

# Vector management for dengue

Authors: Kaur G, Ahmed S, Watkins D, Coates MM, Økland JM, Haaland ØA, Johansson KA

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## Description of condition and intervention

Dengue is a mosquito-borne viral disease transmitted by female mosquitoes of species *Aedes aegypti*. It is caused by Flaviviridae virus family. DENV-1, DENV-2, DENV-3 and DENV-4 are the serotypes of virus that can cause dengue. About 390 million dengue virus infections occur per year globally. Out of these cases 96 million (67–136 million) manifest clinically (with any severity of disease). The transmission of virus to humans takes place through the bite of infected female mosquito. Diagnostic tests like serological and virological methods (RT-PCR) help to confirm the presence of dengue infection. Treatment of dengue is symptomatic and involves primarily antipyretics and specific analgesics to control the fever and muscle aches (WHO 2021).

Vector management of dengue is an important strategy to control the mosquito vector breeding sites near to human habitation. This involves avoiding collecting of water at places that could serve as mosquito breeding sites. Personal preventive measures from mosquito bites like use of window screens, coils, repellents, insecticide treated materials, less exposure of skin is also important. Community engagement by educating the community and engaging the community for sustained vector control. Active mosquito and virus surveillance can be done for the vector management of dengue (WHO 2010). In this evidence brief we assess the effects and cost of vector management for dengue.

EVIDENCE BRIEF

Vector management for dengue

(DCP4 ID: NTD01-02)

Cluster: Neglected Tropical Diseases

**FairChoices**

DCP Analytic Tool

## International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
Asian Development Bank and World Health Organization	<a href="#">Managing regional public goods for health: community-based dengue vector control</a>	Yes

## Intervention attributes

### Type of interventions

Curative

### Delivery platform

This intervention is an example of population-based intervention and may be delivered at the community level.

### Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

## Time dependence

Moderate level of urgency. Treatment outcomes may be affected by some days of delay.

## Population in need of interventions

Treated population: All individuals (prevalent cases) of dengue in the age group of 0 to 99 years and gender are eligible to receive the intervention. The treated fraction is assumed to 100% for this intervention.

Affected population: The affected population includes those with dengue in the age-group of 0 to 99 years, both genders. The affected fraction by this intervention is assumed to be 100%.

## Disease states addressed

This intervention targets dengue infection.

## Intervention effect and safety

Table 1: Effect and safety of vector management of dengue

Effect of intervention		Certainty of evidence
Mortality (due to condition)	0.2 relative risk reduction (assumed)	See appendix

## Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Intervention	Vector management of dengue	
Cost calculation		
Treated population	Based on prevalence of dengue	Global Burden of disease study 2019
Gender	Both	
Age	0 to 99 years	
Treated fraction	1	
Effect calculation		
Affected Population	Those with condition	

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Affected gender	Both	
Affected fraction age	0 to 99 years	
Affected fraction	1	
Comparison	placebo or other care	
Mortality Reduction (RRR)	0.2	

RRR: Relative risk reduction

## Intervention Cost

The cost for vector management for Chagas disease, visceral leishmaniasis, dengue, and other nationally important causes of nonmalarial fever is 284.66 per case in 2004 USD in Argentina. The unit cost is calculated based on the study by Gonzalo M. et al 2009. <https://journals.plos.org/plosntds/article/authors?id=10.1371/journal.pntd.0000363> which reported the cost of the horizontal program and the number of cases of Chagas disease in Argentina based on retrospective (1993–2004) records from the Argentinean Ministry of Health for the Moreno Department, Northwestern Argentina. Based on the estimates provided by the study, we calculated the unit cost per case by dividing the direct price for the horizontal program for vector management by the number of cases.

## References

WHO 2021: World Health Organization. Dengue and severe dengue [Internet]. [cited 2021 Nov 29]. Available from: <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>

WHO 2010: World Health Organisation. WHO | Better environmental management for control of dengue. WHO. 2010

World Health Organization. Managing regional public goods for health: community-based dengue vector control.

Johansson KA et al 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

# Appendix

## Literature Review for effectiveness & safety

This literature search is an example of a level 1 search of literature and guidelines for vector management of dengue infection.

Level 1: intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, meta-analysis, systematic review, clinical practice guidelines)