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The economic returns or ending the AIDS epidemic by 2030: a full income approach

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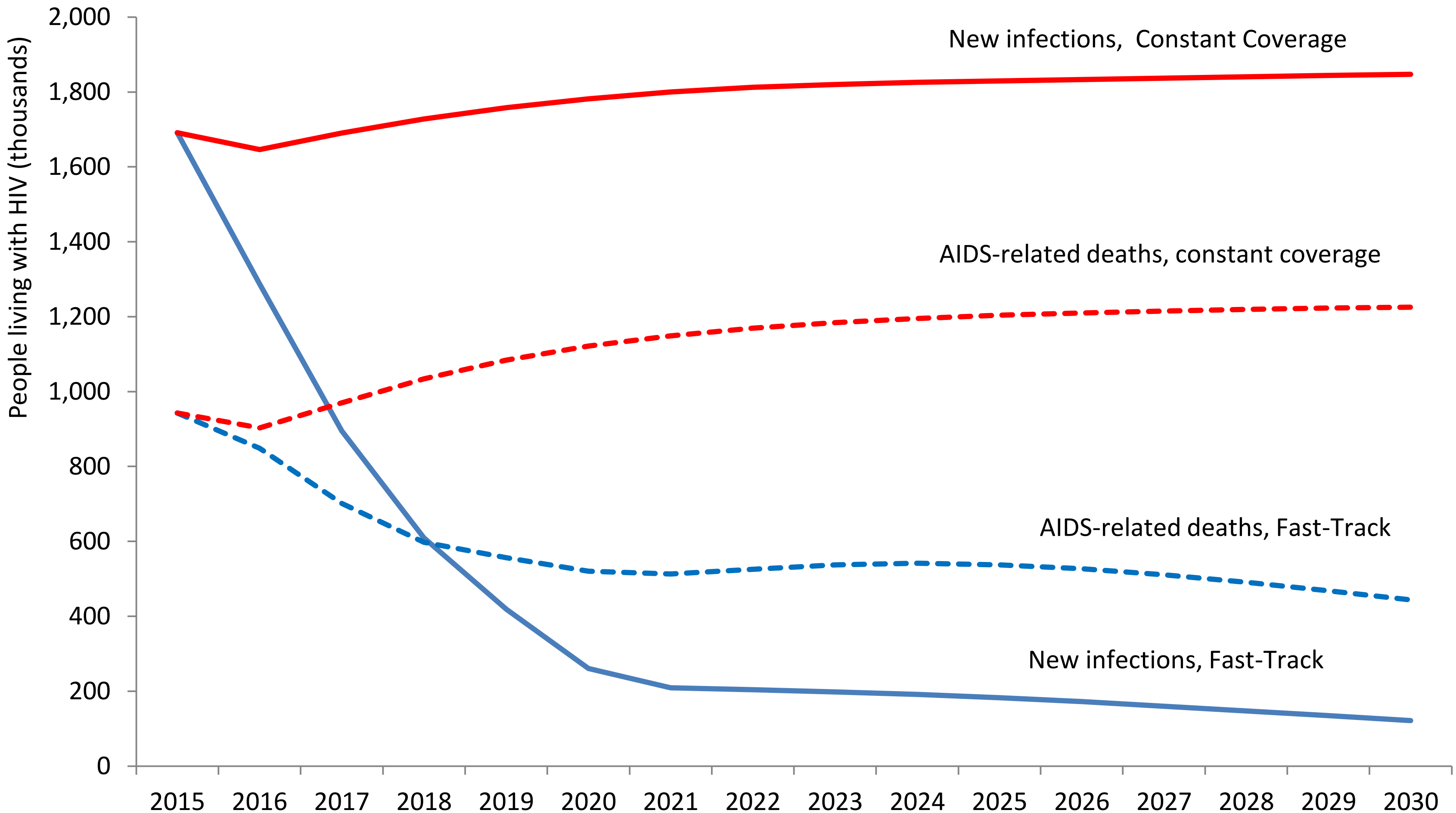
Introduction

- Within the SDGs, the world has pledged to end the AIDS epidemic as a public health threat by 2030.
- Last month, UN General Assembly adopted the Political Declaration to end AIDS which contains clear fast-track targets
- Investments needed: from USD 19bn (2014) to USD 26.2bn (2020)
- What are the economic benefits of such an investment ? Is ending AIDS a "good deal" ?

Two scenarios for two different futures



The full income approach

- Builds on the work from Lancet Commission on Global Health 2035 (Jamison et al, 2013)

- Growth in terms of *full income* = sum of income growth measured in the national income accounts, plus the value of the change in mortality (or life expectancy) during the same period.

