The Economics of the Global Response to HIV/AIDS

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Center for Global Development, Washington DC, June 29, 2016.

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Today's discussion focuses on two sets of questions.

- **Lessons from the global response to HIV/AIDS.**
  - **Significance of HIV/AIDS and global HIV/AIDS response (from a broad macro/development perspective).**
  - **Drawing on body of work engaging with HIV/AIDS – lessons for policy analysis on HIV/AIDS and other health challenges.**
- **Role of economic analysis in engaging with HIV/AIDS and other health challenges.**
  - **Approaching HIV/AIDS from broad fiscal "MoF" perspective.**
  - **Contribution of economic (and especially financial) analysis to health policy design.**

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What does economic perspective mean?

- Taking in health consequences of HIV/AIDS, but also broader economic, social, or fiscal consequences.
- Not seeing impacts of HIV/AIDS and HIV/AIDS policies in isolation.
- Consider costs of HIV/AIDS programs, but also broader fiscal costs (e.g., social spending), as well as fiscal savings which can be attributed to the HIV/AIDS response.
- Slow disease progression means that HIV infections result in long-term financial costs. How do alternative HIV/AIDS policies impinge on/release fiscal space?
- Financing options: Not discussed at length, because most issues are not specific to HIV/AIDS.

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Impacts of HIV/AIDS and of HIV/AIDS Response

- This draws on about the first half of the book (Parts I and II).
- Global Impacts of HIV/AIDS.
  - Three chapters dealing with health, household-level, and macroeconomic consequences.
- Discussion of global HIV/AIDS response and "returns to investment."

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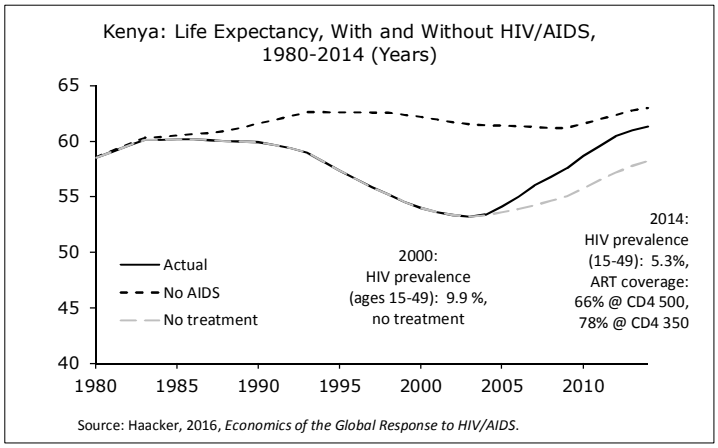
HIV/AIDS and the response to it have dominated health outcomes in numerous countries over the last decades



Source: Haacker, 2016, *Economics of the Global Response to HIV/AIDS*.

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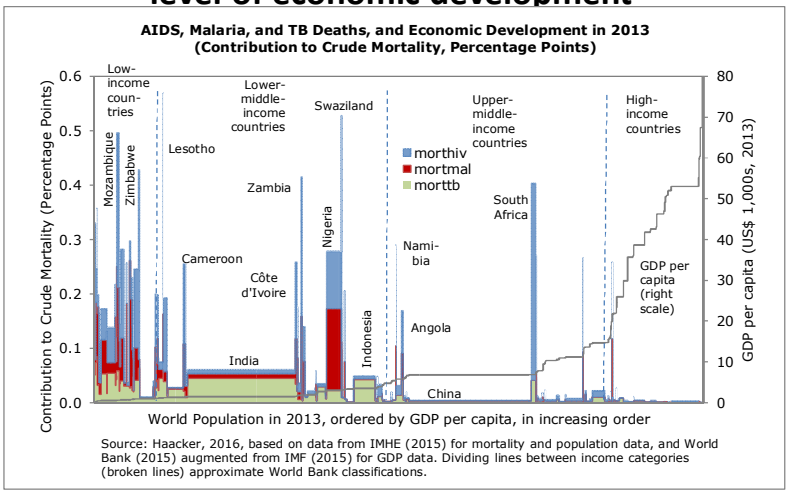
While the global HIV/AIDS response was in part motivated by fears about development impacts, HIV/AIDS is not a typical disease associated with a low level of economic development



Source: Haacker, 2016, based on data from IMHE (2015) for mortality and population data, and World Bank (2015) augmented from IMF (2015) for GDP data. Dividing lines between income categories (broken lines) approximate World Bank classifications.

