Mapping HIV clustering: A strategy for identifying populations at high risk of HIV infection in sub-Saharan Africa

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INTRODUCTION

✓ The geographical structure of an epidemic is ultimately a consequence of the drivers of the epidemic and the population susceptible to the infection.

✓ The ‘know your epidemic’ concept recognizes this geographical feature as a key element for identifying populations at higher risk of HIV infection where prevention interventions should be targeted.

CONCLUSIONS

✓ The results of our analysis indicate stark geographical variation in HIV prevalence in most of the countries. The observed spatial variation in HIV prevalence highlights a clustered HIV transmission across sub-Saharan Africa (SSA).

✓ About 14% of the population in SSA is located in areas of intense HIV epidemics. Meanwhile, another 16% of the population is located in areas of low HIV seroprevalence.

✓ Our findings identify priority geographic areas for HIV programming, and support the need for spatially targeted interventions in order to optimize resources and maximize the impact on the epidemic in SSA.

OBJECTIVE

✓ To illustrate the significant role that geographical space could play in identifying populations at higher risk, we described the geographical heterogeneity of the HIV epidemic across sub-Saharan Africa (SSA).

✓ We aimed to identify geographical settings where the risk of HIV infection is higher or lower.

METHODS

✓ The main source of data for our study was the Demographic and Health Survey conducted in 18 countries from SSA.

✓ We identified the spatial clusters with high and low numbers of HIV infections in each country through Kulldorff spatial scan statistics analysis.

✓ After a cluster was identified, the strength of the clustering was estimated using the relative risk (RR) of HIV infection within the cluster versus outside the cluster. The fraction of the population, and HIV prevalence were also estimated for each cluster.

RESULTS

Figure 1 - Spatial distribution of the clusters with high and low HIV prevalence in countries with national HIV prevalence higher than 4%.

Geographical localization of the clusters with high (red-solid circles) and low (blue-dashed circles) HIV prevalence

Figure 2 - Spatial distribution of the clusters with high and low HIV prevalence in countries with national HIV prevalence lower than 4%.

Geographical localization of the clusters with high (red-solid circles) and low (blue-dashed circles) HIV prevalence

Figure 3 - Strength of HIV clustering. (A) Relative risk of HIV infection in clusters with high HIV prevalence (each bar represents the relative risk in a single cluster). (B) Association between relative risk of HIV infection in clusters with high HIV prevalence and the national HIV prevalence. (C) Relative risk of HIV infection in clusters with low HIV prevalence (each bar represents the relative risk in a single cluster). (D) Association between relative risk of HIV infection in clusters with low HIV prevalence and the national HIV prevalence. Countries are shown in order of increasing national HIV prevalence

CONCLUSIONS

✓ The results of our analysis indicate stark geographical variation in HIV prevalence in most of the countries. The observed spatial variation in HIV prevalence highlights a clustered HIV transmission across SSA within micro-epidemics of different scales.

✓ Our findings identify priority geographic areas for HIV programming, and support the need for spatially targeted interventions in order to optimize resources and maximize the impact on the epidemic in SSA.