

HIV Transmission in Generalized, Concentrated, and Mixed Epidemics in Western Kenya

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Background

HIV prevention planning requires information about those at highest risk of acquiring and transmitting HIV. Kenya exhibits a range of subnational HIV epidemic patterns including highly concentrated, highly generalized, and mixed HIV epidemics. This analysis identifies transmission patterns in each of the six counties of the former Nyanza province based on overall epidemic trends as well as high-risk sub-populations such as female sex workers (FSW) and their clients.

Methods

A literature review identified characteristics of FSW and their clients, classified as “high” risk, and strata of the general population who were not FSW or clients but at increased risk of HIV infection, defined as “medium” risk. Characteristics of FSW such as age, duration in sex work, population size based on a recent FSW enumeration, and number of clients were incorporated into an existing HIV microsimulation model, EMOD-HIV v2.5. Setting-specific data on fertility, mortality, traditional male circumcision and scale-up of voluntary male medical circumcision, HIV testing and treatment rates, and HIV treatment guidelines were incorporated and the model was fit to age and gender stratified HIV prevalence from four cluster-randomized surveys.

Results

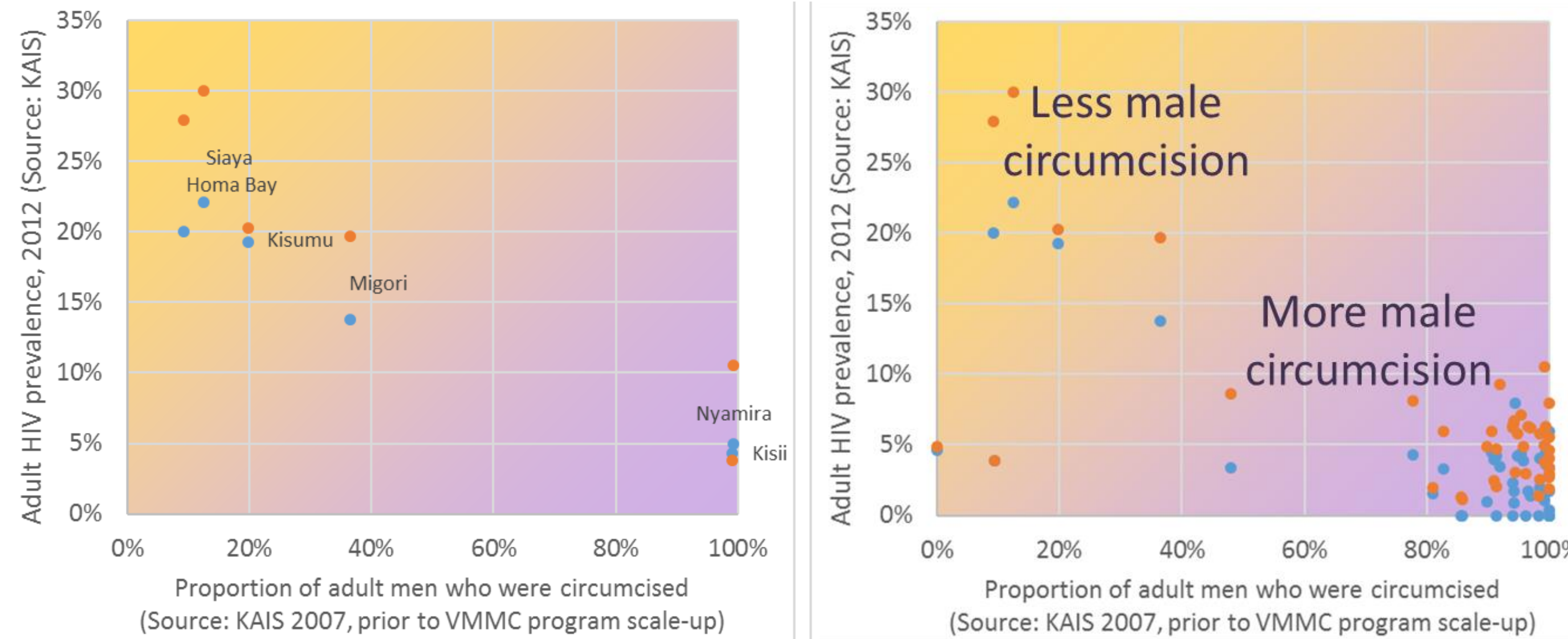


Figure 1. Association between HIV prevalence and traditional male circumcision in Kenyan counties. Left panel shows the six counties of the former Nyanza province.

