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Emergency Preparedness for Waterborne Diseases in the Wake of Floods in Northern Cameroon: A Call for Immediate Action

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ABSTRACT

Severe flooding in Northern Regions of Cameroon (Far North, North and Adamawa Regions), triggered by torrential rains, has led to widespread displacement, destruction of infrastructure, and significant disruptions in essential services, particularly water, sanitation, and healthcare. This article, issued by public health researchers from Science For Life Foundation and Pinnacle University Institute, highlights the heightened risk of waterborne diseases following the recent floods and underscores the urgent need for enhanced emergency preparedness and response measures. Floods create conditions conducive to the spread of diseases such as cholera, typhoid fever, dysentery, and viral hepatitis by contaminating drinking water supplies with sewage and waste. Vulnerable populations, including children, pregnant women, the elderly, and those with pre-existing health conditions, are at increased risk. Overcrowding in temporary shelters further exacerbates the potential for disease outbreaks. The impact of climate change is intensifying the frequency and severity of such flooding events, making timely and effective intervention critical. This article reviews best practices for preventing and mitigating waterborne disease outbreaks, offering guidance to government authorities, health agencies, humanitarian organizations, and local communities. It aims to catalyze immediate action to safeguard public health and prevent a major crisis in the aftermath of the flooding.

Keywords: Waterborne Diseases, Flooding, Emergency Preparedness.

INTRODUCTION

Flooding is one of the most devastating natural disasters, affecting millions of people globally each year [1]. The Northern Regions of Cameroon (Far North, North and Adamawa Regions) has recently experienced severe flooding due to heavy torrential rains, resulting in widespread displacement, destruction of property, and significant disruption of basic services such as water, sanitation, and healthcare [2]. In regions like Northern Cameroon, where infrastructure is already fragile, such disasters can have long-lasting and severe consequences on public health [3].

Floods create an ideal environment for the spread of waterborne diseases, which are transmitted through the ingestion of

contaminated water or food. The sudden and extensive mixing of sewage, waste, and floodwaters increases the risk of contamination of drinking water supplies [1]. In the aftermath of flooding, access to clean and safe water becomes limited, and affected populations are often forced to rely on unsafe sources of water for drinking, cooking, and hygiene, heightening the risk of disease transmission [3].

The most vulnerable groups-children, pregnant women, the elderly, and those with pre-existing health conditions-are at the greatest risk of contracting waterborne diseases [2]. Furthermore, displacement to temporary shelters, where overcrowding, poor hygiene, and inadequate sanitation facilities prevail, significantly elevates the potential for disease outbreaks [3]. The recent floods in Northern Cameroon have resulted in conditions that are ripe for the spread of diseases such as cholera, typhoid fever, dysentery, and viral hepatitis, which have historically affected the region following similar natural disasters [1].

While flooding is a recurrent issue in Northern Cameroon, the ongoing impact of climate change is exacerbating the frequency and severity of such events [2]. Increased rainfall, poor land management, and deforestation have contributed to the worsening flood risk, making emergency preparedness for waterborne diseases more critical than ever [1].

This alert, issued by Science For Life Foundation and Pinnacle University Institute, aims to raise awareness regarding the heightened risk of waterborne disease outbreaks following the floods in Northern Cameroon. It calls for urgent action to strengthen emergency preparedness and response measures. By highlighting the risks posed by waterborne diseases and reviewing best practices for prevention and mitigation, this article seeks to guide government authorities, health agencies, humanitarian organizations, and local communities in implementing effective interventions that can prevent a major public health crisis.

2. MATERIALS AND METHODS

A literature search was conducted across databases like PubMed, Google Scholar, Scopus, and Web of Science for studies published from 2000 to 2024. Search terms included flooding, public health, waterborne diseases, and emergency response. Grey literature from WHO, CDC, and other organizations was also reviewed.

The inclusion criteria focused on studies that discussed the health impacts of flooding and waterborne disease outbreaks. Studies without original data or relevance were excluded. Data were extracted on publication details, health outcomes, and emergency responses. A narrative synthesis organized findings into three major themes: public health impacts, disease outbreaks, and response strategies. Study quality was assessed using the Joanna Briggs Institute (JBI) tool [4], ensuring a rigorous review process.

3. WATERBORNE DISEASES ASSOCIATED WITH FLOODS

Floods significantly increase the risk of waterborne diseases due to the contamination of water sources and disruption of sanitation systems. The mixing of floodwaters with sewage and other pollutants often results in the widespread contamination of drinking water supplies. This section outlines the key waterborne diseases that are commonly associated with floods and their implications for public health.

3.1 Cholera

Cholera is an acute diarrheal disease caused by the bacterium Vibrio cholerae. It is often associated with contaminated drinking water and can lead to severe dehydration and death if not treated promptly. Flooding can exacerbate the spread of cholera by contaminating water sources and creating unsanitary conditions that facilitate the

transmission of the bacteria. Historical data shows that cholera outbreaks frequently follow floods in regions with poor water and sanitation infrastructure, such as in Bangladesh and Haiti. In Northern Cameroon, the recent floods have heightened the risk of a cholera outbreak, given the significant disruption of water and sanitation services [5].