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But HIV/AIDS stands out in terms of the depth of the impact in selected countries.

Large Adverse Health Shocks, Measured by Drop in Life Expectancy

Country	Principal Cause(s)	Period	Duration	Drop in Life Expectancy 1/		
			(5-year periods)	Peak	Average	Cumulative
Cambodia	Violence	1970-80	2	-27.5	-15.8	-31.6
Rwanda	Violence, HIV/AIDS	1985-2000	3	-26.6	-11.3	-34.0
Zimbabwe	HIV/AIDS, economic crisis	1990-	5(+)	-20.9	-13.4	-66.9
Lesotho	HIV/AIDS	1995-	4(+)	-16.3	-12.3	-49.1
Botswana	HIV/AIDS	1990-2010	4	-13.8	-7.2	-28.7
Swaziland	HIV/AIDS	1995-	4(+)	-13.3	-10.3	-41.1
South Africa	HIV/AIDS	1995-	4(+)	-10.1	-6.9	-27.7
Zambia	HIV/AIDS	1980-2005	5	-9.1	-6.0	-29.8
Timor-Leste	Famine, Violence	1975-1985	2	-8.8	-4.4	-8.8
Kenya	HIV/AIDS	1990-2010	4	-8.1	-5.2	-20.7
Namibia	HIV/AIDS	1995-2010	3	-7.8	-3.9	-11.8
Dem. People's Republic of Korea	Famine, economic crisis	1995-	4(+)	-6.5	-2.6	-10.2
Côte d'Ivoire	HIV/AIDS	1990-	5(+)	-6.1	-3.6	-17.9
Congo, Rep. of	HIV/AIDS	1985-2005	4	-5.4	-3.4	-13.8
Central African Republic	HIV/AIDS	1990-	5(+)	-5.4	-2.9	-14.5
Uganda	HIV/AIDS	1980-2005	5	-5.1	-2.7	-13.4

Source: Haacker, 2016, *Economics of Global Response to HIV/AIDS.*

1/ Drop in life expectancy is measured by decline in life expectancy from previous peak.

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No impact of HIV/AIDS on economic growth?

- **Literature on health and growth frequently use life expectancy or mortality as proxies for human capital, finding large effects of health on growth.**
- **This would imply very large swings in growth countries with high HIV prevalence, which have not happened.**
- **When direct indicators for impact of HIV/AIDS are included in regressions (e.g., HIV/AIDS-related deaths), the growth impacts tend to come out miniscule.**

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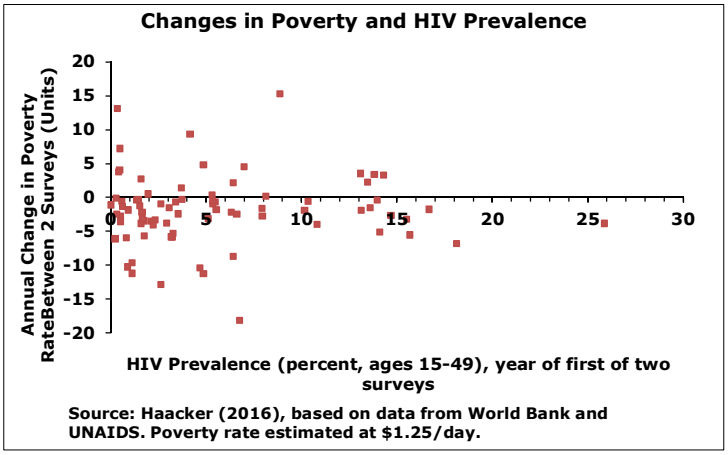
No clear impact of HIV/AIDS on poverty rates or national-level inequality.



