



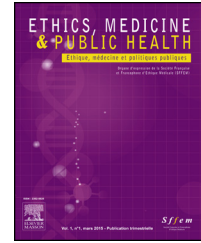
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LETTER TO THE EDITOR

Urgent call for actionable measures to fight the current co-epidemic of dengue burden during the SARS-CoV-2 delta variant era in South-Asia



Dear Editor,

Keywords *Aedes aegypti*; Bangladesh; COVID-19 outbreak; Dengue virus; Dual outbreak; South-Asian countries

Since December 2019, the world has been witnessing the upsurge incidence of coronavirus disease 2019 (COVID-19) caused by a highly etiological agent, severe acute respiratory coronavirus 2 (SARS-CoV-2), which was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 [1]. Though the outbreak was improving, the delta variant of the virus is evolving so rapidly, and as of September 24, 2021, more than 229 million global cases and over 4.71 million deaths have been confirmed worldwide [2]. In addition, another dengue epidemic, caused by the dengue virus (DENV) transmitted by the female mosquitoes of *Aedes* species (*A. aegypti* or *A. albopictus*), affects millions of people in tropical and subtropical regions every year, which has coincided with SARS-CoV-2 delta variant era in South-East Asia and Latin America [3]. Since dengue cases are escalating in South-East Asia and Latin America in recent years, concurrent dengue and COVID-19 syndemic are warning of a disastrous collapse in the prevailing low-resource settings health care system.

Among all the variants of SARS-CoV-2, the most virulent and transmissible is delta (lineage B.1.617.2), having mutations in the gene encoding the SARS-CoV-2 spike protein causing the substitutions D614G, T478K, P681R, and L452R. This mutation affects the virus's transmissibility and antibody neutralization capacity developed by the previously circulating variants of the SARS-CoV-2. [4]. This variant of global concern is responsible for the second/third stream of the pandemic to at least 124 countries by July 2021, including India and its neighboring countries, and became the dominant strain [4]. Furthermore, delta with K417N mutations (lineages AY.1 and AY.2) has been designated as "delta plus" or "Nepal variant," which spreads and binds more readily to lung cells and is potentially resistant to monoclonal antibody therapy [5]. Several shreds of evidence claimed that the delta variant is around 60% more infectious than alpha and almost twice as transmissible as the wild type SARS-CoV-2, and viral loads in delta infections were

approximately 1000 times higher than those in infections caused by other variants. Concerning the issues, WHO has declared delta as "the fastest and fittest" variant [6]. The delta variant is contributing mostly to upraise COVID cases in Asian countries. In addition, low vaccination rates (for example, less than 3% of the population as of August 1, 2021, for Bangladesh and Pakistan) may attribute to the rapid spread in these countries [7].

Generally, DENV infections result in mild illness to acute flu-like illness. Although severe dengue is less common, it can develop lethal complications, like- severe bleeding, organ impairment, plasma leakage, and has high risk of death. In some Asian and Latin American countries, rainfall, temperature, relative humidity, unplanned rapid urbanization, and high population density are viable for the quick transmission of DENV [3]. Since there is no specific treatment for dengue/severe dengue, early detection of disease progression and proper medical care lowers fatality rates of severe dengue to below 1%. Like other South-East Asian countries, the dengue situation of Bangladesh was sporadic from 1964 to 1999, but the first outbreak occurred in 2002. Since then, dengue outbreaks have been arising at increasing frequency and magnitude. The worst-ever dengue outbreak happened in 2019, with more than 100,000 cases and 179 deaths recorded [8]. As of September 24, 2021, Bangladesh counted around 16,000 dengue patients, with 59 of them have died of this vector-borne infectious disease since January 2021. It is alarming that near 7000 of the total patients in Bangladesh have been diagnosed with dengue positive just in the first 24 days of September of 2021, and around 25% of patients are aged under ten years [9].

Latin America and South-East Asian countries have turned endemic areas for dengue, and the situation has been worsening for the past decade. Healthcare systems of these vulnerable regions are already battered by the pernicious COVID-19 outbreak, which may aggravate due to a sharp spike in dengue cases in 2021. In South-Asian countries, including Bangladesh, most hospital beds and Intensive Care Units (ICUs) have been occupied by patients with COVID-19, making it difficult for patients with severe dengue to get admitted to the proper facilities [4]. Besides, the situation has worsened due to the unique clinical signs of COVID-19 and dengue infection, which may create more difficulty in diagnosis in the primary stage. Initial symptoms of both diseases may represent fever, myalgia, headache, leukopenia, thrombocytopenia, and abnormal hepatic functions. Sometimes the severe dengue and COVID-19 appear as cutaneous manifestations, and simultaneous identification and treatment for both infections have been confusing and challenging to reduce the recovery rate. Besides,

other critical associated indicators of concurrent risks exposures to COVID-19 and dengue infections include congested urban-focused unsustainable vulnerability, demographic and social vulnerability, economic and physical vulnerability, and recurrent disaster vulnerability [4]. Dengue infections are predicted to rise during the monsoon season since the density of the *Aedes* population increases [3]. Rapid urbanization, high population density, and tropical climate are also triggering factors for the incidence of dengue cases during monsoon every year. However, the current co-epidemic dengue's regular epidemiological surveillance and the strenuous campaign are still focused off. Apart from this, the number of testing facilities and poor hospital settings are also forcing health care providers to rethink. If the dengue epidemic spreads at a similar rate to the COVID-19, it may become impossible to provide health facilities to treat patients suffering from the ongoing bidirectional viral attacks.

The dual impact of COVID-19 and dengue epidemics can potentially cause disaster in highly populated and developing countries with the fragile health care system. There might have several crucial means to tackle this invincible challenge, including precise epidemiological and contact history-taking combined with the consciousness of false-positive dengue serology and the possibility of co-infections. Besides, fast and consistent testing for COVID-19 diagnosis should be made available to distinguish from dengue infection. Regulations imposed by WHO, including social distancing, must be strictly maintained, and breeding sites of *Aedes* must be kept under proper inspection. Finally, a rigorous strategic plan for emergency response, including several short-term and long-term policies, should be formulated to wrestle with the co-epidemic situation.

Human and animal rights

The authors declare that the work described has not involved experimentation on humans or animals.

Informed consent and patient details

The authors declare that the work described does not involve patients or volunteers.

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