Editorial

Integrated vector management for prevention of Dengue in Bangladesh

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Dengue is a public health problem in many tropical and subtropical countries, particularly in urban and semi-urban areas, where most outbreaks have been reported. Many factors have influenced the global rise of dengue, including population growth, high population density, unplanned rapid urbanization and construction, climate change, absence of reliable piped water, and ineffective vector control strategies. The rapid global spread of dengue is also associated with increased human mobility through air travel; 75% of the global dengue burden lies in Southeast Asia and the Western Pacific region. The incidence of overall global dengue virus (DENV) infection has also increased rapidly in the last two decades; 505,430 cases were reported in 2000, while over 2,400,138 and 3,312,040 cases have been reported in 2010 and 2015, respectively. The number of deaths has also increased from 960 to more than 4032 between 2000 and 2015. Each year, an estimated 100–400 million infections occur, and over 80% of these infections are generally mild and asymptomatic. In line with global trends, the incidence of dengue has also dramatically increased in Bangladesh.

Dengue is a viral infection transmitted to humans through the bite of infected mosquitoes and the primary vectors that transmit the disease are *Aedes aegypti* mosquitoes and, to a lesser extent, *Aedes albopictus*.

Dengue virus (DENV) has four serotypes (DENV-1, DENV-2, DENV-3, DENV-4) and it is possible to be infected by each. Infection with one serotype provides long-term immunity to the homologous serotype but not to the other serotypes; sequential infections put people at greater risk for severe dengue. Many DENV infections produce only mild illness; over 80% of cases are asymptomatic. There is no specific treatment for dengue; however, timely detection of cases, identifying any warning signs of severe dengue infection, and appropriate case management are key elements of care to prevent patient death and can lower fatality rates of severe infection to below 1%.

Dengue was first recorded in the 1960s in Bangladesh (then East Pakistan) and was known as “Dacca fever”. The establishment of the *Aedes aegypti* mosquito vector and urban cycles have made dengue endemic in Bangladesh. The growth factor of dengue cases since 2010 appeared to be linked to regional rainfall patterns (May to September) and is coincidental with higher environmental temperatures. Bangladesh's climate conditions are becoming more favorable for the transmission of dengue and other vector-borne diseases like malaria and chikungunya due to excessive rainfall, waterlogging, flooding, rise in temperature and the unusual shifts in the country's traditional seasons.

Between 1 January and 20 November 2022, a total of 52 807 dengue cases including 230 related deaths (case fatality rate = 0.44%) were reported by the Ministry of Health & Family Welfare (MOHFW) The cases were confirmed either by non-structural protein (NS1) diagnostic kits or by Immunoglobulin M (IgM) tests. According to information available for 40% of reported cases (n=20 982) the median age is 25 years (range: 0 – 89) with males accounting for 60% of the cases. This is the second highest annual number of cases since 2000, the highest having occurred in 2019, when 101 354 cases including 164 deaths were reported.

The most affected division is Dhaka, accounting for 70.6% of cases and 60.4% of deaths. Dhaka city, the largest city in Bangladesh, located in Dhaka division, has reported 64.5% (n= 34 071) of the total number of cases. Other affected divisions include Chattogram division (13.2% of cases and 24.8% of deaths) and Khulna division (5.5% of cases and 4.8% of deaths).

The high incidence of dengue cases this year is taking place in the context of an unusual amount of rainfall since June 2022, accompanied by high temperatures and high humidity which have resulted in an increased mosquito population throughout Bangladesh.

The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for dengue virus infection. Although dengue does not directly spread from human-to-human, *Aedes* species mosquitoes can become infected after biting dengue-infected individuals, thus creating a cycle of transmission capable of spreading dengue and leading to clusters of cases.

The prevention and control of dengue depends on effective vector control. WHO promotes a strategic approach known as Integrated Vector Management (IVM) to control mosquito vectors, including the mosquito genus *Aedes* (the primary vector for dengue). IVM should be enhanced to remove potential breeding sites, reduce vector populations, and minimize individual exposure. This should involve vector control strategies for larvae and adults (i.e., environmental management and source reduction, biological control, and chemical control measures), as well as strategies for protecting people and households. Bangladesh should implement the IVM strategy developed in 2021.

Vector control activities should focus on all areas where there is a risk of human-vector contact (place of residence, workplaces, schools and hospitals). Vector control activities can include covering, draining, and cleaning household water storage containers on a weekly basis. Space spraying with insecticide can be deployed as an emergency measure. Chlorination and application of suitable larvicides/

insecticides for water storage in outdoor containers should also be considered.

Personal protective measures during outdoor activities include the topical application of repellents to exposed skin or on clothing, and the use of long sleeve shirts and pants. Indoor protection can include the use of household insecticide aerosol products or mosquito coils. Window and door screens, as well as air conditioning, can reduce the probability of mosquitoes entering the house. Insecticide-treated nets offer good protection to people against mosquito bites while sleeping during the day. Since *Aedes* mosquitoes are active at dawn and dusk, personal protective measures are recommended particularly at these times of day.

Timely access to appropriate clinical management are key elements of care to reduce the risk for severe dengue complications and deaths due to dengue. Case surveillance should continue to be enhanced in all affected areas and across the country. Where feasible, resources should be allocated to the strengthening of laboratory sample referral mechanisms for the confirmation and sub-typing of the dengue virus.

In a bid to arrest the upsurge of dengue in our country in recent times rather than to focus primarily on patient-centred, curative and medicine-intensive disease management, approaches to improve environmental health and to manage vector habitats should be prioritized. Dengue vector control is an effective tool in reducing *Aedes* mosquito populations, particularly when control strategies utilize a community-based and integrated approach, combined with educational programmes to increase knowledge, awareness, attitudes and practices of people in the local community.

Taking a holistic perspective, for effective management of dengue, the coordinated and multidisciplinary efforts of different government and non goverment departments with regard to sanitation, urban development and education are essential. Increasing community awareness is also important, which can be done through local visits community healthcare workers, radio broadcasts with public/religious leaders and healthcare professionals to encourage the use of preventive methods, and TV as well as social media, particularly in urban areas. Moreover, local communities must be engaged to take active responsibility for their own protection by supporting elimination of Aedes breeding sites and taking personal measures towards prevention of infection, such as use of mosquito repellents.

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