

A Nation in the Grip of Dengue: How Climate, Pollution, and Urbanization are Feeding a Relentless Killer - The Mosquito

Mohiuddin AK*

Alumnus, Faculty of Pharmacy, Dhaka University, Bangladesh

*Corresponding author: Mohiuddin AK, Alumnus, Faculty of Pharmacy, Dhaka University, Dhaka-1000, Bangladesh; E-mail: trymohi@yahoo.co.in

Editorial

Each year, mosquitoes wage a silent yet devastating war infecting nearly 700 million people and claiming more than a million lives across the globe [1]. Mosquito-borne viruses like dengue, chikungunya, and Zika have devastated 166 countries over the last five decades, costing nearly \$100 billion and surging fourteen-fold between 2013 and 2022 [2]. While malaria continues to devastate Africa accounting for over 90% of cases reported in the WHO African Region [3] - Asia is grappling with dengue, which is responsible for nearly 70% of global infections [4], with Southeast Asia bearing the heaviest burden [5]. Although the COVID-19 pandemic momentarily disrupted this trajectory, the post-pandemic resurgence of dengue infections reveals its persistent grip on the region [6]. Bangladesh is at the epicenter of the crisis, grappling with unprecedented challenges. By 21 September 2025, deaths had surged 150% and cases had doubled from the previous year [7], and just two months later, by 23 November, infections had topped 90,000 with fatalities reaching 364 [8] -70% higher than six weeks earlier [9].

Hospital admissions, according to dynamic data from the Directorate General of Health Services (DGHS) [10], nearly quadrupled from 5,951 in June to 22,520 in October 2025, pushing an already fragile healthcare system to the brink. November 2025 brought the crisis to a new peak: on 18 November alone, over 900 viral fever patients flooded hospitals, joining nearly 3,000 dengue cases already under treatment [11]. Since 2023, more than half a million Bangladeshis have been infected, with 2,640 lives lost the deadliest toll in the nation's history. By 23 November, hospital admissions had surged past 21,000, laying bare the outbreak's staggering human cost [12]. Historical data magnify the crisis. Between 2000 and 2022, Bangladesh recorded 853 dengue-related deaths [13], yet 2023 alone more than doubled that total, with 1,705 fatalities and over 321,000 infections [14] the largest annual outbreak on record. The demographic landscape is shifting. Women accounted for 57% of dengue deaths in 2023 [15], but by November 2025, men bore nearly twice as many fatalities, even though they consistently represented about 60% of total cases. Young adults aged 21–30 now comprise more than a quarter of both cases and deaths [10].

Experts blame climate change, stagnant water, or erratic rainfall. True but the picture is deeper. Air pollutants (PM10, SO₂, CO, NO_x, etc.), along with climate factors, spike mosquito populations, virus activity, and affect human immunity, as observed in Singapore [16], Taiwan [17], Guangzhou [18], and São Paulo [19]. This serves as a stark reminder of WHO estimates that nearly a quarter of all human diseases and deaths result from long-term exposure to pollution [20]. Urban waste is a silent catalyst of disease, with roughly 55% of Bangladesh's city garbage left uncollected [21]. Comparable cases in Thiruvananthapuram, South India where poor disposal links to 40% higher dengue and chikungunya rates [22] and informal settlements (slum) in Indonesia and Fiji, where over half of children aged 4–5 were infected [23], strongly suggest a similar environmental link. A Lancet study highlights that improperly discarded plastics trap stagnant water, creating ideal breeding grounds for Aedes mosquitoes the carriers of dengue, Zika, chikungunya, and yellow fever while clogged drains turn every rainfall into mosquito magnets, fueling outbreaks [24]. Another research from the Beijing Institute of Microbiology shows that micro plastics in these waters alter mosquito gut microbiomes, slow development, reduce insecticide effectiveness, and even amplify virus transmission, turning pollution into a public health accelerator [25]. Just three rivers Meghna,

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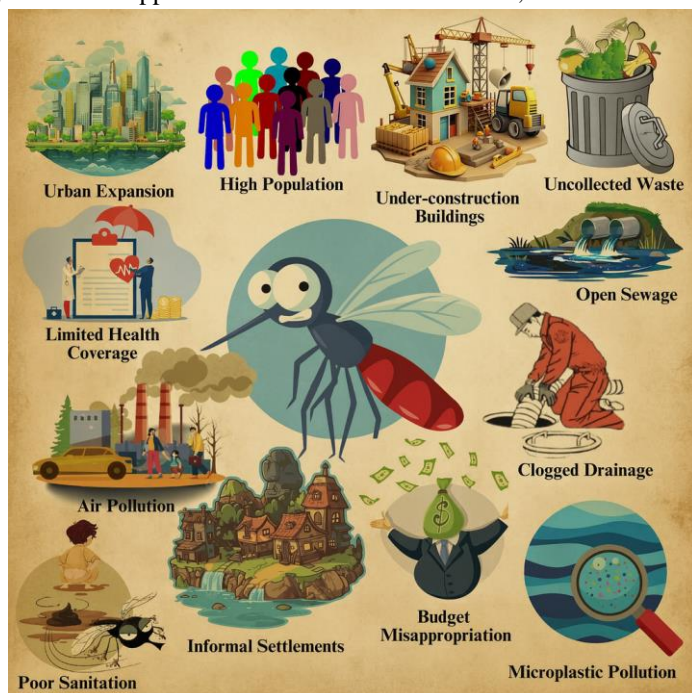
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Karnaphuli, and Rupsha release nearly one million metric tons of mismanaged plastic each year [26]. In Bangladesh, per capita plastic use tripled between 2005 and 2020, the World Bank reports [27], while COVID-19 added an extra 78,000 tons in a single year, according to a 2021 study by the Environment and Social Development Organization (ESDO) [28] making water pollution both a visible and invisible driver of disease.

