



1 Introduction

The 2019 Dengue Outbreak was an indication of a serious public health issue in Nepal. Dengue, which was first reported in 2004 in the country is increasingly becoming common across the country. Only 10 districts out of 77 could remain immune to the disease in 2019. Current measures for dengue control are largely insufficient and ineffective posing a future threat to the population (Adhikari & Subedi 2020).

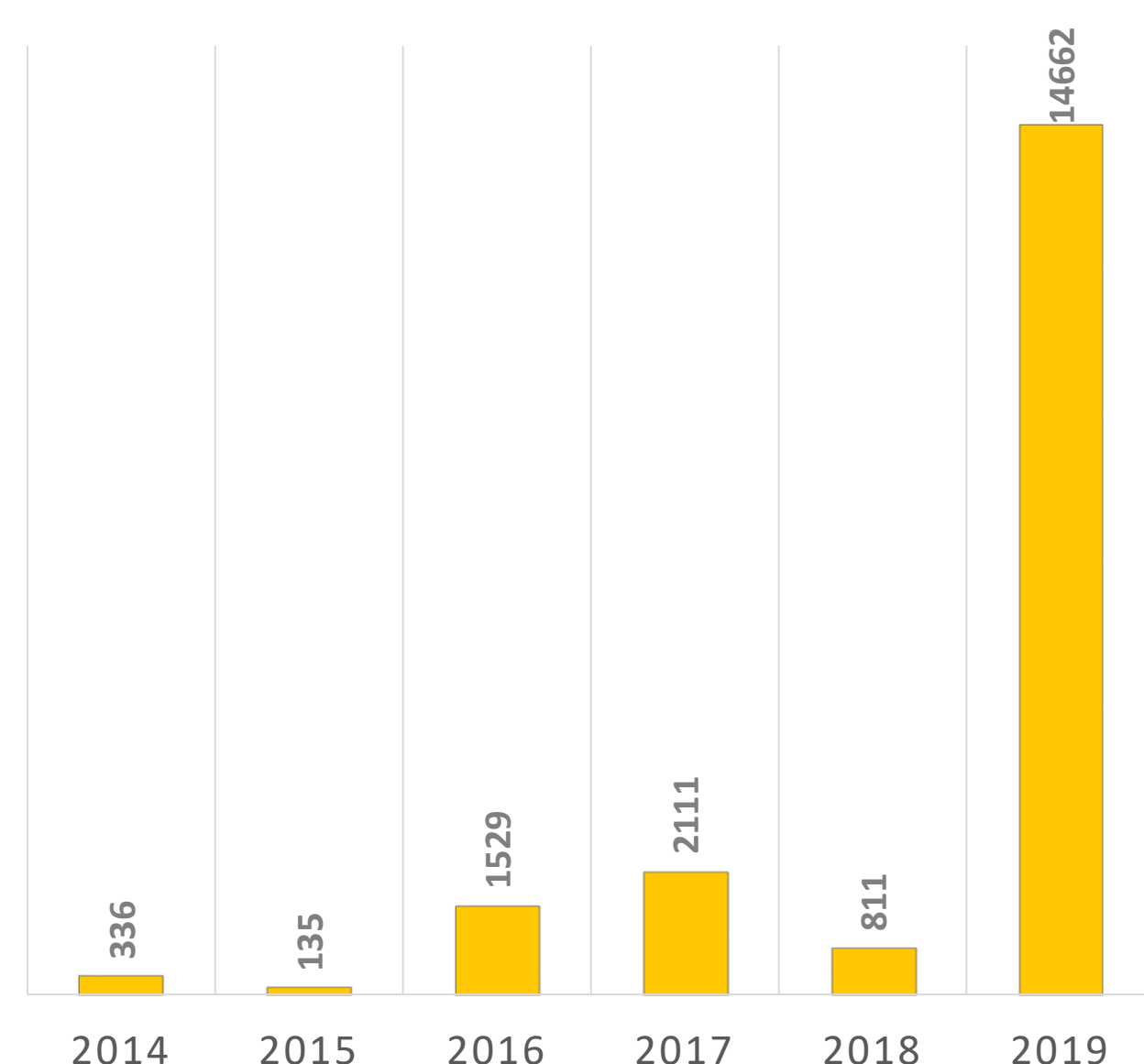


Figure 1.1: Dengue cases in Nepal

(Source: Epidemiology and Disease Control Division, Dept. of Health Services, Ministry of Health and Population)

