legibility and clarity.

Ethical considerations

The interviews were mainly held with IOM personnel and staff from partner organizations in their professional capacities. This study was part of an ongoing collaboration between the IOM, Deltares, and UNU-MERIT, and was carried out at the request of the IOM in the context of the WASH Program's cholera preparedness and response activities in Northeast Nigeria. Approval of the study protocol and permission to conduct fieldwork activities have been obtained from the IOM. The purpose of the research was explained to the study participants and written consent was obtained before conducting the interviews.

RESULTS

Study findings are grouped and presented in the following three subsections: interactions between IDPs and host communities, WASH services, and vulnerability to shocks.

Interactions between IDPs and Host Communities

According to the DTM, inhabitants in most displacement camps in Borno state had access to educational establishments (69% of 245 sites), healthcare facilities (67%), and markets (93%) offsite. Indeed, all assessed camps were located near host communities where IDPs often visited educational, healthcare, and religious institutions. IDPs were also tightly engaged with host communities, working as daily labourers and petty traders. As a result of their movement, IDPs may introduce *V. cholerae* into the camp through the consumption of contaminated water and food or direct contact with a cholera case in host communities. For instance, one cholera case in a camp in Konduga was a child attending school in the host community who reportedly contracted the disease there:

> *'One confirmed case was a student in one of the schools in town. She came to visit on holidays and brought cholera… She didn't contract the disease in the camp.'* (Camp Coordination and Camp Management Staff, IOM)

Likewise, a severe outbreak that devastated displacement camps in Gwoza reportedly originated from a contaminated well in the host community:

> *'Based on the WASH assessment, the outbreak started in a certain area in the host community where they have a well. From there it went to Camp C, from Camp C to Transit Camp, then to the various camps in Pulka.'* (Camp Coordination and Camp Management Staff, IOM)

WASH services in displacement camps

Many sites hosting IDPs in Borno (29%) had their main water source located offsite, according to the DTM. In the majority of sites (70%), IDPs did not have access to more than 15 lpcd, the minimum level specified in the Sphere Handbook (Sphere Association 2018). Moreover, most displacement camps (77% of 245 sites) did not have an adequate number of latrines in accordance with the Sphere standards (i.e., a maximum of 20 people per latrine). Sanitation facilities were not hygienic in most sites (84%) and 57% of the 245 sites demonstrated evidence of open defecation.

In the visited camps, the IOM predominantly supplied water through boreholes. Supply was supplemented by water trucking when necessary. Water quality was regularly monitored at points of distribution and in-line chlorination systems were in place. Given that water was collected by IDPs from points of distribution inside the displacement camps and stored in household-level containers, it was reasonable to assume that post-collection water contamination may contribute to the spread of cholera in the camps. Even in camps where WASH facilities are maintained and hygiene practices generally adopted, outbreaks could still occur. This was the case in two visited camps in Jere and Konduga that experienced small outbreaks, possibly involving post-collection water contamination as suggested by our water quality testing results. In fact, FRC levels at points of distribution in three displacement camps were within the target set in the Sphere Handbook, i.e., 0.2–0.5 mg/L (Sphere Association 2018). However, out of 25 water samples tested at points of consumption, nine (36%) had FRC levels below 0.2 mg/L. It is important to note that we did not test for indicator organisms (e.g., faecal coliforms and *Escherichia coli*). Although low FRC levels do not constitute evidence of faecal contamination, they do hint that post-collection water contamination may occur. IDPs might have also been exposed to *V. cholerae* through water collected from other sources and faecal–oral transmission via alternative exposure routes (e.g., food).

Handwashing stations in displacement camps were not sufficiently used, and many were not functional (e.g., damaged, missing soap or water). Through the interviews, it became apparent that these stations did not account for regional habits and preferences, including the use of kettles for handwashing and anal cleansing:

> *'The IDPs have clearly shown us that they want kettles… Everywhere you go around the Maiduguri area they prefer kettles. This is their culture. If you are going to the latrine, you always carry your kettle.'* (WASH Hygiene Promotion and Community Engagement Facilitator, IOM)

Vulnerability of displacement camps to shocks

All visited camps were exposed to extreme weather-related events. This is consistent with DTM data, which suggest that many sites hosting IDPs were susceptible to floods (24%) and storms (9%), experiencing damage to their WASH infrastructure during the rainy season:

> *'During the rainy season, the IDPs face challenges with flooding and storms… The last storm destroyed shelters in one of the extreme ends of the camp where some new arrivals have settled… It destroyed all their shelters, and some of the IDPs were injured… It affected almost everything. It destroyed a whole latrine block, power, and a borehole.'* (Community Leader or 'Bulama')

Under these circumstances, the use of surface water, the consumption of water from street vendors, and open defecation may increase, exacerbating the risk of occurrence and severity of an outbreak:

> *'Sometimes at least one or a few latrines survive the storm… In a situation where only one survives, they leave it for the women and the men go out and defecate in the open.'* (Community Leader or 'Bulama')

WASH conditions in camps may also worsen following an acute influx of IDPs. By end of December 2021, all formal camps in MMC were set to close. Consequently, IDPs had to return to their areas of origin, relocate to host communities, or alternatively move to other camps. In the latter case, such an influx would add substantial pressure on existing WASH facilities and services in receiving camps, rendering them more vulnerable to cholera outbreaks. At the time of our fieldwork, an outbreak of acute watery diarrhoea was ongoing in a displacement camp in Jere. The outbreak reportedly originated from a camp area lacking sanitation facilities, housing new arrivals from Bakassi camp that closed down. Shortly thereafter, it had spread throughout the camp.

