

Preparing for the dengue explosion in Kathmandu, Nepal



Dengue, a self-limiting viral illness of the tropics, appears to be the infectious disease of the 21st century in many countries because of its heavy disease burden and socioeconomic impact.¹ It was first reported in Nepal in the southern plains in 2004. Since then, there have been frequent outbreaks in that region.² Kathmandu, the capital of Nepal, which is located higher north of the plains, faced its first outbreak during the monsoon in July, 2019. The city has become an ideal breeding ground for the *Aedes* vector mosquito because of climate change, relentless and haphazard urbanisation, brisk trade and transit from dengue-infested areas, and poor health infrastructure, all conducive to the spread of dengue.^{1,3} *Aedes* mosquitos fly only 500 m in their lives, so have the potential to rapidly spread infection in a closely-packed population.⁴

Dengue virus has four serotypes. Primary infection with any serotype in a non-immune population generally causes mild disease, such as Kathmandu faced this season. When secondary infection with another serotype occurs in the same population, there is antibody-dependent enhancement, which usually causes severe dengue (plasma leakage, bleeding, and shock).^{1,3} Over time, this secondary infection might lead to a so-called explosion of the disease, as occurred in Delhi, Dhaka, Ho Chi Minh City, Senegal, and Singapore some years ago,^{5,6} with markedly more infection than Kathmandu has recently witnessed.

When such an explosion eventually occurs in Kathmandu, disease demographics might change as the dengue virus becomes more endemic, affecting mostly children and young adults,^{3,6} in contrast to the recent outbreak, in which many older adults were affected. Other problems could abound. Many patients with fever might be incorrectly diagnosed with dengue because of use of commercial rapid diagnostic kits with low specificity. Companies could cash in on the epidemic and produce unreliable tests, as has already started to happen.⁷ A tug-of-war might occur between the worried well and the truly sick. Additionally, because dengue is mostly an urban disease, many influential people—including politicians—could be affected, resulting in widespread publicity and confusion, unlike silent epidemics in the Himalayas. Hospitals might be overwhelmed and many needy patients with other diseases could be turned away.

Patients who develop WHO-defined warning signs for risk of severe disease might require admission to hospital.⁸ However, severe infection occurs in only a small proportion of patients and, if treated properly, mortality is below 1%.^{1,3} In a dengue explosion scenario, many inexperienced doctors might be anxious because of the high-grade fever and low platelets and leukocytes in the blood, which are present even in mild disease.¹ This anxiety could lead to overtreatment, including unnecessary admissions, antibiotics, transfusions, and excessive intravenous fluids. Plasma leakage usually resolves within 48 h and the leaked fluid gets reabsorbed rapidly. Excessive fluid administration will cause volume overload and pulmonary oedema, thus increasing mortality.^{1,3} Increased mortality has been seen in many previous outbreaks (as high as 25% in south India during 2008),⁶ which could be due to improper fluid management.

Before the explosion occurs, Nepal needs to prepare its health system with an algorithm⁹ for proper triaging and offer uniform, evidence-based treatment guidelines, especially for severe dengue. Injudicious fluid administration could be avoided by using a simple bedside haematocrit machine and skilful nursing care.³ Reassurance with proper, evidence-guided information to decrease anxiety will help reduce the hospital load. Hospitals should determine which commercial serological test to use based on accuracy and WHO guidance.⁸ The awareness campaign must start early, by focusing on prevention (vector control). Schools are a good place to start such programmes. Students are good learners and can be taught to effectively use repellents and mosquito nets and get rid of water collections near their homes and schools; students will then spread this information to their parents.¹⁰ Random spraying of drains in cities might not help. Perhaps, for now, the focus for clinicians in Kathmandu should be to try to mitigate the impact of an inevitable explosion of dengue in the years to come rather than pathophysiological or treatment studies.

Nepal should think ahead by learning lessons from the countries who suffered the onslaught of dengue in the past,^{5,6} and apply lessons learnt to effectively combat the disease in future by formulating awareness

and treatment strategies before an inevitable major outbreak in cities such as Kathmandu. Nepal would be helping itself and providing a model for many other countries where dengue probably will be a major problem in the years to come.

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Sudeep Adhikari, *Buddha Basnyat, Kripa Maharjan
buddha.basnyat@ndm.ox.ac.uk

Department of Internal Medicine (SA) and Department of General Practice and Emergency Medicine (KM), Patan Academy of Health Sciences, Kathmandu, Nepal; Oxford University Clinical Research Unit, Patan Hospital, Kathmandu, Nepal (BB); and Centre for Tropical Medicine and Global Health, Nuffield Department of Medicine, Oxford University, Oxford, UK (BB)

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