Optimizing Investments in the National HIV Responses of Indonesia and Thailand: a Report for World Health Organization South-east Asia Regional Office

22 January, 2016

Kelsey Grantham, Burnet Institute[1]

David Regan, Kirby Institute[2]

Matthew Law, Kirby Institute[2]

David Wilson, Burnet Institute[1]

[1]Burnet Institute, 85 Commercial Rd, Melbourne, Victoria, Australia 3004

[2]Kirby Institute, UNSW Australia, Sydney, New South Wales, Australia 2052

Report: Optimizing Investments in the National HIV Responses of Indonesia and Thailand

Executive Summary

Mathematical modelling was conducted to inform development of the new SEAR Health Sector Strategy on HIV. For this purpose scenario analyses were designed to identify the optimal allocation of funding required to minimize cumulative new HIV infections and AIDS-related deaths over the period 2015 to 2020 under latest available and increased budgets. The findings are summarized briefly here, subdivided by country, and described in more detail below.

Indonesia

Scenario 1: minimize cumulative new HIV infections and AIDS-related deaths with funding at 2012 levels (last publicly available total HIV budget)

- Prevention programs for key populations such as NSP, MSM and Transgender programs and FSW programs should receive an increased allocation under optimized spending.
- ART should also be scaled up to reduce AIDS-related deaths.

Scenario 2: minimize cumulative new HIV infections and AIDS-related deaths with 20% and 50% increased funding

- ART should be consistently scaled up with increased funding.
- Spending on prevention in key populations, FSW and MSM in particular, should be gradually increased with more available funding.

Thailand

Scenario 1: minimize cumulative new HIV infections and AIDS-related deaths with funding at 2011 levels (last publicly available total HIV budget)

- ART should be scaled up to reduce AIDS-related deaths.
- MSM programs should receive most of the remaining non-fixed funding.

Scenario 2: minimize cumulative new HIV infections and AIDS-related deaths with 20% and 50% increased funding

- ART should be scaled up with increased total funding
- PWID and MSM programs should also gradually receive more funding
- Spending on HIV testing and counselling should increase as more funding becomes available

Report: Optimizing Investments in the National HIV Responses of Indonesia and Thailand

Background

The WHO South-East Asia Regional (SEAR) Health Sector Strategy on HIV, 2011–2015 (referred to henceforth as the Strategy), was adopted by the WHO South-East Asia Regional Office (SEARO) Committee during the Sixty-fourth Session in Jaipur, Rajasthan, India, 6 – 9 September 2011. The goals of the Strategy are to achieve universal access to comprehensive HIV prevention, treatment and care, and to contribute to the achievement of Millennium Development Goal (MDG) 6 (Combat HIV/AIDS, malaria and other diseases) and other health-related goals (MDGs 3, 4, 5 and 8) and associated targets.

To reach the goals and targets, four strategic directions have been set out in this regional Strategy: 1) optimizing HIV prevention, care and treatment outcomes; 2) strengthening strategic information systems for HIV research; 3) strengthening health systems for effective integration of health services; and 4) fostering a supportive environment to ensure equitable access to HIV services. For each of the strategic directions, country actions are proposed. Moreover, WHO contributions have been clearly spelled out to assist countries to reach the above goals and targets.

WHO SEARO has been assisting Member States in implementing the Strategy. Regional progress reports have been published annually to monitor the progress of programmes, highlight the achievements, and to identify major gaps and barriers in achieving the targets. 2015 is the final year for this Strategy and is a critical time being the last year for the implementation of the MDGs. WHO SEARO is poised to conduct an external review on the implementation of the Strategy. The review will assess the level of success in meeting the targets, and will highlight the challenges and the lessons learnt as well as the contributions of the WHO Secretariat in assisting countries in achieving their goals. Meanwhile, discussions will be held to develop the next WHO regional HIV strategy in the context of the upcoming global health sector HIV strategy.

To facilitate these discussions and to prepare for the development of the next regional HIV Strategy, it is important to generate and present evidence of the current status and predicted future trends of the HIV epidemic, the impact of interventions, and the relative cost effectiveness of different strategies. It is important to note that the next strategy must be developed in the context of competing demands—a clear need to expand HIV services while external resources for most of the HIV programmes in the region are shrinking. In order to inform the discussions around development of the next Strategy, modelling was conducted to predict the impact of HIV interventions over the next five years under latest available levels of spending and increased levels of spending, and to determine the optimal allocation of spending for minimizing HIV incidence and AIDS-related deaths.

The results presented in this report are intended to inform the HIV response in Indonesia and Thailand over the period from 2015 to the end of 2020. Scenario analyses were designed to address the following questions:

1. With the latest funding, how can HIV program spending best be allocated to minimize cumulative new HIV infections and AIDS-related deaths?
2. With 20% and 50% increases in available funding, how should HIV program spending allocations change to minimize cumulative new HIV infections and AIDS-related deaths?

Glossary of terms and abbreviations

Program related terms:

ART – antiretroviral therapy
Condoms and SBCC – condoms and social behavior and communication change
HR – human resources
HTC – HIV Testing and Counselling
MGMT – management
M&E – monitoring, evaluation, surveillance and research
NSP – needle and syringe program
OST – opiate substitution therapy
PMTCT – prevention of mother to child transmission

Key population (**KP**) related terms:

Clients – clients of female sex workers
DFSW – direct female sex workers
FSW – female sex workers
IFSW – indirect female sex workers
MSM – men who have sex with men
PWID – people who inject drugs
TG – transgender

Other terms:

NP – non-Papua
P – Papua
PLHIV – people living with HIV

Methods

To assess the HIV investment cases in Indonesia and Thailand we used a dynamic, population-based mathematical model of HIV transmission and disease progression called Optima. Optima tracks the entire population of people living with HIV over 5 stages of CD4 count (>500, 350 – 500, 200 – 350, 50 – 200, and <50) from the time of their infection through 5 stages of management (undiagnosed, diagnosed, 1st-line treatment, treatment failure, and 2nd-line treatment). For the current analysis, the modelled population is further partitioned by relevant key populations (Table 1) and accounts for sexual, injecting-related and vertical (mother-to-child) transmission of HIV. This epidemiological model is coupled with functions that account for the cost of delivering services for each type of program and a mathematical optimization function to calculate the optimal allocation of resources to best meet strategic targets. Model input values were obtained from previous recent Optima applications for Indonesia and Thailand, and the results of calibrating the model to HIV prevalence in the target populations (Indonesia and Thailand) are given in the Appendix.

Optima is described in detail in a published journal article by Kerr *et al*.[1] and in Supplemental Digital Content to that paper, which can be found online at http://links.lww.com/QAI/A662. A full description of model parameters, prior distributions and their justifications can be found online at http://optimamodel.com/docs/optima-parameter-priors.pdf.

