Resource optimization to maximize the HIV response in Belarus

Executive summary

In order to maintain the HIV response in Eastern Europe and Central Asia it is imperative to ensure that national HIV programs continue to be sustainably financed. Continued commitment by national governments to finance the HIV the response is critical. Moreover, with planned transition away from donor support, there will be increased demand on domestic fiscal investment. As such it is vital to make cost-effective funding allocations decisions to maximize impact. An allocative efficiency modeling analysis was conducted through partnership with the Belarusian Government, the Global Fund, UNAIDS, and the Burnet Institute. The Optima HIV model was applied to estimate the optimized resource allocation across a mix of HIV programs. It is anticipated that recommendations from this analysis, as summarized below, will inform subsequent National Strategic Plans and Global Fund funding applications.

Key recommendations for HIV resource optimization include:

- **Scaling up antiretroviral therapy (ART)**, which could lead to increased treatment coverage of people diagnosed with HIV from 74% (status quo) to 96% (optimized) in 2019, with high coverage levels maintained to 2030.
- **Scaling up investment for needle-syringe programs for people who inject drugs (PWID).** It is estimated that over 55% of new HIV infections occurred among PWID in 2018 in Belarus. As additional resources become available investment in NSP programs should continue to be scaled-up, along with investment in testing and prevention programs targeting PWID.
- **Scaling up investment for HIV testing and prevention programs targeting female sex workers (FSW).** It is recommended to prioritize investment in this program at 100% budget under optimized allocation, as well as continuing to scale-up investment with increasing budget.
- **Maintaining some investment for HIV testing and prevention programs targeting men who have sex with men (MSM)**. Given 19% of new HIV infections occur among MSM, a portion of the investment in HIV testing and prevention programs targeting this group should be maintained at the 100% budget. Investment in MSM programs should be scaled up as additional resources become available.

Within new HIV infections among in 2018 were estimated to have represented 10% of the burden in Belarus, under current conditions it is not recommended to invest in **HIV programs targeting the general population at the latest reported budget level**, but rather to target limited funds towards key populations who practice higher-risk behaviours.

Background

In Belarus, new HIV infections have increased by 65% and HIV-related deaths by 13% since 2010.[1] Belarus has an HIV epidemic concentrated among key populations with rising HIV prevalence among PWID and MSM. HIV prevalence is estimated to have increased from 25.1% in 2015 to 30.8% in 2017 among PWID[2] and 5.7% in 2015 to 9.8% in 2017 among MSM.[3] HIV prevalence has remained relatively stable among FSW, reported at 7.0% in 2017.[4]

The national response to the HIV epidemic is guided by Belarus' HIV prevention programme. Belarus introduced HIV self-testing in 2017 and it was supposed that the Government funded the antiretroviral therapy program with coverage increased from 8,600 people in 2016 to 22,000 in 2018.[1] Belarus is also committed to scaling up and ensuring the sustainability of harm reduction programmes for PWID.[1]

Over the 2014-2015 period, an HIV allocative efficiency analysis was conducted using the Optima HIV model with support from the World Bank, UNAIDS, the Global Fund, and other partners. Since then, following on recommendations from the 2014-2015 analysis, there have been significant improvements in the adoption of updated HIV testing and treatment protocols, reductions in treatment costs, updated epidemiological values, and improvements in service delivery leading to cost savings. Following on from this initial study, an updated allocative efficacy modeling analysis was conducted to estimate the optimal allocation of HIV resources based on latest reported values with findings described below.

Objectives

1. Given 2015-2017 resource allocation, how many new HIV infections, HIV-related deaths, and HIV-related DALYs (comparable to QALYs saved) are estimated to have been averted through HIV program implementation?
2. What is the optimized resource allocation to minimize HIV infections and HIV-related deaths by 2030 under optimized varying budget levels?
3. What is the optimized HIV resource allocation for best achieving the 90-90-90 and 95-95-95 targets by 2020 and by 2030, respectively, and what are the minimum levels of resources required for best achieving these targets?

Methodology

An allocative efficacy modeling analysis was undertaken in collaboration with the HIV program of Belarus. Epidemiological and program data was provided by the Belarus country team and validated during a regional workshop that was held July 2019 in Kiev, Ukraine. Country teams were consulted before and after the workshop on data collation and validation, objective and scenario building, and results validation. Demographic, epidemiological, behavioural, programmatic, and expenditure data from various sources including UNAIDS Global AIDS Monitoring and National AIDS Spending Assessment reports, Integrated bio-behavioural surveillance surveys, national reports and systems, as well as from other sources were collated. This allocative efficacy analysis was conducted using Optima HIV, an epidemiological model of HIV transmission overlayed with a programmatic component and a resource optimization algorithm. A more detailed description of the Optima HIV model has been published by Kerr et al.[5]

Populations and HIV programs modeled

Populations considered in this analysis were:

- Key populations
  - Female sex workers (FSW)
  - Clients of female sex workers (Clients)
  - Men who have sex with men (MSM)
  - Males who inject drugs (MWID)
  - Females who inject drugs (FWID)
- General populations
  - Males 0-14 (M0-14)
  - Females 0-14 (F0-14)
  - Males 15-24 (M15-24)
  - Females 15-24 (F15-24)
  - Males 15-49 (M25-49)
  - Females 15-49 (F25-49)
  - Males 50+ (M50+)
  - Females 50+ (F50+)

HIV programs considered in this analysis:

- Antiretroviral therapy (ART)
- HIV testing and prevention targeting PWID
- HIV testing and prevention targeting MSM
- HIV testing and prevention targeting FSW
- HIV testing services (HTS) for the general population
- Needle-syringe programs (NSP)
- Prevention of mother-to-child transmission (PMTCT)
- Opiate substitution therapy (OST)

Model constraints

Within the optimization analyses, no one on treatment, including ART, PMTCT, and OST, can be removed from treatment, unless by natural attrition.

Model weightings

To minimize new HIV infections and HIV-related deaths by 2030 objectives functions were weighted 1 to 1 for infections to deaths.

Findings

Objective 1. Given 2015-2017 resource allocation, how many new HIV infections, HIV-related deaths, and HIV-related DALYs are estimated to have been averted through HIV program implementation?

To estimate the impact of past HIV spending on the status of HIV in Belarus, all spending on targeted HIV programs was removed from 2015 to 2017, representing the previous Global Fund funding cycle period (non-targeted HIV program spending was not considered). This was compared with actual program spending over the same period, referred to as the baseline scenario.

Results suggest that past investments have had an important impact on the HIV response. Had the HIV program not been implemented from 2015 to 2017, by 2018 it is estimated that there could have been almost 200% more new HIV infections (almost 6,500 more HIV infections) and over 350% more HIV-related deaths (approximately 2,900 more HIV-related deaths) over this period (figure 1). The total annual HIV program spending in 2018 amounted to US$25.7M, of which the estimated share of Global Fund contribution was 13%.

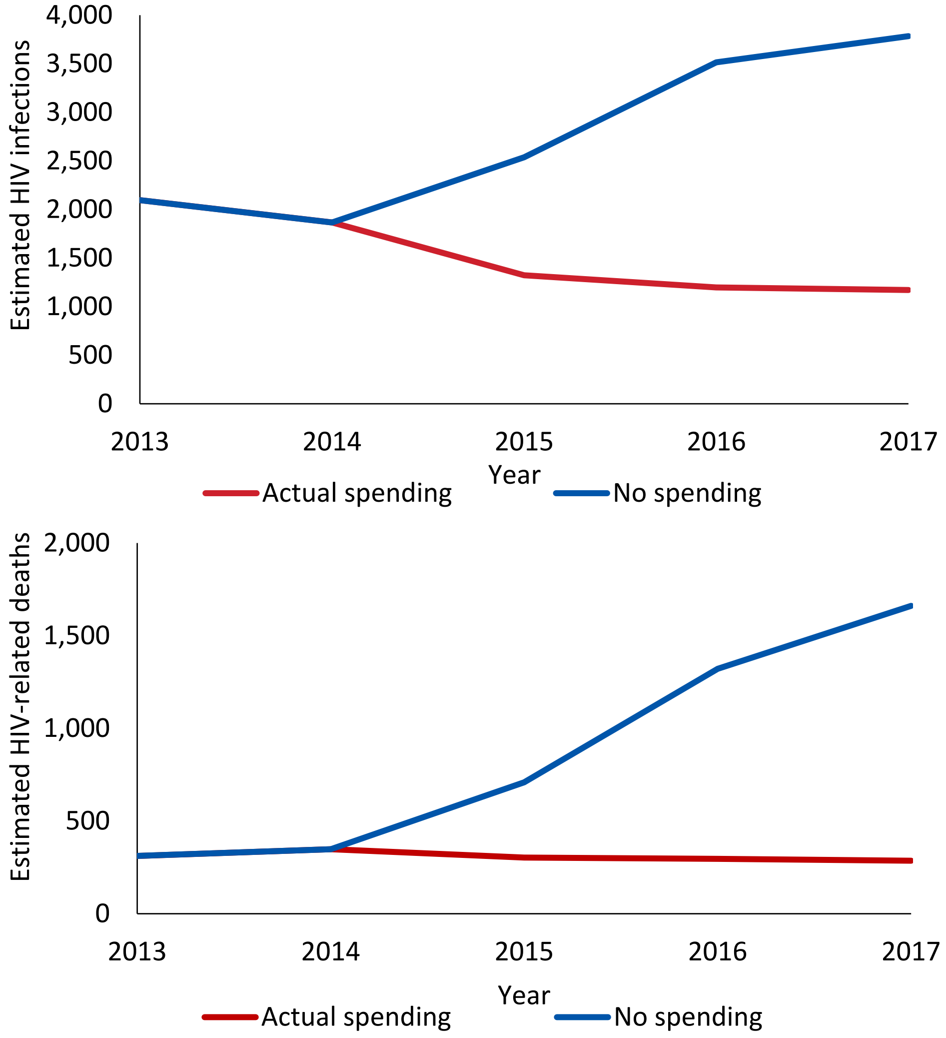


Figure 1. Estimated new HIV infections and HIV-related deaths in the absence of HIV program spending from 2015 to 2017

Objective 2. What is the optimized resource allocation to minimize HIV infections and HIV-related deaths by 2030 under varying budget levels?

