

New tool to predict the global spread of dengue

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Researchers at CSIRO, Australia's national science agency, QUT and Queensland Health have developed a new tool to predict the global spread of human infectious diseases, like dengue, and track them to their

source. The tool draws on travel data from the International Air Transportation Association and dengue incidence rates from the Global Health Data Exchange to derive new insights about the spreading dynamics of dengue, a mosquito-borne disease.

Dr. Jess Liebig, postdoctoral fellow at CSIRO's data science arm Data61, said international travel significantly contributes to the rapid spread of dengue from endemic to non-endemic countries.

"According to the World Health Organisation, around half the world's population is at risk of contracting dengue," Dr. Liebig said.

"By understanding the travel behaviour of infected individuals, we can estimate the number of infections that are imported into different countries each month.

"The [tool](#) also determines the infections' country of origin and is able to uncover the routes along which dengue is most likely spread,"

In non-endemic countries such as Australia, local outbreaks are triggered by individuals who acquire the [disease](#) overseas and transmit the virus to local mosquitoes.

Professor Raja Jurdak, QUT, said that in many locations, infected individuals are not diagnosed, and dengue can be under-reported to health authorities, making it challenging to monitor risk and prevent the spread of infection.

"According to recent studies, around 92 per cent of symptomatic infections are not reported to health authorities mainly due to low awareness levels and misdiagnosis," Professor Jurdak said.

"Our tool is one of the first to be able to forecast the absolute number of

dengue importations, rather than the relative risk, at a global level."

The tool identifies the travel route from Puerto Rico to Florida as having the highest predicted volume of dengue-infected passengers travelling to a non-endemic region.

"This provides a useful tool to assist public [health authorities](#) with dengue preparedness," Dr. Cassie Jansen, researcher at Queensland Health said.

"It can also help authorities to identify those locations where new dengue outbreaks may occur, following the arrival of infected passengers."

The tool can be applied to other vector-borne diseases of global concern such as malaria, Zika and chikungunya.

It expands on previous work, which modelled how dengue infections from overseas might spread in Australia.

The research is part of the Disease Networks and Mobility (DiNeMo) project aimed at developing a real-time alert and surveillance system for human infectious diseases.

An earlier model was developed to predict the spread of [dengue](#) within Australia.

DiNeMo combines CSIRO's expertise in [health](#) and biosecurity with the deep technology capabilities of its data science arm, Data61.

More information: Jessica Liebig et al. A global model for predicting the arrival of imported dengue infections, *PLOS ONE* (2019). [DOI: 10.1371/journal.pone.0225193](https://doi.org/10.1371/journal.pone.0225193)

Provided by CSIRO

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