Table 1. Population subgroups selected for modelling of the HIV epidemics in Indonesia and Thailand

Indonesia		Thailand
Papua	**Non-Papua**	DFSW
FSW	FSW	IFSW
Clients	Clients	Clients
MSM	MSM	MSM
General population males	General population males	General population males
General population females	General population females	General population females
Transgender	Transgender	Male PWID
	PWID	Female PWID

Key Assumptions

- ART programs are modelled under the constraint that people receiving treatment cannot be taken off treatment except through natural attrition.
- Annual spending on indirect HIV programs, as defined in the relevant National AIDS Spending Assessment (NASA) reports, includes: blood safety; enabling environment; HR and research; management; orphans and vulnerable children (OVC); and social protection. These are fixed using the 2012 and 2011 spending amounts for Indonesia and Thailand, respectively.
- Other HIV-related costs include: spending on blood safety; enabling environment; OVC; social protection; and general care and treatment.
- Viral suppressive ART is assumed to reduce infectiousness by 70%.

[1] Kerr CC, Stuart RM, Gray RT, Shattock AJ, Fraser-Hurt N, Benedikt C, Haacker M, Berdnikov M, Mahmood AM, Jaber SA, Gorgens M & Wilson DP 2015. Optima: a model for HIV epidemic analysis, program prioritization, and resource optimization. *Journal of Acquired Immune Deficiency Syndromes*, 69, 365-76.

Results

Results are presented by target population for each of the two analysis scenarios. For Indonesia, the results are further subdivided by Papua and non-Papua. Spending on Other HIV-Related costs, HR and Research, and Management are held constant for all analyses.

Indonesia

Note that the latest available HIV program spending data is for the 2012 budget of approximately USD 84.7 million.

Scenario 1: minimize cumulative new HIV infections and AIDS-related deaths with 2012 funding

From Figure 1 and Table 2 it can be seen that in order to minimize cumulative new HIV infections and AIDS-related deaths between 2015 and 2020, with total annual spending capped at the 2012 level, spending should be more focused on ART and key population prevention than on general population prevention. The model suggests a large reduction in expenditure (~30-fold for non-Papua and ~150-fold for Papua) on condoms and SBCC, involving condom distribution and knowledge dissemination targeted at the general population. By contrast, overall spending on NSP, FSW, MSM and TG programs should be increased but this varies depending on whether the setting is Papua or non-Papua. For example, spending on MSM programs should increase by ~45% for non-Papua but decrease by ~99% for Papua, similarly for spending on FSW. Considering that Papua is experiencing a more generalized epidemic while non-Papua has a concentrated epidemic, prioritization of prevention programs for key populations in non-Papua over Papua is not surprising. The model also suggests that optimal spending would involve increased (~11%) spending on ART.

Under optimized spending, around 14,000 new HIV infections and 3,000 AIDS-related deaths would be averted between 2015 and 2020 (Table 3). From Figure 2 it can be seen that there is no marked disproportionate benefit for any particular population group/s in terms of new HIV infections and AIDS-related deaths averted.

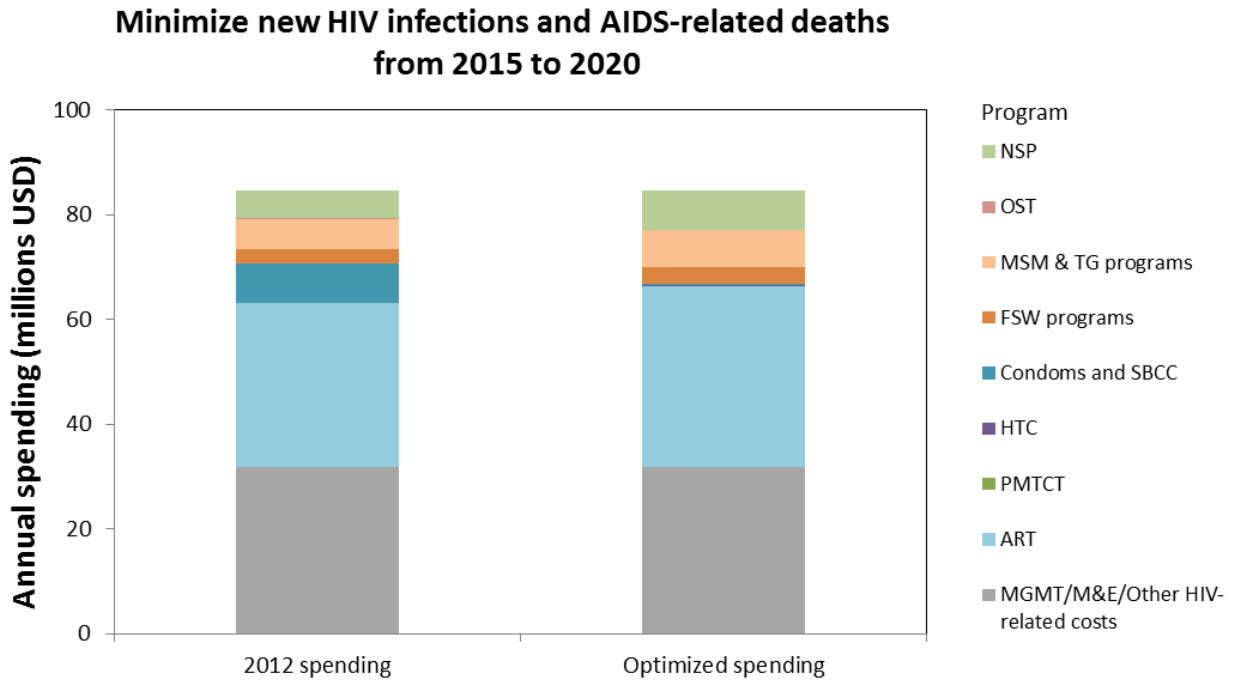

Figure 1. Optimized spending allocations to minimize both cumulative new HIV infections and AIDS-related deaths from 2015 through to the end of 2020 compared to 2012 spending for the same period

Table 2. HIV program spending allocations, in thousands of US dollars, for 2012 and optimized spending, 2015–2020

HIV program	2012 spending	% of HIV spending	Optimized spending	% of HIV spending	Relative change (%)
NSP	$5,286	6.24	$7,675	9.07	45
OST	$166	0.20	$6	0.01	-97
MSM programs (NP)	$4,854	5.73	$7,048	8.32	45
MSM programs (P)	$994	1.17	$10	0.01	-99
FSW programs (NP)	$2,190	2.59	$3,179	3.76	45
FSW programs (P)	$448	0.53	$34	0.04	-92
Condoms and SBCC (NP)	$6,241	7.37	$205	0.24	-97
Condoms and SBCC (P)	$1,278	1.51	$5	0.01	-100
HTC (NP)	$77	0.09	$111	0.13	45
HTC (P)	$1	0.00	$2	0.00	45
PMTCT	$123	0.15	$34	0.04	-73
ART	$31,182	36.83	$34,532	40.79	11
Other HIV-related costs*	$3,766	4.45	$3,766	4.45	0
HR and Research*	$11,985	14.16	$11,985	14.16	0
Management*	$16,073	18.98	$16,073	18.98	0

