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Review Article

An Overview of Nigeria and Annual Cholera Outbreak

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ABSTRACT

Introduction

Cholerais a gastrointestinal disease caused by Vibrio cholerae prevalent in poor developing countrieswith piteous healthcare systems, ignorance, and political instability among other factors. The intensityof the disease underscores the need for more efficient preventive measures. Since human activity determinescholera extent of spread geographically, the severity of the disease in Nigeria is a noteworthy issue. The present study reviewed the sustain risk factors and preventive strategies to contain the spread of cholera disease according tothe Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review (PRISMA-ScR) standards. Overall, factors that contribute to cholera spread such as poverty, poor hygiene, insecurity, banditry, and overcrowding may eventually help reduce the frequency of epidemics. Several reports continued to support the idea that to lessen the effect of cholera spread is to support people's ability to maintain general health including personal hygiene and environmental sanitation. Therefore, the control of cholera outbreaks requires effective surveillance and response systems which are often sub-optimal in developing countries and therefore this study accentuates the need for an effective surveillance system with the capacity to appropriately detect and contain cholera outbreaks timely.

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Introduction

Cholera (Acute diarrheal illness) continues to be a serious public health concern because it significantly increases morbidity and mortality in many poor nations including Africa and Nigeria. The bacterium Vibrio cholerae, a microscopic organism that may infect the intestines, is the cause of cholera. Cholera is a gastrointestinal disease caused by Vibrio cholerae, the disease is rife in developing countrieswith poor healthcare systems, poor infrastructure, lack of accessto potablewater, high levelsof illiteracy, and political instability among other factors [1,2]. In 1817, cholera spread beyond the Indian subcontinent and there were six worldwide cholera pandemics between 1817 and 1923. Between 1849 and 1854, London physician John Snow proposed that cholera to be a communicable disease and that stool contained infectious material [3]. Descriptions of a disease thought to be cholera are found in Sanskrit back to the 5th century BC, and the disease has existed on the Indian subcontinent for centuries.

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This pandemic is caused by a new biotype of V. cholerae first isolated in 1905 in El Tor, Egypt [4]. Vibrio cholerae of serogroup 01 and 0139 is associated with high morbidity and mortality [5, 6, 7]. Although cholera is vastly under-reported, the WHO estimates that there are 3–5 million cases per year, predominantly in Asia and Africa [3].

In Africa, there have been recurrent cholera outbreaks, characterized by a large disease burden and high case-fatality rates. African countries accounted for 3,316,201 (46%) of the suspected cholera cases reported to the WHO from 1970 to 2012. In 2012, sub-Saharan Africa recorded 71% of all reported cases and 86% of cholera deaths [7]. Cholera is endemic in Nigeria, with an increase in cases since June 2021and have been negatively impacted by floods, with outbreaks mostly occurring in the northern states [5,8, 9,10,11].

The disease is transmitted through the fecal-oral route via contaminated food, carriers, and unsanitary environmental conditions. Cholera outbreaks tend to occur due to contamination of food or water with Vibrio cholerae organisms due to poor personal hygiene, and unsafe environmental sanitation conditions compounded by lack of potable water supply. Internal displacement of persons by natural and man-made disasters leading to unstable living conditions with contamination of food and water sources have also been reported to cause cholera outbreaks [7,10].

Affected population people mostly vulnerable to cholera are; people living in areas or regions where the sanitation is poor, people living in regions where the water is unsafe, and people who are consumers of foods, fruits, and vegetables that have not been properly cooked or washed with clean, safe water [8]. Climate change such as flooding directly affects the lives of the inhabitants of these underdeveloped

states making them susceptible and vulnerable to infections and diseases [9].Contamination of wells and other types of water, overflowing latrines, and regular alterations of water supplies for human behavior and consumption may all result in cholera outbreaks. Moreover, insurgency, which has devastated the Northeast and armed banditry in the Northwest and north-central, has displaced millions of people, limiting access to clean water and food.

This situation has aggravated the outbreaks of cholera in the region leading to recurring outbreaks which are characterized by high mobility, increased hospitalization, and deaths. However, the nature of the hostilities in the regions makes it challenging to determine the precise burden of cholera due to reporting and access issues [11,12, 13].The objectives of this study are to review the cholera situation in northern Nigeria, to sustain risk factors, and to facilitate the prevention strategies to contain the spread of cholera disease.

