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Letter to the Editor

Dengue in Bangladesh: A Gendered Perspective on Infection and Fatality Rates amidst Global Epidemiological Trends

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Dear Editor

Occasionally, we observe patterns in the complex world of global infectious diseases that challenge our understanding and prompt us to delve deeper into the interaction of biology, behavior, and socio-environmental factors (1). One such pattern is the recent outbreak of dengue fever in Bangladesh from January 1 to December 21, 2023. This outbreak has a significant impact on the global dengue situation and presents an intriguing gender disparity in infection and mortality rates (Fig. 1) (2).

As of the beginning of December 2023, the global community has observed over 5 million dengue cases and over 5,000 related fatalities across 86 countries and territories (3). Within this international context, the situation in Bangladesh is particularly concerning, with 1,705 deaths reported as of December 31, making up a significant portion of the worldwide fatality count (2). The dengue statistics from Bangladesh reveal a perplexing gender disparity. While males appeared more susceptible to the disease, with 192,610 cases compared to 128,569 female cases, the death toll tells a different story. Interestingly, although less frequently diagnosed, females had a higher mortality rate, with 970 deaths compared to 735 in males. However, the data shows a change in the mortality trend for men in the over-60 age group, possibly due to factors such as a higher prevalence of other health conditions, age-related decline in immune function, and potential delays in seeking healthcare (4). Diving into the detailed data on age-specific demographics, the age group of 36–40 stands out with a significant total of 165 deaths. In this group, there is a significant difference in gender-specific fatalities. There were 107 female deaths compared to 58 male deaths, resulting in a Case Fatality Rate (CFR) of 0.86% for females and 0.38% for males in the 36–40 age group. The fatality rate among females is significantly higher than males ($p< 0.001$), indicating it is not due to chance. Moving to adjacent age groups, the 31–35 and 26–30 categories also report significant death tolls of 155 and 148 deaths, respectively. In these age ranges, female fatalities exceed those of males, with a 0.89% fatality rate for females compared to 0.22% for males in the 31–35 age group ($p< 0.001$), and a 0.56% fatality rate for females compared to 0.23% for males in the 26–30 age group ($p< 0.001$). The significant gender-based gap is evident in the 31–35 age group, where females account for the majority of the 155 fatalities, contributing to 116 deaths. This pattern prompts further inquiry into the underlying causes, as the statistical significance suggests that factors beyond random variation are contributing to the higher mortality rate among

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females in these age groups (Fig. 1) (2).

Several hypotheses emerge regarding this difference. From a biological standpoint, gender-specific physiological factors, particularly hormonal variations, may influence the immune response to dengue virus infection, affecting disease severity and outcomes (5). However, it is important to consider that biology may not be the only factor. Socio-cultural dynamics deeply rooted in societies, such as Bangladesh, play a crucial role (6). Behavioral epidemiology indicates that factors such as occupational exposure, societal roles, and outdoor activities may make males more susceptible to mosquito bites. On the other hand, caregiving responsibilities, socioeconomic barriers, and societal perceptions of illness could affect how and when females seek medical intervention, which is a critical factor in determining dengue prognosis.

When comparing Bangladesh's data with the global dengue epidemic, it becomes evident that the nation bears a disproportionate burden. This significant contribution to the global fatality count, coupled with the observed gender dynamics, underscores the need for a holistic, multi-faceted research approach. Socio-cultural studies are necessary to understand how societal norms, roles, and barriers influence disease outcomes beyond the biological and behavioral aspects.

The 2023 dengue outbreak in Bangladesh, when viewed within the larger global epidemiological landscape, serves as a stark illustration of the intricate challenges posed by infectious diseases. The pronounced gender disparity observed in this outbreak not only highlights the complexities in disease dynamics but also brings to the fore the critical need for a comprehensive and gender-sensitive approach to public health strategies. Examining epidemiological data through a gendered lens is essential to ensure that health interventions are both effective and equitable, as highlighted by this outbreak. To mitigate such occurrences in the future, it is imperative to integrate biological research with socio-behavioral studies, to understand how societal norms and roles contribute to disease transmission and outcomes. Additionally, there should be a focus on developing and implementing public health policies that address these gender-based disparities, ensuring equitable access to healthcare and preventive measures. Furthermore, community-based initiatives that empower women, who are often the primary caregivers and therefore crucial in implementing disease prevention strategies at the household level, should be prioritized. Such initiatives could involve education campaigns tailored to different gender roles, ensuring widespread awareness and engagement in preventive measures.

The dengue outbreak in Bangladesh is a reminder of the multifaceted nature of infectious diseases and the necessity of adopting a holistic approach to global health research and interventions. By addressing the biological, socio-cultural, and behavioral dimensions of disease we can work towards more effective and inclusive public health strategies, ultimately reducing the burden of infectious diseases in vulnerable populations.

