Economic burden of chikungunya in an outbreak setting: A modelling study in Rome and Nice

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BACKGROUND

Chikungunya: A growing public health and economic threat in Europe

Chikungunya:

- Most common symptoms are fever, muscle and joint pain, and a rash[1,2]
- **Chronic symptoms** in 40-50%[3,4]
- Transmitted by *Aedes* mosquitoes, present **in most parts of Europe[5]**

Risk is increasing, with in 2025:[5]

- **~ 700 cases in France**
- **~ 350 cases in Italy**

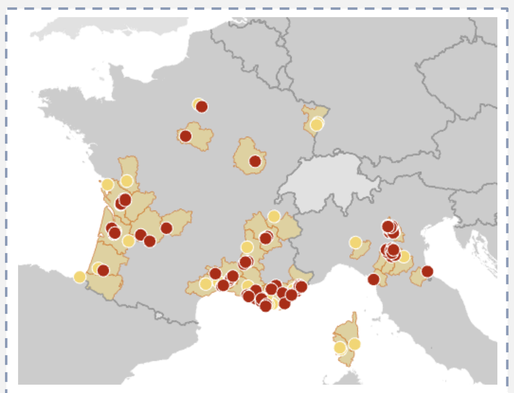

Figure 1. Distribution of chikungunya cases in 2025 until 8 October 2025.
Source: ECDC Chikungunya virus disease: Surveillance and updates.

METHODS

Estimate the potential size and economic impact of CHIKV outbreaks in Nice and Rome

- Urban chikungunya outbreak models – Rome[6] and Nice
- Economic aspects playing a role during a chikungunya outbreak[7]
  - Costs related to *damages/losses*: modelled direct and indirect costs
  - Costs related to *disease management*:* literature estimates[8]

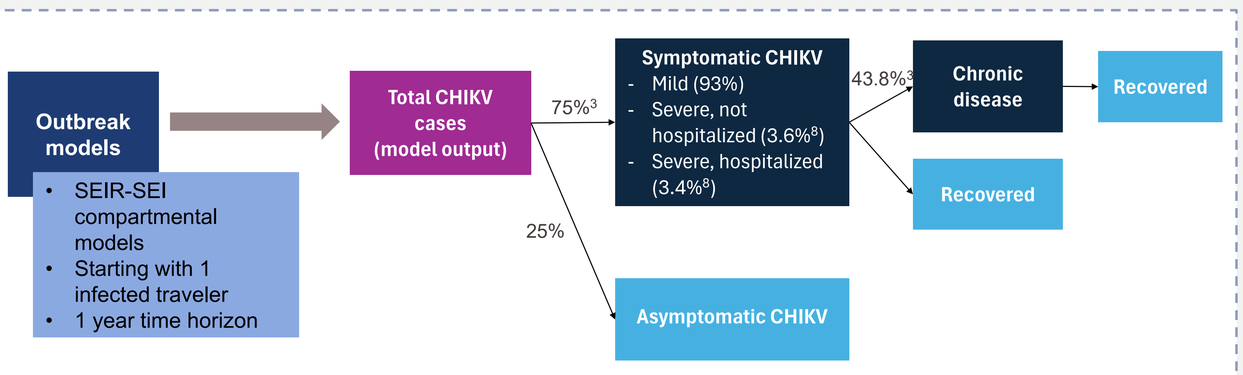

Figure 2. Schematic overview of the study.

