

LETTER TO THE EDITOR

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The alarming outbreaks of dengue in Nepal



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Abstract

Dengue is a mosquito-borne viral infection. Since the first reported incidence in 2004, several sporadic outbreaks of dengue have been recorded from both tropical and subtropical regions of Nepal, including the capital city Kathmandu. However, in the last 5 years, the incidence of dengue cases has risen alarmingly. The largest-ever outbreak was reported in 2019, which killed six people. The global warming, unplanned urbanization, increased transportation, and lack of efficient mosquito control are presumably associated with the spread of dengue and its vector to the plane and hilly regions of this country. With the ongoing Nepalese government campaign “Visit Nepal Year 2020” to attract two million tourists in mind, effective dengue control measures must be implemented to control potential future outbreaks.

Keywords: Dengue, Nepal, Alarming outbreaks, Control, Visit Nepal Year 2020

Dear Editor,

Nepal is a landlocked country located between India and China. Several studies have shown that dengue is well established in neighboring countries and the incidence of dengue is in the rise in both India and China [1, 2]. Given the open border policy with India and a tremendous trade relationship with China, Nepal is always in a high risk of cross-country spread of dengue.

Dengue is caused by the dengue virus (DENV) of family *Flaviviridae*. There are four well-established serotypes of dengue virus (DENV1–4) that infect humans. It is mainly transmitted by *Aedes aegypti* and *Aedes albopictus* female mosquitoes [3]. The first reported incidence of dengue in 2004 was considered to be imported to Nepal from India, based on genetic similarity [4, 5]. Shortly after the first incidence, several cases of dengue have been reported from tropical lowland and subtropical hilly region, including Kathmandu and surrounding cities. In 2006, all four serotypes of the dengue virus were reported [6]. The dengue outbreaks have gradually stretched out towards the hills and mountains from plane tropical regions [7].

The major clinical symptoms of dengue infection in Nepalese patient reported by Khetan et al. were fever (100%), cerebral pain (71.3%), rashes (11.3%), retro-orbital torment (23.5%), retching (23.4%), joint pain (32.1%), and

thrombocytopenia (85.7%) [8]. During the first decade (2004–2013) of Nepalese dengue history, two major epidemics in 2010 and 2013 have been recorded [9]. However, in the last 5 years (2014–2019), a yearly outbreak of the dengue has been more frequent compared with 2004–2013. The number of confirmed annual dengue incidence varied from 336 to 14,662 between 2014 and 2019 (Fig. 1) [10]. The largest-ever outbreak was reported in 2019, infecting more than 14,000 people. Similar to previous years, the outbreak of 2019 has started in midsummer from a tropical region and then spread to hilly subtropical location [11]. In the year 2019, the first dengue case was confirmed in Sunsari District, eastern region of Nepal, on May 13, thereafter, in Makwanpur District, southwest district of Kathmandu, on July 27, and in next 2 months, dengue covered 68 out of 77 districts in Nepal [12]. A total of six deaths have been reported in 2019 [13]. The regional distribution of 2019 dengue outbreak is shown in Fig. 2. The highest number of dengue infection (7151) was noted in Province 3 (Bagmati), which includes the capital, Kathmandu. There were 1583 confirmed dengue cases in Kathmandu alone [13]. Although the major cause of dengue outburst in Kathmandu, which is otherwise considered as not suitable for dengue vectors, is largely unknown, unplanned housing, improper waste management, and highly dense population could be the factors that help the spread of dengue mosquitoes. This alarming situation of the dengue outbreak in Nepal has attracted the attention of international media [14]. This may

