

**HEPATITIS-E OUTBREAK IN CHAD: A PUBLIC HEALTH CRISIS AMIDST
REFUGEE INFLUX FROM SUDAN**

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ABSTRACT

Since April 2023, Chad's Ouaddai region, which borders war-torn Sudan, has experienced a humanitarian crisis as a result of the entry of over 720,000 Sudanese refugees, the majority of whom are women and children, with over 445,000 settling in Ouaddai alone. The congested refugee camps, with inadequate sanitation and limited health services, have resulted in a massive Hepatitis E outbreak, with 2,092 suspected cases documented by April 2024, 95% of which are in refugee camps. The disease, which is mostly transmitted by polluted water and poor hygiene, has hit hardest in regions like the Adré and Aboutengué camps. WHO, MSF, UNICEF, and others prioritize infection control, WASH (Water, Sanitation, and Hygiene) measures, and medical assistance. Improving water quality, particularly through chlorination to WHO guidelines (0.5 mg/L FRC), is critical for reducing the ongoing illness load.

KEYWORDS: Chad; Hepatitis E; Disease; Refugees; Public health.

INTRODUCTION

Eastern Chad province Ouaddai shares a border with the war-torn Sudan. The migration of Sudanese refugees and Chad returnees from Sudan, containing a high number of women and children, to Ouaddai since April 2023 has created a humanitarian crisis. The spread of disease in such areas of conflict and migration adds fuel to the fire. The heavy influx of people into Chad territory has outgrown the available facilities (accommodation, sanitation, and health) for the refugees.^[1]

As of December 2024, Chad is hosting over 720,000 Sudanese refugees, making it the largest host country for Sudanese refugees globally. This influx began in April 2023 due to escalating violence in Sudan. The majority of these refugees have settled in the eastern provinces of Ouaddai, Sila, Wadi Fira, and Ennedi Est. Notably, Ouaddai province alone hosts over 445,000 refugees, with Sila and Wadi Fira each accommodating more than 90,000 individuals. Approximately 88% of the refugees are women and children, many of whom have experienced severe trauma and lack access to basic

services such as healthcare, education, and adequate shelter.^[2]

On 5th March 2024, Chad IHR (*International Health Regulation*) reported an outbreak of hepatitis E in the Ouaddai province. From the start of the year 2024 till 28th April, a total of 2092 suspected cases of hepatitis E were reported in the province, and a whopping majority, i.e., 95% of the cases, were reported to be from the refugee settlements.^[3]

Disease burden

According to the CDC (Center for Disease Control and Prevention), Hepatitis E has a worldwide endemicity. Approximately 20 million cases of Hepatitis E are reported worldwide annually and around 70,000 are reported due to HEV. In spite of the worldwide endemicity, large outbreaks of Hepatitis E have been reported in Africa, Central America, South and Central Asia, and tropical East Asia occurring mostly amidst a humanitarian crisis. Waterborne outbreaks are a major cause of outbreaks in refugee camps.^[4]

Chad previously had an urban Hepatitis E outbreak in 2017 in which more than 1800 suspected cases were reported, while 23 deaths were reported.

The 2021 outbreak was of lesser significance, with 380-plus cases and 2 deaths.

The current outbreak has affected more than 2000 patients and is bigger than the previous ones due to the dynamic situation of the war refugees from Sudan.

46% of the cases have been reported from the Adré health district in the Lycée d'Adré site, while 25.4% of the cases arise from the Aboutengué camp, but whether this contains acutely jaundiced patients solely due to HEV is yet to be determined.^[3]

Causes

Hepatitis E virus transmission routes are as follows: fecal-oral route (most prevalent), Person-to-person Contact, Zoonotic sources (donkeys, pigs, etc.), Sexual Contact/Transfusion (although evidence supports this mode of transmission only in Japan and Europe), Vertical transmission (one Egyptian study available in which 5 neonates of 9 mothers were infected).^{[5][6]}