* Program spending held fixed

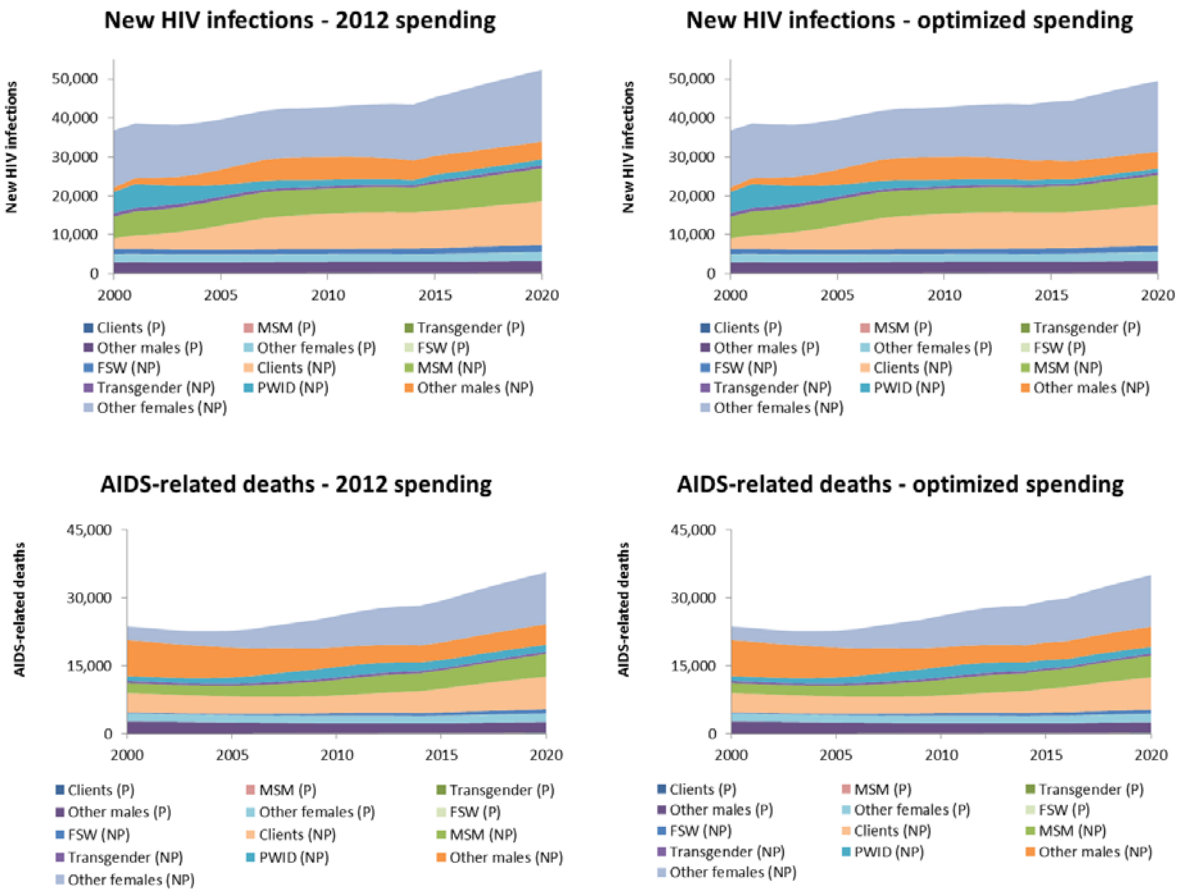

Figure 2. Estimated annual new HIV infections and AIDS-related deaths for 2012 and optimal spending allocations, 2000–2020

Table 3. Cumulative number of new HIV infections and AIDS-related deaths for 2012 and optimal spending allocations, 2015–2020

Indicator (2015–2020)	Maintain 2012 spending	Optimized spending	Relative change (%)
New HIV infections	293,415	279,642	-5
AIDS-related deaths	195,244	192,017	-2
New HIV infections averted	Baseline	13,773	
AIDS-related deaths averted	Baseline	3,227	

*Number of new HIV infections and AIDS-related deaths averted through optimized spending are additional to what would be achieved were 2012 spending maintained for the same time period.

Scenario 2: minimize cumulative new HIV infections and AIDS-related deaths with 20% and 50% increased funding

From Figure 3 it can be seen that as overall funding is scaled up, the model suggests that spending on ART should be increased proportionately in order to minimize the cumulative number of new HIV

infections and AIDS-related deaths between 2015 and 2020. Similarly spending on key populations, FSW and MSM in particular, should be increased accordingly. As was observed in Scenario 1, prevention programs for key populations in non-Papua are prioritized over Papua with increased available funding (Table 4).

Figure 4 shows that the numbers of new HIV infections and AIDS-related deaths per year are expected to steadily increase over time unless funding is scaled up. Under 2012 spending and optimized spending of 2012 resources, both measures increase each year from 2015 to 2020. When funding is scaled up to 20% of 2012 resources, the estimated number of new HIV infections in 2020 is similar to 2015, while there is an increase in the estimated number of AIDS-related deaths in 2020 compared to 2015. A reduction in estimated new HIV infections and AIDS-related deaths per year is only achieved once funding is scaled up to 50% of 2012 resources, a total budget of nearly USD 127 million.

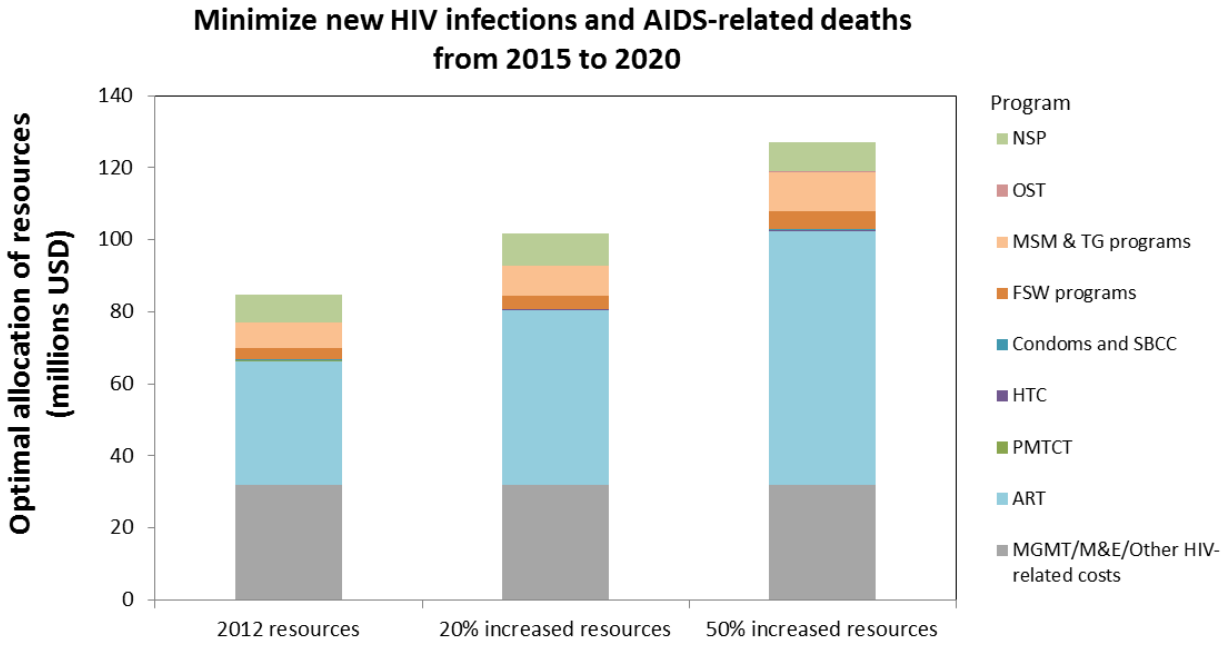

Figure 3. Optimized spending allocations to minimize both cumulative new HIV infections and AIDS-related deaths from 2015 through to the end of 2020 for 2012, 20% increased and 50% increased resources.

