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Short Communication

Bangladesh records persistently increased number of dengue deaths in recent years: Dissecting the shortcomings and means to resolve

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ABSTRACT

Objectives: Dengue, a life-threatening disease caused by the mosquito-borne dengue virus, has become a severe problem in recent years in Bangladesh, a South Asian country. In this study, we have critically analyzed the factors contributing to the escalation of the dengue burden in recent years in Bangladesh and discussed the strategies for effective control.

Design: This retrospective observational study analyzed the dengue data collected from the five most dengue-affected countries (Bangladesh, Brazil, Mexico, Peru, and the Philippines) from 2019 to 2023.

Results: An increased number of dengue-related deaths has been recorded in Bangladesh since 2021. The year 2023 has witnessed a record high dengue-related deaths in Bangladesh, with cumulative deaths for the year surpassing all totals of the previous 23 years (2000-2022: 853 deaths vs 2023: 1705 deaths). Comparing the epidemiologic data of major dengue-endemic countries over the last 5 years, Bangladesh recorded higher dengue fatality rates consecutively for 3 years. Besides the environmental and viral host factors, which are also applicable to many other dengue-endemic countries, there is concern about the failures and mismanagement of authorities to manage dengue patients properly.

Conclusion: This study provided evidence that Bangladesh recorded higher dengue fatality rates in recent years. By implementing multi-pronged proactive approaches that can ensure proper prevention programs and appropriate patient management, Bangladesh or similar other countries can significantly reduce the current dengue burden and the associated deaths.

Introduction

Dengue, caused by the dengue virus (DENV), is a potentially fatal mosquito-borne viral disease that maintains endemic status in more than 100 countries and poses a global health concern [1]. Bangladesh, a South Asian country, has maintained its dengue-endemic status for about 25 years, with a heterogenous prevalence. However, dengue has become a serious life-threatening problem in recent years in Bangladesh. An increased number of hospitalized patients with dengue and dengue-related deaths have been recorded in the country for the first time in 3 consecutive years. Although similar patterns have been reported in recent years in some other dengue-endemic countries [2–4], the death tolls due to dengue recorded in Bangladesh are exceptional. Currently, the dengue burden extends beyond the immediate health impacts in Bangladesh, encompassing economic losses, strain on health care systems, and social disruption. Therefore, analyzing the factors related to higher dengue deaths is critical for understanding disease dynamics, identifying failures, and improving clinical management. With these realities, in this communication, we have analyzed the factors contributing to the escalation of the dengue burden in recent years in Bangladesh and discussed the strategies for effective control.

Materials and methods

This retrospective observational study analyzed the dengue data collected from the five most dengue-affected countries (Bangladesh, Brazil, Mexico, Peru, and the Philippines). The data were retrieved from the World Health Organization/Government reporting system [5–7].

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We analyzed dengue incidences and deaths recorded in these countries from 2019 to 2023. The database contains updated epidemiologic information essential for understanding dengue cases and deaths. After data extraction, at least two authors cross-checked the data to ensure consistency. Time series analyses based on the column and line chart and scatter plot were conducted using Microsoft Excel and SAS (version 9.4; Cary, NC, USA). This study was not submitted to any ethical body for clearance because we used only secondary aggregate data that does not allow the identification of the cases assessed.