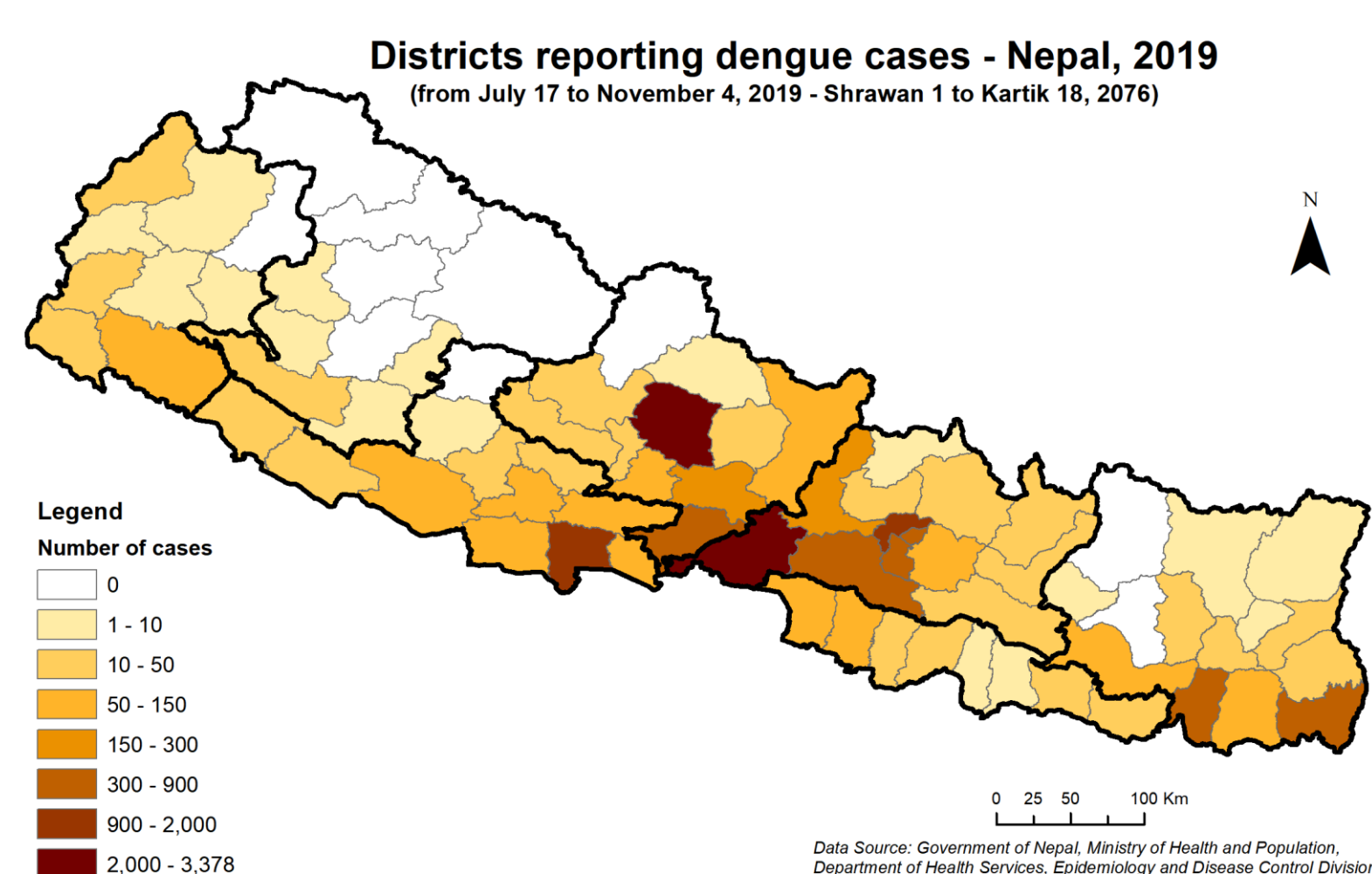


Figure 1.2: Prevalence of Dengue in 2019

The most important method of preventing the transmission of dengue is controlling its vector, the *Aedes* mosquitoes. The dengue virus belonging to *Flaviviridae* family causes dengue infection. The virus is transmitted by *Aedes aegypti* and *Aedes albopictus* female mosquitoes. We generally deal with these mosquitoes using nets, repellents, fish breeding and fumigation. But do they really help?

For the correct response to the problem, we need to understand some facts about the disease vectors.

- Dengue vectors are diurnal unlike other mosquitoes causing Malaria or Kala-zar. Using nets at night is thus less helpful.
- The eggs of the mosquitoes need clean water in order to hatch into larva. Hence, any surface that can retain water is an ideal place for these vector to breed.
- Aedes* are expanding their geographic range due to global warming. Besides temperature, rainfall is also associated with their breeding.

Non-biodegradable waste such as plastic containers, metal cans, rubber tyres, porcelain materials, glass etc. can act as “dengue vector producers” as they provide the surface for water accumulation where mosquitoes can easily breed. Solid wastes are thus potential larval habitats. Past studies have identified these wastes as hazardous containers for sustaining the *Aedes* mosquitoes (Krystosik et al. 2020; Banerjee et al 2015; Dutta et al. 1999).

2 Materials and Methods

This study is mainly based on review of published reports and articles. Evidences of linkage between dengue and solid waste as well as successful measures for dengue control through waste management have been collected from scholarly publications.

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3 Results and Discussion

3.1 Solid Waste Management (SWM) in Nepal

- Institutional waste has over 70% of non-biodegradables like plastics, papers, metals and rubbers whereas it amounts to 54% for commercial waste.
- Waste segregation is rarely practiced in Nepal and open dumping on the roadside or riverbanks is rampant.
- Residence time for waste varies from 5 to 10 days before municipality takes it to landfill site. This period is sufficient for an egg to develop into adult mosquito. During rainy season, more challenges are added such as difficulty in segregating the wet waste, delayed transfer to landfill due to road disturbances and so on.
- Such poor SWM practices and services are offering the best environment for mosquitoes to breed.