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There is no clear correlation between HIV/AIDS and socio-economic factors within countries

- Early presumption that HIV/AIDS hits predominantly the poor. But in DHS studies wealthier individuals turned out to have higher HIV prevalence
- Weak and sometimes positive link between access to education and HIV prevalence.
- HIV/AIDS (in country where heterosexual transmission dominates) has a disproportionate effect on women, who tend to become infected earlier.
- Link between HIV/AIDS and socio-economic factors may be changing – larger declines in HIV prevalence for individuals with higher educational attainment?

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Arguments on economic impacts have not offered compelling *additional* motives for HIV policies.

- Not a disease particularly associated with low levels of development.
- No clear impact on economic growth.
  - Need to develop more differentiated approach to assessing macro consequences of health shocks.
- No clear evidence on impacts of HIV/AIDS on poverty *rates* or inequality.
  - This does not belittle the impacts on *affected households*.
  - But others may gain.
  - Socio-economic indicators like poverty rates misleading if shocks affect denominators?

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Has the global HIV/AIDS response received too much money?

- Share of health-related aid going to HIV/AIDS much higher than share in burden of disease (but this is a very poor indicator).
- In 2013, spending on treatment across L&MCs of US$10 billion sustained about 12 million treatment, unit costs have come down since then.
- HIV prevalence among young people (a pointer for incidence) has been going down in almost all countries with high HIV prevalence between 2000 and 2014.
- Global HIV/AIDS response has been very effective in averting or reversing *catastrophic health outcomes*.

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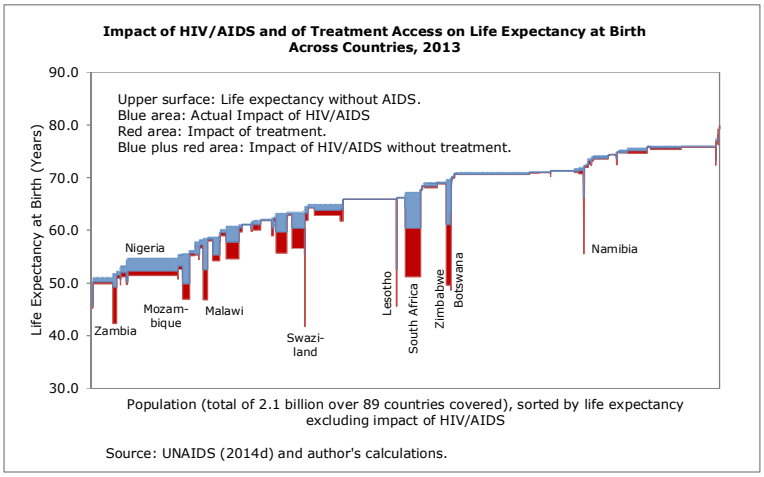
Global HIV/AIDS response was effective in averting/mitigating catastrophic health outcomes



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Policy analysis – "fiscal approach" to assessing HIV/AIDS programs and interventions

- Program-level analysis
  - Scope of costs of HIV/AIDS response and caused by HIV/AIDS
  - Scale of current costs and liability posed by HIV/AIDS response.
- Linking HIV/AIDS policies to national development objectives – e.g., life expectancy, access to health services.
- Accounting for current costs and liabilities by HIV/AIDS policies
  - Under HIV/AIDS policy each new HIV infection causes spending commitment that resembles a financial liability.
- Powerful tool to assess cost-effectiveness and "returns to investment" of HIV/AIDS policies and interventions.

