

# Effects of high temperatures and heatwaves on dengue fever: a systematic review and meta-analysis

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## Background and Objective

- Dengue virus (DENV) infection is a disease transmitted by the primary arthropod *Aedes aegypti* and *Aedes albopictus* mosquitoes.
- Spread in 128 countries and globally over 390 million cases



(Zeng et al. 2017)

- To determine the **risk of dengue fever** infection per unit increase in exposure to ambient temperature and heatwaves

## Methods

### Database search



### Inclusion and Exclusion criteria following PECOS:

- A peer reviewed epidemiological studies (S) in the general population (P), that reported comparative risks (C) of dengue infection (O) over different ambient temperature and heatwaves exposures (E)

### Evidence assessment and Data

- Risk of Bias
- Quality of Evidence
- Strength of evidence

### Data Analysis and Synthesis

- Random effect meta-analysis
  - Relative Risk (RR) per Unit increase

## Results



**106 studies included**

- 102 high
- 5 Heatwave



**> 4,000,000 cases**



**32 countries**

- A 1°C ↑ RR= 13% (95%CI: 1.11–1.16)
- Heatwaves** ↑ RR= 8% (95%CI: 0.87–1.34)



(Murray et al. 2013)

↑ in tropics, low and middle income nations

### Strength of evidence

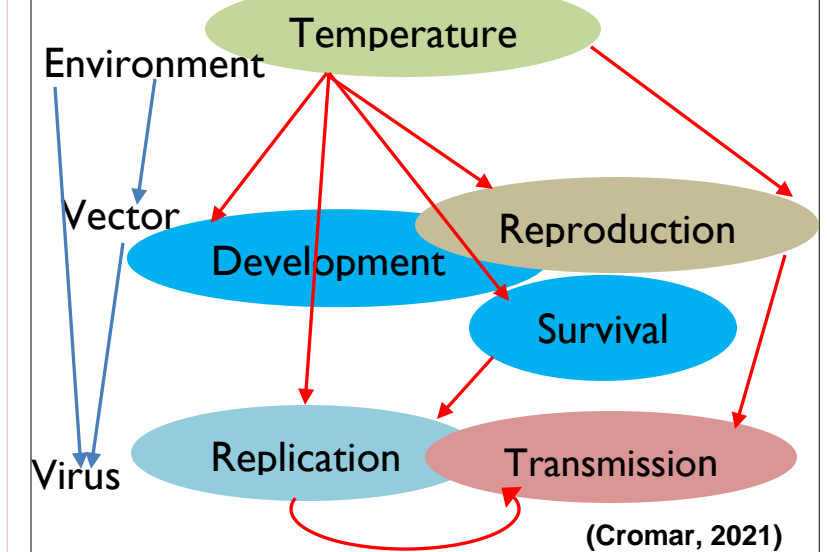
Low Risk of Bias

High Quality of evidence

Increasing trend

**Sufficient evidence**

## Discussion and Conclusion



Temperature takes complex pathways in dengue transmission

- vector cycle, virus replication and transmission
- Climate change spreads dengue to temperate climate regions

- Provide evidence to develop localized dengue warning systems

### References

- Zeng, Z., Zhan, J., Chen, L., Chen, H. and Cheng, S., 2021. Global, regional, and national dengue burden from 1990 to 2017: A systematic analysis based on the global burden of disease study
- Murray, N.E.A., Quam, M.B. and Wilder-Smith, A., 2013. Epidemiology of dengue: past, present and future prospects. *Clinical epidemiology*, 5, p.299.
- Cromar, L. and Cromar, K., 2021. Dengue fever and climate change. In *Climate Change and Global Public Health* (pp. 273-310). Humana, Cham.