CHOLERA AND NIGERIA

Cholera is one of the major opportunistic diseases. The rate of the outbreak in North-eastern and North-western Nigeria, especially in Borno, is alarming, with concentrated cases in Gwoza and Danboa LGAs. As of December 1, 2022, 75% of the reported 696 cases and 69% of the 46 fatalities from the outbreak were accounted for.

Relief web recorded more than 2,000 instances of cholera in 25 local government areas in Borno, Adamawa, and Yobe states, with 76 fatalities; these LGAs were among those that were severely impacted by the Boko haram insurrection in 2021 alone [14].According to the Nigeria Centre for Disease Control (NCDC) report, from September 1 to September 4, 2022, a total of 1,677 suspected cholera cases were reported across 11 states. The number of reported cases includes 853 cases in Yobe, 333 in Borno, 247 in Jigawa, 133 in Gombe, 171 in Kano, 115 Katsina, 14 in Kaduna, 12 in Sokoto, 11 in Plateau, and 1 in Kebbi.

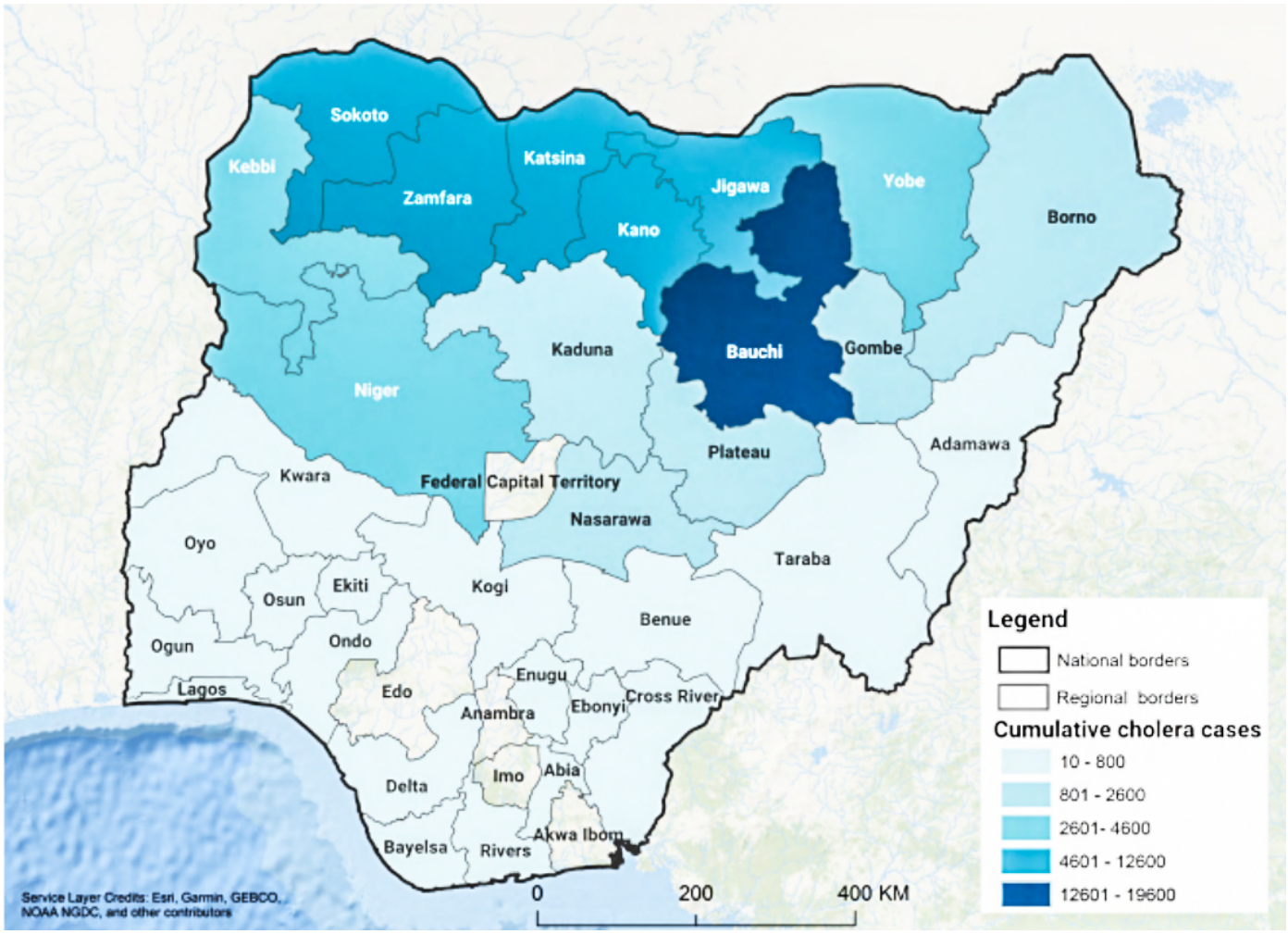
Nine of these eleven states are located in Nigeria's Northeast or Northwest region [15-20]. As a result of insecurity, these areas are now difficult to access and have inadequate water, hygiene, sanitary (WASH) infrastructure and health care services. Wells, reservoirs, pipelines, transformers, and other crucial infrastructure for the provision of basic social amenities were destroyed by the Boko haram rebels [21-23]. Likewise, the relocation of internally displaced persons (IDPs) and the absence of adequate sanitation services in overcrowded settlements resulted in the overflowing of latrine pits coupled with flash floods, which exacerbated the situation.