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Builds on program-level fiscal analysis (WB) and work on HIV/AIDS "investment cases"

- World Bank, 2008-12: Fiscal Dimension of HIV/AIDS
  - Scope of costs (e.g., social grants), quantify fiscal space released by HIV prevention programs, links to DSA.
- WB & UNAIDS, 2012-16: Strengthening economic backbone of HIV/AIDS investment cases
  - Returns to investment, cost-effectiveness of alternative policies.
- Systematically developing methodology
  - *Economics of Global Response to HIV/AIDS*, OUP, 2016.
  - Ongoing work on Hepatitis C (WB) and NCDs (Harvard).

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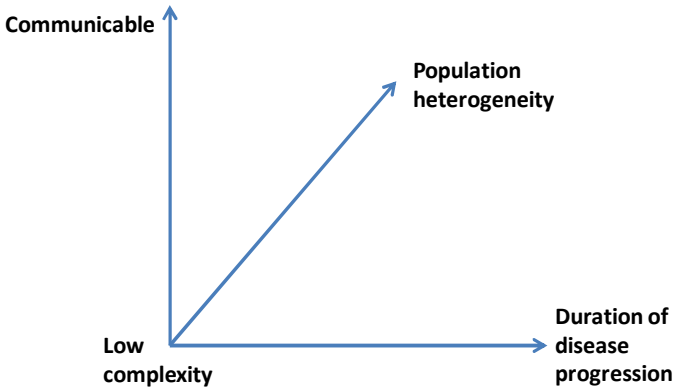
Considerations on Cost-Effectiveness



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The transition of HIV/AIDS into chronic disease has implications for cost-effectiveness analysis of HIV prevention interventions

- Fewer people who become infected with HIV die because of AIDS.
- Those deaths are spread over decades.
- In consequence, standard indicators of cost-effectiveness (e.g., US$ per death averted) can look bad in policy evaluations.
- In contrast, financial consequences of HIV infections (actual or averted) become more pervasive.
- Long survival also implies “long memory” in disease transmission dynamics.

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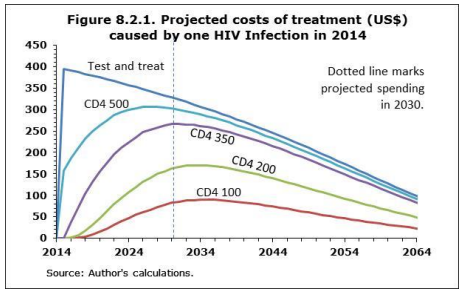
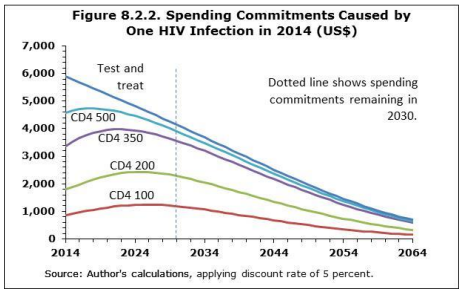
Financial consequences drawn out over decades





- Policy evaluations based on costs within conventional policy periods misleading (unless very long time horizon, but then cost-effectiveness ratios become a mash of causes and effects over decades).

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Returns to investments in HIV prevention – health returns shrinking, financial returns more pervasive

Table 7.1. Health and Financial Consequences of One HIV Infection

	Life expectancy (Years)	Projected time on treatment (Years)	Probability of dying from AIDS (Percent)	Costs of treatment (US$)	Costs of treatment, discounted at… 3 percent (US$)	5 percent (US$)	7 percent (US$)
No ART	12	0	93	0	0	0	0
ART from CD4 count of 100	19	7	75	2,898	1,347	874	595
ART from CD4 count of 200	25	15	56	5,818	2,734	1,796	1,241
ART from CD4 count of 350	33	25	31	9,974	4,913	3,354	2,417
ART from CD4 count of 500	35	30	25	12,108	6,389	4,588	3,481
ART at all CD4 counts	36	35	20	14,106	7,881	5,883	4,634

Source: Author's calculations. Assumes that 100 percent of individuals progress to treatment once they reach eligibility, and that the annual costs of treatment are constant at US$ 400. Life expectancy is remaining life expectancy from time of infection.

