**Title:** Where could the Angola Yellow Fever outbreak spread next?

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In December 2015, a Yellow Fever outbreak was detected and later confirmed in Luanda, Angola, marking the first Yellow Fever epidemic to hit the country in over 30 years.1 The Luanda outbreak has since spread throughout Angola, with 3,552 suspected cases, 875 of which are laboratory confirmed and 355 of which have resulted in death.2 Serologically related Yellow Fever has been reported in Kenya, Democratic Republic of the Congo (DRC), and China. While new cases in Angola are in decline most likely due to deployment of vaccinations to affected areas, Yellow Fever continues to spread internationally, with the DRC recently declaring a Yellow Fever epidemic in three provinces. FLIRT (previously validated on U.S. Zika Virus cases) was used to predict the movement of Yellow Fever infected travelers over air travel networks. In an increasingly globalized world, network analyses are key components in investigating potential spread of infectious diseases and can inform prudent policy and biosurveillance to mitigate future risk of spread.

FLIRT is a biosurveillance modeling application that uses airline passenger flow data to simulate human movement over flight networks. Passenger simulations were run for approximately 100K modeled passengers departing from selected airports in Angola and the DRC for the time range 06/20/16 to 08/20/16.To mimic the spread of cases associated with Angola through transportation networks, simulations were also run for only LAD airport in Angola for a 12/05/2015 to 06/02/2016 time period.

This simulation indicated that the DRC, the country with the most Angola associated cases, ranked 9th of 156 destinations for the time range 12/05/2015 to 06/02/2016. This underestimation is likely due to FLIRT’s lack of land travel data in its network simulations. China, currently with 11 imported cases, ranked 10th. All countries that currently have cases linked to Angola were ranked in top 20% of locations most likely to receive travelers infected with Yellow Fever.

For the 06/20/2016 to 08/20/2016 time period, FLIRT simulations indicated risk of Yellow Fever spreading to Europe, Asia, South America, and within Africa. High ranking travel destinations in Eastern China, Central Africa, and the Atlantic coast of South America arewithin the observed range of *Aedes aegypti* mosquito and are therefore at a higher risk of local transmission and subsequent epidemics. While epidemiological and geographic barriers may prevent endemic spread within Asia, high volumes of travel, favorable local ecology and low vaccinations coverage leave parts of Asian vulnerable to future local spread. 5, 6 Other *A. aegypti* transmitted diseases, including Dengue, Zika, and Chikungunya, have spread intercontinentally via air travel. Yellow Fever may exhibit similar behavior, and thus poses a clear threat to global public health.

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Competing Interests:

We have read the journal’s policy and have this potential conflict: This study was made possible by the generous support of Defense Threat Reduction Agency (DTRA) through a contract (Contract No. HDTRA1-13-C-0029) awarded to Dr. Andrew Huff while employed at EcoHealth Alliance. The contents are the responsibility of the authors and do not necessarily reflect the views of EcoHealth Alliance, DTRA, or the United States Government.

Figure 1: (Upper) Predicted destinations of approximately 100K simulated passengers from 06/15/16 to 08/15/2016 departing from Quatro de Fevereiro Airport (LAD) in Angola and N’djili Airport (FIH) in the Democratic Republic of the Congo (indicated in yellow). Countries are colored by number of Yellow Fever cases from Angola outbreak. (Lower) Number of simulated passengers for 06/15/16 to 08/15/2016 time period aggregated by country.

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