Results

Although 2019 marked an unprecedented dengue incidence worldwide, the number of dengue cases dropped in major endemic countries during the early COVID-19 period (in 2020) (Figure 1a). However, the number of dengue cases and deaths has increased in these countries since the mid-time of the COVID-19 pandemic (in 2021 and 2022). In 2023, a notable increase in dengue emerged worldwide, resulting in a historic high of over 6.5 million cases with more than 7000 deaths [1]. This resurgence is marked by a substantial uptick in the quantity and scope of outbreaks occurring across various regions and territories previously untouched by DENV infection. Among the most affected countries, Brazil reported the highest number of dengue cases in 2023 (n = 3,088,223), followed by Bangladesh (n = 321,179), Mexico (n = 277,963), Peru (n = 274,227), and the Philippines (n = 195,603). On the other hand, Bangladesh ranked first worldwide in the number of dengue-related deaths in 2023 (n = 1705), followed by Brazil (n = 1163), Philippines (n = 657), Peru (n = 441), and Mexico (n = 203), representing a case fatality rate (CFR) of 0.53%, 0.03%, 0.34%, 0.16%, and 0.07%, respectively. Comparing the epidemiologic data of these five countries over the last 5 years, Brazil recorded more than 10 million dengue cases, with 0.04% CFR. On the other hand, Bangladesh documented about 0.5 million dengue cases with a 0.40% fatality rate. Data revealed that Bangladesh recorded higher CFR consecutively for the last 3 years (2021-2023) (Figure 1b). In fact, the mortality of dengue in Bangladesh was taken a twist in 2021, and each following year surpassing the number of dengue-related deaths of the previous year (Figure 2). As a result, the year 2023 has witnessed a record high dengue-related deaths in Bangladesh, with cumulative deaths for the year surpassing all totals of the previous 23 years (2000-2022: 853 deaths vs 2023: 1705 deaths). The dengue-related fatality rate in Bangladesh also provides alarming signals for 2024 because the country already recorded a higher CFR (1.11%) during the dengue non-seasonal January-April period when the hospitals were not overburdened (only 2204 dengue patients were hospitalized).

Discussion

The variability of climate, such as changes in temperature, rainfall, and humidity, promotes the transmission cycle of DENV. Comparable to many other dengue-endemic countries, Bangladesh has experienced highly favorable environmental factors (unusual sporadic rainfall, unexpected floods, and extreme heatwaves) for breeding DENV-transmitting mosquitoes in recent years. Thus, the effect of climate change, along with urbanization, poor waste management and water storage practices, and inadequate vector control, is believed to be related to the upsurge of dengue cases and deaths in Bangladesh [8,9]. In addition, several viral and host factors, including dengue reinfection and the effect of COVID-19, may have contributed to the increased burden of dengue in recent years [10–15]. Although all four serotypes of DENV have been recorded in Bangladesh at different times since 2000, DENV-2 and DENV-3 dominantly prevail in the country in recent years [16,17]. It is assumed that considerable numbers of patients with dengue in recent years, particularly, those who presented severe clinical outcomes, may have been infected with the different types of DENV before. In addition, there is a concern that previous COVID-19 may interfere with developing severe dengue because individuals with SARS-CoV-2 infection sustained inflammatory and dysregulated immune responses for an extended period, even with mild-to-moderate infection [13–15]. Bangladesh and similar other dengue-endemic countries relaxed the COVID-19–related restriction in 2021, assuming that many people in Bangladesh may have developed SARS-CoV-2 infection–induced dysregulated immune responses. With these possibilities, we cannot exclude the association between previous SARS-CoV-2 infection and severe dengue outcomes. However, these associations should be explored with substantial clinical data in multiple countries.

Besides the environmental and viral host factors, which are also applicable to many other dengue-endemic countries, there is concern about the failures and mismanagement of Bangladesh authorities to manage patients with dengue properly [18]. In this regard, the reality of the health care delivery system of Bangladesh since COVID-19 time should be considered in the pretext of deaths due to dengue. The number of diagnostic facilities for viruses by molecular techniques and intensive care units has increased significantly since the emergence of COVID-19. Even with the use of these facilities, a persistently increased number of dengue-related deaths have been recorded in Bangladesh since the mid-COVID-19 period. In many cases, authorities have failed to provide adequate life-saving saline and advanced treatment facilities, including intensive care unit beds for patients with severe diseases, which may have led to the tragic loss of many lives [17,19]. Furthermore, the lack of trained physicians and other health care personnel in the management of patients with severe dengue is indeed a significant contributing factor to the higher dengue-related mortality rates in Bangladesh. Many of these failures and mismanagement are associated with the lack of proactive measures. Despite recurrent outbreaks and ample warnings, the health care management authority has often been reactive rather than proactive in its approach, allowing escalating outbreaks.