3.2. Typhoid Fever

Typhoid fever is caused by the bacterium Salmonella typhi and is transmitted through contaminated water or food. The disease is characterized by prolonged fever, weakness, and abdominal pain. Flooding can lead to the contamination of water supplies with Salmonella typhi, increasing the risk of typhoid fever outbreaks. Previous studies have demonstrated a correlation between flooding and increased incidence of typhoid fever, especially in areas with inadequate sanitation and hygiene practices [6]. In Northern Cameroon, the flood-induced contamination of water sources poses a significant risk for typhoid fever, particularly in displaced populations living in overcrowded and unsanitary conditions [7].

3.3. Dysentery

Dysentery, including both bacillary dysentery (caused by Shigella species) and amoebic dysentery (caused by Entamoeba histolytica), is characterized by severe diarrhea with blood and mucus. The risk of dysentery increases during and after floods due to the spread of fecal matter and pathogens in contaminated water. Flooding often overwhelms sanitation systems, leading to the release of fecal contaminants into drinking water supplies [7]. The recent flooding in Northern Cameroon has created conditions conducive to the spread of dysentery, given the high likelihood of contaminated water sources and inadequate sanitation facilities [1].

3.5. Viral Hepatitis

Viral hepatitis, including hepatitis A and E, is another waterborne disease that can spread through contaminated water. Hepatitis A is caused by the hepatitis A virus (HAV), while hepatitis E is caused by the hepatitis E virus (HEV). Both viruses can cause liver inflammation and are transmitted through ingestion of contaminated food and water. Flooding can increase the risk of hepatitis outbreaks by contaminating water supplies with fecal matter, which is a common transmission route for both HAV and HEV [6]. The floods in Northern Cameroon are likely to heighten the risk of viral hepatitis due to the widespread contamination of water sources [7].

3.6. Leptospirosis

Leptospirosis is a bacterial infection caused by Leptospira species, transmitted through contact with water contaminated by animal urine. Flooding can increase the risk of leptospirosis by causing the overflow of sewage and contaminated water, which can come into contact with human skin or be ingested accidentally. This disease can lead to severe illness, including liver damage, kidney failure, and even death if not treated promptly [5]. The recent flooding in Northern Cameroon could potentially enhance the risk of leptospirosis, particularly in areas where people come into contact with contaminated floodwaters [4].

4. RISK FACTORS IN THE NORTHERN REGIONS OF CAMEROON

The recent severe flooding in the Northern Regions of Cameroon has exposed several risk factors that exacerbate the potential for waterborne disease outbreaks. Understanding these risk factors is crucial for developing effective emergency response strategies and mitigating public health risks. This section outlines the primary risk factors contributing to the heightened vulnerability to waterborne diseases in the affected region.

4.1 Poor Sanitation and Hygiene Infrastructure

One of the major risk factors in the Northern Regions of Cameroon is the inadequate sanitation and hygiene infrastructure. Floods often overwhelm existing sanitation

systems, leading to the contamination of water sources with fecal matter and other pollutants. In many areas, sanitation facilities are either non-existent or insufficiently maintained, which exacerbates the risk of disease transmission. For instance, in rural and semi-urban areas, pit latrines and septic tanks are frequently compromised by floodwaters, leading to widespread environmental contamination [9].

4.2 Limited Access to Safe Drinking Water

The flooding has severely impacted the availability and accessibility of safe drinking water in the northern region. Many water sources have been contaminated with floodwaters, and the destruction of water treatment facilities has further exacerbated the problem. The reliance on unsafe water sources, such as open wells and surface water, increases the risk of contracting waterborne diseases. In many flood-affected communities, emergency water supply interventions are inadequate or slow to deploy, leaving populations vulnerable to waterborne pathogens [10].

4.3 Overcrowding in Temporary Shelters

The displacement of individuals and families due to flooding has led to overcrowding in temporary shelters. These shelters often lack adequate sanitation facilities and are susceptible to poor hygiene practices, which can facilitate the spread of waterborne diseases. Overcrowding increases the risk of person-to-person transmission of diseases and creates challenges in maintaining effective sanitation and hygiene. The conditions in these shelters are often ideal for the spread of diseases such as cholera and dysentery, as noted in similar situations in past flood events [10].

4.4 High Prevalence of Malnutrition

Malnutrition is another critical risk factor that compounds the impact of flooding on public health. Malnourished individuals, particularly children and pregnant women, have weakened immune systems that make them more susceptible to infections, including waterborne diseases. The flooding has disrupted food supplies and agricultural activities, exacerbating existing food insecurity and malnutrition issues. Inadequate nutrition not only increases vulnerability to disease but also hinders recovery efforts and the effectiveness of medical treatments [11].

