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Spatial distributions and characteristics of HIV clusters in Ethiopia

Summary

Ethiopia's HIV prevalence has decreased by 75% through the successful implementation of antiretroviral therapy. Despite this progress, HIV transmission continues to occur. However, spatial trends could offer solutions to implementing targeted cluster interventions.

Biomarker and survey data were used from the Ethiopian Demographic and Health Surveys (DHS). The spatial-temporal distribution of HIV was estimated using a likelihood-based model for determining clusters. Statistically significant clusters were then compared to non-clusters.

In Ethiopia, geographic HIV clusters are driven by different risk factors. These different risk factors across four clusters were unsafe injections, transactional sex, and male circumcision.

Decreasing the HIV transmission burden requires targeted interventions.

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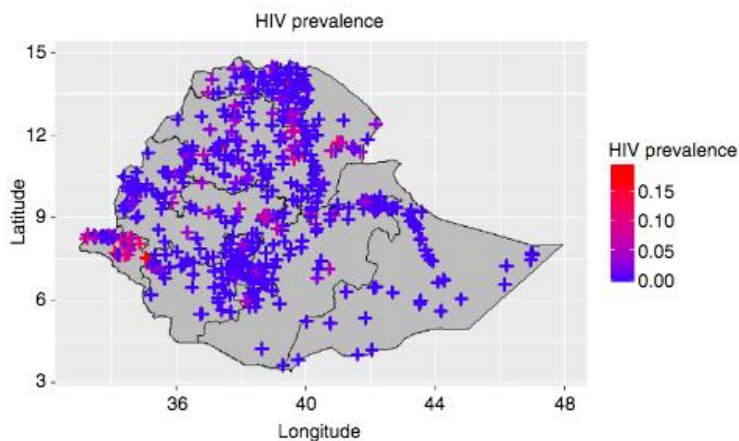[2] Department of Global Health and Primary Care, University of Bergen, Bergen, Norway
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HIV prevalence

Key Findings

Cluster Risk Factors

There were four clusters centered around Addis Ababa, Afar, Dire Dawa, and Gambella. These clusters accounted for only 17% of the population but 43% of the HIV burden in 2016. Cluster 1 (Addis Ababa) had higher levels of individuals reporting unsafe injections and transactional sex. Cluster 2 (Afar) had high levels of transactional sex. Cluster 3 (Dire Dawa) had high levels of unsafe injections. Cluster 4 (Gambella) had lower levels of unsafe injections, hisk risk occupations, and male circumcision. No individual geographical cluster had high levels of high-risk occupations, but when taken all together all cluster had a higher level of high-risk occupations than the rest of the country.

Discussion

Using DHS data, geographical clusters with high HIV disease burdens were identified throughout Ethiopia. These areas are epidemiologically different and can be characterized by certain biological and behavioral risk factors that are specific to these clusters. Using HIV geographic clusters provides a method that can identify high and low HIV prevalence areas in order to inform targeted interventions. Possible interventions based on these risk factors could include clean needle exchanges, safe injection sites, reducing transactional sex, and increasing male circumcision. Future modeling studies will evaluate the potential effects of such regionally-targeted interventions.

Implications for Policy

Global policy organizations have begun to implement nuanced responses for HIV epidemics in order to better understand the burden of disease geographically and implement interventions that are more effective. In Ethiopia, these efforts have led to focusing on geographic hotspots, such as these clusters, to reach at-risk populations with the proper interventions. Studies that focus on spatial distributions and characteristics of HIV clusters can be critical in identifying interventions that specifically meet the needs of each area. While HIV has decreased in Ethiopia, there remain clusters that carry the burden of disease greater than surrounding areas. The methods used in this study can identify the unique risk factors of HIV transmission.