With these realities, Bangladesh requires immediate and long-term multifaceted proactive approaches to minimize dengue-related deaths in the coming days. The failures and mismanagement observed in recent years in Bangladesh underscore the immediate need for greater accountability and transparency to strengthen the health care system and ensure adequate treatment facilities for patients with dengue. In addition, accountability and efficacy are needed for preventive and control programs. The complex dynamics of DENV transmission involve interactions between humans, mosquitoes, and the environment, highlighting the need to adopt a “One Health” approach. Thus, strategic investments in the One Health approach that recognizes the interconnectedness of human health, vector control, and the environment are essential for achieving sustainable outcomes in DENV control. It is worth noting that dealing with patients with severe dengue often requires multidisciplinary personnel, involving trained physicians, nurses, laboratory technicians, and public health officials. Therefore, addressing the shortage of trained health care personnel is essential for improving outcomes for patients with dengue. This may involve expanding training programs and updating evidence-based treatment guidelines. In addition, implementing dengue vaccination programs is another tool that Bangladesh could use to significantly reduce the disease burden by preventing severe cases and deaths. Furthermore, it is urgently needed to take evidence-based scientific programs to explore the cellular and molecular mechanisms underlying dengue-related high fatality rates. Because of this, collaboration among governments, international organizations, research institutions, and communities is essential.

Because this study relies on data from national and international dengue surveillance systems, it is subject to the inherent limitations of such data, including under-reporting, misreporting, reporting biases, and delays in reporting. Indeed, this study did not explore the clinical and analytical data associated with the current dengue burden in Bangladesh. However, we provided evidence that Bangladesh recorded higher dengue fatality rates in recent years. Along with environmen-