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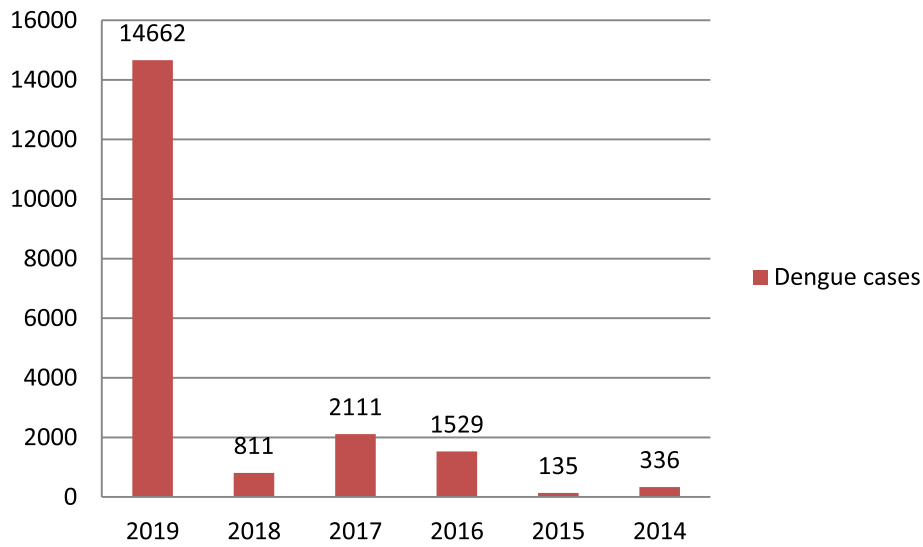


Fig. 1 Year-wise records of dengue cases in Nepal from 2013/2014–2018/2019. Data were taken from the Epidemiology Disease Control Division, Nepal, which records confirmed cases of dengue

influence the campaign of “Visit Nepal Year 2020” where it targets two million tourists [15], whose main route of entry is Kathmandu. Accordingly, such outbreaks do not just influence the national economy, but also expands the dengue hazard to other nations. Given that the majority of

the Nepalese population resides in tropical and subtropical regions, more than 50% of people in Nepal are in the risk of dengue infection [7].

The present situation has indicated that the dengue infections could be explosive in future in this country and

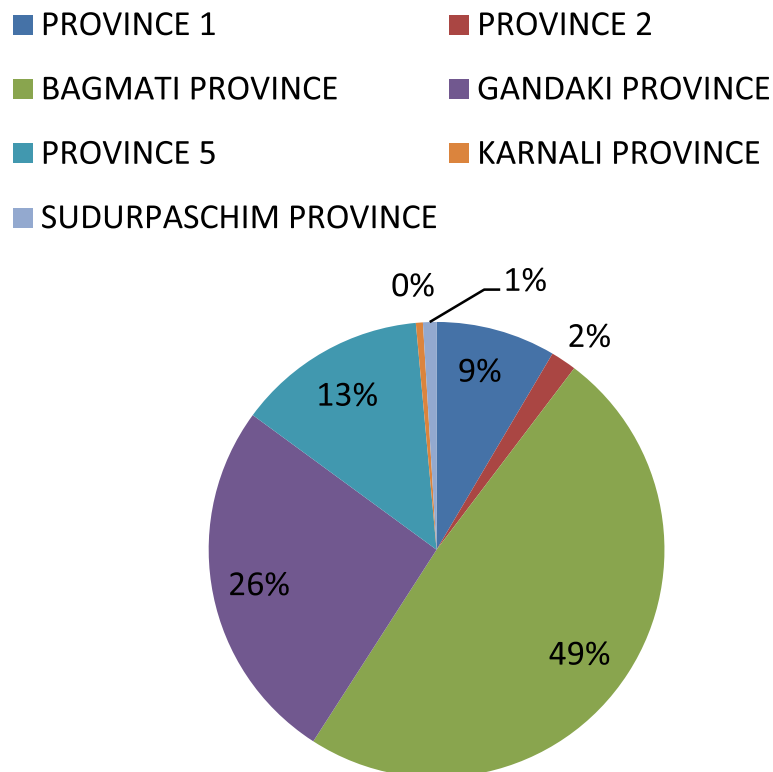


Fig. 2 Region-wise records of dengue cases in Nepal, 2019. Data were taken from the Epidemiology Disease Control Division, Nepal, which records confirmed cases of dengue

currently available disease control measures are not effective to control the transmission of dengue. The government has released national guidelines for the prevention, control, and management of dengue in Nepal [16]. The vector control method is one of the proven control methodologies. There are practices of using insecticide-treated mosquito bed nets in Nepal to control other mosquito-borne infections such as malaria and Kala-zar. However, dengue vectors are diurnal, and this practice does not seem to be protective for dengue [16]. Therefore, there is a need for effective vector surveillance program and awareness to the general public on strategies to control transmission and proliferation of dengue vector. With the increasing trend of visiting overseas in Nepalese community, the risk of dengue transmission from countries other than India and China should also be investigated. Furthermore, the case reported by “Epidemiology Disease Control Division, Nepal” needs to be verified by molecular techniques such as polymerase chain reaction (PCR). This should be supported by well-equipped virology laboratories to track the transmission of dengue serotypes.

