

## Model description

We use a dynamic deterministic, compartmental model which simulates HIV transmission among males and females in the general population, FSWs, clients, female 2+ and male 2+ in Rakai. Susceptible individuals are recruited into their respective compartments at constant population rates proportion to initial total population size. We assume a growing heterosexually active population in Rakai from 1979 to 2011 [4]. FSWs, clients, female 2+ and male 2+ are assumed to retire into the general population and will move into the male and female compartments. HIV is transmitted between males and females in the general population, FSWs and their commercial male clients, female 2+ and male 2+, mixing between general population males and females and FSW and male clients, mixing between female 2+ and clients. Upon infection, infected individuals will move into the acute HIV infection and will eventually move into the chronic HIV infected individuals compartment. We considered increased HIV transmission to be associated with individuals in the acute HIV infection stage [5,6]. The model includes treatment of HIV infected individuals with a CD4 count <250 cells/ $\mu$ l and effects of HIV treatment in reducing HIV transmission [7,8]. Treatment of HIV was introduced by the Government of Uganda in June 2004 [15]. HIV negative males are also divided into those who are circumcised and those who are not [2]. Circumcision is considered to be at 12% baseline in 2002 and is increased linearly to about 22% in 2006. The SHARE trial also coincided with the last year of follow up of male circumcision trial [14]. Circumcised males have a reduced chance of acquiring HIV [9]. Females in all compartments are divided into those experiencing IPV and those who are not from 2006 to 2009 [2]. Women who are not experiencing IPV have a reduced chance of acquiring HIV [2]. In the SHARE trial the IPV intervention and control groups had an HIV incidence rate ratio (IRR) of 0.64, 95% CI [0.42-0.97] for women [2]. To model HIV treatment as a possible pathway to explain the SHARE trial results, treated males are also divided into those experiencing IPV and those who are not between 2006 to 2009. Males not experiencing IPV are considered to have an increased rate of treatment due to significant partner and personal disclosure of HIV status [2]. Condom use is also considered at different consistent levels in all population groups.

The model was parameterized using behavioural data collected from Rakai, published literature on Uganda and sub-Saharan Africa in Table 1. Behavioural data that had to be obtained from other settings included data on commercial sexual behavior, female 2+ and male 2+. Biological parameters were drawn from the literature [5-8,10-12], whereas all HIV prevalence for the females and males in the general population is for Uganda and data for HIV incidence is for Rakai.

## References

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