Belarus has a latest reported HIV program budget of US$26M in 2018 with 42.5% of the overall budget invested in non-targeted HIV programs (figures 2 and 3). As non-targeted HIV programs are not considered within the optimization, budgets for these programs are fixed. Optimization results suggest scaling up ART, which could lead to increased treatment coverage of those diagnosed with HIV from 74% (status quo) to 96% (optimized) in 2019, with high coverage levels maintained to 2030 (figures 2 and 3; table A5).

At 100% optimized budget results suggest scaling up investment for needle-syringe programs targeting PWID (figures 2 and 3; table A5), given that over 55% of new HIV infections in Belarus are estimated to have occurred among PWID in 2018. Should additional resources become available, investment in HIV testing and prevention programs should be scaled-up (figure 2; table A5). In order to maintain the response to HIV in FSW and to prevent increases in new HIV infections among FSW, investment in HIV testing and prevention programs targeting this group should be scaled up at the 100% budget level (figure 2; table A5). It is estimated over 5% of new HIV infections occur among FSW. Given 19% of new HIV infections occur among MSM, some investment in HIV testing and prevention programs targeting MSMS should be maintained and scaled up as additional resources become available.

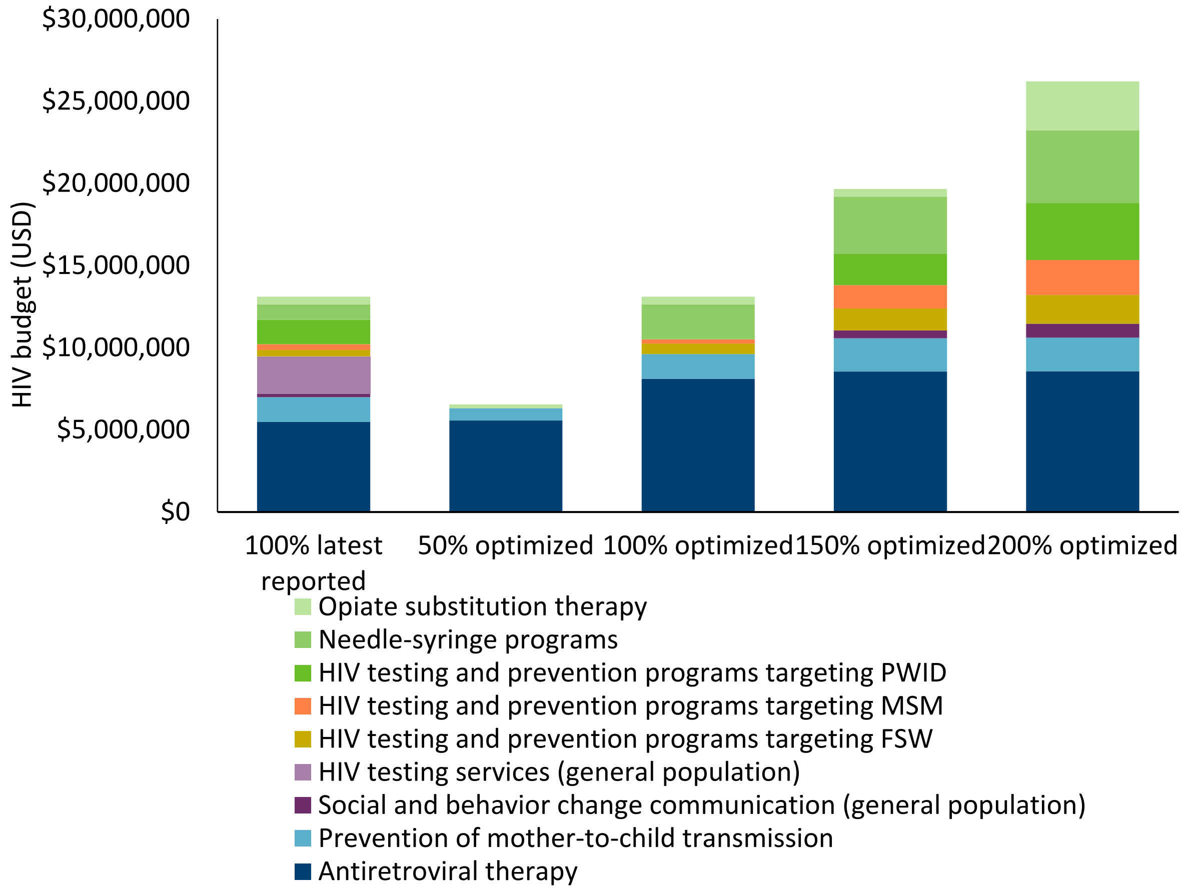


Figure 2. Optimized allocations under varying levels of annual HIV budgets for 2019 to 2030, to minimize new infections and HIV-related deaths by 2030

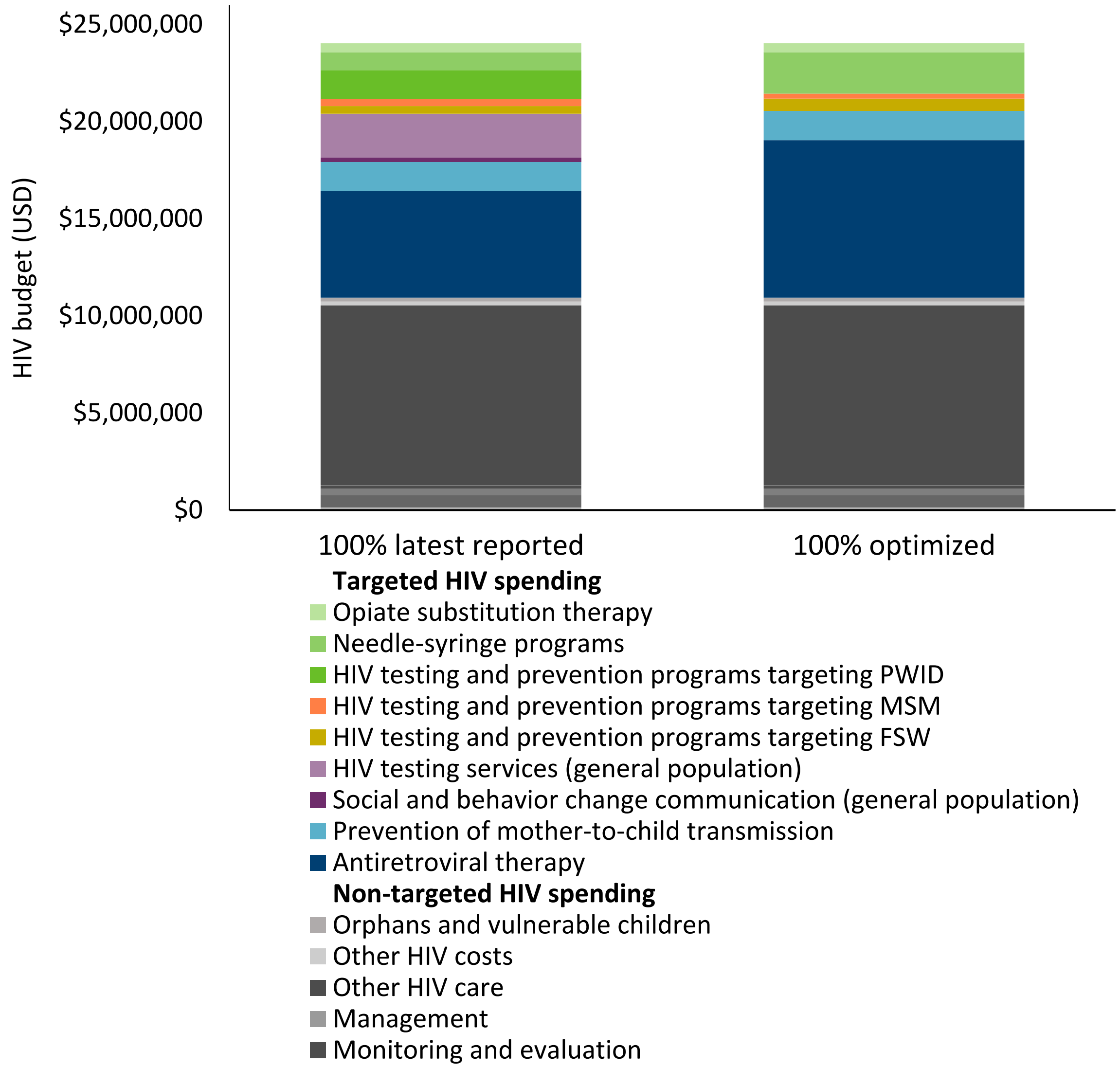


Figure 3. Optimized HIV annual resource allocation, 2019 to 2030 to minimize new infections and HIV-related deaths by 2030. Non-targeted HIV program budgets are shown here but are not considered within the optimization.

Under 100% optimized annual budget to minimize new HIV infections and HIV-related deaths from 2019 to 2030, it is estimated that by 2030 an additional 40% of new HIV infections could be averted (6,800 more infections averted) and 55% more HIV-related deaths could be averted (3,000 more deaths averted) compared with the latest reported allocation being maintained over the same period (figure 4). By 2030, an additional 75,000 DALYs could be averted under optimized budget allocation.