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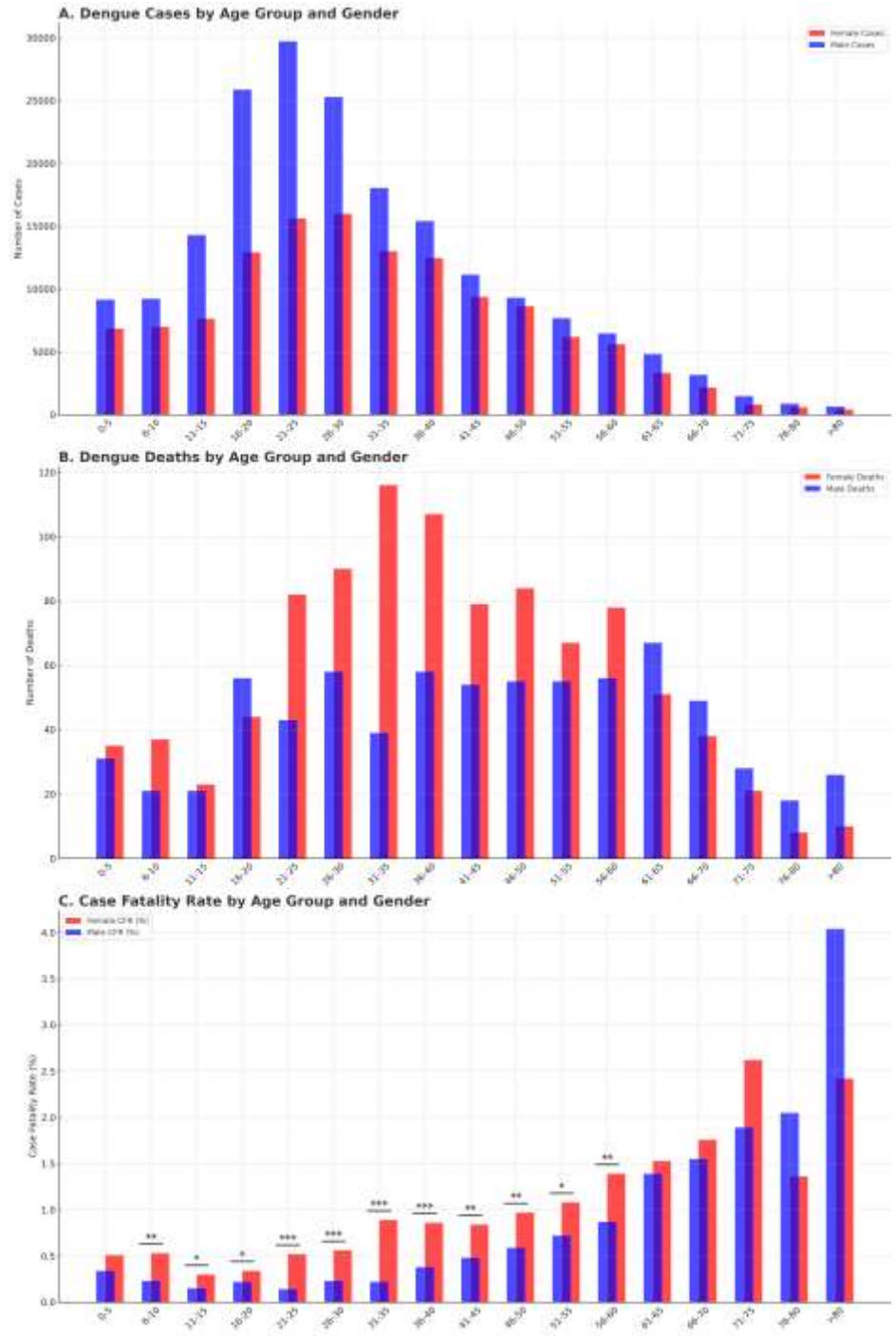

Fig. 1. Dengue cases, deaths, and case fatality rates in Bangladesh by age and gender, 2023

This figure provides a comprehensive breakdown of dengue cases, deaths, and case fatality rates (CFR) up to 31 December 2023, segmented by age groups. The data is color-coded for clarity: blue representing males and red for females, offering a distinct comparison of gender-specific trends in the dengue outbreak. The top panel (A) shows the total number of dengue cases (N= 321,179), the middle panel (B) shows the number of deaths (N= 1705), and the bottom panel (C) illustrates the CFR with statistical significance markers (*, **, ***). These markers indicate the level of statistical significance between male and female CFRs: *p< 0.05, **p< 0.01, ***p< 0.001. A chi-square test was used for statistical analysis.

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