Abbreviations

DENV: Dengue virus; PCR: Polymerase chain reaction

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Authors' contributions

NA conceived the idea of the paper, reviewed the literature, and prepared the first draft. DS validated the results, helped in the data analysis, and edited the final manuscript in collaboration with NA. Both authors read and approved the final manuscript.

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Ethics approval and consent to participate

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Consent for publication

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Competing interests

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References

1. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, et al. The global distribution and burden of dengue. *Nature*. 2013;496:504–7.

- Yue Y, Liu X, Xu M, Ren D, Liu Q. Epidemiological dynamics of dengue fever in mainland China, 2014–2018. *Int J Infect Dis*. 2019;86:82–93.
- Ferreira-de-Lima VH, Lima-Camara TN. Natural vertical transmission of dengue virus in *Aedes aegypti* and *Aedes albopictus*: a systematic review. *Parasit Vectors*. 2018;11:77. <https://doi.org/10.1186/s13071-018-2643-9>.
- Takasaki T, Kotaki A, Nishimura K, Sato Y, Tokuda A, Lim CK, et al. Dengue virus type 2 isolated from an imported dengue patient in Japan: first isolation of dengue virus from Nepal. *J Travel Med*. 2008;15:46–9. <https://doi.org/10.1111/j.1708-8305.2007.00165.x>.
- Pandey BD, Rai SK, Morita K, Kurane I. First case of dengue virus infection in Nepal. *Nepal Med Coll J*. 2004;6:157–9.
- Malla S, Thakur GD, Shrestha SK, Banjeree MK, Thapa LB, Gongal G, et al. Identification of all dengue serotypes in Nepal. *Emerging Infectious Diseases*. 2008;14:1669–70.
- Acharya BK, Cao C, Xu M, Khanal L, Naeem S, Pandit S. Present and future of dengue fever in Nepal: mapping climatic suitability by ecological niche model. *Int J Environ Res Public Health*. 2018;15.
- Khetan RP, Stein DA, Chaudhary SK, Rauniyar R, Upadhyay BP, Gupta UP, et al. Profile of the 2016 dengue outbreak in Nepal. *BMC Res Notes*. 2018;11:423. <https://doi.org/10.1186/s13104-018-3514-3>.
- Subedi D, Taylor-Robinson AW. Epidemiology of dengue in Nepal: history of incidence, current prevalence and strategies for future control. *Journal of Vector Borne Diseases*. 2016;53:1–7.
- Year wise status of dengue (2013/2014-23, August, 2019). <http://edcd.gov.np/resources/download/year-wise-status-of-dengue-updated>. Accessed 8 Nov 2019.
- As dengue spreads, officials scramble to contain the disease. <https://kathmandupost.com/health/2019/09/09/as-dengue-spreads-officials-scramble-to-contain-the-disease>. Accessed 3 Jan 2020.
- Pandey BD, Costello A. The dengue epidemic and climate change in Nepal. *Lancet*. 2019;394:2150–1.
- Dengue updates (Nov, 2019). <http://edcd.gov.np/news/download/dengue-updates1>. Accessed 8 Nov 2019.
- Nepal is reeling from an unprecedented dengue outbreak | Science News. <https://www.sciencenews.org/article/nepal-reeling-from-unprecedented-dengue-virus-outbreak>. Accessed 8 Nov 2019.
- Nepal Visit Year Planned for Year 2020 with aim to bring 2 million tourists. <https://www.nepalhikingteam.com/the-year-2020-planned-as-nepal-visit-year/>. Accessed 8 Nov 2019.
- EDCC|National guidelines of prevention, control & management of dengue in Nepal 2019. <http://www.edcd.gov.np/resource-detail/national-guidelines-of-prevention-control-and-management-of-dengue-in-nepal-2019>. Accessed 8 Nov 2019.

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