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"Fiscal space" analysis of HIV programs and interventions

- **Explicit optimization remains elusive.**
  - **Very large number of state variables.**
  - **Endpoint problem.**
- **Financial liability analysis improves cost-effectiveness analysis**
  - **Full accounting for financial consequences beyond policy period.**
  - **Enables meaningful analysis of *current* policies, e.g., budget allocations for the upcoming fiscal year.**
- **Tool to assess cost-effectiveness across interventions but also scope for mitigating costs of the HIV/AIDS response over time.**

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Table 9.3. Consequences of One HIV Infection - Subsequent Infections, Financial Costs

	Excluding risk of later HIV infection				Including risk of later HIV infection			
	Total HIV infections	Own HIV Infections	Other HIV Infections	Financial Costs (Total)	Total HIV infections	Own HIV Infections	Other HIV Infections	Financial Costs (Total)
Zimbabwe								
Men who have sex with men	4.41	1.00	3.41	18,674	3.56	0.68	2.88	15,461
Female sex workers	2.04	1.00	1.04	10,858	1.27	0.61	0.66	6,270
Clients of female sex workers	1.53	1.00	0.53	7,070	0.86	0.62	0.24	5,240
Casual heterosexual sex - males	1.74	1.00	0.74	7,871	1.62	0.93	0.69	7,409
Casual heterosexual sex - females	1.49	1.00	0.49	6,841	1.33	0.89	0.44	6,563
Low-risk heterosexual sex - males	1.29	1.00	0.29	5,890	1.18	0.91	0.27	5,464
Low-risk heterosexual sex - females	1.20	1.00	0.20	5,553	1.04	0.86	0.17	4,866
Jamaica								
Men who have sex with men	4.72	1.00	3.72	19,686	3.98	0.72	3.26	16,933
Female sex workers	2.72	1.00	1.72	17,892	2.65	0.97	1.68	11,694
Clients of female sex workers	1.60	1.00	0.60	7,279	1.26	0.97	0.29	7,116
Casual heterosexual sex - males	1.54	1.00	0.54	6,996	1.53	0.99	0.54	6,944
Casual heterosexual sex - females	1.35	1.00	0.35	6,168	1.34	0.99	0.34	6,875
Low-risk heterosexual sex - males	1.37	1.00	0.37	6,223	1.36	0.99	0.37	6,176
Low-risk heterosexual sex - females	1.36	1.00	0.36	6,165	1.35	0.99	0.36	6,109

Source: Author's calculations, based on Barrow, Jarrett, and Stevens and others (2012), and Fraser and others (2010).

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Table 9.1. HIV Infections Averted and Cost Savings From Increased Condom Use

Age		HIV Infections Averted						
		Direct Effect		Total Effect		Gross Savings (US$), Discounted at		
Male	Female	Male	Female	Male	Female	3%	5%	7%
By Female Age								
28	20	53.0	66.5	48.4	39.6	451,313	329,648	252,077
32	25	62.9	42.4	61.0	31.6	454,351	328,063	248,614
36	30	44.8	22.1	43.5	20.4	304,394	218,256	164,546
41	35	28.1	15.0	26.9	14.7	195,304	139,680	105,135
45	40	19.5	12.7	18.5	12.6	145,351	103,807	78,059
By Male Age								
20	19	67.0	8.8	51.0	5.1	313,709	232,584	179,315
25	22	82.7	45.3	64.5	30.0	502,829	370,533	285,026
30	24	55.9	62.8	51.1	46.7	490,120	355,855	270,837
35	27	36.3	49.2	35.5	40.9	370,120	266,474	201,571
40	29	26.8	30.7	25.7	27.6	253,748	182,031	137,331

Source: Author's calculations, based on ASSA (2011), a model of the South African HIV epidemic.
Numbers refer to an increase in condom use by 100,000, distributed in proportion to sexual activity.
Cost savings assume annual treatment cost of US$ 400 and do not take into account further program costs.