Table 4. HIV program spending allocations, in thousands of US dollars, for optimized spending of 2012, 20% increased and 50% increased resources, 2015–2020

HIV program	Optimized spending	% of HIV spending	Relative change (%)	Optimized spending of 20% increased resources	% of HIV spending	Relative change (%)	Optimized spending of 50% increased resources	% of HIV spending	Relative change (%)
NSP	$7,675	9.07	45	$8,931	8.79	69	$8,123	6.40	54
OST	$6	0.01	-97	$28	0.03	-83	$9	0.01	-95
MSM programs (NP)	$7,048	8.32	45	$8,201	8.07	69	$10,995	8.66	127
MSM programs (P)	$10	0.01	-99	$1	0.00	-100	$15	0.01	-98
FSW programs (NP)	$3,179	3.76	45	$3,700	3.64	69	$4,960	3.91	127
FSW programs (P)	$34	0.04	-92	$40	0.04	-91	$53	0.04	-88

Condoms and SBCC (NP)	$205	0.24	-97	$28	0.03	-100	$9	0.01	-100
Condoms and SBCC (P)	$5	0.01	-100	$48	0.05	-96	$177	0.14	-86
HTC (NP)	$111	0.13	45	$130	0.13	69	$174	0.14	127
HTC (P)	$2	0.00	45	$2	0.00	69	$3	0.00	127
PMTCT	$34	0.04	-73	$18	0.02	-85	$24	0.02	-81
ART	$34,532	40.79	11	$48,649	47.88	56	$70,632	55.62	127
Other HIV-related costs*	$3,766	4.45	0	$3,766	3.71	0	$3,766	2.97	0
HR and Research*	$11,985	14.16	0	$11,985	11.80	0	$11,985	9.44	0
Management*	$16,073	18.98	0	$16,073	15.82	0	$16,073	12.66	0
Total	$84,665	100.00	0	$101,598	100.00	20	$126,998	100.00	50

* Program spending held fixed

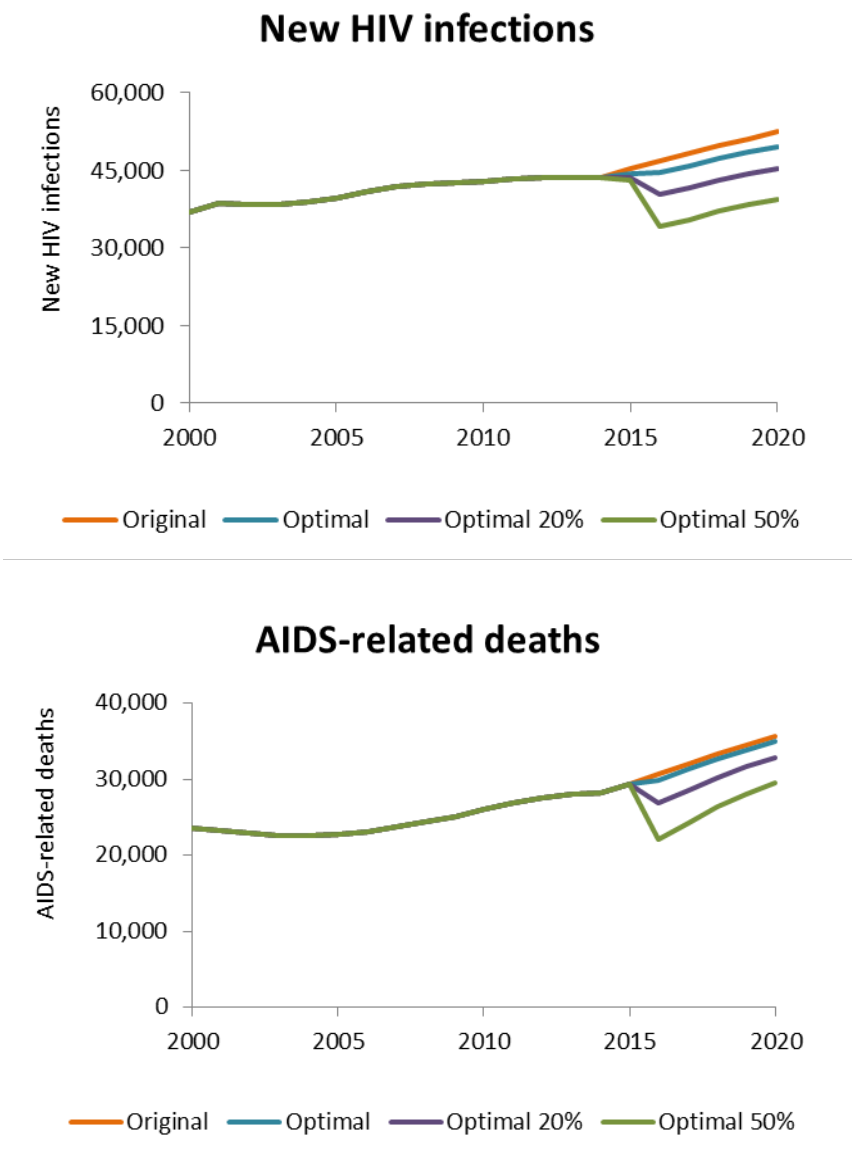

Figure 4. Annual new HIV infections and AIDS-related deaths, 2000–2020

Thailand

Note that the latest publicly available HIV program spending data is for the 2011 budget of approximately USD 323.9 million.

Scenario 1: minimize cumulative new HIV infections and AIDS-related deaths with 2011 funding

Figure 5 shows that the optimal allocation of 2011 spending to minimize new HIV infections and AIDS-related deaths would entail scaling up funding for ART at the expense of other prevention programs. ART constitutes ~42% of the 2011 budget and is increased to 53% of total HIV spending (a relative increase of ~25%) under optimized spending (Table 5). This increase would be funded by reallocation of expenditure from other key population prevention programs as well as prevention for the general population.

Under optimized spending, around 13,000 additional new HIV infections and 25,000 additional AIDS-related deaths would be averted between 2015 and 2020 compared to the situation where 2011 spending was maintained each year (Table 6). From Figure 6 it can be seen that each of the population groups driving the epidemic, namely MSM and general population males and females, benefit from optimal spending in terms of reductions in both new HIV infections and AIDs-related deaths.

