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Editorial

Dengue Skyrocket: Should It Be Neglected Now?

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Dengue is an *Aedes aegypti*- and *Aedes albopictus*-borne viral (Family: Flaviviridae) disease predominant in impoverished and marginalized communities. Many policymakers, medical professionals, and researchers have always considered it a neglected disease. The lack of clinical burdens, non-specific clinical characteristics, and difficulty in diagnosis have led to underestimating the significance of dengue, and it is listed to be neglected accordingly.

Dengue has been the world's fastest-spreading tropical disease (1,2). Notably, all four dengue virus serotypes (DENV 1, DENV 2, DENV 3, and DENV 4) are circulating globally. Dengue affects about 129 countries, with 100-400 million cases annually (2). The cases of dengue fever peaked globally by 8-fold from 2000 to 2022 (3). As of 8 June 2023, more than 2 million cases and about 1000 deaths from dengue have been reported globally (4). Currently, about 4 billion people are at risk of dengue. It has been predicted that more than 9 million cases might be globally present in 2023; however, it may depend on the monsoons in Asian countries (3). It is also predicted that dengue could result in a pandemic threat (3), indicating that the dengue emergency is one of the best implementations to be considered soon.

While dengue has peaked the earth, it is essential to understand the causes of this peak. Hypothetically and experimentally, few underlying factors have been associated with dengue outbreaks. For example, climate change is generally considered an essential factor in dengue. Rising temperatures, rising sea levels, shifting rainfall patterns, and extreme weather frequency and severity have indicated global climate change (5). Climatic factors, directly and indirectly, affect the lifecycle, growth, and survival of *Aedes* spp. and the transmission of dengue viruses (6). This can be experienced by shifting dengue from low to high altitudes in many areas such as Nepal, India, Pakistan, and others. *Aedes* spp. are killed at a temperature over 45 °C; however, they can breed in the water of ditches, cans, buckets, containers, drums, and several other utensils where the temperature is usually lower than that level. In these contexts, heat-resistant genes expressed by *Aedes* might be critical for the survival of those mosquitoes (7). It is vital that *A. albopictus* and *A. aegypti* immensely love tropical and subtropical climates. Climate change, subsequent heavy rainfall, and prolonged rainy season are stunning for *Aedes*'s life history. In addition, they multiply rapidly in warmer climates when viral levels are also quantified, resulting in the dengue outbreak. Therefore, global warming is one of the best things for *Aedes* to survive. Climate change and other complex landscapes might play a role in vector development and the subsequent viral spread. However, it is not easy to strictly relate climate change and dengue outbreaks.

Second, vehicles and travel have contributed to spreading *Aedes* vectors from one place to another, especially along a complex landscape. Local and international tourists are also important for vector spreads (8,9). Tires and goods carried by vehicles are important in transmitting *Aedes*. These mosquitoes are tire multipliers. They are also credited to the distribution of vectors from warmer regions to colder regions.

Author's Biosketch

Tirth Raj Ghimire obtained a Doctor of Philosophy Degree in Immunology from the University of Strathclyde, UK, in 2012. He worked as Scientific Officer at the Nepal Academy of Science and Technology, Lalitpur, Nepal, from 2015 to 2021. Then, he joined the team as an Assistant Professor at Tribhuvan University. He has been working in the Department of Zoology, Tri-Chandra Multiple Campus, Kathmandu, Nepal. His research interest lies in One Health Approach to Understanding Diseases. He is researching how protozoa, helminths, and arthropods are distributed in an environment and how they can modify the host's immune system and physiology. In another context, his research interest is how natural products applied by traditional medicine, drugs, and vaccines work against these pathogens.

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Figure 1. *Aedes* spp. biting on the skin. Source. Photo kindly provided by Aarati Gyawali, Amrit Campus, Kathmandu, Nepal

Third, vegetation and lack of environmental sanitation and nearby animal sheds can enhance *Aedes* breeding. Similarly, increased and unplanned urbanisation may result in the collection of garbage, defects in the sewage systems, and minimum living environment standards.

Fourth, the lack of awareness must be addressed. *Aedes* spp. are typically diurnal; thus, they attack the hosts in daylight (Figure 1). However, due to the lack of awareness to *Aedes* mosquitoes and their behaviour towards human hosts, people do not care about mosquito biting or need to learn how to fully protect themselves from biting in the working environment. In addition, people typically prefer to be half-cloth or non-cloth, especially during the day, while working at high temperatures. In many areas, people are unaware of dengue-controlling methods such as sustainable biological control programs. Lack of awareness is also fueled by poverty, ignorance, and illiteracy, which might have resulted in enhanced *Aedes* breeding and attack.

Finally, research regarding molecular surveys and rationale vector surveillance is lacking, especially in many dengue endemic areas post-monsoon before the winter season. The eggs and larvae of *Aedes* can overwinter, and their development initiates the following year's outbreak. This is one of the most critical phenomena in the life history of *Aedes* spp. (10). Moreover, forgetting such events in vector research and controlling programs may result into enhanced dengue outbreaks.

In conclusion, as many Asian and newly exposed countries are becoming epicentres of dengue, further integrated vector management (IVM) should be considered and implemented practically. IVM involves many variables, including eliminating potential breeding habitats, reducing mosquito vectors, and reducing individual contact with those vectors. To this end, Search and Destroy of vectors (immature and mature forms) programs are locally adaptable and practicable. Search and Destroy should include research and policy to check the egg or larval overwintering. This involves cleaning of surrounding, ditches, water tanks, and vehicle tires. Elimination programs should also be conducted in vehicles, trains, aircraft, and densely populated areas such as schools, camps, hospitals, and vehicle parking sites. Travel to endemic areas and travels by dengue-positive patients should be discouraged, especially during outbreaks. Additionally, awareness programs via Facebook, Twitter, YouTube, and print media at local levels should be beneficial for quick responses to dengue preventive strategies. Alternative, cool, long-sleeve clothes should be designed, produced, and used while working in the daytime. Finally, Dengue Emergencies worldwide should be demanding, especially where the cases and deaths are unnaturally high. Therefore, the time has come to tackle upcoming dengue pandemics fully; thus, this vector-borne killer must not be neglected at least this year.

Competing Interests

None.

Ethical Approval

Not applicable.

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