



Search and Destroy Campaign for Dengue Prevention in Kathmandu

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Abstract

Dengue, a viral disease transmitted by Aedes mosquitoes, has become a significant public health concern in Nepal. Because of the city's rapid development, haphazard settlements, and inadequate sanitation facilities, mosquitoes can reproduce and spread more easily, raising the possibility of dengue transmission. In 2023, Nepal has been witnessing sporadic cases of dengue even during the summer in almost all topographical regions of the country. Climate change, unplanned urbanization, poor solid-waste

management, easy transit between dengue-endemic regions, and limited public health resources are common reasons for dengue outbreaks in Nepal. Although dengue prevention was less of a priority in the country until last year. The "Search and Destroy" campaign is a key approach to controlling and preventing the spread of dengue fever. This strategy focuses on identifying and eliminating mosquito breeding sites to reduce the mosquito population and thereby reduce the transmission of the dengue virus.

Keywords: Campaign; Dengue; Destroy; Search; Slum

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Background



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Dengue is endemic in Nepal. All four serotypes of dengue exist in the country, with DENV 1&2 contributing to the burden. In 2022, the country experienced a dengue outbreak with a total of 55,000 cases and 88 fatalities. This year to date (26 Aug) 19,113 reported dengue cases, 13 confirmed deaths, 75 affected districts, and a number of cases of more than 500 cases in 4 districts [1]. Dengue, a viral disease transmitted by *Aedes* mosquitoes, has become a significant public health concern in Nepal. Because of the city's rapid development, haphazard settlements, and inadequate sanitation facilities, mosquitoes can reproduce and spread more easily, raising the possibility of dengue transmission [2,3]. In Nepal, dengue cases usually increase in July, coinciding with monsoon season, falling between June and September, with most cases reported in September. Hence, the approximate impact will be from July to September 2023. In addition, dengue incidence started even during the winter season and is steadily rising over the year. Mathematical modeling projection conducted by WHO shows that cases have already exceeded the alert threshold since the middle of 2023 when compared to the reported dengue. Which indicates an outbreak in various regions of Nepal [4]. The Government of Nepal has been sincerely trying to address the emerging trend through joint planning and implementation [5]. The number of dengue cases reached its highest level in 2022 and the government declared an outbreak. Dengue infection in Nepal is recurrent, with cyclical muscular pain, and sporadically even death, is spread by mosquito bites [8].

Dengue has disparate effects on different population strata. While pregnant and lactate women, children, and the elderly population are vulnerable to dengue, the young adult population working outside has a higher exposure risk to dengue-infected vectors [8–10]. In addition, the

outbreaks. There is also a high risk of secondary infection among infected individuals, which is indicated by an increasing number of severe dengue cases and case fatality rate. A recent study shows the misconceptions and myths about dengue fever among slum dwellers of 150 participants [6]. Most of the participants (55%) were not aware of the mode of transmission. The rate of infection was higher in females (54.4%) than in males (33.33%). A relatively low 15% of the participants revealed that they were involved in the program for the destruction of the breeding site of the *Anopheles* mosquito [7].

About Dengue

Aedes aegypti and *Aedes albopictus* mosquitoes, which are females, are the main vectors of the mosquito-borne disease dengue, which is spread by their bites. These vectors act as carriers of the dengue virus, transferring it to people because of their blood-feeding behavior. This complex chain of disease transmission between mosquitoes and people highlights the crucial part that these mosquitoes play in the spread of viruses. Given that these mosquito species are the main targets of interventions aiming at reducing the prevalence of dengue, it is imperative to understand this method of transmission to develop effective prevention and control strategies. The virus, which can cause symptoms including a high-grade fever, a headache that lasts all day and joint pain as well.

urban design of major cities in Nepal lacks infrastructural public health aspects, along with a challenging waste management system and poor sanitation facilities, providing vectors with an optimal environment for breeding [11]. People residing in slums or urban cities with poor



sanitation facilities are at greater risk of being affected. Hence, an exponential rise in dengue cases can not only overwhelm health systems but also affect the most vulnerable population with low socio-economic conditions.

Situation in Kathmandu (Kathmandu, Bhaktapur, Lalitpur districts)

With a median elevation of around 1300 meters above sea level, the Kathmandu Valley, home to approximately 5 million people, is situated. The area, which lies in a subtropical valley, has a climate with temperatures ranging from 19°C to 27°C. While during the winter, temperatures can reach as high as 20°C. Notably, maximum temperatures during the summer season are noted to reach around 35°C, and the winter season brings minimum temperatures of roughly -3°C. Throughout the year, the average ambient humidity is around 75%. Nepal's average annual maximum temperature is on the rise, having increased by 0.056°C over the previous 40 years. The vicinity obtains 1400 mm of annual rainfall on average [2,3]. This climatic profile holds significance when assessing factors that contribute to the prevalence and transmission of diseases like dengue, given its connection to mosquito breeding patterns and disease dynamics.