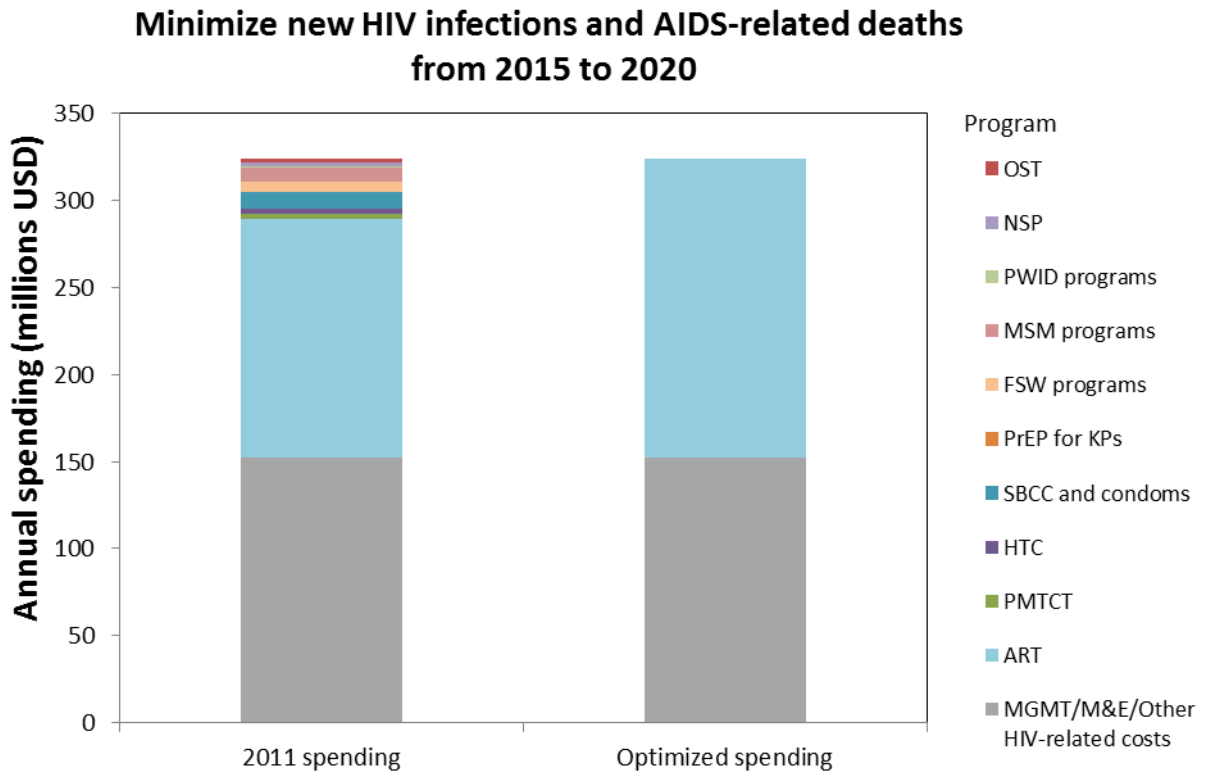

Figure 5. Optimized spending allocations to minimize both cumulative new HIV infections and AIDS-related deaths from 2015 through to the end of 2020 compared to 2011 spending for the same period

Table 5. HIV program spending allocations, in thousands of US dollars, for 2011 and optimized spending, 2015–2020

HIV program	2011 spending	% of HIV spending	Optimized spending	% of HIV spending	Relative change (%)
NSP	$1,951	0.60	$0	0.00	-100
OST	$2,198	0.68	$0	0.00	-100
PWID programs	$1,077	0.33	$0	0.00	-100
MSM programs	$8,155	2.52	$0	0.00	-100
FSW programs	$5,458	1.68	$0	0.00	-100
PrEP MSM	-	0.00	$0	0.00	-
Condoms and SBCC	$9,549	2.95	$0	0.00	-100
HTC	$3,302	1.02	$0	0.00	-100
PMTCT	$2,746	0.85	$0	0.00	-100
ART	$137,277	42.38	$171,714	53.01	25
Other HIV-related costs*	$122,469	37.81	$122,469	37.81	0
HR and Research*	$19,280	5.95	$19,280	5.95	0
Management*	$10,440	3.22	$10,440	3.22	0

* Program spending held fixed

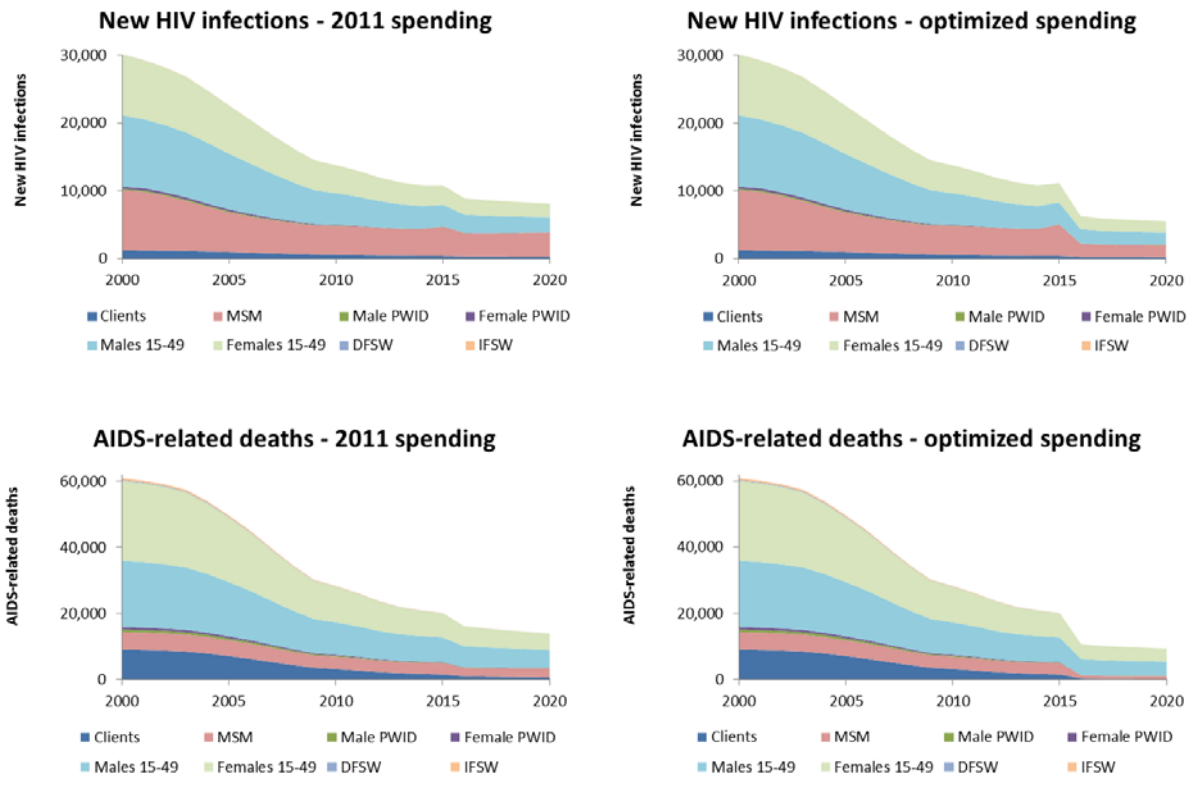

Figure 6. Estimated annual new HIV infections and AIDS-related deaths for 2011 and optimal spending allocations, 2000–2020

Table 6. Cumulative number of new HIV infections and AIDS-related deaths for 2011 and optimal spending allocations, 2015–2020

Indicator (2015–2020)	Maintain 2011 spending	Optimized spending	Relative change (%)
New HIV infections	53,120	40,163	-24
AIDS-related deaths	95,143	69,986	-26
New HIV infections averted	Baseline	12,957	
AIDS-related deaths averted	Baseline	25,157	

*Number of new HIV infections and AIDS-related deaths averted through optimized spending are additional to what would be achieved were 2011 spending maintained for the same time period.