If the budget were doubled to 200% and the allocation optimized, it is estimated that by 2030 new HIV infections could be reduced by an additional 60% (9,700 more infections averted), HIV-related deaths by 60% (3,500 more deaths averted), and HIV-related DALYs by 60% (90,000 more DALYs averted) compared with the latest reported budget level and allocation (figure 4). It is estimated that investment beyond 220% will only have very marginal impact on reducing HIV infections and deaths given the current mix of programs, as programs will reach set saturation levels (calculated as 95% of the maximum achievable reduction in infections and deaths in 2030 compared to 2018 levels).

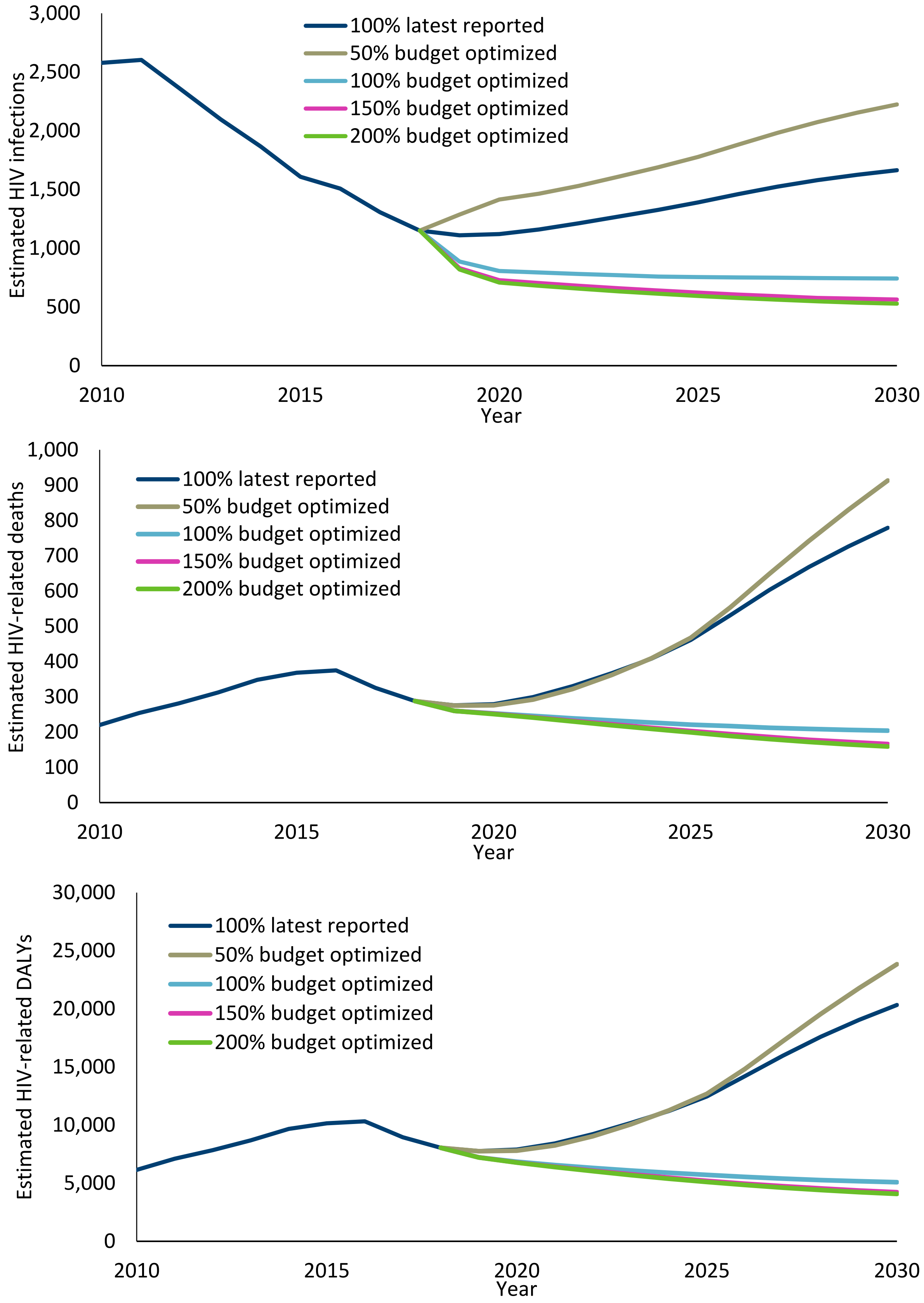


Figure 4. Estimated new HIV infections, HIV-related deaths, and HIV-related DALYs under optimized varying annual budget levels 2019 to 2030 to minimize infections and deaths by 2030

Objective 3. What is the optimized HIV resource allocation for best achieving the 90-90-90 and 95-95-95 targets by 2020 and 2030, respectively, and what are the minimum levels of resources required for best achieving these targets?

Under the latest reported budget, it is estimated that by 2020 77% of people living with HIV will be diagnosed, 73% of those diagnosed will receive treatment, and 56% of those on treatment will achieve viral suppression (figure 5). Even with an increased budget, optimization results suggest that 90-90-90 targets will not be met by 2020, as this is such a short timeframe.

To best achieve 95-95-95 targets, it is estimated that the annual HIV program budget from 2019 to 2030 should be increased to 150% of the latest reported budget level (an additional $6M annually) and optimized with prioritization of antiretroviral therapy (ART), needle-syringe programs, HIV testing and prevention programs targeting MSM, HIV testing and prevention programs targeting FSW, and HIV testing services for the general population (figure 6). By 2030, this could allow Belarus to have 92% of people living with HIV be aware of their status, 97% of those diagnosed on treatment, and 95% of those on treatment to have achieved viral suppression (figure 5).

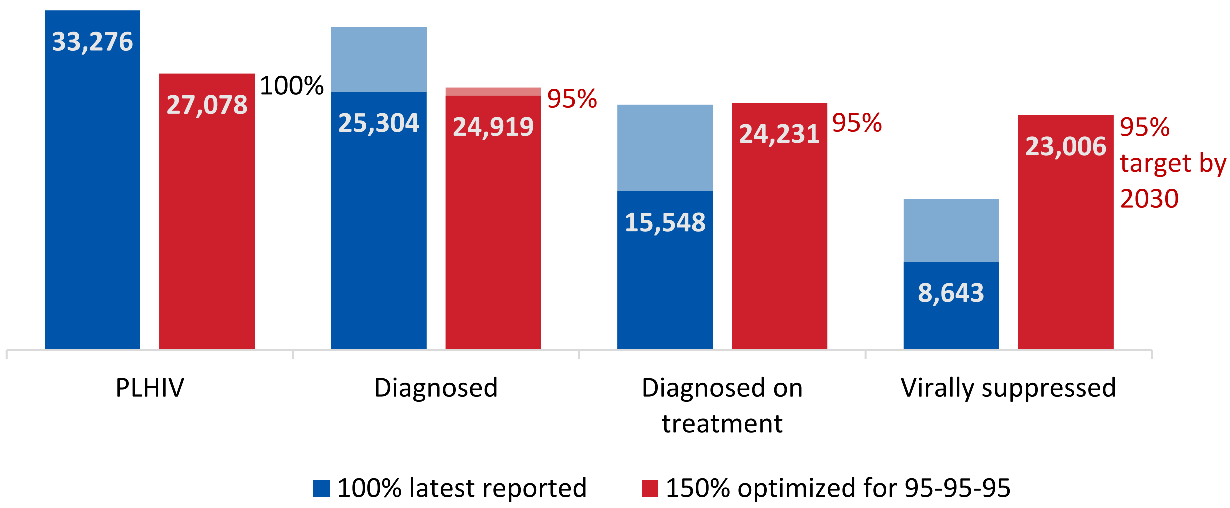


Figure 5. HIV cascade under optimized resource allocation to best achieve 95-95-95 targets by 2030. Dark blue bars represent progress towards 95-95-95 targets under 100% latest reported budget, with light blue bars showing the gap to achieving targets. Red bars represent progress towards 95-95-95 targets under 150% optimized resource allocation to best achieve 95-95-95 targets, with light red bars showing the gap to achieving targets.