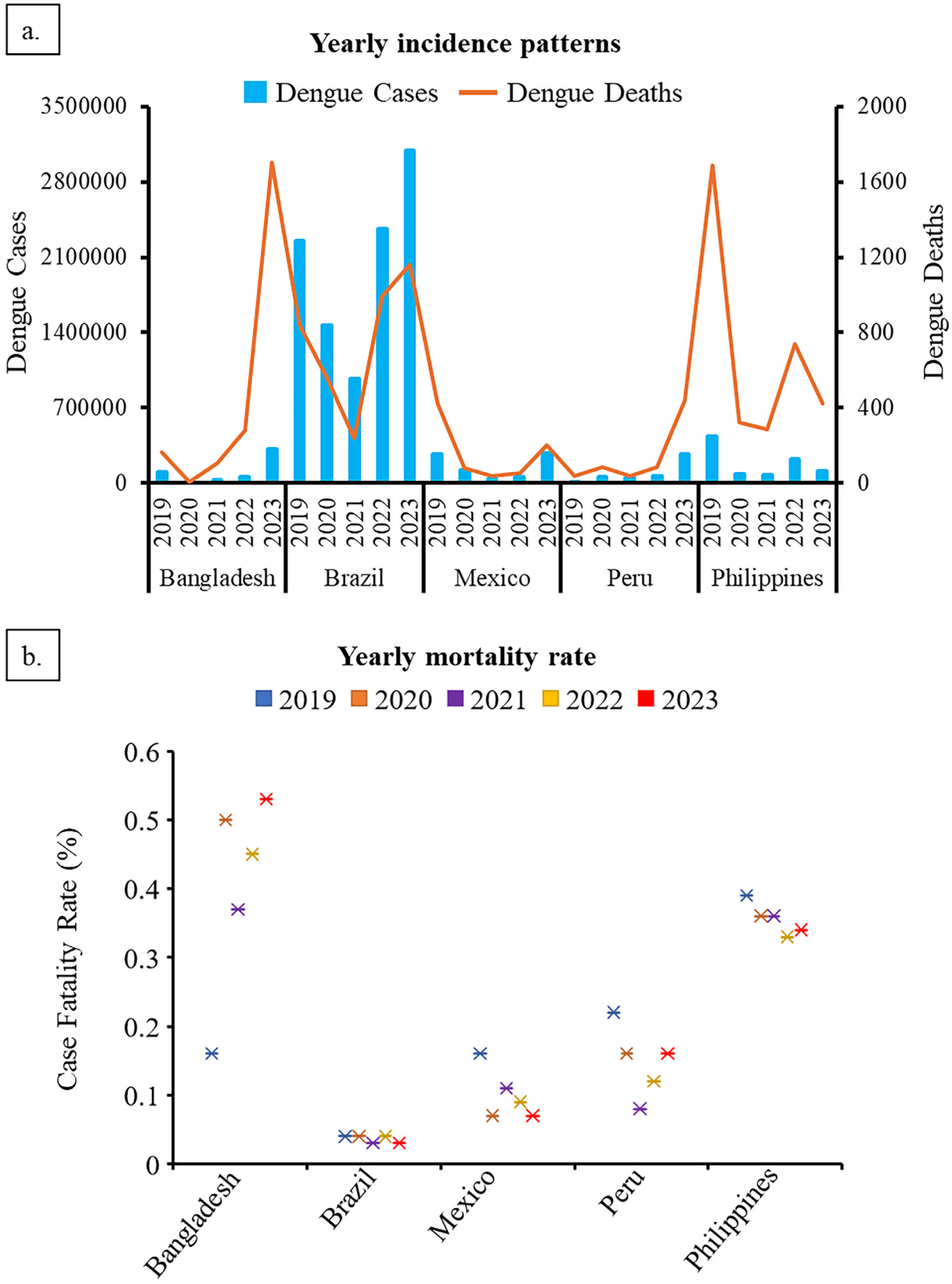

Figure 1. Dengue incidence patterns in major endemic countries. (a) Number of dengue cases and deaths during 2019-2023. (b) Percentage of dengue-related fatality rate during 2019-2023.

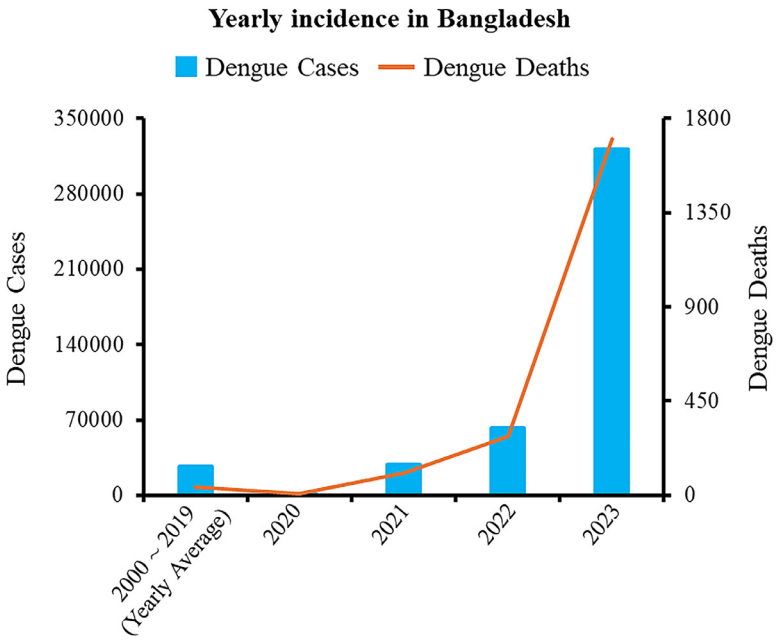

Figure 2. Epidemiologic patterns of dengue infection in Bangladesh. Reported hospitalized dengue cases and dengue-related deaths in Bangladesh during 2000-2023.

tal and viral host factors, there is concern about the failures and mismanagement by authorities in properly managing patients with dengue, which may lead to the loss of more lives. Immediate steps are needed to strengthen the healthcare system to ensure appropriate patient management.

Declarations of competing interest

The authors have no competing interests to declare.

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Author contributions

S.K. planned and compiled the manuscript. S.M.F.A., M.A.M., T.Y., K.K., T.H., and A. N. supported data and manuscript editing. All authors discussed and approved the final version of the manuscript.

Data sharing statement

The data that supports this paper are available upon reasonable request from the corresponding author (S.K.).

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