

## S1 Table. Key model inputs

Sexual Risk Characteristics	Base Case	Probabilistic Range	Distribution	Ref.
Age of Sexual Debut	19	17-21	Uniform	29
Proportion of men who are homosexual	0.06%	0.06%-0.1%	Uniform	28
Proportion of men who are bisexual	0.04%	0.029%-0.035%	Normal	28
Proportion of women who are homosexual	0.06%	---	---	Assumption
Proportion of women who are bisexual	0.04%	---	---	Assumption
Proportion of straight males who are abstinent	27.75%	21%-41%	Normal	32
Proportion of straight males who are in stable, monogamous relationships	57.33%	--	--	32
Proportion of straight males in multiple, concurrent relationships (Class 3)	12.9%	12.9%-21.2%	Normal	32
Proportion of straight males in multiple, concurrent relationships (Class 4)	2.0%	2%-3.3%	Uniform	30
Proportion of bisexual males who are abstinent	0%	---	---	--
Proportion of bisexual males who are in stable, monogamous relationships	23.0%	15.41%-30.35%	Normal	28
Proportion of bisexual males in multiple, concurrent relationships (Class 3)	67.5%	---	---	--
Proportion of bisexual males in multiple, concurrent relationships (Class 4)	9.5%	7.44%-11.98%	Normal	28
Proportion of homosexual males who are abstinent	0%	---	---	--
Proportion of homosexual males who are in stable, monogamous relationships	23.0%	15.41%-30.35%	Normal	28
Proportion of homosexual males in multiple, concurrent relationships (Class 3)	67.5%	---	---	--
Proportion of homosexual males in multiple, concurrent relationships (Class 4)	9.5%	7.44%-11.98%	Normal	28
Proportion of straight females who are abstinent	26.0%	12.27%-43.78%	Normal	29
Proportion of straight females who are in stable, monogamous relationships	69.0%	53.45%-84.78%	Normal	29
Proportion of straight females in multiple, concurrent relationships (Class 3)	4.7%	1.99%-2.73%	Normal	29
Proportion of straight females in multiple, concurrent relationships (Class 4)	0.3%	0.3%-3%	Uniform	30
Proportion of bisexual females who are abstinent	26.0%	12.27%-43.78%	Normal	29
Proportion of bisexual females who are in stable, monogamous relationships	69.0%	53.45%-84.78%	Normal	29
Proportion of bisexual females in multiple, concurrent relationships (Class 3)	4.7%	1.99%-2.73%	Normal	29
Proportion of bisexual females in multiple, concurrent relationships (Class 4)	0.3%	0.3%-3%	Uniform	30
Proportion of homosexual females who are abstinent	26.0%	12.27%-43.78%	Normal	29
Proportion of homosexual females who are in stable, monogamous relationships	69.0%	53.45%-84.78%	Normal	29
Proportion of homosexual females in multiple, concurrent relationships (Class 3)	4.7%	1.99%-2.73%	Normal	29
Proportion of homosexual females in multiple, concurrent relationships (Class 4)	0.3%	0.3%-3%	Uniform	30

**S1 Table. Key model inputs (continued)**

HIV Transmission	Base Case	Sensitivity Range	Distribution	Ref.
<b>Sexual Transmission</b>				
Transmission risk per sex act (F→M)	0.00042	0.5x-1.5x	normal	60
Transmission risk per sex act (M→F)	0.00081	0.5x-1.5x	normal	60
Transmission risk per sex act (M→M)	0.00169	0.5x-1.5x	normal	60
Relative risk of transmission if VL category 0-2.5 log copies/ml	0.16	--	--	62
Relative risk of transmission if VL category 2.5-3.5 log copies/ml	1.87	--	--	62
Relative risk of transmission if VL category 3.5-4.5 log copies/ml	6.54	--	--	62
Relative risk of transmission if VL category 4.5-5.5 log copies/ml	8.85	--	--	62
Relative risk of transmission if VL category >5.5 log copies/ml	9.03	--	--	62
Degree of assortative mixing between age and sexual activity classes (0=assortative, 1=proportionate)	0.20	0.05-0.50	uniform	56
Average duration (years) of stable, monogamous partnerships	30.0	0.5x-1.5x	uniform	2
Average duration (years) of partnership in activity group 2	1.0	0.5x-1.5x	uniform	2
Average duration (years) of partnership in activity group 3	0.5	0.5x-1.5x	uniform	2
Median number of concurrent partnerships for activity group 1	1.0	--	--	55
Median number of concurrent partnerships for activity group 2	3.0	0.5x-1.5x	uniform	55
Median number of concurrent partnerships for activity group 3	10.0	0.5x-1.5x	uniform	55
Relative risk reduction of HIV seroconversion when using condoms	0.80	--	--	65
Relative risk reduction of HIV seroconversion if treated STI	0.40	--	--	66
Relative risk reduction of HIV seroconversion if circumcised	0.59	--	--	67
<b>Injection Drug Use</b>				
Transmission risk per injection	0.0036	0.5x-1.5x	normal	61
Proportion of population that uses IV drugs	4.99E-5	0.0018-0.0054	uniform	28
Proportion of IDU with unsafe injection practices	32%	--	--	Assumption
Number of needle sharing partners per year	5	0.5x-1.5x	uniform	63
Shared injections per year	102	54-150	Uniform	61

