

Hemorrhagic Dengue Epidemic In The Legal Amazon: Public Health Challenges

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Introduction

Hemorrhagic dengue, a severe and potentially fatal form of dengue, poses a serious public health challenge in tropical regions such as the Legal Amazon, where climatic, socio-economic, and environmental factors favor the proliferation of *Aedes aegypti*. This study aims to analyze the epidemiological progression of the disease in the region, supporting more effective public policies for its prevention and control.

The high incidence of hemorrhagic dengue in the Legal Amazon underscores the urgency of strategies to combat it, given its burden on healthcare systems and high social and financial costs. This study seeks to map the spatiotemporal patterns of the disease and relate them to epidemiological surveillance, vector control, and medical care measures.

The methodology involved a literature review in the Scielo database using the term "hemorrhagic dengue." Articles published between 2000 and 2023 were analyzed, with 12 selected based on criteria such as publication in Portuguese, national or regional scope, and focus on hemorrhagic dengue.

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For complementary analysis, epidemiological bulletins from states with the highest disease incidence were used (Epidemiological Bulletins Portal of the Ministry of Health) for the years 2020, 2021, 2022, and 2024.

2. Dissemination and Epidemiological Analysis of Hemorrhagic Dengue in the Legal Amazon

The spread of hemorrhagic dengue in the Legal Amazon reflects the complexity of structural, climatic, and socioeconomic factors that perpetuate regional vulnerability to *Aedes aegypti*, the primary vector of the disease. Studies by Mourão et al. (2004) and Luna de Oliveira et al. (2009) indicate that unregulated urbanization, inadequate sanitation, and improper water storage are critical elements exacerbating mosquito proliferation, particularly in the outskirts of cities such as Manaus and Belém.

Recent data from Epidemiological Bulletins (2020–2024) reinforce this analysis, highlighting seasonal incidence peaks between November and May, driven by high temperatures (25°C to 32°C) and elevated humidity. In 2022, for instance, 72,310 confirmed cases were reported, with 1,520 progressing to severe forms. The simultaneous circulation of serotypes such as DENV-1 and DENV-2 has intensified the risk of immune system amplification and complications, particularly among vulnerable populations like children and the elderly. Pará and Maranhão accounted for 34% of reported cases, underscoring structural challenges such as inadequate sanitation and limited access to healthcare services.

Hyperendemicity, marked by the introduction of new serotypes like DENV-3, also plays a significant role. Rocha and Taail (2009) reported that during outbreaks in Manaus, severe cases tripled within a single year due to the circulation of multiple serotypes. While advancements in clinical management,

such as early detection of severe symptoms, have contributed to a slight reduction in the mortality rate to 2.8% in 2024, vaccine coverage remains low, reaching only 12% of the target population by 2023.

Additionally, only 18% of educational campaigns have reached rural and Indigenous communities, which make up 22% of the local population. Misinformation about early symptoms and delayed healthcare seeking exacerbate the situation, while 62% of health facilities remain unable to handle severe cases due to a lack of infrastructure and trained professionals.

The persistence of hemorrhagic dengue in the Legal Amazon underscores the need for integrated and intersectoral actions. Barreto and Teixeira (2008) emphasize the importance of strategies that combine public health, sanitation, and education to reduce incidence and mortality rates. Mourão et al. (2004) further highlight the urgency of targeted campaigns in rural and Indigenous areas, which are often overlooked. Investments in research, including vaccine development and innovative vector control methods, are essential for addressing the issue in a sustainable and comprehensive manner.

This scenario reinforces that combating hemorrhagic dengue requires continuous and effective public policies, including the expansion of primary healthcare, the strengthening of epidemiological surveillance, and the promotion of community engagement in vector control. Only through an integrated approach will it be possible to mitigate the disease's impact and improve health conditions in the Legal Amazon.

3. Final Considerations

Hemorrhagic dengue in the Legal Amazon faces complex challenges linked to socioeconomic, environmental, and structural factors. Data from 2022 and 2023 highlight the region's

hyperendemicity, with multiple serotypes of *Aedes aegypti*, while studies by Rocha and Tauil (2009) point to immune amplification as a contributing factor to the rise in severe cases.

Despite advances in diagnosis and treatment, persistent inequalities in healthcare access and the lack of basic sanitation sustain the high incidence of the disease. These challenges are further exacerbated by the seasonal pattern influenced by the region's hot and humid climate. Barreto and Teixeira (2008) emphasize the need for intersectoral actions integrating healthcare, sanitation, and education, with community engagement and vector control.

According to Ponte et al. (2011), strengthening health infrastructure and surveillance networks is an urgent priority. Effective dengue control requires coordinated intersectoral efforts, research, and educational campaigns to ensure sustainable and impactful interventions in the region.

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