

'Transport infrastructure' determines spread of HIV subtypes in Africa

December 4 2012

Road networks and geographic factors affecting "spatial accessibility" have a major impact on the spread of HIV across sub-Saharan Africa, according to a study published online by the journal *AIDS*, official journal of the International AIDS Society.

Using sophisticated [mapping techniques](#) and detailed databases, Dr Andrew J. Tatem of the University of Florida and colleagues have found "coherent spatial patterns in [HIV](#)-1 subtype distributions" across Africa. The researchers write, "A comprehensive understanding and evidence-base on accessibility, travel and mobility in resource poor settings would...provide a valuable resource for the strategic planning of disease control." The article is available on the [AIDS journal homepage](#) and in the November 28 print edition.

Molecular HIV Data Overlaid on Spatial Accessibility Maps...

Dr Tatem and his team performed a spatial analysis of the distribution of HIV for the years 1998 to 2008 to explore the impact of transportation networks and geography on the spread of HIV. Molecular data on specific HIV subtypes were obtained and analyzed in relation to "detailed and complete" spatial datasets on Africa-wide road networks.

In addition to roads, the data included a wide range of factors affecting "spatial accessibility," such as land cover, settlement locations, bodies of

water, and topography. Sophisticated models were used to calculate not just the distance between locations, but also the ease of traveling from one place to another.

Even simply laying a chart of HIV subtypes over a map of travel times between settled areas makes the link between spatial accessibility and HIV subtype "clearly evident." Dr Tatem and coauthors write, "[C]lusters of similar subtype distributions are well connected and easily accessible from one another, whereas regions of low accessibility separate groupings of similar subtype distributions."

...Show Role of Travel in Spread of HIV Subtypes

Transport networks and ease of travel—rather than the straight-line distances between locations—provided a much better explanation for the distribution of HIV subtypes. The data showed clustering of certain subtype distributions in well-connected regions—such as the western, eastern, and southern Africa and Ethiopia—that are separated by areas of "limited connectivity."

In contrast, the difficulty of travel in certain areas of central Africa likely restricted the spread of HIV, the researchers suggest. "The relatively poor connectivity in central Africa likely contributed to the slow initial growth of the epidemic in the first half of the 20th century," according to Dr Tatem and colleagues. The same factor may explain why HIV rates remained relatively low in central [Africa](#), while soaring elsewhere.

Although the study has some important limitations, it adds important evidence for understanding how transport infrastructure and geography have affected—and will continue to affect—the spread of HIV. The authors hope that the modeling techniques used can be extended to map cultural and other factors affecting HIV subtype distribution and

transmissibility. More accurate data on "actual volumes and flows of human travel" could also lend new insights.

"The increased travel and mobility of people may lead to the accelerated spread of new variants and the further diversification of the global HIV epidemic," Dr Tatem and coauthors write. They believe that ongoing efforts to monitor the spread of HIV subtypes could have important implications for developing effective prevention and treatment strategies.

Provided by Wolters Kluwer Health

Citation: 'Transport infrastructure' determines spread of HIV subtypes in Africa (2012, December 4) retrieved 20 March 2024 from <https://medicalxpress.com/news/2012-12-infrastructure-hiv-subtypes-africa.html>

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