Hence making the victims vulnerable to cholera among other opportunistic diseases Six LGAs in Adamawa state, including Yola, are currently home to 135 cholera cases and 7 fatalities. As a result, there have been temporary population displacements and water contamination in the impacted areas. Yobe Statehas yet to formally declare a cholera outbreak despite having acute watery diarrhea cases. Over 12 LGAs, an estimated 1,300 people have been impacted [13, 14]. As priority is now being shifted towards security, a significant data concerning cholera outbreaks are limited and unavailable from most of the remote areas of Northeastern and Northwestern Nigeria, leading to underreporting. Bauchi, a Northern Nigerian State had the highest record of Cholera in Nigeria as at 2021 [9].Children: 28% of cholera cases are among children between 5-14 years old [24].

SIGN AND SYMPTOMS

Cholera is an extremely virulent disease that can cause severe acute watery diarrhoea. It takes between 12 hours and 5 days for a person to show symptoms after ingesting contaminated food or water [25].

Cholera affects both children and adults and can kill within hours if untreated. Most people infected with V. cholerae do not develop any symptoms, although the bacteria are present in their faeces for 1-10



days after infection and are shed back into the environment, potentially infecting other people. Among people who develop symptoms, the majority have mild or moderate symptoms, while a minority develop acute watery diarrhoea with severe dehydration [3,25].

Cholera-related diarrhea comes on suddenly and can quickly cause dangerous fluid loss as much as a quart (about 1 liter) an hour. Diarrhea due to cholera often has a pale, milky appearance that resembles water in which rice has been rinsed [26]. Vomiting occurs especially in the early stages of cholera and can last for hours.Dehydration can develop within hours after cholera symptoms start and range from mild to severe. A loss of 10% or more of body weight indicates severe dehydration [26].

RISK FACTORS OF CHOLERA

Type O blood:For reasons that aren't entirely clear, people with type O blood are twice as likely to develop cholera compared with people with other blood types [27].

Poor sanitary conditions:Cholera is more likely to flourish in situations where a sanitary environment and a safe water supply aredifficult to maintain. Such conditions are common inrefugee camps, impoverished countries, and areas afflicted by famine, war, or natural disasters [28]. Also, poor maintenance of artificial water sources, leading to water pollution was what led to the cholera outbreak that occurred in Gomani, Kwali LGA of the Federal Capital Territory [9].

Another study carried out in 2010 to determine the risk factors associated with the outbreak of cholera in a rural community in the northern region of Nigeria showed that infected persons, improper washing of hands after visiting the toilet and before meals were highly significant risk factors associated with the cholera infection [9].

Reduced or non-existent stomach acid: Cholera bacteria can't survive in an acidic environment, and ordinary stomach acid often serves as a defense against infection. But people with low levels of stomach acidsuch as children, older adults, and people who take antacids, H-2 blockers, or proton pump inhibitors- lack this protection, so they're at greater risk of cholera [29].

Although industrialized nations no longer have large-scale cholera outbreaks, eating shellfish from waters known to harbor the bacteria greatly increases your risk [9].