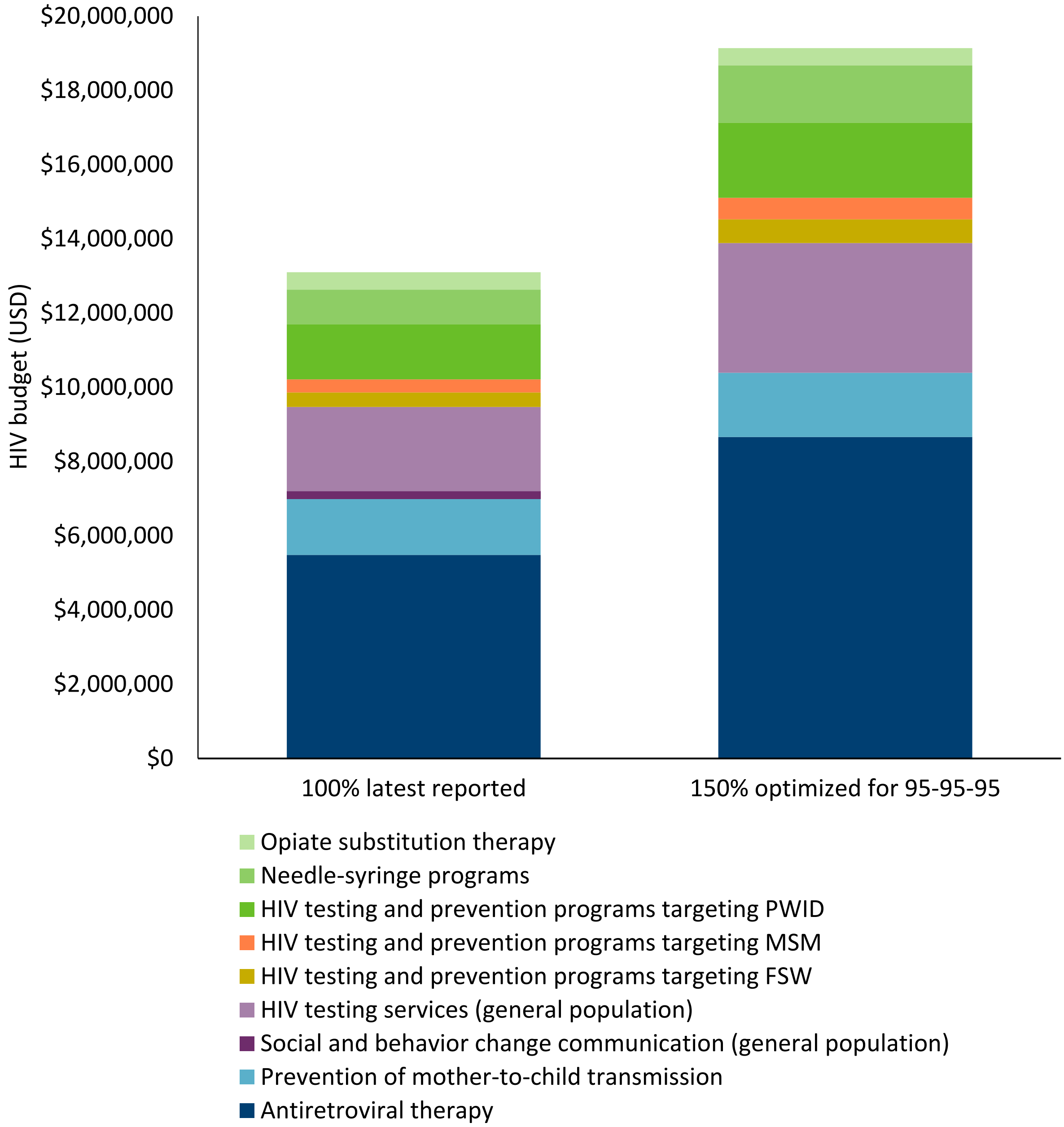


Figure 6. Optimized HIV budget level and allocation to best achieve 95-95-95 targets by 2030

Compared with latest reported 100% budget allocation, by 2030 under optimized allocation of 150% budget towards achieving 95-95-95 targets it is estimated that an additional 65% of new HIV infections could be averted (approximately 11,000 more infections averted) and an additional 70% of HIV-related deaths could be averted (approximately 4,000 more deaths averted) (figure 8).

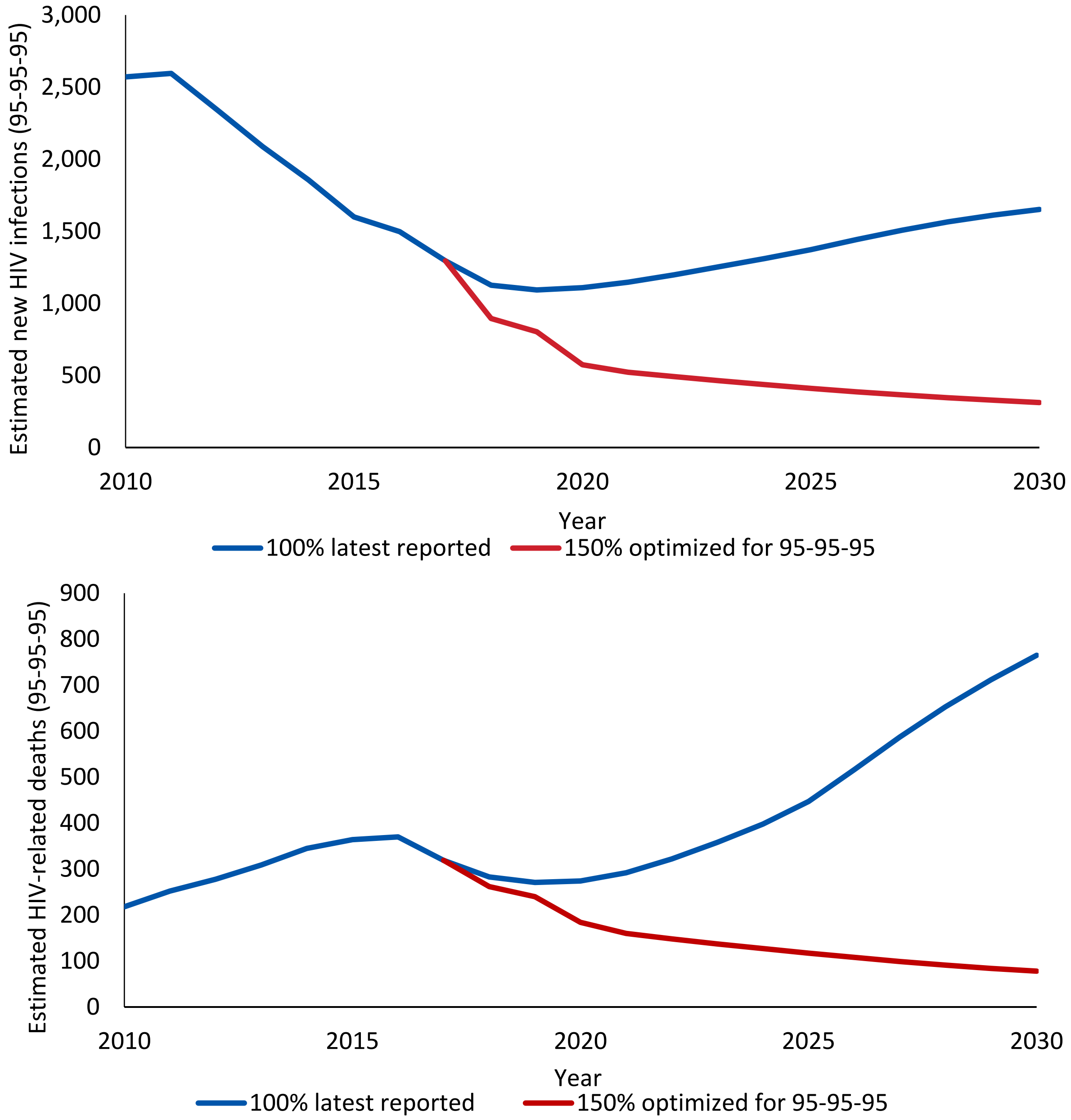


Figure 8. Estimated new HIV infections and HIV-related deaths under optimized allocation towards best achieving 95-95-95 targets by 2030

Study limitations

As with any modelling study, there are limitations that should be considered when interpreting results and recommendations from this analysis. First, limitations in data availability and reliability can lead to uncertainty surrounding projected results. Although the model optimization algorithm accounts for inherent uncertainty, it might not be possible to account for all aspects of uncertainty because of poor quality or insufficient data, particularly for cost and coverage values informing cost functions. Coupled with epidemic trends, cost functions are a primary factor in modeling optimized resource allocations. Second, we used contextual values and expert opinion where available, otherwise evidence from systematic reviews of clinical and research studies were used to inform model assumptions. Lastly, we did not capture the effects of migration of on the HIV epidemic.

Conclusions

The results of this allocative efficiency modeling analysis demonstrate the impact that an optimized resource allocation across a mix of HIV programs can have on reducing infections and deaths. The purpose of this modelling analysis was to evaluate the allocative efficiency of core HIV programs. However, additional gains could be achieved through improving technical or implementation efficiency. In addition, policy makers and funders are encouraged to consider resources required to improve equity, such as through investment in social enablers to remove human rights-based barriers to health. These elements have not been explicitly dealt with in this analysis.

References

1. Belarus country overview, UNAIDS, accessed December 2019. https://www.unaids.org/en/regionscountries/countries/belarus

2. Integrated bio-behavioral surveillance and population size estimation survey among people who inject drugs in Belarus, 2017.

3. Integrated bio-behavioral surveillance and population size estimation survey among men who have sex with men in Belarus, 2017.

4. Integrated bio-behavioral surveillance and population size estimation survey among Female sex workers in Belarus, 2017.

5. Kerr CC, Stuart RM, Gray RT, Shattock AJ, Fraser-Hurt N, Benedikt C, et al. Optima: A model for HIV epidemic analysis, program prioritization, and resource optimization. JAIDS, 2015;69(3):365-76.

