Data required for Tanzania modelling (15-49 years age group): country level

1. **General population data**
a. Population size for males/females
b. HIV prevalence/incidence
c. Circumcision rate per year
d. Percentage of consistency of condom use in the general population
2. **Client behavioural and epidemiological data**
    a. Population size for clients
    b. HIV prevalence/incidence
    c. Frequency that clients have commercial sex
    d. Percentage consistency of condom use during commercial sex
    e. Percentage of clients who have regular partners
    f. Duration that current clients have been buying sex

3. **Partners of female 2+ [females with multiple partners]**
a. Population size for female 2+ partners
b. HIV prevalence/incidence
c. Frequency that partners of female 2+ have sex
d. Percentage of condom use
e. Duration one stays as a partner of female 2+
4. **Data on female 2+ [females with multiple partners]**
a. Population size of female 2+
b. HIV prevalence/incidence
c. Percentage of female 2+ in the population
d. Frequency that females 2+ have sex
e. Percentage consistency of condom use
f. Duration one stays as a female 2+

5. **Data on FSWs**

    a. Population size
    b. HIV prevalence/incidence
    c. Percentage/number of FSWs in the population
    d. Percentage/number of FSWs who have regular partners
    e. Number of sex acts with regular partner per month
    f. Percentage of sex acts in which condoms are used with regular non-commercial partner
    g. Duration FSWs have been selling sex

6. **ART and testing data**
    a. Percentage of general population, FSWs and clients that are HIV tested each year over different years
    b. Linkage to care - % of those testing positive for HIV who are linked into pre-ART or ART care
    c. Data of percentage of HIV infected FSWs and general population on ART for different years
    d. ART dropout rate per year

Table 1: Model parameter values

Description	Symbol	Parameter value/range	References and additional details
Biological Parameters			
Probability of HIV transmission	(β_{mf}, β_{fm})	0.006-0.06	Boily et al. (2009) [1]
Duration of initial high viral load phase of HIV	γ_V	0.242[0.103-0.381]	Hollingsworth et al. (2008)[2]
Multiplicative factor due to increase HIV transmission in the high-viremia phase	η_V	5.5-24	Quinn et al.(2000) [3] Wawer et al. (2005)[4]
Multiplicative factor due to reduced HIV transmission due to treatment	θ	0.08 [0-0.16]	Cohen (2011) [5]. Donnell, (2010)[6].
Rate of treatment dropout	d		
Life expectancy on HIV treatment	$1/\gamma_t$		
Life expectancy in the population	$1/\mu$		
HIV- related death rate	γ		
Subgroup Population Sizes			
Relative size of FSWs group	P_{FBB}		
Relative size of Females with 2+ partners group	P_{FTS}		
Relative size of group of clients	P_{CFBB}		
Relative size of group of Males 2+ partners group	P_{MTS}		
Number of Sexual Partners			
Number of client partners of female sex worker.	C_{FBB}^c		
Number of sex acts client have with each FSW partner			
Number of partners of Females 2+ partners	C_{CTS}^{TS}		
Number of sex acts all male partners of females 2+ have with each female 2+ partner and vice versa			
Number of FSWs, clients engage with.	C_{CBB}^c		

Number of sex acts client partners have with each FSW partner			
Number of females 2+ partners, clients FSW engage with.	C_{CBB}^{TS}		
Number of sex acts clients with females 2+ partners			
Number of sex acts clients have with females 2+ partners			
Average number of partners for males in the general population	C_{MGP}		
Number of sex acts per year for males in general population			
Average number of partners of females in the general population	C_{FGP}		
Number of sex acts per year for females in general population			
Condom use			
Condom efficacy	ϵ	$0.8 - 0.95$	Weller (2002)[13]. Pinkerton and Abramson (1997) [14].
Consistency of condom use among female sex workers	f_{FBB}		
Consistency of condom use of females with 2+ partners	f_{FTS}		
Consistency of condom use among females in the general population	f_{FGP}		
Duration of Time Spent as Member of Subgroup			
Duration of female sex workers	$1/\alpha_{BB}$		
Duration of transactional sex based female sex workers	$1/\alpha_{TS}$		
Duration of clients	$1/\varphi_{BB}$		
Duration of males 2+ partners	$1/\varphi_{TS}$		
Mixing parameter			
Percentage of sex acts of females 2+ with client partners	ξ	0-100%	
(Percentage of sex acts of females 2+ with	$1 - \xi$	0-100%	

non-client male partners)			
Male circumcision efficacy		50-60%	Auvert et al. (2005)[17]
Percentage of circumcised males			
Percentage of married sex workers			
Prevalence ranges			
Year	Prevalence in males	Prevalence in females	

References

1. Boily MC, Baggaley RF et al. Heterosexual risk of HIV-1 infection per sexual act: systematic review and meta-analysis of observational studies. The Lancet Infectious Diseases. 2009;9(2):118-29

2. Hollingsworth, T. D., R. M. Anderson, et al. (2008). HIV-1 transmission, by stage of infection. J Infect Dis 198(5): 687-693.

3. Quinn TC, Wawer MJ, Sewankambo N, et al. Viral load and heterosexual transmission of human immunodeficiency virus type 1. Rakai Project Study Group. N Engl J Med 2000;342(13):921-9.

4. Pilcher CD, Tien HC, Eron JJ, Jr., et al. Brief but efficient: acute HIV infection and the sexual transmission of HIV. J Infect Dis 2004;189(10):1785-92.

5. Wawer MJ, Gray RH, Sewankambo NK, et al. Rates of HIV-1 Transmission per Coital Act, by Stage of HIV-1 Infection, in Rakai, Uganda. J Infect Dis,2005

6. Cohen, MS., YQ. Chen, et al. (2011). Prevention of HIV-1 Infection with Early Antiretroviral Therapy. New England Journal of Medicine 365(6): 493-505.

7. Donnell, D., J. M. Baeten, et al. (2010). Heterosexual HIV-1 transmission after initiation of antiretroviral therapy: a prospective cohort analysis. The Lancet 375(9731): 2092-2098.

8. Murray C. J. L., K. F. Ortblad, C. Guinovart, et al , Global, regional, and national incidence and death for HIV, tuberculosis, and malaria during 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. Lancet, (2014).