Other displacement camps in Borno state may face similar outbreaks if IDPs from the closed camps relocate there, especially when WASH facilities in the receiving camps are insufficient. For example, camps in Bama were already overstretched and such an influx might put camp inhabitants at further risk:

> *'The camp was initially designed to accommodate only 25,000 individuals. But now, we are talking about 70,000 individuals.'* (Camp Coordination and Camp Management Staff, IOM)

> *'All our facilities are overstretched, the water points, latrines, waste management, shelters, food… because of the number of IDPs presently in the camp.'* (Camp Coordination and Camp Management Staff, IOM)

DISCUSSION

The recurrence of cholera outbreaks in displacement camps in Northeast Nigeria is likely facilitated by substantial interactions between IDPs and host communities, suboptimal WASH services, and shocks.

There is ample evidence to demonstrate the consistent interaction between IDPs residing in displacement camps and members of host communities. IDPs access healthcare facilities, educational institutions, and markets in the host community and very often engage in livelihood activities there. Such interactions are not unique to Northeast Nigeria. For instance, cholera outbreak descriptions have also alluded to high levels of interaction between forcibly displaced people and host communities in Bangladesh (Khan & Shahidullah 1982) and Kenya (Mahamud *et al.* 2012). Given that cholera is endemic in Nigeria, the movement at the porous borders of camps and the high level of interaction between IDPs and host communities implies that the risk of an outbreak in camps may not be adequately reduced if WASH facilities and practices do not improve in both host communities and displacement camps. This was clearly illustrated by an outbreak in Gwoza that reportedly originated in the host community and later affected camp inhabitants. *V. cholerae* may also be introduced into a camp through the arrival of new IDPs from areas with active transmission or infected visitors from host communities. Conversely, outbreaks may originate in displacement camps and later spread to host communities (Ngwa *et al.* 2020).

Displacement camps were quite vulnerable to shocks. Due to heavy rainfall and floods, camps often witnessed damage to their WASH facilities during the rainy season. These extreme weather-related events have previously been implicated in

cholera outbreaks affecting refugee camps in Malawi (Moren *et al.* 1991) and Sudan (Mulholland 1985). Outbreak risk may also be heightened by an acute influx of new arrivals overwhelming WASH services, as suggested by investigations in Kenya (Mahamud *et al.* 2012) and Malawi (Swerdlow *et al.* 1997).

FRC levels at points of consumption were not always within the target set by the World Health Organization's Guidelines for Drinking Water Quality (World Health Organization 2022), constituting another risk factor. Chlorine levels decay over time, especially in high ambient temperatures and poor WASH conditions. Therefore, FRC levels between 0.2 and 0.5 mg/L at points of distribution may not ensure adequate and prolonged protection at points of consumption in camps (Ali *et al.* 2021). In such settings, Ali *et al.* (2021) recommend the development and adoption of site-specific chlorination targets. This may be complemented by the distribution of safe storage containers with a narrow neck or tap as specified in the Sphere Handbook (Sphere Association 2018), as well as hygiene promotion activities (Ali *et al.* 2021). In Nigeria, and in line with the World Health Organization's Guidelines for Cholera Control (World Health Organization 1993), the WASH Sector Nigeria recommends increasing FRC levels to 1.0 mg/L at points of distribution in emergencies and during the rainy season (WASH Sector Nigeria 2019). However, this increase is not maintained throughout the year.

Handwashing stations did not account for regional preferences and were not sufficiently used by IDPs. The Sphere Handbook highlights the importance of community engagement, including active participation in WASH decision-making, in the provision of appropriate and accessible WASH services (Sphere Association 2018). One notable example is the participatory approach that was followed in Rohingya refugee camps in Bangladesh. There, refugees were engaged in the design of handwashing stations (Stevens 2020) and female-friendly WASH facilities (Schmitt *et al.* 2021).

CONCLUSION

Multiple factors contribute to the recurrence of cholera outbreaks in displacement camps in Northeast Nigeria including population movement, suboptimal WASH services, and shocks. Cholera WASH preparedness and response measures employed by the IOM include the rehabilitation and maintenance of drinking water supply, water quality monitoring, the construction of emergency latrines, household disinfection, and hygiene promotion and community mobilization activities. We recommend that WASH implementing agencies in Northeast Nigeria consider expanding preparedness and response activities beyond displacement camps in order to achieve a sustainable risk minimization of cholera outbreaks in camps. Site-specific and evidence-based chlorination targets are needed to maintain adequate and prolonged protection at points of consumption throughout the year. The observed low FRC levels also emphasize the continued importance of hygiene promotion activities, even in settings where WASH services are generally maintained. Moreover, we suggest that WASH interventions be designed following extensive stakeholder engagement across sectors, and through a participatory process that encourages the active involvement of IDPs in identifying and developing durable and effective WASH solutions. Finally, pragmatic recommendations, appropriate to the Northeast Nigerian context, are needed to address the aftermath of extreme weather-related events and acute population influxes.

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DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

CONFLICT OF INTEREST

This study was conducted in collaboration with the International Organization for Migration.

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