Medical Xpress

Southern Europe risks Zika outbreaks this summer

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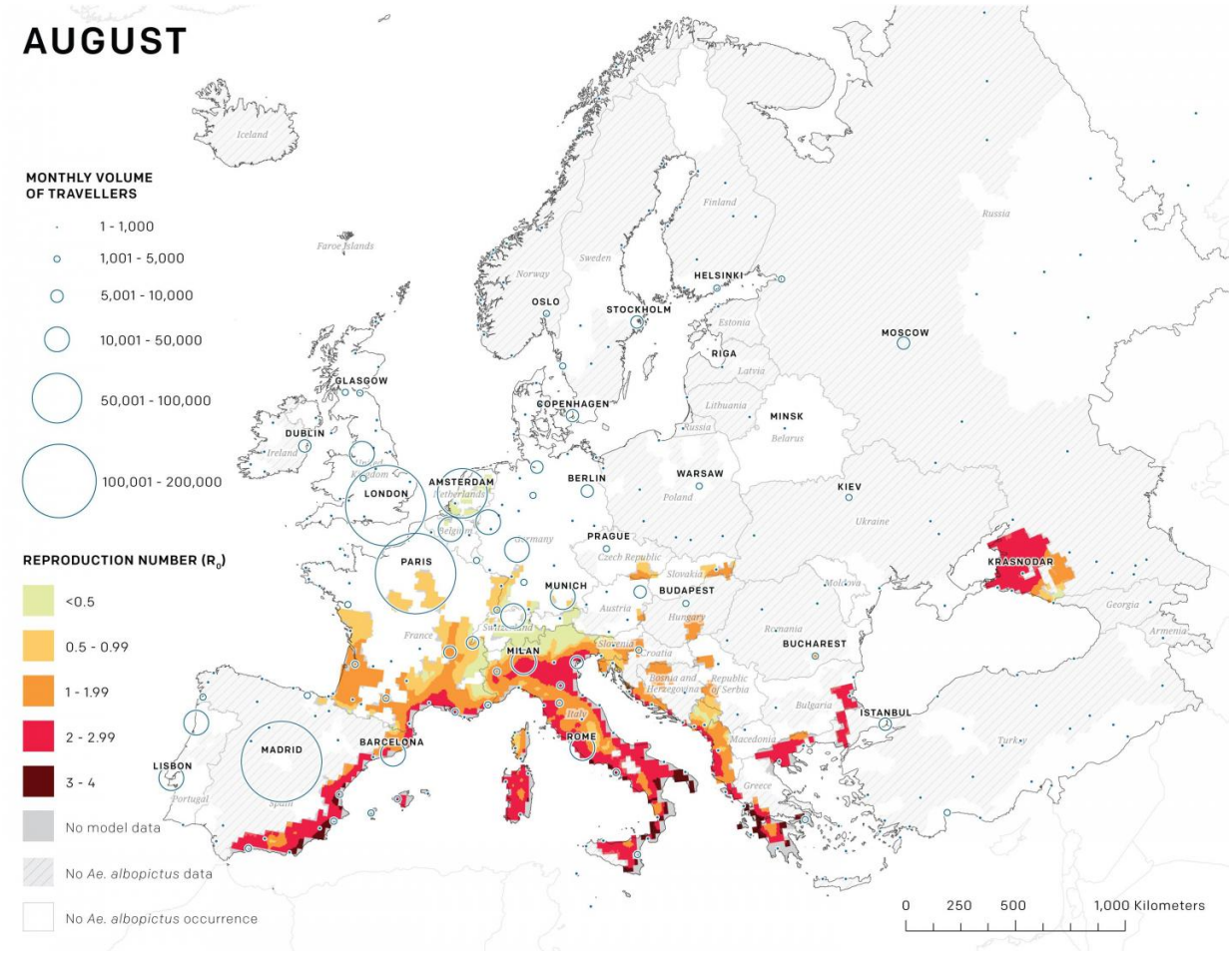