Scenario 2: minimize cumulative new HIV infections and AIDS-related deaths with 20% and 50% increased funding

As funding is scaled up, the model suggests that the optimal allocation of funds required to minimize new HIV infections and AIDS-related deaths would entail increasing funding for ART, prevention programs for key populations (particularly MSM programs and PrEP) and general population testing , while funding for other programs would be considerably reduced (e.g., NSP, PWID and FSW programs) (Figure 7). Note that PrEP programs for key populations were included in the model even though these programs were not in effect in 2011 and therefore no funding was allocated to these programs within the 2011 budget. For 20% and 50% increased funding, the model suggests allocating funding to a PrEP program for MSM, accounting for around 2% and 4% of the respective total budgets (Table 7).

In contrast to Indonesia, new HIV infections and AIDS-related deaths have been declining since at least 2000 and, as can be seen from Figure 8, are predicted to continue to decline under 2011 spending. Under optimized spending of 2011, 20% increased and 50% increased resources, estimated numbers of new HIV infections and AIDS-related deaths per year are progressively lower.

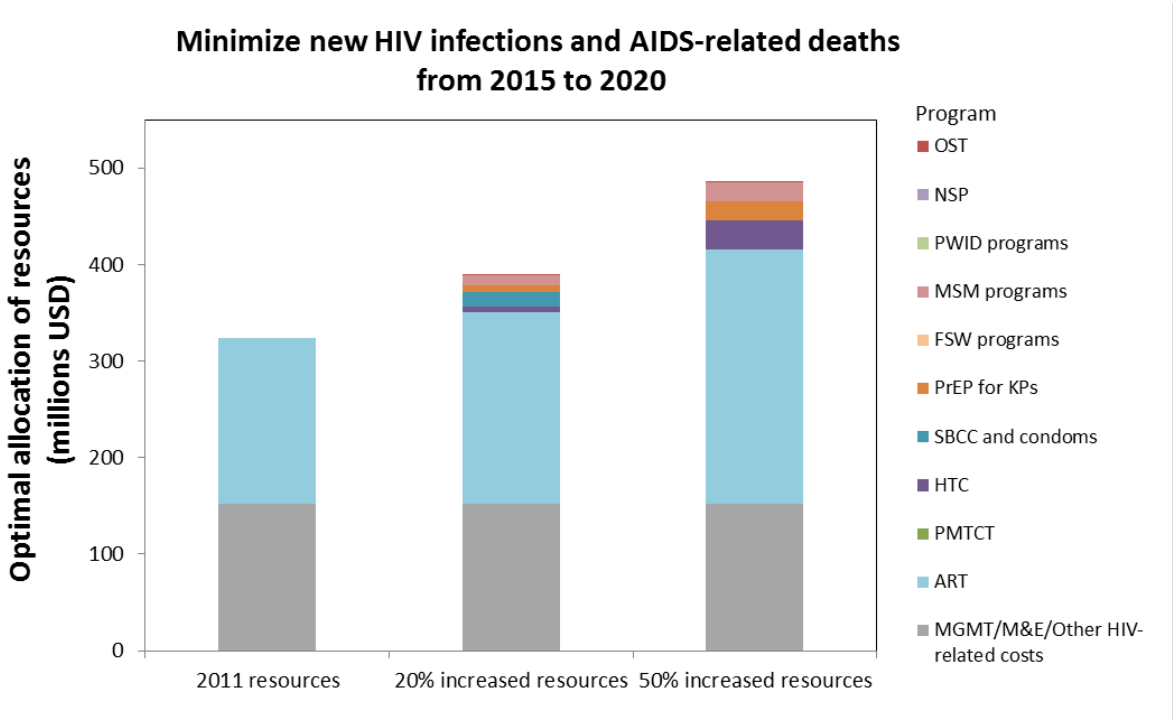

Figure 7. Optimized spending allocations to minimize both cumulative new HIV infections and AIDS-related deaths from 2015 through to the end of 2020 for 2011, 20% increased and 50% increased resources.

Table 7. HIV program spending allocations, in thousands of US dollars, for optimized spending of 2011, 20% increased and 50% increased resources, 2015–2020

HIV program	Optimized spending	% of HIV spending	Relative change (%)	Optimized spending of 20% increased resources	% of HIV spending	Relative change (%)	Optimized spending of 50% increased resources	% of HIV spending	Relative change (%)
NSP	$0	0.00	-100	$2	0.00	-100	$3	0.00	-100
OST	$0	0.00	-100	$17	0.00	-99	$9	0.00	-100
PWID programs	$0	0.00	-100	$4	0.00	-100	$18	0.00	-98
MSM programs	$0	0.00	-100	$9,455	2.43	16	$19,570	4.03	140
FSW programs	$0	0.00	-100	$13	0.00	-100	$11	0.00	-100
PrEP MSM	$0	0.00	-	$7,361	1.89	-	$19,764	4.07	-
Condoms and SBCC	$0	0.00	-100	$15,620	4.02	64	$86	0.02	-99
HTC	$0	0.00	-100	$5,401	1.39	64	$30,341	6.24	819
PMTCT	$0	0.00	-100	$76	0.02	-97	$20	0.00	-99
ART	$171,714	53.01	25	$198,545	51.08	45	$263,843	54.31	92
Other HIV-related costs*	$122,469	37.81	0	$122,469	31.51	0	$122,469	25.21	0
HR and Research*	$19,280	5.95	0	$19,280	4.96	0	$19,280	3.97	0
Management*	$10,440	3.22	0	$10,440	2.69	0	$10,440	2.15	0
Total	$323,902	100.00	0	$388,683	100.00	20	$485,854	100.00	50