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Table 9.4. Consequences of One Medical Male Circumcision Performed in South Africa in 2013: HIV Infections Averted, Financial Returns

Age at MC	Impact on HIV Incidence			MCs per HIV infection averted	Cost of MC per HIV infection averted (US$)	Net savings from one MC (US$, @5% disc.)	Amortization period (years, @ 5% disc.)	Internal rate of return (Percent)
	Total	Direct	Indirect					
0	0.236	0.082	0.154	4.2	221	301	30.6	7.8
10	0.232	0.084	0.147	4.3	450	401	22.8	9.9
15	0.218	0.085	0.133	4.6	478	475	17.4	11.5
20	0.227	0.088	0.139	4.4	460	617	12.2	14.5
25	0.159	0.083	0.076	6.3	657	412	11.6	13.6
30	0.079	0.059	0.020	12.6	1,316	123	16.6	8.8
35	0.040	0.034	0.006	25.1	2,623	-2	n.a.	4.9
40	0.022	0.020	0.002	46.2	4,826	-52	n.a.	1.8
45	0.014	0.013	0.000	72.7	7,592	-74	n.a.	-0.9
50	0.009	0.009	0.000	113.3	11,819	-86	n.a.	-3.6
55	0.005	0.005	0.000	214.2	22,350	-95	n.a.	-6.8

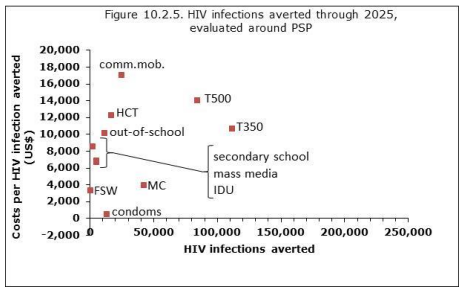
Source: Haacker, Fraser-Hurt, and Gorgens, 2015.

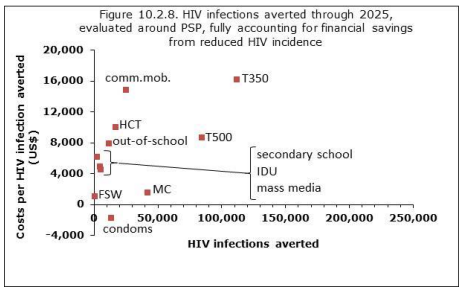
Table 9.6. Treatment Eligibility and the Effectiveness and Cost-Effectiveness of Treatment

						Owing to reduced HIV infections						
	Life years gained (Years)	Treatment costs (US$)	Costs per life year gained (US$)	HIV infections averted (units)	Costs per HIV infection averted (US$)	Life years gained (Years)	Treatment costs (US$)	Costs of end-of-life care (US$)	Total Costs (US$)	Total Life years gained (Years)	Total costs per life year gained (US$)	Total costs per HIV infection averted (US$)
Average Cost-Effectiveness												
ART from CD4 count of 100	6.9	874	127	0.063	13,933	1.63	-34	-219	621	8.5	73	9,904
ART from CD4 count of 200	13.4	1,796	134	0.181	9,912	3.54	-217	-355	1,225	16.9	72	6,759
ART from CD4 count of 350	21.1	3,354	159	0.303	11,088	3.58	-667	-455	2,232	24.6	91	7,377
ART from CD4 count of 500	23.0	4,588	200	0.399	11,485	3.96	-1,155	-472	2,961	26.9	110	7,412
ART at all CD4 counts	24.2	5,883	244	0.501	11,749	4.37	-1,680	-482	3,721	28.5	130	7,431
Marginal Cost-Effectiveness												
ART from CD4 count of 100	6.9	874	127	0.063	13,933	1.63	-34	-219	621	8.5	73	9,904
ART from CD4 count of 200	6.5	922	142	0.118	7,783	1.90	-183	-136	603	8.4	72	5,093
ART from CD4 count of 350	7.7	1,558	203	0.121	12,844	0.04	-451	-100	1,007	7.7	130	8,301
ART from CD4 count of 500	1.9	1,234	642	0.097	12,725	0.38	-487	-17	729	2.3	317	7,522
ART at all CD4 counts	1.2	1,295	1,102	0.101	12,789	0.42	-525	-10	760	1.6	478	7,505