Appendices

Appendix 1. Model parameters

Table A1. Model parameters: transmissibility, disease progression, and disutility weights

Interaction-related transmissibility (% per act)		
	Insertive penile-vaginal intercourse	0.04%
	Receptive penile-vaginal intercourse	0.08%
	Insertive penile-anal intercourse	0.09%
	Receptive penile-anal intercourse	1.38%
	Intravenous injection	0.80%
	Mother-to-child (breastfeeding)	36.70%
	Mother-to-child (non-breastfeeding)	20.50%
Relative disease-related transmissibility		
	Acute infection	5.60
	CD4 (>500)	1.00
	CD4 (500) to CD4 (350-500)	1.00
	CD4 (200-350)	1.00
	CD4 (50-200)	3.49
	CD4 (<50)	7.17
Disease progression (average years to move)		
	Acute to CD4 (>500)	0.30
	CD4 (500) to CD4 (350-500)	1.11
	CD4 (350-500) to CD4 (200-350)	3.10
	CD4 (200-350) to CD4 (50-200)	3.90
	CD4 (50-200) to CD4 (<50)	1.90
Changes in transmissibility (%)		
	Condom use	95%
	Circumcision	58%
	Diagnosis behavior change	0%
	STI cofactor increase	265%
	Opiate substitution therapy	54%
	PMTCT	90%
	Pre-exposure prophylaxis	73%
	Unsuppressive ART	50%
	Suppressive ART	92%
Disutility weights		
	Untreated HIV, acute	0.15
	Untreated HIV, CD4 (>500)	0.01
	Untreated HIV, CD4 (350-500)	0.02
	Untreated HIV, CD4 (200-350)	0.07
	Untreated HIV, CD4 (50-200)	0.27
	Untreated HIV, CD4 (<50)	0.55
	Treated HIV	0.05

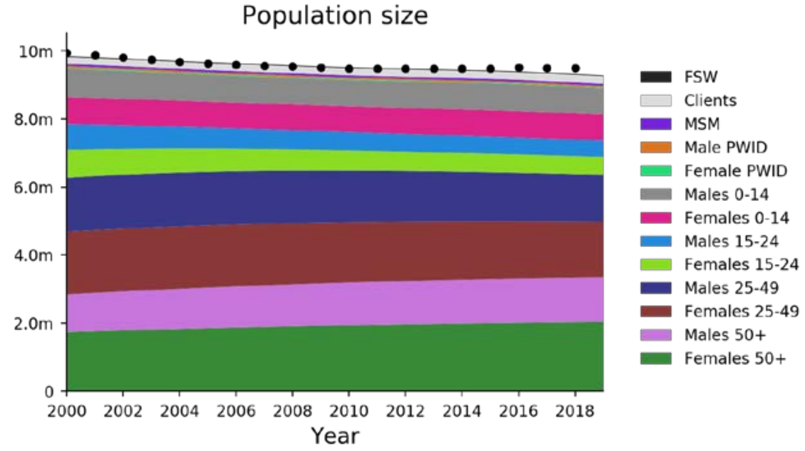
Source: Optima HIV User Guide Volume VI Parameter Data Sources

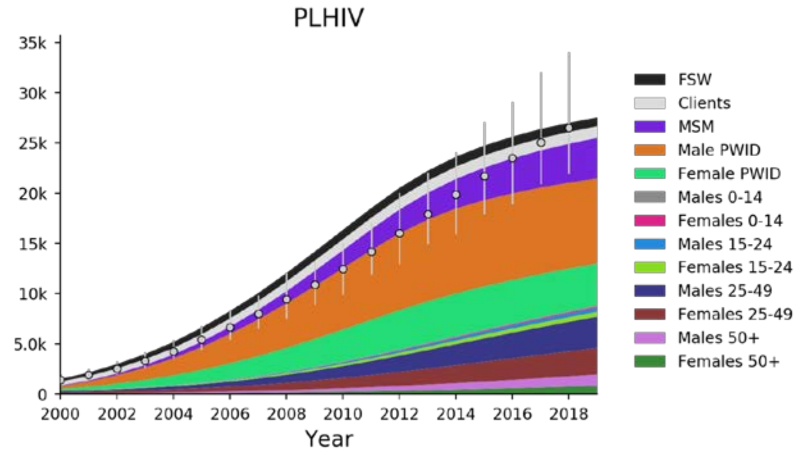
Table A2. Model parameters: treatment recovery and CD4 changes due to ART, and death rates

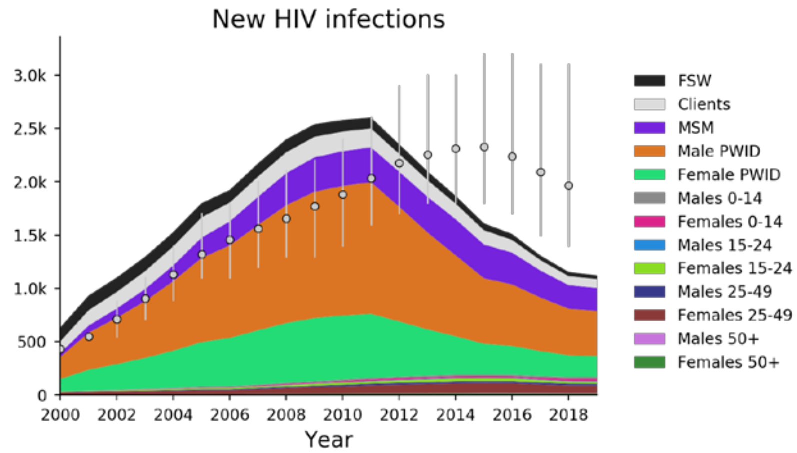
Treatment recovery due to suppressive ART (average years to move)		
	CD4 (350-500) to CD4 (>500)	2.20
	CD4 (200-350) to CD4 (350-500)	1.42
	CD4 (50-200) to CD4 (200-350)	2.14
	CD4 (<50) to CD4 (50-200)	0.66
	Time after initiating ART to achieve viral suppression (years)	0.20
	Number of VL tests recommended per person per year	2.00
CD4 change due to non-suppressive ART (%/year)		
	CD4 (500) to CD4 (350-500)	3%
	CD4 (350-500) to CD4 (>500)	15%
	CD4 (350-500) to CD4 (200-350)	10%
	CD4 (200-350) to CD4 (350-500)	5%
	CD4 (200-350) to CD4 (50-200)	16%
	CD4 (50-200) to CD4 (200-350)	12%
	CD4 (50-200) to CD4 (<50)	9%
	CD4 (<50) to CD4 (50-200)	11%
Death rate (% mortality per year)		
	Acute infection	0%
	CD4 (>500)	0%
	CD4 (350-500)	1%
	CD4 (200-350)	1%
	CD4 (50-200)	8%
	CD4 (<50)	43%
	Relative death rate on suppressive ART	30%
	Relative death rate on non-suppressive ART	70%
	Tuberculosis cofactor	217%

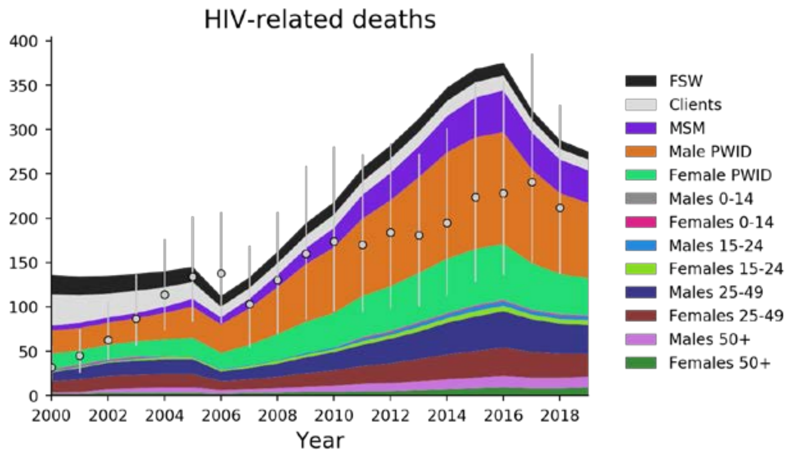
Source: Optima HIV User Guide Volume VI Parameter Data Sources