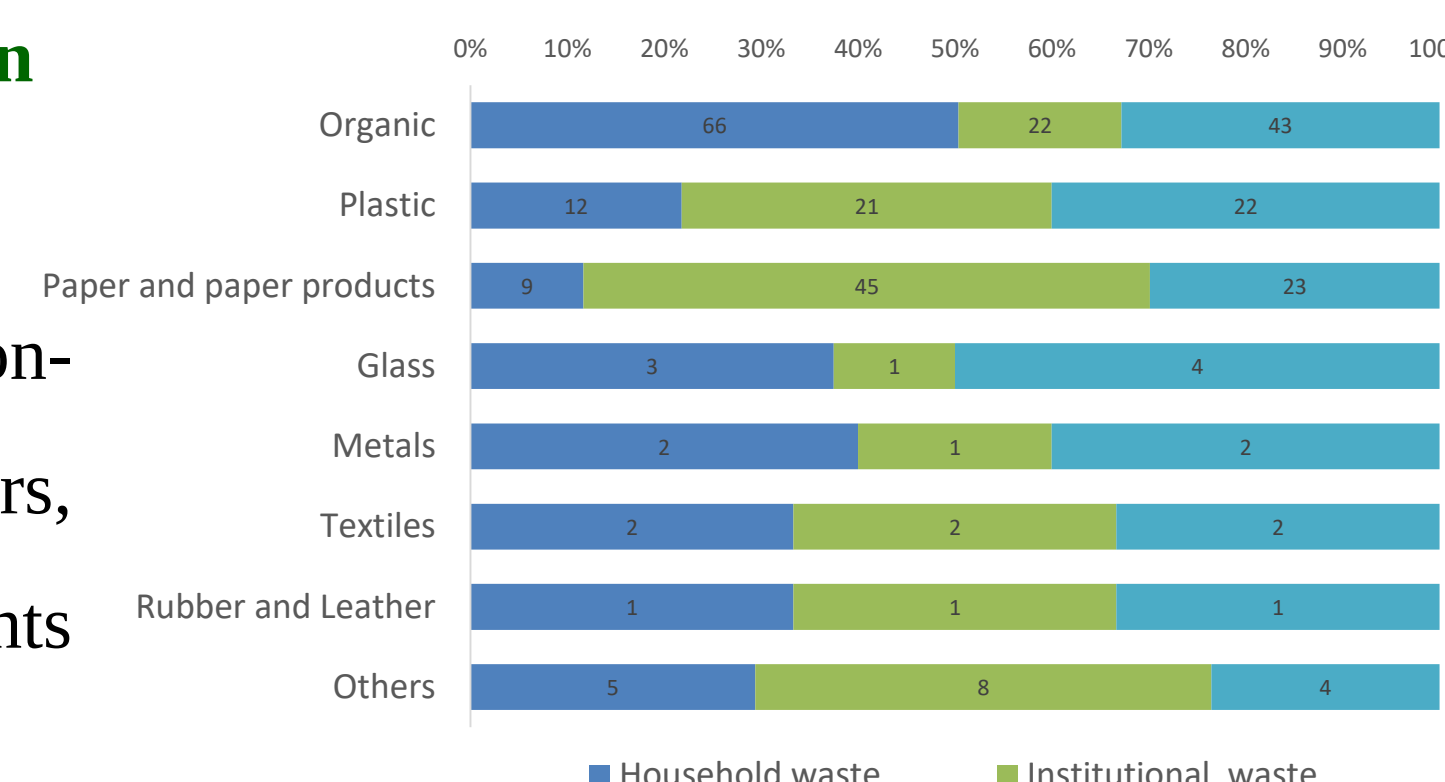


Figure 3.1: Waste composition in Nepal
Source: ADB, 2013

3.3 Evidences of dengue vector control through SWM

- Cuba:** Community based environmental management approach, health education (Vanlerberghe et al. 2009)
- Nicaragua and Mexico:** Clean-up campaigns, community participation and community empowerment (Andersson et al. 2015)
- Sri Lanka:** Community mobilization, household-level waste management, composting of household waste, improvement of garbage collection (Abeyewickreme et al. 2012)
- Uruguay:** Innovative intervention (community empowerment, media campaigns, pick-up facility etc.) to eliminate unwanted water containers involving community, municipality and Ministry of Public Health (Basso et al. 2015)

4 Conclusions and Recommendations

- Dengue is an emerging disease in Nepal and is representing one of the major public health threats. Although vector control is the key solution to dengue transmission, interventions on solid waste management from the perspective of eliminating larval habitat has not received much attention.
- Studies have shown that waste management and clean-up campaigns such as community events, garbage collection, education on waste management and integrated vector management mainly involving the locals have helped to control dengue vectors in many parts of the world.
- A single measure is not sufficient to control the disease. Hence, Integration of vector control with SWM services can yield multiple benefits. Frequency of waste collection needs to be improved, especially during vulnerable seasons like summer and monsoon, festivals, and ceremonies during which more waste are generated. Reducing solid waste not only reduce the environmental burden but also reduce spreading of disease like dengue.