Armed conflict a mode of cholera transmission

Armed conflict acts as a direct or indirect catalyst in the transmission and exacerbation of infectious diseases [32]. Armed conflict was connected to a 3.6-fold increase in cholera outbreaks in Nigeria, and over the past two decades, the cholera disease outbreak attributable to conflict in Nigeria is 19.7% [33]. Boko Haram and bandit attacks often result in the tragic deaths of women, children, and the elderly, along with widespread kidnappings and rapes. These assaults also lead to significant destruction of homes and medical facilities [19]. Displaced by these attacks, many people are forced into hostile environments with inadequate shelter, poor access to water, sanitation, and hygiene (WASH), and insufficient healthcare, facilitating the spread of diseases like cholera, typhoid, and schistosomiasis [15].

Conflicts might worsen pre-existing vulnerabilities, making poverty worse and increasing the risk of cholera. Poverty has far-reaching implications and is a documented risk factor for illnesses like cholera [32].People living in areas impacted by protracted crises are at a higher risk of contracting communicable illnesses, particularly diarrhea, measles, and acute respiratory illnesses, due to the lack of access to drinkable water, filthy living conditions, overcrowding, and inadequate sewage systems [34, 35].

In addition, conflict-related displacement of people may result in the usage of water polluted with toxic Vibrio cholerae strains due to a lack of alternate water sources, causing cholera epidemics. Conflict-related relocation can make it difficult to get sanitation (such as toilet access or soap availability), making it easier for infectious diseases to spread quickly [36]. Medical staff and even patients often come under attack triggering fears.

The staff of humanitarian organizations may leave these places as their safety cannot be guaranteed. In this situation, health-response intervention by non-governmental organizations (NGOs) to control infectious diseases may be interrupted or withdrawn from these areas due to an inability to ensure the safety of their staff [33]. Vaccination is key to preventing infections. The output of armed conflict serves as one of the key barriers to preventing and eradicating vaccine-preventable diseases such as polio, pertussis, and measles. Insecurity concerns related to armed conflict affect vaccination energies in northern Nigeria, thwarting many children from receiving and/or impacting the immunization cycle [37].

TACKLING CHOLERA IN NIGERIA

Non-governmental organizations (NGOs) have existed in developing countries for more than four decades and have played vital roles in managing the spread of communicable diseases [38, 39]. The central area of concern for many NGOs involves improving healthcare systems and good governance [39]. which agrees with the government's primary responsibility at both state and national levels.

The Nigerian government supported the fight against cholera directly or indirectly through various government agencies and institutes. At the national level, Nigeria established the NCDC in 2007 to address the emerging outbreaks in the country. NCDC champions the forefront position in the prevention, control, and provision of laboratory facilities to combat the spread of contagious diseases, including cholera, in Nigeria.

The government strongly collaborates with the World Health Organization (WHO), the US CDC, and other organizations, providing and managing disease surveillance in the country and establishing reference laboratories [40].

Most recently, an epidemiological survey showed that out of the six geopolitical zones in Nigeria, the Northeast and Northwest have higher fatality rates [41], requiring urgent government and NGO intervention. To end cholera's etiology, the Nigerian government paid much attention to providing a safe drinking water supply and sensitization on personal hygiene and sanitation practices [42]. The role of NGOs in tackling cholera cannot be overemphasized.

They provide essential information to the government on the incidence of many infectious diseases in Nigeria. For example, during the 2015 cholera outbreak in two Internally Displaced Persons (IDP) camps in the Northeastern region, they (NGOs) immediately notified the Borno State government of the incidence of 30 suspected diarrheacases and seven deaths, which led to the recruitment of 6 Nigeria Field Epidemiology and Laboratory Training Program (NFELTP) residents to investigate the matter properly [38].

In the Northwest, Kano is considered one of the most endemic regions with cholera cases resurfacing annually. Due to this, successive Federal and state governments have continued to provide good quality water supply and intervene in public health hygiene and sanitation to end the disease. Despite NGOs' and governments' involvement in tackling the cholera outbreak in the Northwest, the hotspot areas in Kano State were not fully identified [43]. In line with WHO directives to identify small hotspot areas ravaged by cholera, Nigeria established the "National Strategic Plan of Action on Cholera Control (NSPCC)" to identify and administer the vaccine in such affected areas [43].