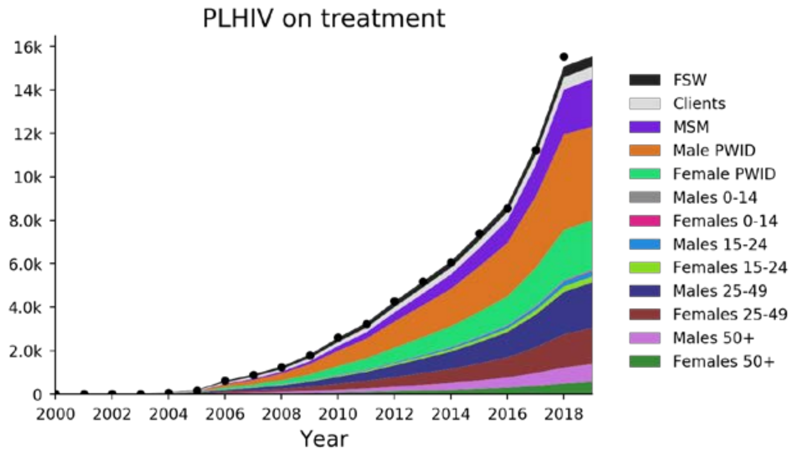
Appendix 2. Model calibration

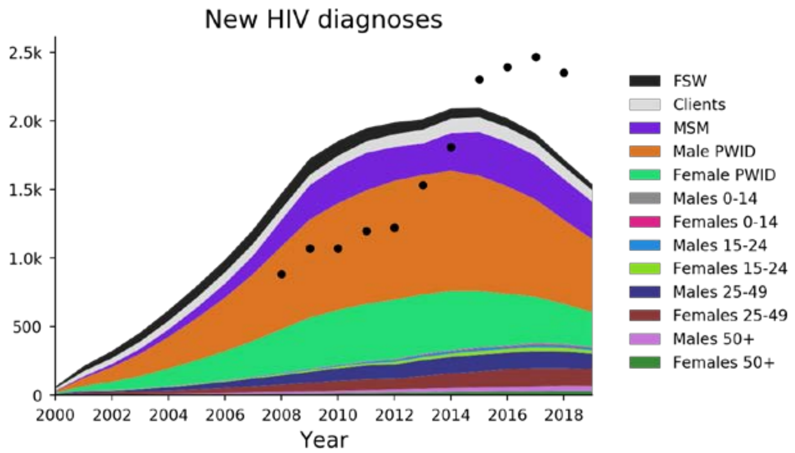


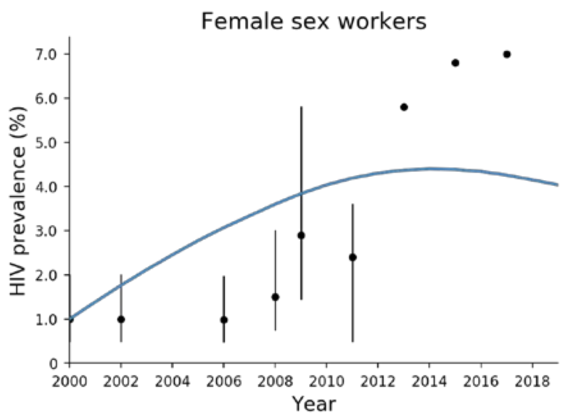


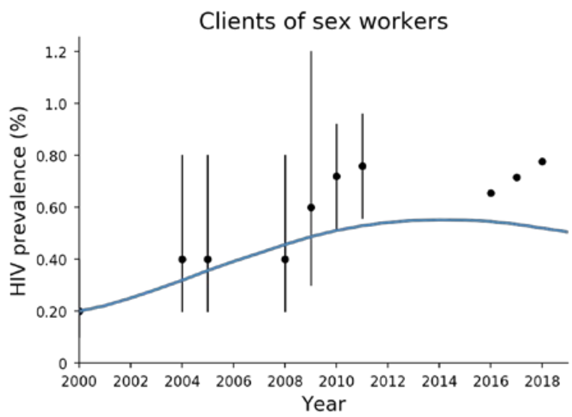


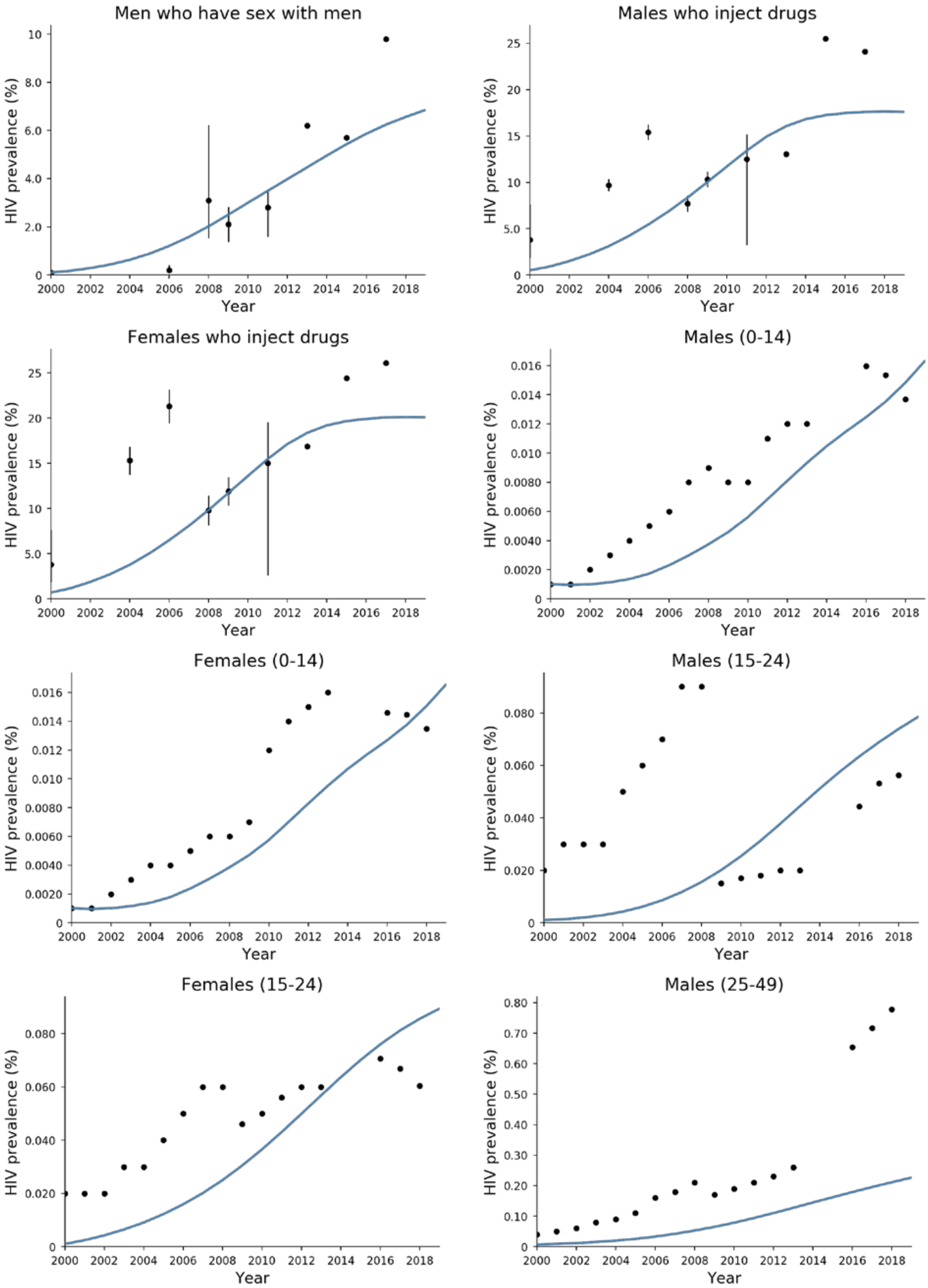

HIV-related deaths
Year
FSW
Clients
MSM
Male PWID
Female PWID
Males 0-14
Females 0-14
Males 15-24
Females 15-24
Males 25-49
Females 25-49
Males 50+
Females 50+

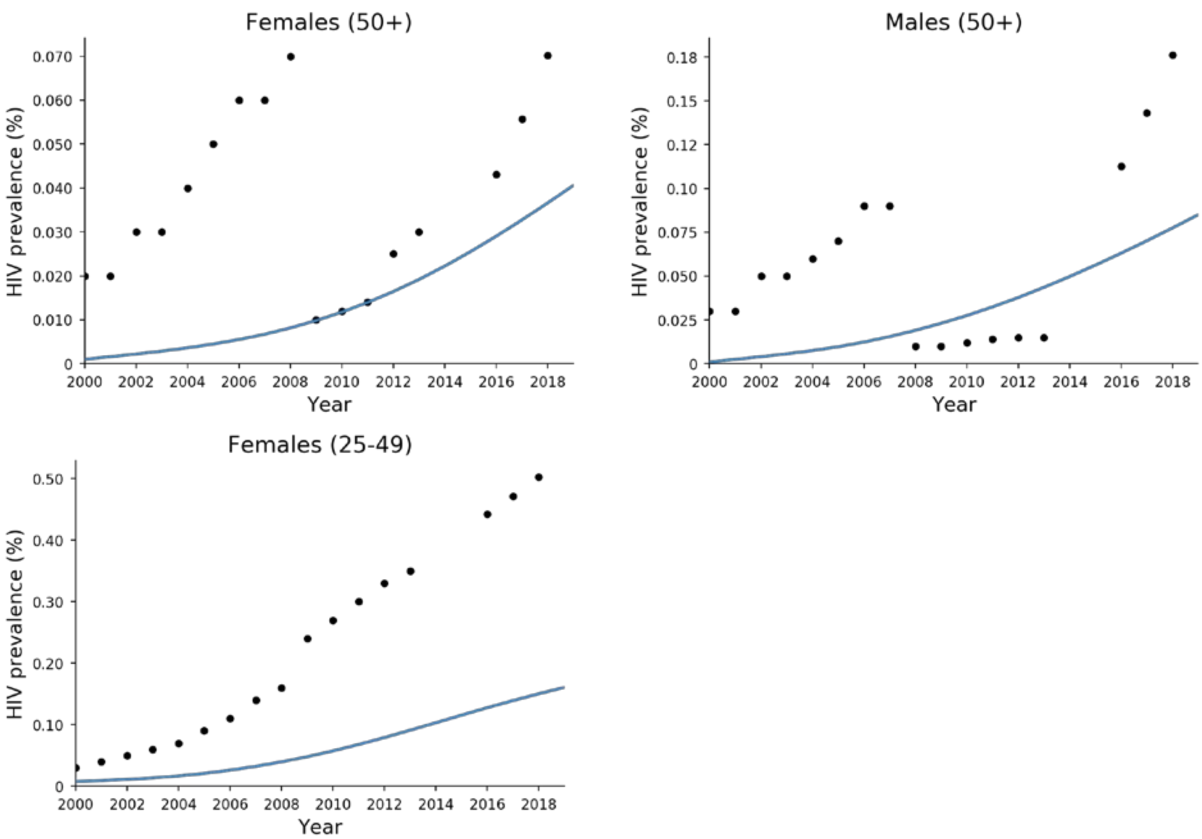

PLHIV on treatment
Year
FSW
Clients
MSM
Male PWID
Female PWID
Males 0-14
Females 0-14
Males 15-24
Females 15-24
Males 25-49
Females 25-49
Males 50+
Females 50+


New HIV diagnoses
Year
FSW
Clients
MSM
Male PWID
Female PWID
Males 0-14
Females 0-14
Males 15-24
Females 15-24
Males 25-49
Females 25-49
Males 50+
Females 50+


Female sex workers
HIV prevalence (%)
Year


Clients of sex workers
HIV prevalence (%)
Year


Men who have sex with men
HIV prevalence (%)
0
2.0
4.0
6.0
8.0
10
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Males who inject drugs
HIV prevalence (%)
0
5.0
10
15
20
25
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Females who inject drugs
HIV prevalence (%)
0
5.0
10
15
20
25
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Males (0-14)
HIV prevalence (%)
0
0.0020
0.0040
0.0060
0.0080
0.010
0.012
0.014
0.016
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Females (0-14)
HIV prevalence (%)
0
0.0020
0.0040
0.0060
0.0080
0.010
0.012
0.014
0.016
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Males (15-24)
HIV prevalence (%)
0
0.020
0.040
0.060
0.080
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Females (15-24)
HIV prevalence (%)
0
0.020
0.040
0.060
0.080
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year
Males (25-49)
HIV prevalence (%)
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018
Year