**S1 Table. Key model inputs (continued)**

<b>Biological/behavioral modifiers of transmission</b>	<b>Base Case</b>	<b>Sensitivity Range</b>	<b>Distribution</b>	<b>Ref.</b>
<b>General Population Risk</b>				
Prevalence of untreated STI	0.06	0.06-0.10	Normal	59
Probability of not being circumcised	0.80	0.68-0.92	Uniform	68
Prevalence of condom nonuse most or all of the time	0.73	0.73-0.82	Normal	29
Probability/rate of not being tested for HIV	0.98	0.947-0.999	Uniform	31
Probability of linkage to care once HIV diagnosed	0.30	---	---	
Prevalence of ART non-adherence	0.26	0.26-0.36	Normal	58
Probability of loss to follow-up	0.26	0.23-0.29	Normal	69
<b>Female vs. Male</b>				
	<b>RR</b>			
RR of condom non-use	1.08	1.06 – 1.11	Log-Normal	70
<b>Homosexual vs. Straight</b>				
	<b>RR</b>			
RR of condom non-use	0.63	0.6 – 0.66	Log-Normal	71
RR of not being tested for HIV	0.31	0.28 – 0.35	Log-Normal	71
<b>Bisexual vs Straight</b>				
	<b>RR</b>			
RR of not being tested for HIV	0.31	0.28 – 0.35	Log-Normal	Assumption
<b>Non-monogamous vs. monogamous</b>				
	<b>RR</b>			
RR of condom non-use	1.14	1.13 – 1.16	Log-Normal	71
RR of not being tested for HIV	0.81	0.79 – 0.82	Log-Normal	71
<b>High risk (class 4) vs. monoagmous</b>				
	<b>RR</b>			
RR of condom non-use	0.16	0.15 – 0.18	Log-Normal	71
RR of not being tested for HIV	0.23	0.22 – 0.25	Log-Normal	71
RR of untreated STI	8.85	7.4 – 10.3	Log-Normal	70
<b>Alcohol use vs. non alcohol use</b>				
	<b>RR</b>			
RR of condom non-use	1.29	1 – 1.58	Uniform	36
RR of ART non-adherence	2.33	1.17 – 3.5	Uniform	38,39,41
RR of untreated STI	1.72	1.4 – 2.05	Uniform	43,72,73
<b>IDU vs. non-IDU</b>				
	<b>RR</b>			
RR of condom non-use	0.62	0.55 – 0.7	Log-Normal	71
RR of not being tested for HIV	0.6	0.54 – 0.67	Log-Normal	71
RR of ART non-adherence	2	1 – 3	Normal	Assumption
RR of untreated STI	1.43	1.22 – 1.63	Log-Normal	71
RR of LTFU prior to linkage	2	1 – 3	Normal	Assumption
<b>HIV+ vs. HIV-</b>				
	<b>RR</b>			
RR of condom non-use	0.47	0.4 – 0.54	Log-Normal	74
RR of not being circumcised	2.22	1.16 – 6.67	Log-Normal	75

**S1 Table. Key model inputs (continued)**

<b>HIV disease related demographics</b>	<b>Base Case</b>	<b>Sensitivity Range</b>	<b>Distribution</b>	<b>Ref.</b>
Mean CD4 count (SD) for newly infected individuals	644 (260)	294-994 (65-585)	Uniform (Normal)	33
Mean log viral load (SD) for newly infected females	4.46 (0.99)	4-5	Uniform	33
CD4 count threshold for treatment initiation	200	---	---	76
Fertility rate (range, depending on age)	0.0027- 0.23	---	---	77
<b>Costs (2014 USD)</b>				
1 <sup>st</sup> line ART monthly costs	\$11.86	--	--	47
2 <sup>nd</sup> line ART monthly costs	\$49.27	--	--	47
Annual routine costs if in HIV care and treatment program	\$132.18	--	--	49
Annual inpatient hospitalization costs if patient has AIDS	\$347.25	--	--	49
HIV-1 viral load test	\$49.54	--	--	47
CD4+ count test	\$6.32	--	--	47
Initial proportion alcohol abuse problems, males	0.185	0.0925-0.2775	Normal	57
Initial proportion alcohol abuse problems, females	0.020	0.0096-0.0224	Normal	Assumption