Source: Author's calculations. Life expectancy is remaining life expectancy from time of infection. Treatment costs are assumed constant at US$ 400 annually, and end-of-life care costs US$1,000. Total costs are treatment costs, minus savings in treatment costs from reduced HIV incidence, minus change in end-of-life care. All cost estimates apply a discount rate of 5 percent.
1/ Projected time on treatment is unconditional (irrespective of whether individual moves to treatment). The projected time on treatment for individuals who do obtain treatment can be calculated by dividing the unconditional expected time on treatment by the probablity of reaching treatment (see Table 9.5).

Cost-effectiveness across HIV prevention interventions: Example from KwaZulu-Natal





Note: Illustration is from Haacker (2016), based on analysis by Kripke and others (2013) and workfiles provided by Kripke, with permission from the South African Department of Health.

Table 10.3. Scoreboard for Assessing Program and Allocative Efficiency
HIV Infections Averted, Costs, and Returns to Investment

		Costs	Savings (-)		Net	Returns to Investment		
			through	beyond	Costs		incl. savings	incl. full
	Impact		2025	2025		direct costs	through 2025	savings
	(HIV infections)	(US$ millions)			(US$ millions	(HIV infections averted per US$ 1 million)		
Prevention through secondary schools	1,974	18	-1.1	-4.6	12	109	116	146
Community mobilization	24,634	438	-17	-54	367	56	58	64
Condom promotion and distribution	12,725	15	-8	-29	-21	833	1,689	(cost-saving)
Female sex worker interventions (FSW)	225	0.9	-0.1	-0.5	0.2	252	295	600
HIV counseling and testing (HCT)	16,546	215	-11	-37	167	77	81	93
Injecting drug user interventions (IDU)	4,399	35	-4.9	-8	22	127	149	164
Mass media	4,716	35	-2.7	-11	22	133	144	193
Medical male circumcision (MC)	41,729	187	-19	-102	67	223	248	490
Prevention among out-of-school youth	10,990	119	-6.8	-25	87	92	98	117
Treatment 350	111,196	1,222	-25	613	1,810	91	93	61
Treatment 500	84,051	1,155	31	-454	732	73	71	120
Memorandum items								

Summary/lessons/relevance.

- There is little evidence for macroeconomic effects which add to returns to HIV/AIDS investments, hence focus on health and financial aspects.
- Because of slow disease progression and transmission, assessing cost-effectiveness of HIV treatment and prevention is challenging. Fiscal space analysis improves cost-effectiveness and allows adequate assessment of *current* policies.
- The approaches developed here address aspects of HIV/AIDS also shared by other health conditions, and will become more relevant as the burden of disease shifts from acute to chronic health conditions (including many NCDs).

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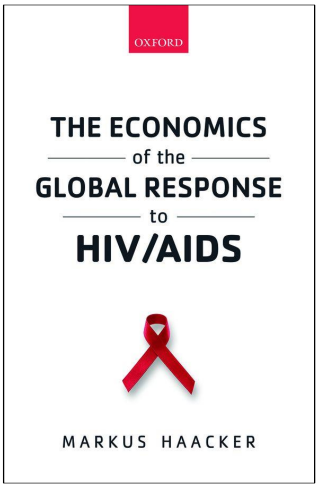
- From me (US$ 50 cash).



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