



Contents lists available at ScienceDirect

Annals of Hepatology

journal homepage: [www.elsevier.es/annalsofhepatology](http://www.elsevier.es/annalsofhepatology)

## Opinions

## Alarming increase of acute liver failure during Sudan's conflict: a call for urgent global hepatology response

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## ARTICLE INFO

## Keywords:

Humanitarian medicine

Armed conflict

Epidemics

Hepatology

## 1. Introduction

Q2 Sudan is currently suffering the world's largest humanitarian crisis, with over 11 million people displaced [1]. The conflict has directly targeted healthcare, leading to over 519 attacks, and the killing of 119 health care workers [2]. These disruptions in healthcare delivery, alongside the vulnerable state of the population, have fueled frequent outbreaks of infectious diseases such as cholera, measles, and dengue fever [3]. Within this deteriorating healthcare landscape, a previously undocumented wave of acute hepatitis has been observed across different regions in Gezira State, with a concerning number progressing to acute liver failure.

According to recent World Health Organization (WHO) situation reports and United Nations Population Fund (UNFPA) (August 2025), Sudan remains in the grip of one of the world's largest displacement crises, with 9.8 million people internally displaced. Across conflict-affected regions, over 80% of health facilities are non-functional, raising the risk of malnutrition and heightened threats of disease outbreak such as hepatitis [4].

## 2. Observation from the field

The clinical observation and laboratory data between March and July 2025 have documented nearly 500 cases of acute hepatitis across Gezira State. Of these, 15–20% progressed to acute liver failure. This number is believed to be underestimated as several patients reported that other household members and community residents exhibited similar presentations without seeking medical care. This wave emerged across various regions in Gezira State, affecting a wide range of demographics. The cases have been

reported in both genders, with different ages and socioeconomic levels. Most of the cases followed a self-limiting course; however, a significant proportion developed acute liver failure with a very high mortality rate. These numbers have been supported by field notes and informal communication among regional medical doctors at Wad Medani Teaching Hospital. Preliminary clinical data indicate consistent presentation of jaundice, nausea, vomiting, and right hypochondrial pain. While many cases follow a self-limiting course within weeks, without progression, a concerning proportion have developed severe coagulopathy, jaundice, and encephalopathy, fulfilling the diagnostic criteria of acute liver failure. Marked elevated liver enzymes exceeding 1000 IU/L, high total bilirubin exceeding 8 mg/dl and severe coagulopathy with INR above 5 were observed in this wave. These severe presentations were associated with a high fatality rate.

## 3. Possible sources for the infection

Cases appear to be more prevalent in communities where the inhabitants have been displaced due to the ongoing conflict, suggesting a possible link with poor sanitation, contaminated water and environmental sources; these factors seem to play a vital role in the spread of infection. Multiple hypotheses have been proposed to explain the spread of this acute hepatitis wave. While the lack of case reporting and laboratory-confirmed data has hindered the possible etiology, the distribution of cases pointed toward infectious or environmental sources that warrant local and international concern. The data from affected patients pointed toward possible consumption of contaminated water during displacement or siege suggesting a likely environmental source. Aside from environmental factors, an undetected strain of microbe is another possible explanation. Population movement coupled with crowding and lack of immunization, timely management and adequate nutrition are all factors that can explain the emergence of new strains.

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<https://doi.org/10.1016/j.aohep.2025.102167>

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## 4. Barriers to investigations

With the continuation of Sudan's conflict, the efforts to investigate the exact cause of this outbreak are severely constricted. In addition, the collapse of health infrastructure, challenges in field data collection, and lack of laboratory capacity have delayed the healthcare system response. Standard serological tests for common hepatotropic viruses (HAV/HBV/HCV/HDV) using both IgM/IgG serology as well as rapid ICT-based and ELISA methods all yielded negative results. The consistent negativity of these results raised concerns about a possible undetected or unrecognized pathogen or environmental exposure or HEV infection. Furthermore, the possibility of ischemic hepatitis in the context of hypovolemia and severe malnutrition as well as toxic hepatitis from contaminated industrial exposure must be considered. Unfortunately, liver biopsy, post-mortem examination and toxicology screening were not available.

Historically, outbreak response mechanisms organized by WHO-EMRO and Médecins Sans Frontières (MSF) have supported outbreak surveillance in conflict-related regions, such as measles outbreaks. However, in central Sudan, these surveillance efforts have been severely hindered by insecurity and disruptions in communication networks.

## 5. Public health implications

This hepatitis demands urgent public health recognition and action. The outbreak not only reflects the consequences of disrupted healthcare systems and displacement but also signals the failure of early warning and disease surveillance mechanisms. This situation demands global recognition and immediate integration into humanitarian response planning, as it highlights how emerging health crises in conflict-related zones can escalate rapidly under a nearly collapsed healthcare system. Without decisive action; this outbreak could spread to broader local and regional zones, particularly if infectious, environmental or toxic sources remain uninvestigated.

## 6. Conclusions

Sudan's humanitarian crisis has accelerated infectious disease outbreaks, including a concerning wave of acute hepatitis with high fatality rates. The unknown etiology coupled with collapsed healthcare systems demands urgent investigation. Strengthened surveillance, improved diagnostics, and urgent international support are critical to contain this outbreak and prevent further loss of life. Decisive action is needed to address this emerging public health threat and the broader collapse of Sudan's health system. Most critically, this outbreak underscores the urgent need for sustained global investment in conflict-related zones, where emerging health threats are often neglected until it is too late. We urge hepatology societies including the European Association for the Study of the Liver (EASL), Asia-Pacific Association for the Study of the Liver (APASL), and American Association for the Study of Liver Diseases (AASLD) to support disease surveillance, investigations, and resource mobilization for the emerging current outbreak.

## 6.1. Action plan

Provide emergency support for a wide range of investigations, including toxicology testing.

Deployment of mobile diagnostic units for hepatitis testing, and establishment of emergency vaccination drives coordinated by WHO and Non-governmental organizations (NGOs).

Deploy a response team led by WHO and international humanitarian organizations to conduct field investigation in Gezira State.

Implement a simplified reporting system for all suspected hepatitis and acute liver failure cases.

Urgently assess environmental water sources for contamination and provide emergency water purification and sanitation interventions to limit environmental exposure.

Call for support from global institutions to fund etiologic research and emergency relief. Advocate for Sudan's inclusion in international early warning systems for future liver-related or post-conflict syndemics.

Engage the global hepatology societies such as EASL, APASL and AASLD to provide financial and technical support.

## Author contribution

M.A.D conceptualized the manuscript idea, both M.A.D and M.M contributed to manuscript writing. M.A.D is responsible for the integrity of the work as a whole.

## Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used Gemini in order to improve readability. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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