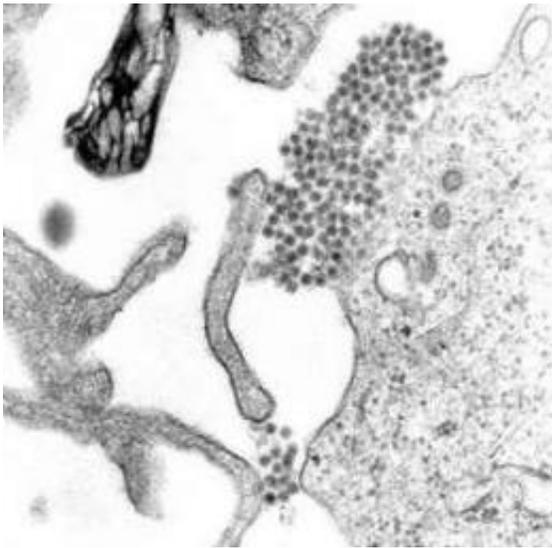


Mobile phone records may predict epidemics of mosquito-borne dengue virus

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A TEM micrograph showing Dengue virus virions (the cluster of dark dots near the center). Image: CDC

A new study led by researchers at Harvard T.H. Chan School of Public Health finds that mobile phone records can be used to predict the geographical spread and timing of dengue epidemics. More people around the world are becoming vulnerable to this deadly virus as climate change expands the range of the mosquito that transmits dengue and infected travelers spread the disease across borders. Utilizing the largest data set of mobile phone records ever analyzed to estimate human mobility, the researchers developed an innovative model that can predict

epidemics and provide critical early warning to policy makers.

The study appears online September 7, 2015 in *PNAS*.

Dengue is the most rapidly spreading mosquito-borne disease worldwide. Infection can lead to sudden high fever, bleeding, and shock, and causes significant mortality.

The researchers analyzed data from a large dengue outbreak in Pakistan in 2013 and compared it to a transmission model they developed based on climate information and mobility data gleaned from call records. Data from nearly 40 million [mobile phone subscribers](#) was processed in collaboration with Telenor Research and Telenor Pakistan, with the call records being aggregated and anonymized before analysis.

The results showed that the in-country mobility patterns, revealed by the call records, could be used to accurately predict the geographical spread and timing of outbreaks in locations of recent epidemics and emerging trouble spots.

"Accurate predictive models identifying changing vulnerability to dengue outbreaks are necessary for epidemic preparedness and containment of the virus," said Caroline Buckee, assistant professor of epidemiology, and the study's senior author. "Because [mobile phone](#) data are continuously being collected, they could be used to help national control programs plan in near real time."

Amy Wesolowski, postdoctoral research fellow, was lead author of the study.

More information: "Impact of human mobility on the emergence of dengue epidemics in Pakistan," Amy Wesolowski, Taimur Qureshic, Maciej F. Bonid, Pal Roe Sundsoy, Michael A. Johansson, Syed Basit

Rasheed, Kenth Engo-Monsen, and Caroline O. Buckee, *PNAS*, online September 7, 2015, [DOI: 10.1073/pnas.1504964112](https://doi.org/10.1073/pnas.1504964112)

Provided by Harvard School of Public Health

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