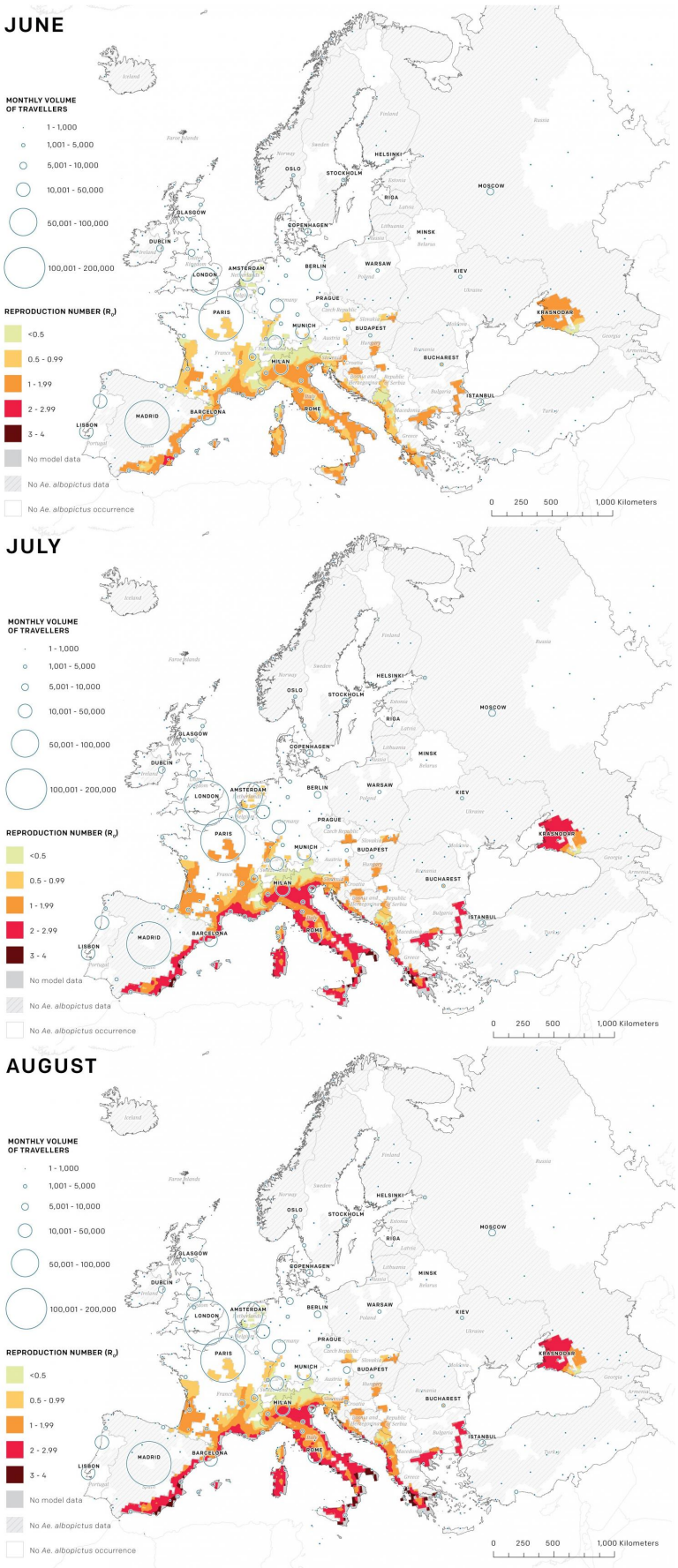
Risk areas for August. Reproductive number (R0) explains the estimated epidemic growth rate of Zika. At levels below 1 epidemics die out. At higher values the epidemic grows exponentially. Credit: *EBioMedicine*

Established *Aedes-mosquito* population could spread the Zika virus in Europe this summer if infected travelers introduce the virus. An analysis of temperatures, vectorial capacity, basic reproductive number (R0), and air traveler flows suggests parts of Southern Europe may be at risk for Zika outbreaks between June and August. This according to a study, led by Umeå University researchers in Sweden and published in the journal *EBioMedicine*.

