

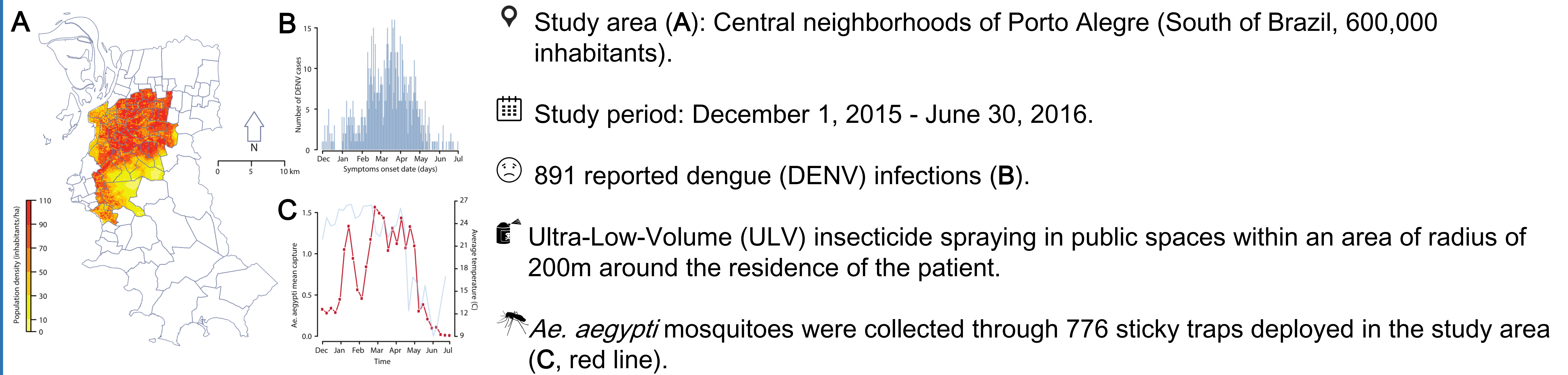
Effectiveness of adulticides in preventing dengue transmission in temperate non endemic metropolitan areas

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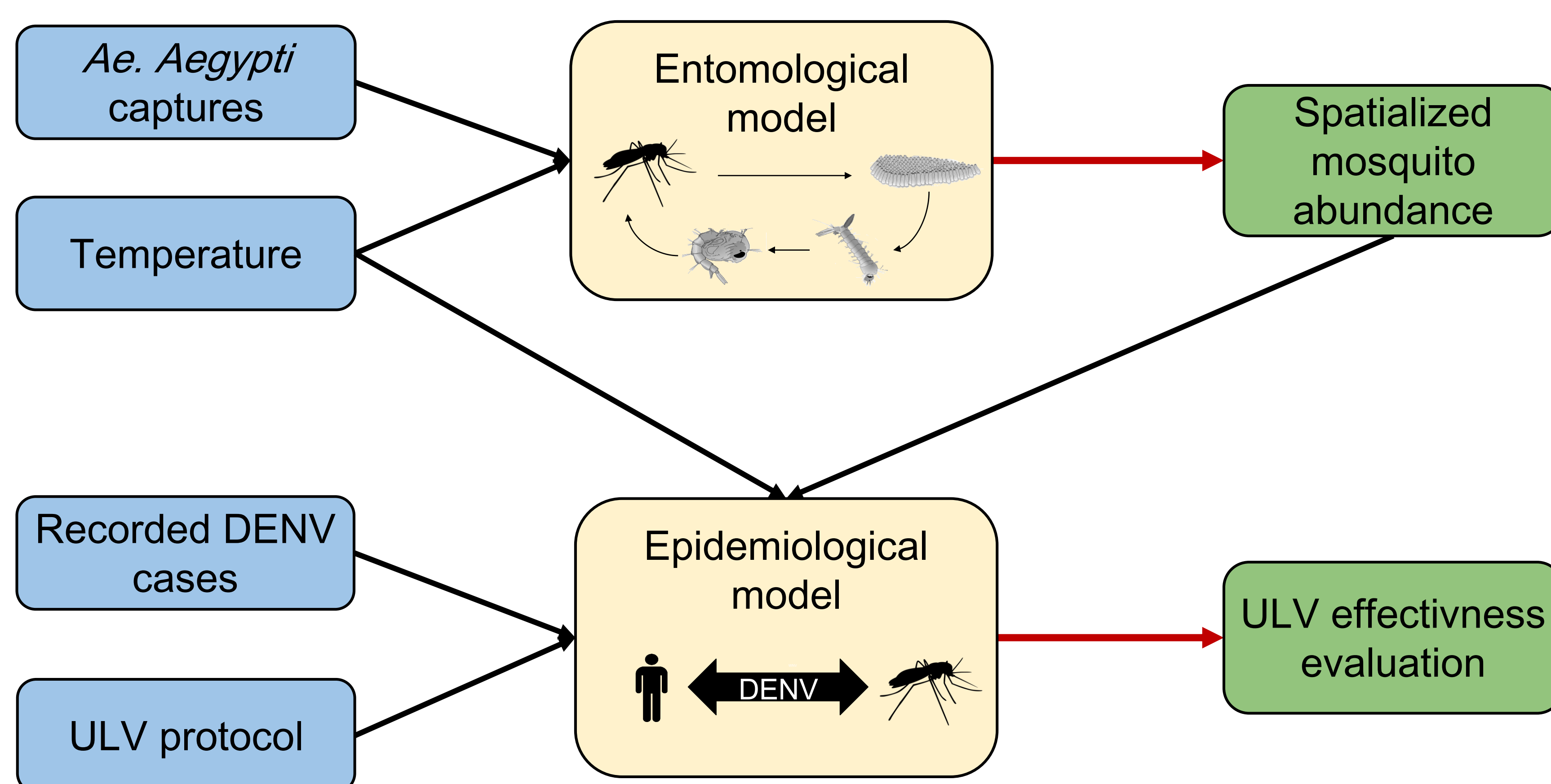
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Background