HEV can cause acute fulminant hepatitis on its own or as a super-infection in existing HBV patients (rarely documented in the US but significantly documented in Africa).^[7]

Although the most prevalent route in humanitarian areas is contaminated water and untreated sewage (fecal-oral route). Person-to-person transmission cannot be ruled out as a cause of an outbreak, as statistics from prior studies indicate that in addition to spread through common water sources, a significant amount of interpersonal spread was detected in HEV outbreaks in Chad. Since both these factors are prevalent in the refugee camps (due to overcrowding of camps and unavailability of safe water and sanitary conditions), both are considered to be the driving force of the current outbreak.^[6]

Efforts

Poor sanitary conditions, contaminated water sources, overcrowded camps, and limited hygiene services are some of the factors responsible for the outbreak and possibly the loss of savable lives. Eradicating the risk factors is of major importance to limit the spread. To curb the aforementioned issues, a collective effort of multiple organizations such as WHO (World Health Organization), MSF Switzerland (*Médecins Sans Frontières*), UNICEF (United Nations Children's Fund), UNHCR (United Nations High Commissioner for Refugees), and WFP (World Food Programme) is underway. These efforts are directed towards case confirmation and management, infection prevention and control (IPC), and Water, Sanitation and Hygiene (WASH).^[1] MSF is currently working in coordination with the Ministry of Public Health Chad to provide

medical facilities to the refugees in the health camps and transit sites.^[8]

Construction of boreholes and sanitary latrines has been initiated along with the emptying of fecal sludge with the help of WASH program partners.

Furthermore, the need for adequate vaccination facilities for the migrants is currently being assessed.

CONCLUSION AND RECOMMENDATIONS

Chlorination of the available water resources to an FRC (*Free Residual Chlorine*) level of 0.5 mg/L may provide us with contamination-free water as it is the cut-off value used by WHO guidelines for water disinfection. Achieving this may decrease the disease burden, as the untreated/contaminated water will continue to be an active source of viral transmission for the foreseeable future.^[9]

Treatment and disposal of human excreta is also an important step in blocking the other end of the spectrum of feco-oral transmission. Although difficult to achieve in refugee camps with limited facilities, its importance should not be undermined, and through international cooperation of government and non-government organizations, better facilities may be provided. Achieving this can potentially curb the HEV disease burden and also decrease the spread of other feco-oral transmitted diseases such as cholera.^[10]

Adequate isolation of suspected HEV cases from the rest of the refugees and local inhabitants to limit person-to-person spread of the disease can prove to be beneficial, as there is strong evidence of human-to-human spread without a common water source.^[6]

Massive vaccination drives in the refugee camps and also the surrounding areas of the camps can play a vital role in developing immunity among the refugees and especially the locals as well, to prevent the disease from spreading outside the refugee facilities.^[8] Boiling and frying of water and other edibles at above 90 degrees centigrade and washing vegetables with chlorinated solutions wherever available may be put in place.^{[9][10]}

Global outreach programs can be launched to identify and highlight the risk of increasing disease burden, and to promote collaborative efforts to limit disease spread.

Establishment of refugee camps with better facilities for water and sewage treatment, along with upgrading existing camps' sanitary conditions can cap the waterborne spread of the disease. Increasing the number of refugee camps by efficiently utilizing the resources so that overcrowding may be avoided. This in turn can limit person-to-person spread, thus resulting in decreasing the endemic disease burden.^[6]

Pregnant women are at the highest risk of developing acute fulminating hepatic failure, and hence application of triage may be necessary, as pivoting on timely detection of the virus in pregnant women and adequate treatment may save patients from disease and impending death.^[5]

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IHR: International Health Regulation

HEV: Hepatitis E virus

MSF: Médecins Sans Frontières, also known as Doctors Without Borders

FRC: Free Residual Chlorine

WHO: World Health Organization

UNICEF: United Nations Children's Fund

UNHCR: United Nations High Commissioner for Refugees

WFP: World Food Programme

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