"We know warm climates create the kind of conditions suitable for mosquito-borne illnesses to spread," says Joacim Rocklöv, researcher at Umeå University's Unit for Epidemiology and Global Health and co-author of the article.

"Vectorial capacity depends on a number of parameters but in general, warmer temperatures increase the rate in which the female mosquitos bite, the mosquito virus reproduction, and their virus transmission risk. The presence of established *Aedes mosquito* populations, the warmer climate and the coinciding peak flow of air travelers into Europe, is a triage making Southern Europe fertile ground for Zika."

Following a similar epidemiological study conducted on the similar dengue virus, the group of researchers led by Joacim Rocklöv at Umeå University, used a temperature dependent computer model to predict Zika virus infection risks for Europe. The research exploration was undertaken in close collaboration with the European Centre for Disease Prevention and Control (ECDC). In the analysis, the researchers overlaid data on monthly flows of airline travelers arriving in European cities from Zika-affected areas, data on month-by-month estimates of virus infection reproduction capabilities of Aedes-mosquito populations in Europe, and human population data within the areas where mosquito-borne transmission of the Zika virus could be possible.


JUNE
JULY
AUGUST
MONTHLY VOLUME OF TRAVELLERS
1 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 200,000
REPRODUCTION NUMBER (R_0)
<0.5
0.5 - 0.99
1 - 1.99
2 - 2.99
3 - 4
No model data
No Ae. albopictus data
No Ae. albopictus occurrence
HELSINKI
OSLO
STOCKHOLM
RIGA
MOSCOW
GLASGOW
COPENHAGEN
MINSK
DUBLIN
LONDON
AMSTERDAM
BERLIN
WARSAW
KIEV
PRAGUE
PARIS
MUNICH
BUDAPEST
KRASNODAR
BUCHAREST
MILAN
ISTANBUL
ROME
MADRID
BARCELONA
LISBON
0 250 500 1,000 Kilometers

Risk areas for Zika in June-August. Reproductive number (R0) explains the estimated epidemic growth rate of Zika. At levels below 1 epidemics die out. At higher values the epidemic grows exponentially. Credit: *EBioMedicine*

The main findings, presented in *EBioMedicine*, a journal initiative integrating the *Lancet* and *Cell*, are:

- The risk of mosquito-borne transmission of Zika virus is estimated to peak between June and August in parts of Southern Europe (see map)
- The peak flow of air travelers from regions of the Americas affected by the Zika virus coincides with the peak in the *Aedes-mosquitos* capacity to transmit the virus.
- The findings could help European public health officials to identify locations and times where the risk for Zika is heightened.

The risk assessment assumes that European *Aedes-mosquitos* have the same potential to spread the Zika virus as their South-, Middle- and North American counterparts.

Earlier research has shown that increasing temperatures will enlarge Europe's seasonal window for the potential spread of mosquito-borne viral disease and expand the geographic areas at risk for epidemics to include large parts of Europe. The threat includes tropical and sub-tropical viruses such as Zika and Dengue.

The *Aedes mosquitos*—*Aedes aegypti* and *Aedes albopictus*—are largely responsible for the transmission of the Zika virus. Both *Aedes* mosquitos

are likely to become a fixture in Europe. Historically, *Aedes* mosquitos were present in many European countries during the first half of the 1900s. *Aedes aegypti* has recently been documented in Russia and Georgia. And current surveillance indicate that Aedes albopictus are present in much of Southern Europe and as far north as the Netherlands.

More information: Assessing Seasonal Risks for the Introduction and Mosquito-borne Spread of Zika Virus in Europe, DOI: 10.1016/j.ebiom.2016.06.009 , www.ebiomedicine.com/article/S2352-3964%2816%2930253-5/abstract

Provided by Umea University