RESULTS

Model projections indicate ~5% infection during a chikungunya outbreak in European cities

- Between 4.8% (Nice) and 6.2% (Rome)[6] of the urban population could be infected during an outbreak.
- This corresponds to ~16,000 and ~170,000 infections, respectively

Total costs extend beyond healthcare expenditures, encompassing acute management expenses and substantial long-term disease costs

Costs playing a role in a chikungunya outbreak are:

- Direct medical and non-medical costs
- Indirect costs
- Surveillance and vector control costs
- Personal protection costs
- Awareness campaign costs

Chikungunya costs

Costs related to damages/losses

	Acute (symptomatic) disease (75%)		Chronic disease (43.8%)
	Mild (93%)	**Severe (7%)**	
Diagnostics	RT-PCR	RT-PCR	-
Healthcare use	GP visits	Emergency care visit Hospitalization (50%)	Specialist visit Physiotherapy
Medication	Paracetamol	Paracetamol	Paracetamol, NSAIDs, prednisone, DMARDs
Indirect costs		Cost of absenteeism	Cost of absenteeism

Costs related to disease management

- Surveillance
- Personal protection
- Vector control
- Awareness campaigns

* Management costs: Only includes costs related to larvicide, adulticide and breeding site removal. Calculated as €40 per hectare, based on Trentini *et al.* (2018).

The modelled Rome outbreak leads to ~170,000 infections, corresponding to an economic burden of €66.2 million

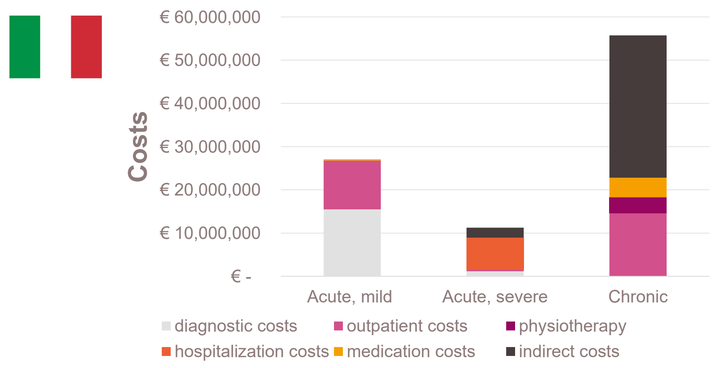

Figure 4. Direct and indirect costs of chikungunya, per disease stage – Rome, Italy

Est. cost per case:

- Acute, mild: €227
- Acute, severe: € 1,254
- Chronic: € 406

Management costs*:

~ € 5,1M

The modelled Nice outbreak leads to ~16,000 infections, corresponding to an economic burden of €5.4 million

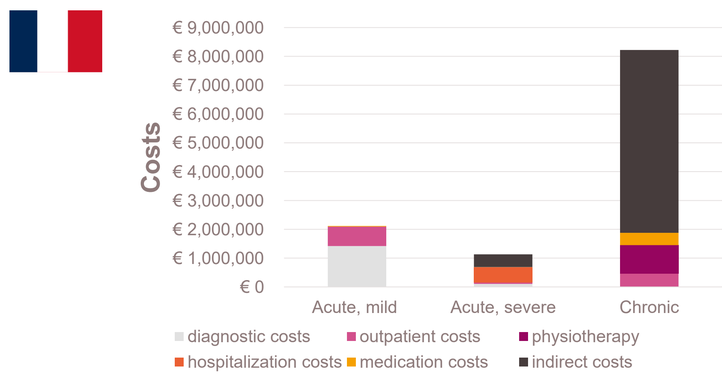

Figure 5. Direct and indirect costs of chikungunya, per disease stage – Nice, France

Est. cost per case:

- Acute, mild: €188
- Acute, severe: € 1,334
- Chronic: €355

Management costs*:

~ € 290,000

CONCLUSION

- **Our models highlight the potential for chikungunya outbreaks in European urban centers under favorable conditions, with ~5% of the population potentially infected.**
- **Beyond the immediate health impact, such outbreaks may result in substantial economic consequences, including direct medical costs, long-term costs from absenteeism due to chronic disease, and disease management costs**
- **Chikungunya outbreaks could impose unanticipated economic burdens of several million euros, representing costs not accounted for in public health budgets and ultimately borne by governments and healthcare payers.**
- **These findings underscore the importance of surveillance, vector control, and preparedness planning in at-risk cities.**

References

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Disclosures

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