This has led to the successful vaccination of about 710,212 people in Bauchi State. To sustain the fight against cholera, the "National Cholera Emergency Operations Center (EOC)" was reinvigorated in 2021, leading to massive support by the rapid response teams in the hotspot areas in the Northwest (Kaduna and Kano), Northeast (Bauchi), and Northcentral (Plateau and Benue) regions. In Borno State, the EOC improved the coordination, management, and distribution of oral cholera vaccine in IDP camps and monitored Cholera incidence daily [11, 43].

POLICIES AND STRATEGIC CONTROL ANALYSIS

The World Health Organization's plans to prevent and control cholera have seen a multifaceted approach being utilized. This is seen as a combination of surveillance, water, sanitation and hygiene, social mobilization, treatment, and oral cholera vaccination approaches [45].

Also, WHO, through its Global Task Force on Cholera Control (GTFCC) initiation in 2014, seeks to control cholera by promoting the creation and implementation of global strategies to aid capacity development, providing a platform for technical exchange, coordination, and cooperation of cholera related activities to prevent and control cholera, support countries for implementing effective control strategies, supporting research development, and increasing information dissemination of cholera as a public health problem [45].

WHO also launched a global roadmap strategy to end cholera, predicting a 90% reduction in cholera deaths by 2030.Following a spike in the amount of cholera outbreaks, the National Cholera Emergency Operations Center (EOC) was activated on the 22nd day of June 2021. This center was hosted at NDC and included the Federal Ministry of Environment and Water Resources, the World Health Organization, the National Primary Health Care Development Agency (NPHCDA), and other partners [8]. Rapid responses were supplied to support most of the affected areas and a reactive oral cholera vaccine campaign led by the NPHCDA was conducted in Bauchi state. This could, however, yield only minimal results as it was reported that none of these medical interventions could solve all the underlying issues about the outbreaks of cholera.

This is because cholera is a waterborne disease and there is a higher risk of transmission when sanitation is improper and poor, and the flow of clean water supply is disrupted. NCDC gathered that national response strategies to cholera outbreak are being hampered by challenges such as lack of funds, difficulty in accessing some communities due to security concerns, poor logistics and inadequate manpower to carry out community awareness and health education, open defecation, lack of portable drinking water in some rural areas, inadequate vaccines to cover all LGAs, inadequate health facility infrastructure, inadequate trained manpower for cholera outbreak detection, investigation and management, and inconsistent reporting from states [44].

CONTROL MEASURES

The use of culture-based diagnostic techniques is constrained in many cholera-prone areas in northeastern Nigeria due to low or inappropriate laboratory capacity, unstable security circumstances, limitations on movement, lack of necessary resources, the high population in the camps, and insufficient funding for the humanitarian response plans and WASH [46]. In many cholera-prone areas, inadequate or insufficient laboratory capacity limits the use of culture-based diagnostic procedures.

This limitation is caused by problems with personnel management, a death of qualified laboratory staff, a scarcity of laboratory supplies, challenges with sample transportation and storage, and faulty reporting. The response, the flow of necessary supplies, the inability to preposition supplies, and the lack of resources required to manage cholera and obtain delivery supplies promptly, are all impacted by access issues brought on by ongoing insecurity in affected and vulnerable areas. These issues have an impact on preparedness, mitigation, and case management.

Control of cholera outbreaks requires effective surveillance and response systems which are often sub-optimal in developing countries and therefore this study accentuates the need for an effective surveillance system with the capacity to appropriately detect and contain cholera outbreaks timely [7].

The long-term solution for cholera control lies in economic development through universal access to safe drinking water and adequate sanitation [7, 47]. The crucial cholera epidemic preventive mechanism remains providing a waste management system that separates waste from the water supply [7]. Oral cholera vaccines (OCV) which are an additional efficient tool to control cholera outbreaks are yet uncommonly used in Nigeria [48]. OCVs though not a replacement for conventional control measures like portal safe water and personal hygiene, could serve as a complementary measure [7].

CONCLUSION

Overall, the results continue to support the idea that the greatest way to lessen the effects of this condition is to support people's ability to maintain general health and the roles that they play as individuals. Cholera outbreak was contained by implementing health education about proper hand hygiene and chlorinating water. Long-term sustainability measures to prevent future outbreaks include the rehabilitation of existing boreholes, the construction of standard pit latrines, and the establishment of proper waste disposal systems.

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