* Program spending held fixed

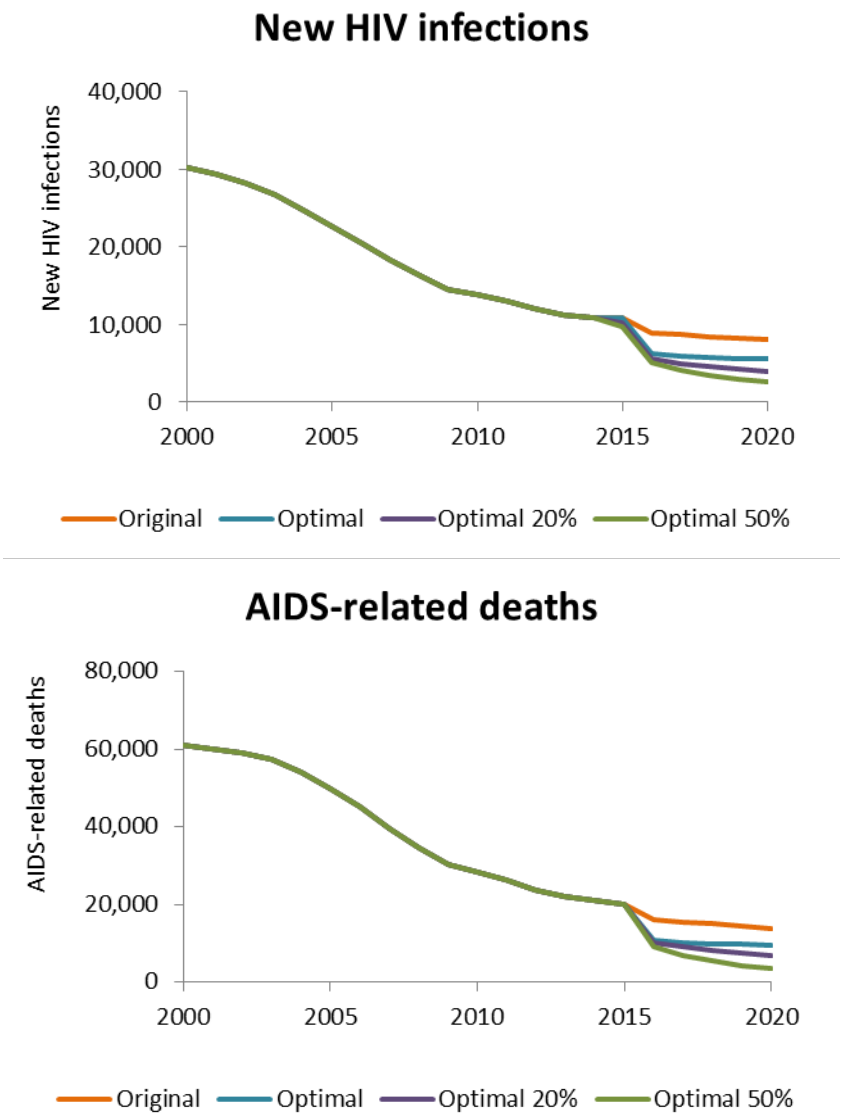

Figure 8. Annual new HIV infections and AIDS-related deaths, 2000–2020.

Appendix

The following figures show calibration of the model to the HIV epidemics in Indonesia (P: Papua; and NP: non-Papua) and Thailand. Points represent available data for HIV prevalence. The curves represent the prevalence trend for each population that is used by the model.

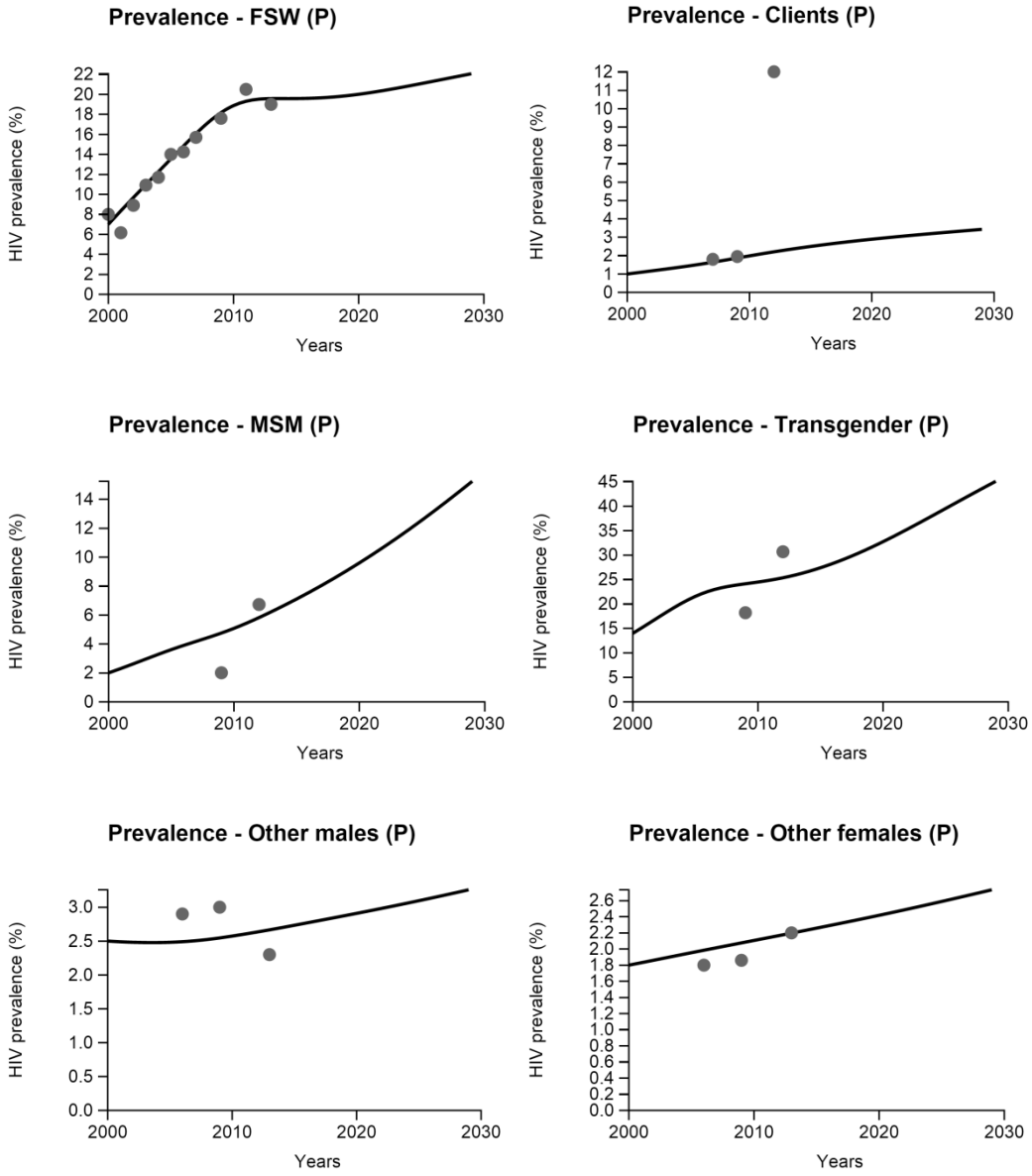

Figure 9. Calibration of model to the HIV epidemic in Papua, Indonesia.