4.5 Limited Health Care Access

The floods have disrupted healthcare services in the Northern Regions, with many health facilities either damaged or rendered non-operational. The lack of access to healthcare services impedes the timely diagnosis and treatment of waterborne diseases, leading to increased morbidity and mortality. Emergency health interventions are often limited by logistical challenges, including damaged infrastructure and shortages of medical supplies and personnel [9].

4.6 Climate Change and Increased Flooding Frequency

Climate change is contributing to an increase in the frequency and intensity of flooding events in the Northern Regions of Cameroon. Rising temperatures and altered precipitation patterns are leading to more frequent and severe rainfall, which exacerbates flood risks and complicates disaster preparedness and response efforts [5]. The ongoing impact of climate change necessitates improved strategies for flood risk management and adaptation to protect vulnerable populations [9].

5. EMERGENCY PREPAREDNESS AND RESPONSE MEASURES

Effective emergency preparedness and response are crucial for minimizing the impact of waterborne diseases during and after floods. In the Northern Regions of Cameroon, where recent floods have created a heightened risk for such diseases, timely and coordinated interventions can significantly reduce morbidity and mortality. This section outlines key strategies and measures for emergency preparedness and response to waterborne disease outbreaks.

5.1 Rapid Assessment and Surveillance

Conducting rapid assessments and establishing robust surveillance systems are essential first steps in managing flood-related health risks. Rapid assessments help identify the immediate needs of affected populations, including water and sanitation requirements, and evaluate the extent of damage to infrastructure [11]. Surveillance systems should monitor disease incidence and track potential outbreaks to facilitate early detection and response [13].

5.2 Provision of Safe Drinking Water

Ensuring access to safe drinking water is a priority in flood-affected areas. Emergency interventions should include the provision of clean water through methods such as chlorination, distribution of bottled water, and establishment of temporary water purification facilities [14]. Additionally, efforts to repair and rehabilitate damaged water treatment plants and infrastructure should be expedited to restore long-term water supply [15].

5.3 Improvement of Sanitation and Hygiene

Improving sanitation and hygiene practices is critical for preventing the spread of waterborne diseases. Emergency response efforts should include the distribution of hygiene kits, which contain essential items such as soap, sanitary supplies, and disinfectants [13]. The construction of temporary latrines and waste disposal facilities can also help mitigate the risk of disease transmission [12].

5.4 Health Education and Community Engagement

Health education and community engagement are vital components of emergency preparedness and response. Educating affected populations about proper hygiene practices, safe water usage, and the signs and symptoms of waterborne diseases can help reduce the risk of infection [14]. Engaging local communities in response efforts, including the training of community health workers, can enhance the effectiveness of interventions [15].

5.5 Coordination of Health Services

Coordinating health services is essential for an effective response to waterborne disease outbreaks. Collaboration between government agencies, non-governmental organizations, and international partners can ensure a comprehensive and efficient response [12]. Coordination efforts should focus on addressing gaps in healthcare delivery, ensuring the availability of medical supplies, and providing support to healthcare facilities [13].

5.6 Monitoring and Evaluation

Ongoing monitoring and evaluation of emergency response activities are important for assessing their effectiveness and making necessary adjustments. Monitoring should include tracking disease trends, evaluating the coverage and impact of interventions, and identifying areas for improvement [14]. Regular reporting and feedback mechanisms can help ensure that response efforts are responsive to evolving needs [14].

5.7 Long-Term Recovery and Resilience Building

In addition to immediate response measures, long-term recovery and resilience building are crucial for reducing future risks. Efforts should focus on rebuilding and strengthening infrastructure, improving water and sanitation systems, and enhancing community preparedness for future disasters [12]. Addressing underlying vulnerabilities, such as poverty and malnutrition, can also contribute to greater resilience against future flood events [13].

6. CONCLUSION

The floods in Northern Cameroon have created conditions ripe for outbreaks of waterborne diseases, posing an immediate public health threat. Without swift and coordinated action, diseases like cholera, typhoid, and dysentery could spread rapidly, causing significant morbidity and mortality. This review emphasizes the need for robust emergency preparedness plans, enhanced surveillance, and prompt response measures to mitigate the risks of waterborne diseases in flood-affected areas. Collaboration

between government authorities, humanitarian organizations, and local communities is essential to prevent further health crises. Long-term investments in water and sanitation infrastructure and climate change adaptation are also critical to building resilience against future floods.

By raising awareness of the urgency of this situation, we can foster a proactive approach to emergency preparedness and prevent a full-scale health disaster. The time to act is now.

Declaration by Authors

Ethical Approval: As this article is a systematic review of previously published studies, no new data collection involving human or animal subjects was conducted. Therefore, formal ethical approval was not required. All studies included in the review were assumed to have followed ethical standards as per their original research protocols.

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