Appendix 3. HIV program costing

Table A3. HIV program unit costs and saturation values

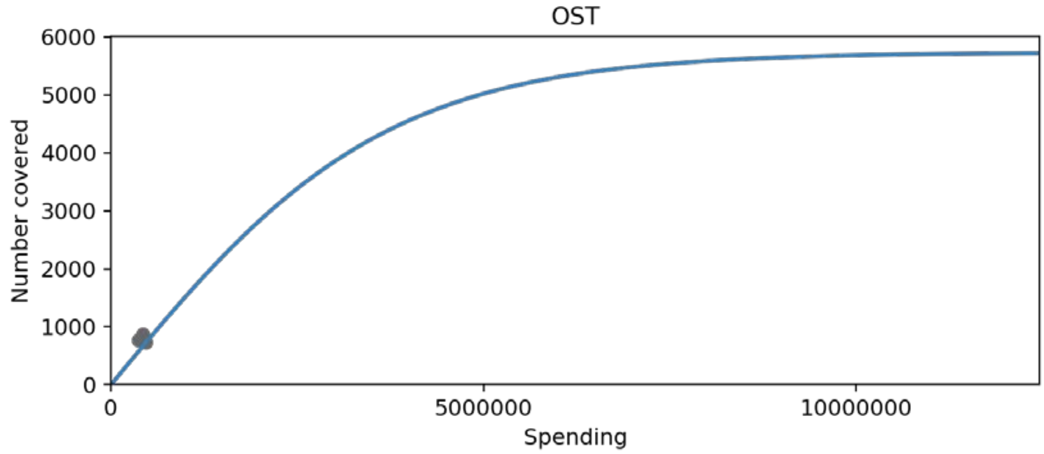
HIV program	Unit cost (USD)	Saturation (low)	Saturation (high)
Antiretroviral therapy (ART)	$352.71	95%	100%
HIV testing services (HTS) (general population)	$1.37	80%	90%
HIV testing and prevention targeting FSW	$47.25	70%	80%
HIV testing and prevention targeting MSM	$25.95	70%	80%
HIV testing and prevention targeting PWID	$28.66	80%	90%
Needle-syringe program (NSP)	$18.21	90%	100%
Opiate substitution therapy (OST)	$643.27	10%	10%
Prevention of mother-to-child transmission (PMTCT)	$6,441.00	90%	100%
Social and behaviour change communication (SBCC)	$0.06	80%	90%

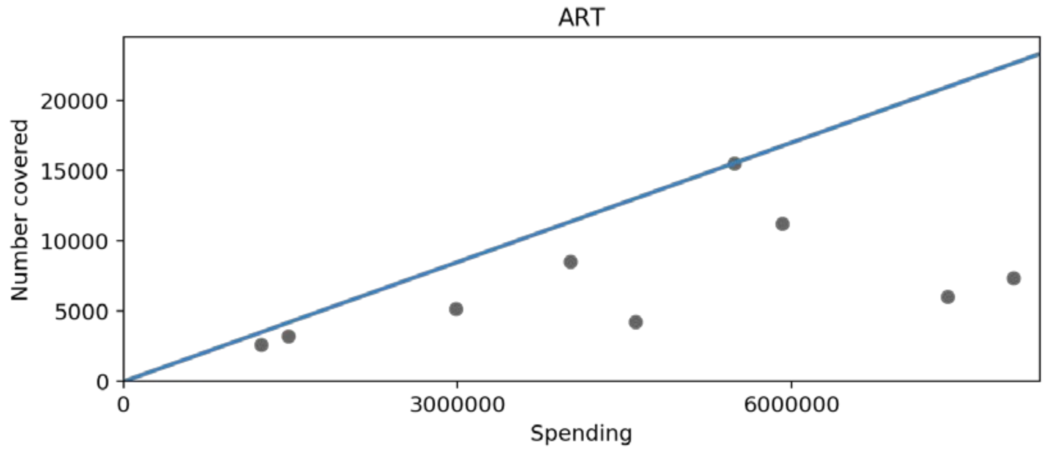
Table A4. Values used to inform HIV program cost functions

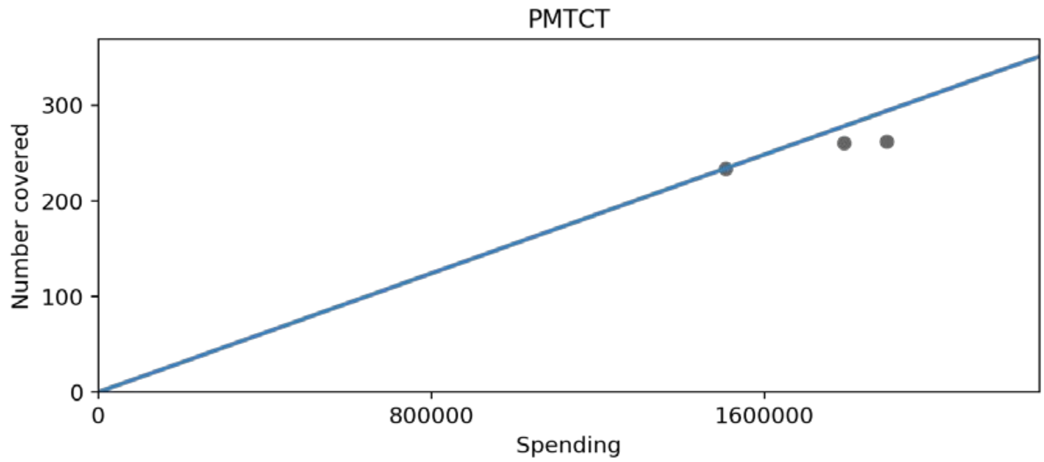
HIV program	Parameter	Population interactions or populations	In absence of any programs		At max attainable coverage	
			low	high	low	high
HTS	HIV testing rate	FSW	2%	8%	7%	9%
FSW programs	HIV testing rate	FSW	2%	8%	35%	45%
PWID programs	HIV testing rate	FSW	2%	8%	10%	14%
HTS	HIV testing rate	Clients	8%	9%	31%	36%
MSM programs	HIV testing rate	MSM	8%	9%	76%	76%
HTS	HIV testing rate	MSM	8%	9%	16%	21%
PWID programs	HIV testing rate	Male PWID	8%	9%	41%	46%
HTS	HIV testing rate	Male PWID	8%	9%	11%	16%
PWID programs	HIV testing rate	Female PWID	8%	8%	41%	46%
HTS	HIV testing rate	Female PWID	8%	8%	11%	16%
HTS	HIV testing rate	Males 15-24	6%	6%	10%	15%
HTS	HIV testing rate	Females 15-24	4%	5%	20%	40%
HTS	HIV testing rate	Males 25-49	5%	6%	18%	20%
HTS	HIV testing rate	Females 25-49	5%	6%	20%	45%
HTS	HIV testing rate	Males 50+	2%	2%	10%	20%
HTS	HIV testing rate	Females 50+	2%	2%	10%	11%
NSP	Needle sharing	Male PWID	13%	13%	6%	6%
NSP	Needle sharing	Female PWID	13%	13%	7%	7%
FSW programs	Condom use (commercial acts)	Clients, FSW	80%	81%	97%	98%
FSW programs	Condom use (casual acts)	Clients, FSW	80%	81%	97%	98%
MSM programs	Condom use (casual acts)	MSM, MSM	65%	65%	69%	69%
SBCC	Condom use (casual acts)	MSM, MSM	65%	65%	68%	68%

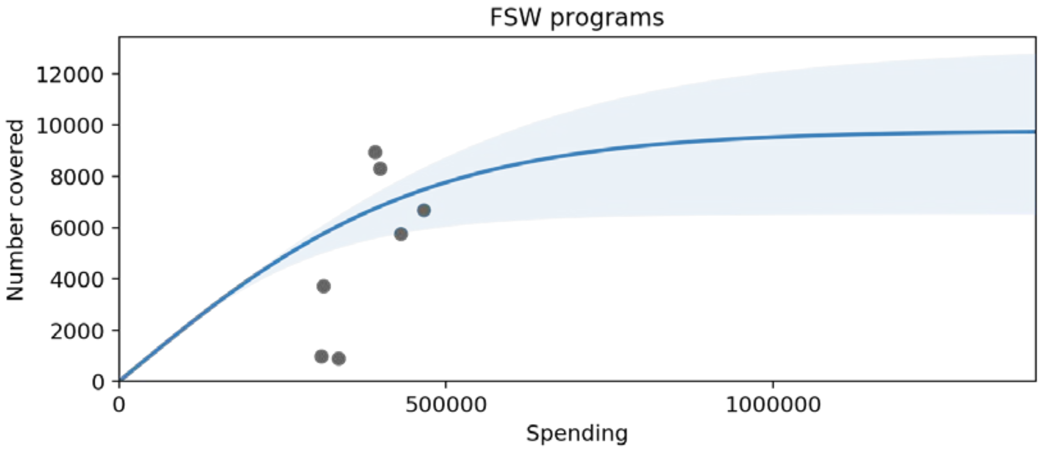
HIV program	Parameter	Population interactions or populations	In absence of any programs		At max attainable coverage	
			low	high	low	high
SBCC	Condom use (casual acts)	Male PWID, Female PWID	17%	17%	66%	66%
PWID programs	Condom use (casual acts)	Male PWID, Female PWID	17%	17%	88%	88%
SBCC	Condom use (casual acts)	Male PWID, Females 15-24	43%	43%	63%	63%
PWID programs	Condom use (casual acts)	Male PWID, Females 15-24	43%	43%	69%	69%
SBCC	Condom use (casual acts)	Male PWID, Females 25-49	40%	40%	65%	65%
PWID programs	Condom use (casual acts)	Male PWID, Females 25-49	40%	40%	71%	71%
SBCC	Condom use (casual acts)	Clients, Female PWID	18%	18%	59%	59%
PWID programs	Condom use (casual acts)	Clients, Female PWID	18%	18%	59%	59%
SBCC	Condom use (casual acts)	Males 15-24, Female PWID	43%	43%	60%	60%
PWID programs	Condom use (casual acts)	Males 15-24, Female PWID	43%	43%	72%	72%
SBCC	Condom use (casual acts)	Males 25-49, Female PWID	42%	42%	66%	66%
PWID programs	Condom use (casual acts)	Males 25-49, Female PWID	42%	42%	69%	69%
SBCC	Condom use (casual acts)	Clients, Females 15-24	38%	38%	58%	58%
SBCC	Condom use (casual acts)	Clients, Females 25-49	36%	36%	61%	61%
SBCC	Condom use (casual acts)	Clients, Females 50+	9%	9%	68%	68%
SBCC	Condom use (casual acts)	Males 15-24, Females 15-24	47%	47%	83%	83%
SBCC	Condom use (casual acts)	Males 15-24, Females 25-49	47%	47%	83%	83%
SBCC	Condom use (casual acts)	Males 25-49, Females 15-24	47%	47%	83%	83%
SBCC	Condom use (casual acts)	Males 25-49, Females 25-49	47%	47%	83%	83%
SBCC	Condom use (casual acts)	Males 25-49, Females 50+	27%	27%	78%	78%
SBCC	Condom use (casual acts)	Males 50+, Females 25-49	27%	27%	78%	78%