The incidence of dengue cases in Kathmandu has experienced a concerning surge over the past decade. Instances of outbreaks have been notably documented during the monsoon season, which spans from June to October, coinciding with the period of heightened mosquito breeding activity. The cities densely populated slum areas, due to their inadequate sanitation facilities, insufficient waste management systems, and limited accessibility to healthcare services, have emerged

as particularly susceptible to the transmission of dengue. These slum regions in Kathmandu face an array of challenges that encompass not only issues of basic living conditions but also hindered access to vital healthcare services, contributing to the elevated prevalence of the disease. Among the concerns confronting these areas are livability standards, availability of healthcare resources, and the prevalence of diseases such as dengue fever. This ailment has now assumed the status of a major health crisis that profoundly impacts these vulnerable communities. Stagnant water accumulation during this period provides an optimal breeding ground for mosquitoes, intensifying the prevalence of dengue. The insufficient drainage systems and inadequate waste management practices further contribute to the expansion of mosquito breeding habitats. Consequently, slum residents are at an increased risk of contracting dengue and suffering its associated consequences, given the prevalence of the virus in these areas. Considering this challenge, the primary objective of the project is to mitigate the impact of dengue within Kathmandu's slum communities. This multifaceted strategy encompasses various components, including comprehensive awareness programs, among other initiatives, aimed at tackling the issue holistically.

Search and Destroy Strategy

The "Search and Destroy" strategy is a key approach to controlling and preventing the spread of dengue fever in many countries, including Nepal. This strategy focuses on identifying and eliminating mosquito breeding sites to reduce the mosquito population and thereby reduce the transmission of the dengue virus. Given the complex nature of dengue transmission and the unique challenges faced in slum areas, a multi-faceted approach that combines various strategies



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is necessary to effectively combat the disease. This approach would involve combining efforts in awareness campaigns, search and destroy for vector control via a community engagement approach, and advocating health workers and leaders for partnerships, and appropriate treatment and prevention.

PHRSN initiatives

The PHRSN has implemented a comprehensive strategy known as the "Search and Destroy" approach to combat the proliferation of dengue. This initiative focuses on proactive measures to identify and eliminate potential breeding sites for the *Aedes* mosquitoes, which are the primary vectors responsible for transmitting the dengue virus. The strategy encompasses several key components aimed at reducing mosquito populations and curbing the transmission of the disease. Under the "Search" aspect of the strategy, community engagement and public awareness campaigns were prioritized. Residents of slum dwellers are educated about the common breeding sites of *Aedes* mosquitoes, which

Conclusion

Nepal has an opportunity to strengthen its dengue prevention and control program, from national to the local government levels. The revised national program should focus on case and vector surveillance in communities, the improvement of clinical and laboratory diagnosis capacities, and a protocol-based case management approach. Integrated vector management, early warning and reporting during outbreaks, health promotion, advocacy, and research are other areas for improvement. Furthermore, climate change is responsible for the expansion of dengue toward new areas and altitudes. The PHRSN's vision also

include stagnant water in containers, discarded tires, and other items that can collect rainwater [7]. This empowers individuals to actively search for and eliminate these breeding sites in and around their homes and communities.

The "Destroy" element focuses on taking swift action once potential breeding sites are identified. This involves proper disposal of waste, ensuring proper drainage systems, and adopting preventive measures. Larvicides target mosquito larvae in stagnant water sources, rice fields, and possible mosquito breeding sites. Collaboration between government agencies, non-governmental organizations, and local communities is vital to implement these measures effectively. The PHRSN initiative also emphasizes the importance of ongoing monitoring and evaluation to gauge the success of the "Search and Destroy" strategy and make necessary adjustments. By addressing the root cause of mosquito breeding, the PHRSN's "Search and Destroy" approach aims to significantly reduce the occurrence of dengue in Kathmandu Nepal and mitigate its impact on public health.

incorporates environmental control measures, such as the search and destruction of potential breeding sites for mosquitos in slum dwellers of Kathmandu, Nepal. The perception and knowledge of dengue fever among the residents of slum areas are crucial for the prevention and control of the disease. The public should be at the forefront of such control strategies so that the negative impacts of future dengue epidemics can be reduced, and the effectiveness of control programs sustained.



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