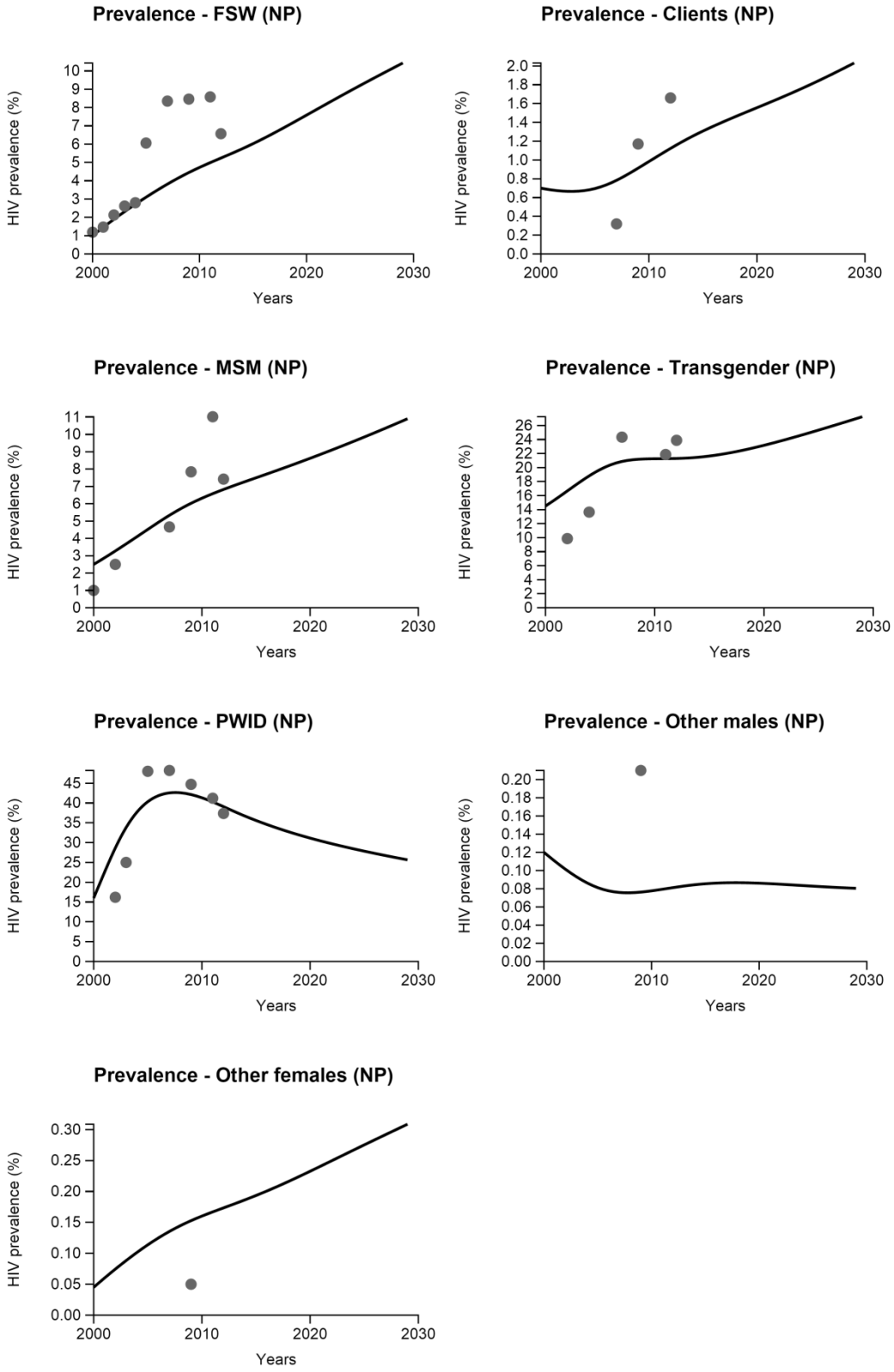

Figure 10. Calibration of model to the HIV epidemic in non-Papua, Indonesia.

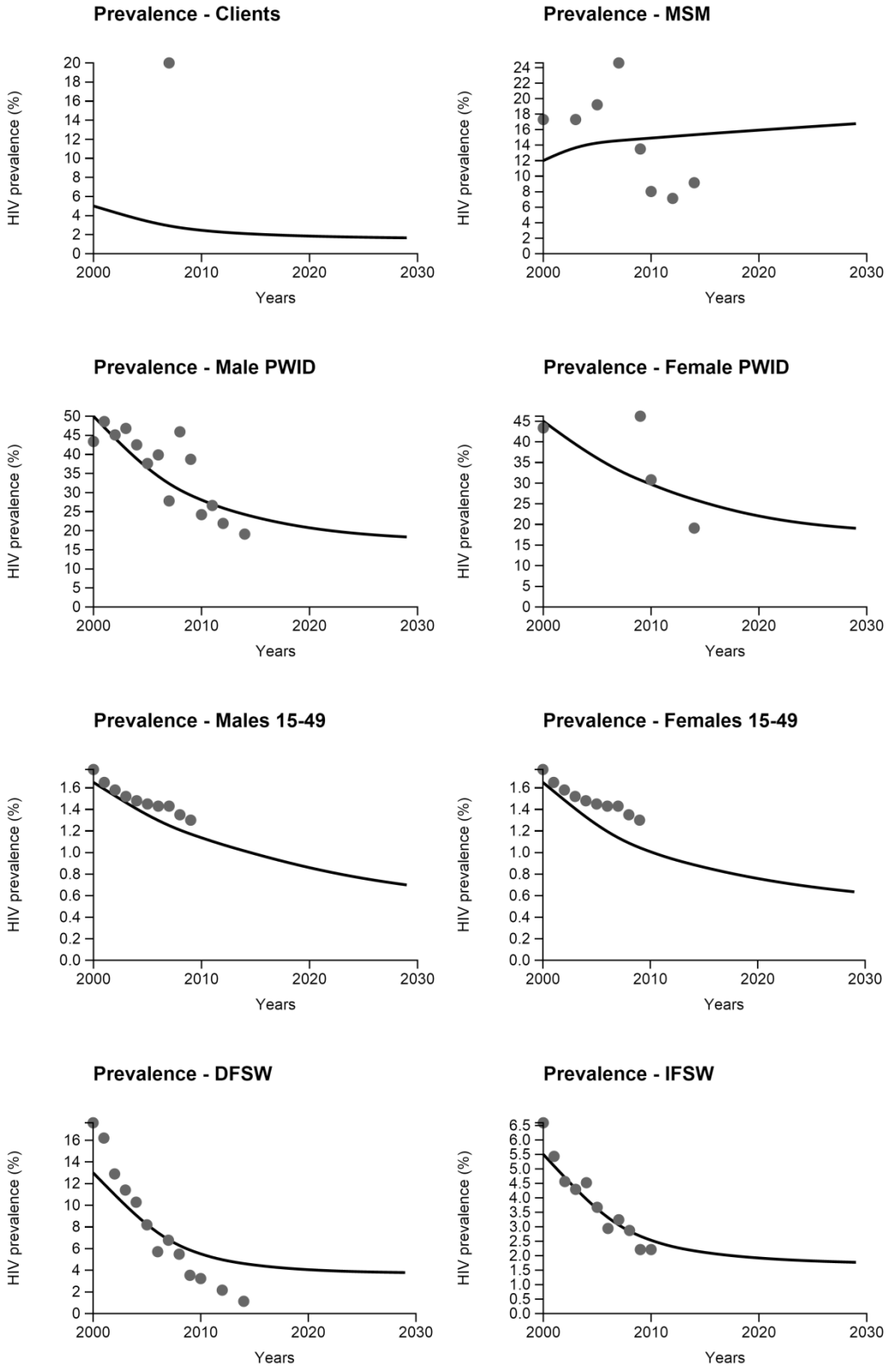

Figure 11. Calibration of model to the HIV epidemic in Thailand.