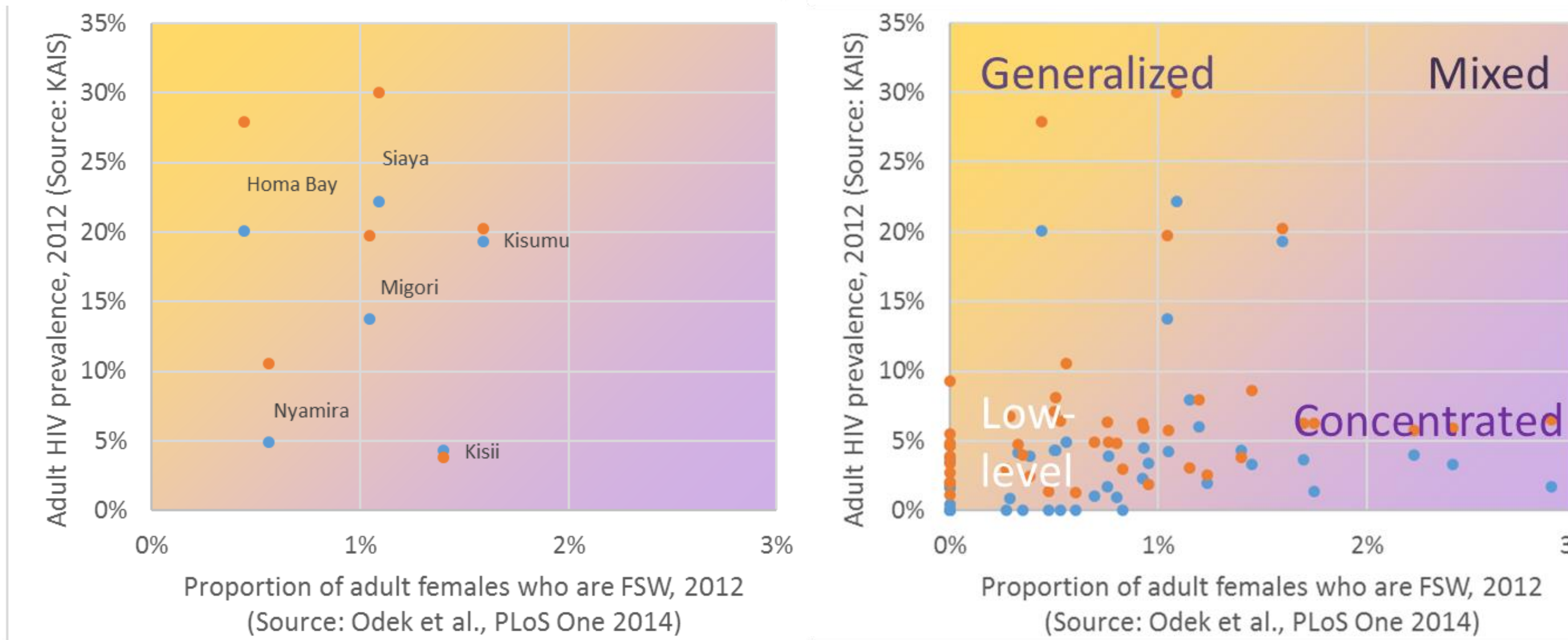


Figure 2. Lack of association between HIV prevalence and FSW in Kenyan counties. Left panel shows the six counties of the former Nyanza province.

Results

Though HIV prevalence in Kenyan counties is strongly associated with HIV-related factors such as traditional male circumcision (Figure 1), Western Kenya exhibits different combinations of HIV prevalence and the proportion of adult females who were FSW in 2012 (Figure 2), implying different transmission patterns underlying generalized, concentrated, and mixed epidemics. In the EMOD model of six counties in Western Kenya, HIV incidence rates were highest among FSW and their clients, but the overall number of new infections was higher in the general population (Figure 3). In Kisii, which exhibits the most concentrated epidemic in Nyanza, numbers of new infections were similar in medium risk and high risk (FSW and clients). In other counties, new infections in medium risk exceeded those in FSW and clients. Surprisingly, the number of transmissions originating from medium risk exceeded those in high- and low-risk individuals, including in Kisii.

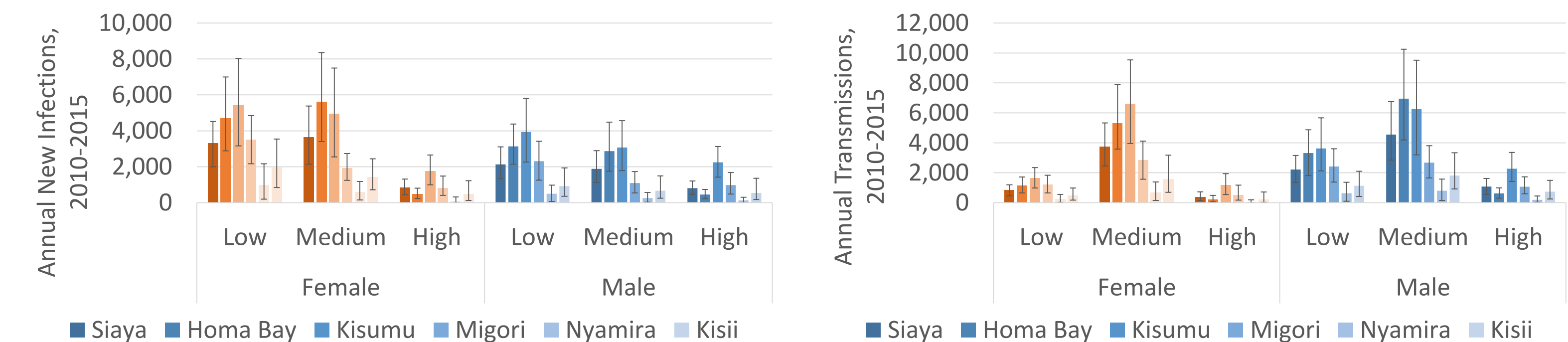


Figure 3. Annual new infections in, and transmissions from, risk groups in each county. Counties are arranged from lowest to highest HIV prevalence (from left to right).

Conclusions

While FSW and their clients experience the highest HIV incidence, the largest contribution to HIV transmission in the Nyanza region comes from more numerous “medium” risk individuals, defined as those at high risk of HIV infection in the general population, but not FSW or their clients. Broadly available and acceptable HIV prevention among medium risk individuals is needed to maximize the impact on the HIV epidemic.