Poor sanitation affects more than a third of Bangladesh, and according to a joint UNICEF WaterAid press release [29], roughly 230 tons of fecal waste flow daily into Dhaka's sprawling 4,500 km drainage network already 70% blocked with trash and debris due to poor architectural network and negligence, the Institute of Water Modelling reports [30] turning every rainfall into stagnant, mosquito-infested pools, further fueled by floods and extreme weather. Rising temperatures may accelerate mosquito lifecycles, a 2024 Springer study finds [31] but heat-exposed generations adapt, gaining viral tolerance without losing vitality, according to a 2025 Nature study [32]. Historically, dengue has been an urban-focused threat, with over 80% of cases concentrated in Dhaka and Chittagong between 2014 and 2016 [33]. Today, soaring temperatures have turned Dhaka into a mosquito incubator. Days with extreme heat ($\geq 35^{\circ}\text{C}$) have nearly doubled over the past three decades, the International Institute for Environment and Development (IIED) reports [34], while the city's heat index climbs 65% faster than the national average, according to the World Bank [35]. At the same time, Dhaka's fading away tree cover has stripped the city of its natural defenses. With more than half of its greenery lost between 1989 and 2020 [36], Dhaka now mirrors global patterns like Amazonian Brazil, where the removal of even a single square kilometer of forest triggered 27 additional malaria cases [37] creating hotter, harsher, mosquito-friendly terrain. With more than 75,000 people per square mile [38], Dhaka's overcrowded neighborhoods especially in Badda, Jatrabari, Kadamtali, Mirpur, Mohammadpur, Sobujbagh, Shyampur, Tejgaon, Dhanmondi, and Uttara are riddled with stagnant water that fuels mosquito breeding and intensifies human-mosquito contact [39], while irregular water supplies force residents to store water, further accelerating proliferation [40] a pattern mirrored across neighboring India



Dhaka's rapid and largely unplanned urban expansion has created near-perfect conditions for *Aedes* mosquitoes to thrive. Between 2008 and 2016, RAJUK the authority shaping the greater Dhaka region approved at least 64,000 new constructions each year, with the pre-2016 average climbing to nearly 95,000 structures annually [42,43]. The latest pre-monsoon survey by DGHS and IEDCR highlights the toll of this unchecked growth: multistory buildings now harbor almost 60% of all *Aedes* larvae, while another 20% breed across the city's endless network of under-construction sites [44]. In fact, just last year, the former Mayor of DSCC warned that construction projects would be halted wherever *Aedes* larvae were found [45]. Clearly, inadequate mosquito-control efforts and a lack of public awareness campaigns have worsened the crisis, while Dhaka's BDT 1,000 crore (over \$81 million) investment has largely gone to waste [46], leaving the city and its surrounding division to shoulder more than half of the nation's dengue burden [10]. Political oversight has come under scrutiny. Critics point to the interim government's inadequate mosquito-control efforts since August 2024, yet over 320,000 cases and 1,700 deaths occurred in 2023 under an elected government showing that vector-borne outbreaks transcend partisan boundaries. No doubt, corruption, arbitrariness, and systemic irregularities persist, creating a major barrier to effective, results-driven mosquito

control a misfortune that continues to plague the people of Bangladesh. Media coverage has largely failed to capture the true severity of the crisis, while domestic research remains thin and scattered. In a country with low health literacy, even strong scientific findings rarely translate into public awareness or policy action, leaving evidence-based progress frustratingly slow. Yet this national tragedy must be seen in a global context. A study in *Nature* warns that by 2080, nearly three in five people could be at risk of dengue [46]. Last year alone, over fourteen million people were infected worldwide double the previous year and twelve times higher than a decade ago [47,48]. The World Health Organization reports that dengue causes up to 400 million infections annually [49], with incidence having surged thirtyfold over the past fifty years [50], now threatening more than 3.9 billion people [51] almost half of humanity. As climate volatility, unplanned urbanization, and mosquito expansion intensify, dengue is no longer a regional burden it is an emerging pandemic demanding urgent international action. The time to act is now, before a greater catastrophe unfolds and more lives are lost.

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