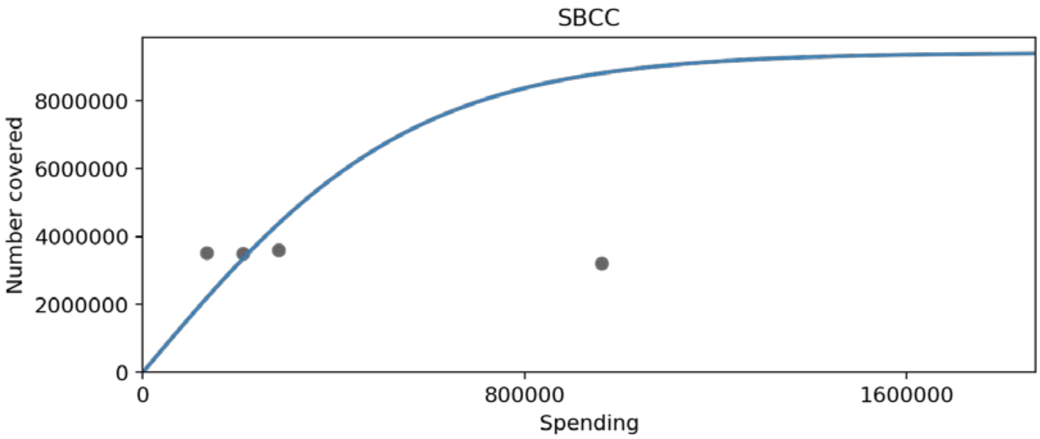
Appendix 4. Cost functions








FSW programs
Number covered
0
2000
4000
6000
8000
10000
12000
0
500000
1000000
Spending


SBCC
Number covered
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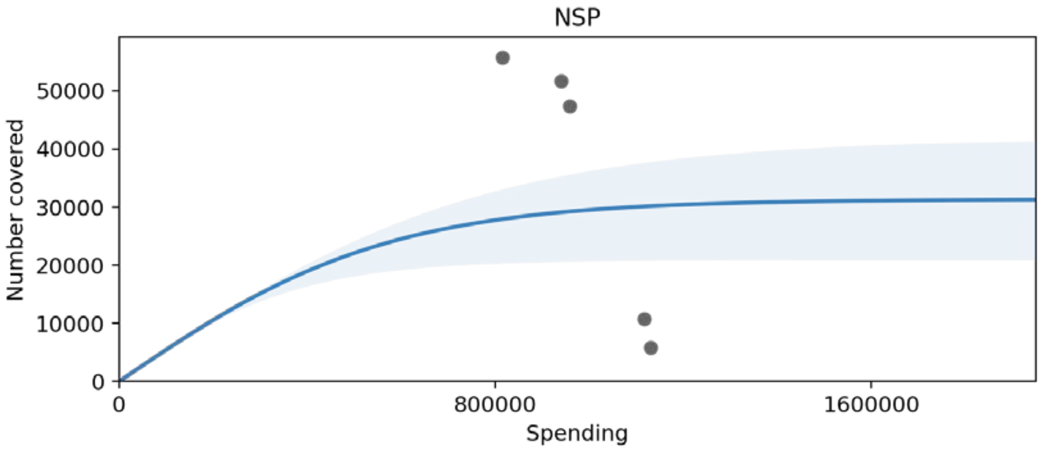
4000000
6000000
8000000
0
800000
1600000
Spending


NSP
Number covered
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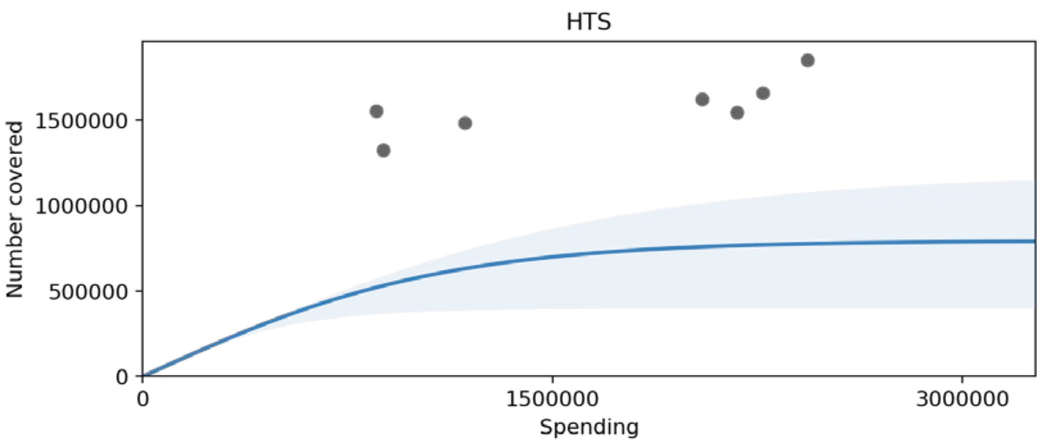
10000
20000
30000
40000
50000
0
800000
1600000
Spending


HTS
Number covered
0
500000
1000000
1500000
0
1500000
3000000
Spending

Appendix 5. Annual HIV budget allocations at varying budgets

Table A5. Annual HIV budget allocations at varying budgets for 2019 to 2030

	100% latest reported (2018)	**50% optimized**	**100% optimized**	**150% optimized**	**200% optimized**
Targeted HIV program					
Antiretroviral therapy (ART)	$5,483,899	$5,563,705	$8,105,752	$8,547,957	$8,567,392
HIV testing services (general population)	$2,270,062	$0	$0	$0	$0
HIV testing and prevention targeting FSW	$391,030	$0	$634,335	$1,330,999	$1,756,334
HIV testing and prevention targeting MSM	$353,089	$0	$253,122	$1,423,148	$2,124,615
HIV testing and prevention targeting PWID	$1,479,646	$0	$0	$1,918,652	$3,467,434
Needle-syringe program (NSP)	$939,874	$0	$2,134,201	$3,463,228	$4,422,249
Opiate substitution therapy (OST)	$468,299	$234,150	$468,299	$468,299	$2,980,758
Prevention of mother-to-child transmission (PMTCT)	$1,507,151	$753,576	$1,507,151	$2,027,604	$2,041,874
Social and behaviour change communication (SBCC)	$209,810	$0	$0	$474,404	$845,063
Non-targeted HIV program					
Enabling environment	$141,659	$141,659	$141,659	$141,659	$141,659
Human resources	$622,744	$622,744	$622,744	$622,744	$622,744
Infrastructure	$341,746	$341,746	$341,746	$341,746	$341,746
Monitoring and evaluation	$163,331	$163,331	$163,331	$163,331	$163,331
Management	$14,390	$14,390	$14,390	$14,390	$14,390
Other HIV care	$9,252,226	$9,252,226	$9,252,226	$9,252,226	$9,252,226
Other HIV costs	$197,517	$197,517	$197,517	$197,517	$197,517
Orphans and vulnerable children (OVC)	$197,517	$197,517	$197,517	$197,517	$197,517
Total HIV program budget	$24,033,990	$17,482,560	$24,033,990	$30,585,420	$37,136,850

Table A6. Maximum estimated achievable HIV budget to minimize new HIV infections and HIV-related deaths by 95% under optimized allocation

Maximum impact budget	Reduction in HIV infections in 2030 compared with 2018	Reduction in HIV-related deaths in 2030 compared with 2018	Reduction in HIV infections in 2030 compared with 2010	Reduction in HIV-related deaths in 2030 compared with 2010
220%	61% (694)	60% (171)	83% (2,100)	49% (106)

Estimated as the budget required to achieve 95% of the maximum reduction in infections and deaths achievable. This is the maximum reduction in infections and deaths with the current mix of programs, delivered with program impact as modeled here. Additional reduction in infections and deaths could be realized if the modeled programs could be delivered more cost-efficiently or if additional targeted HIV programs were to be implemented.