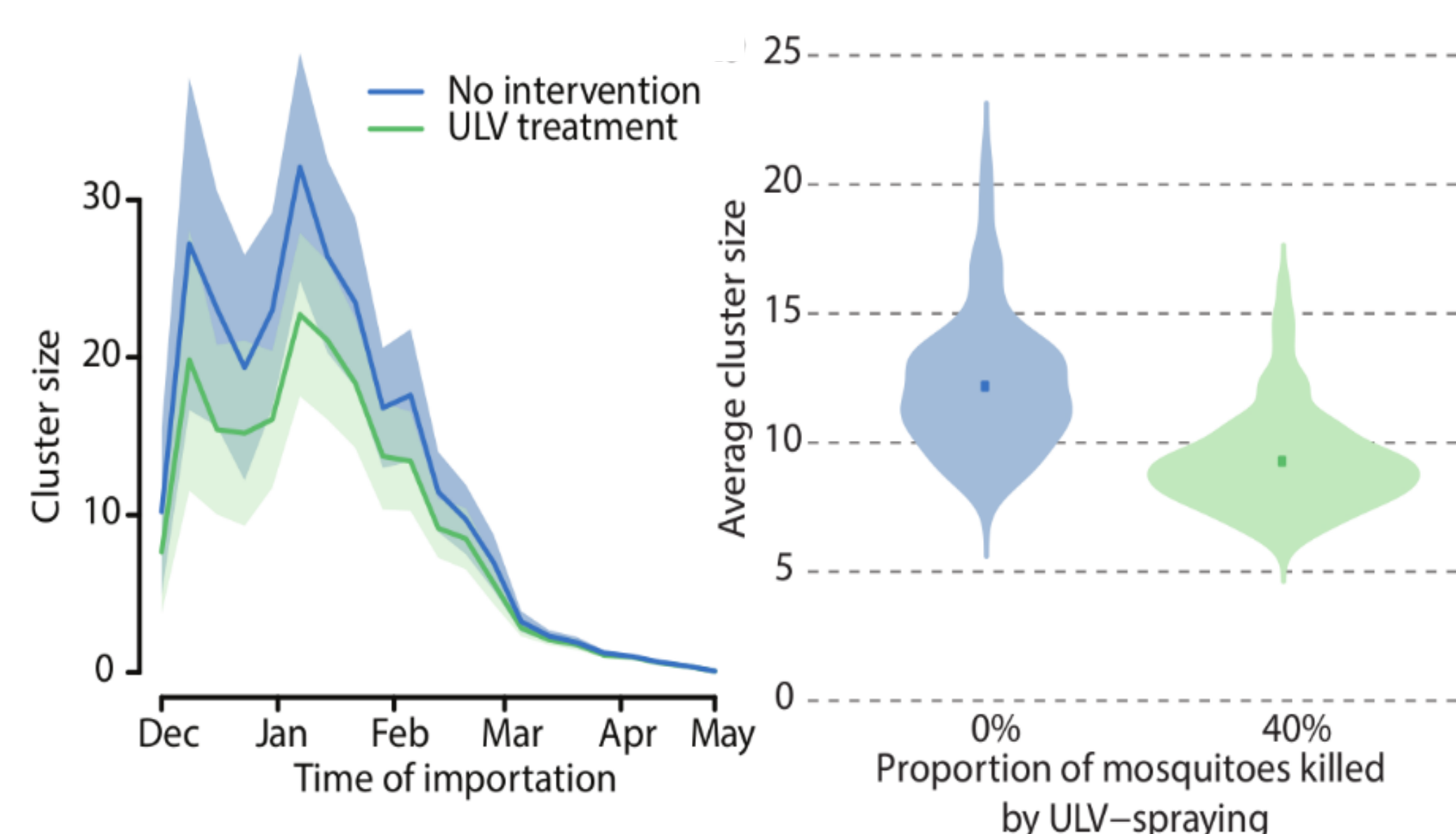


Computational framework



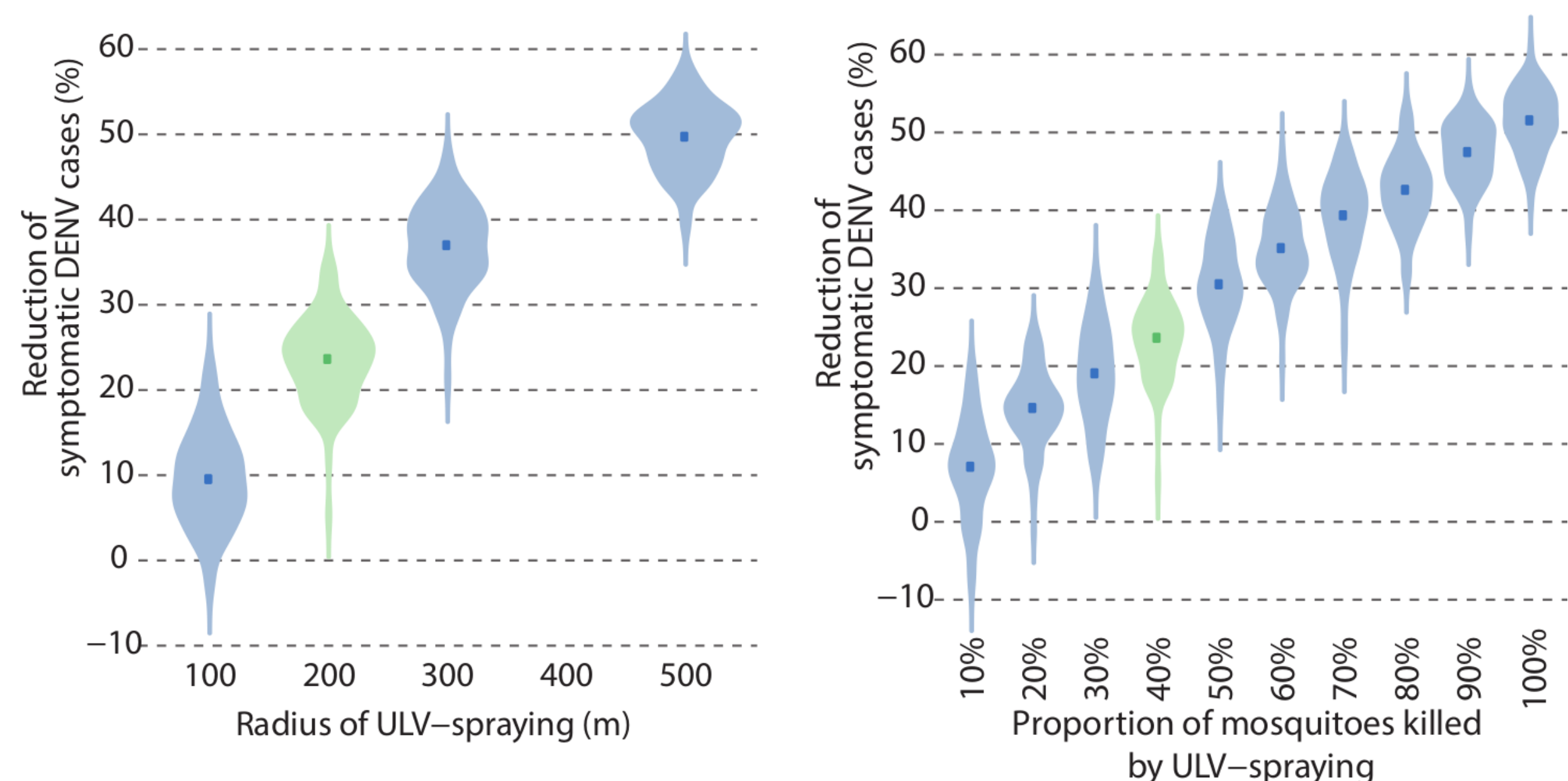
1. Entomological capture data was used to estimate the spatiotemporal distribution of mosquito abundance.
2. DENV dynamics was implemented by considering a standard SEIR-SEI model with distance-dependent kernel.
3. We simulate single transmission clusters (all human infections directly and indirectly generated by a single index case) to compare the number of symptomatic DENV cases obtained with and without treatment and with different control protocols.

Results



- ULV kills 40% of mosquitoes (estimated)
- Average cluster size: 11.9 → 9.1 (23.9% reduction)
- Peak reduction of 38.0% for clusters starting at the end of December.

Protocol modifications would significantly affect ULV effectiveness:



Conclusions

- ULV has been rarely evaluated in terms of its impact on DENV transmission in real-life settings.
- Current ULV protocol avoided approximately **one fourth** of all symptomatic cases.
- Performance of ULV intervention was negatively affected by the **low estimated efficiency** in killing existing mosquitoes in the treated area.
- Control outcomes could be **improved** by **increasing** the targeted area and **including** private premises, but trade-offs against increased efforts need to be carefully analyzed.

Marini G, Guzzetta G, Marques Toledo CA, Teixeira M, Rosà R, Merler S (2019) Effectiveness of Ultra-Low Volume insecticide spraying to prevent dengue in a non-endemic metropolitan area of Brazil. PLoS Comput Biol 15(3): e1006831.

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