Full income, what it is, what it is not

	Annual value of change in mortality associated with 1y increase in LE (% of GDP) $V(e_i, e_j, y) / (e_j - e_i)$	Value or 1-year increase in LE, VLY (as a multiple of GDPpc)	
		r=3%	r=7%
LMIC	6.8%	2.3	1.0
Sub Saharan Africa	12.6%	4.2	1.8
HIC	4.3%	1.4	0.6

Table A.3.10 from Jamison et al* (truncated)

$v(e_{2000}, e_{2011}) = \$506$

$y_{2000} = \$2,576$

$(e_{2011} - e_{2000}) = 2.9 years$

If assume change in LE is perpetual i.e. $v(e_i, e_j, y)$ occurs every year

=> need discount rate to translate future value into present value, *r*

Considering that PV of a perpetual stream of value *x* at discount rate *r* equal *x/r*

Let's consider a GDP growth of 2.5 % in Sub Saharan Africa**

The full income approach predicts that 2 percentage points of this growth are due to improvements in health

* : Jamison et al, Lancet Commission on Global Health 2035 , 2013, appendix III, table A.10

** : World Bank, Global Economic Prospect, June 2016

Applying the full income approach to ending AIDS by 2030

- Cost: Incremental costs of Fast track compared to our benchmark constant scenario
- Constant scenario can benefit of improvement in efficiency and lower unit costs encountered in FT, or not
- Cost associated to benefits witnessed in 2030= $\sum_{2016}^{2030} cost_t$

- Benefit: value of change in mortality in 2030
- Discounted stream of future mortality reductions
- Value of a statistical life (VSL) = 180 * GDPpc

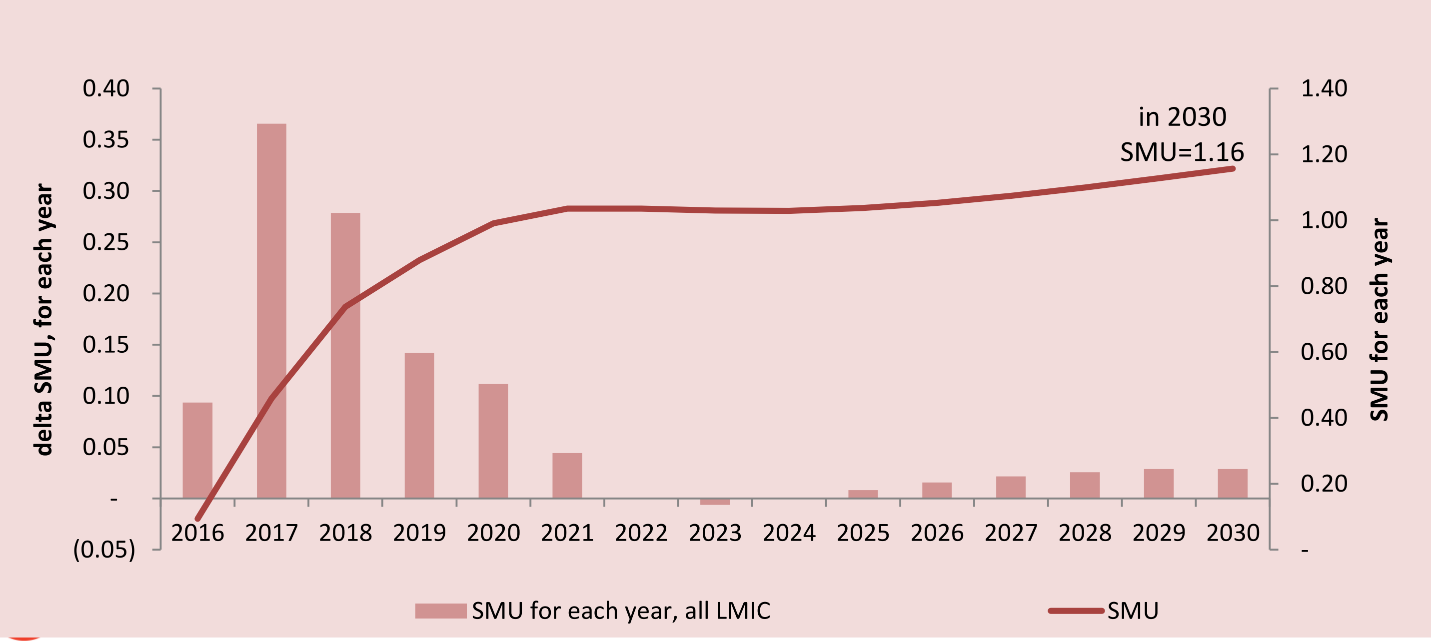
Benefits:
Discounted stream of future mortality reductions

Reduction in mortality(in SMU) =

$$\Delta SMU_t^{FT-CC}\, r = \sum_{2016}^{2030} (SMU_t^{FT-CC} - SMU_{t-1}^{FT-CC})\, r$$

Where

$$SMU_t^{FT-CC} = (reduc\, mort_t^{FT-CC} / pop_t)\, 10^4$$



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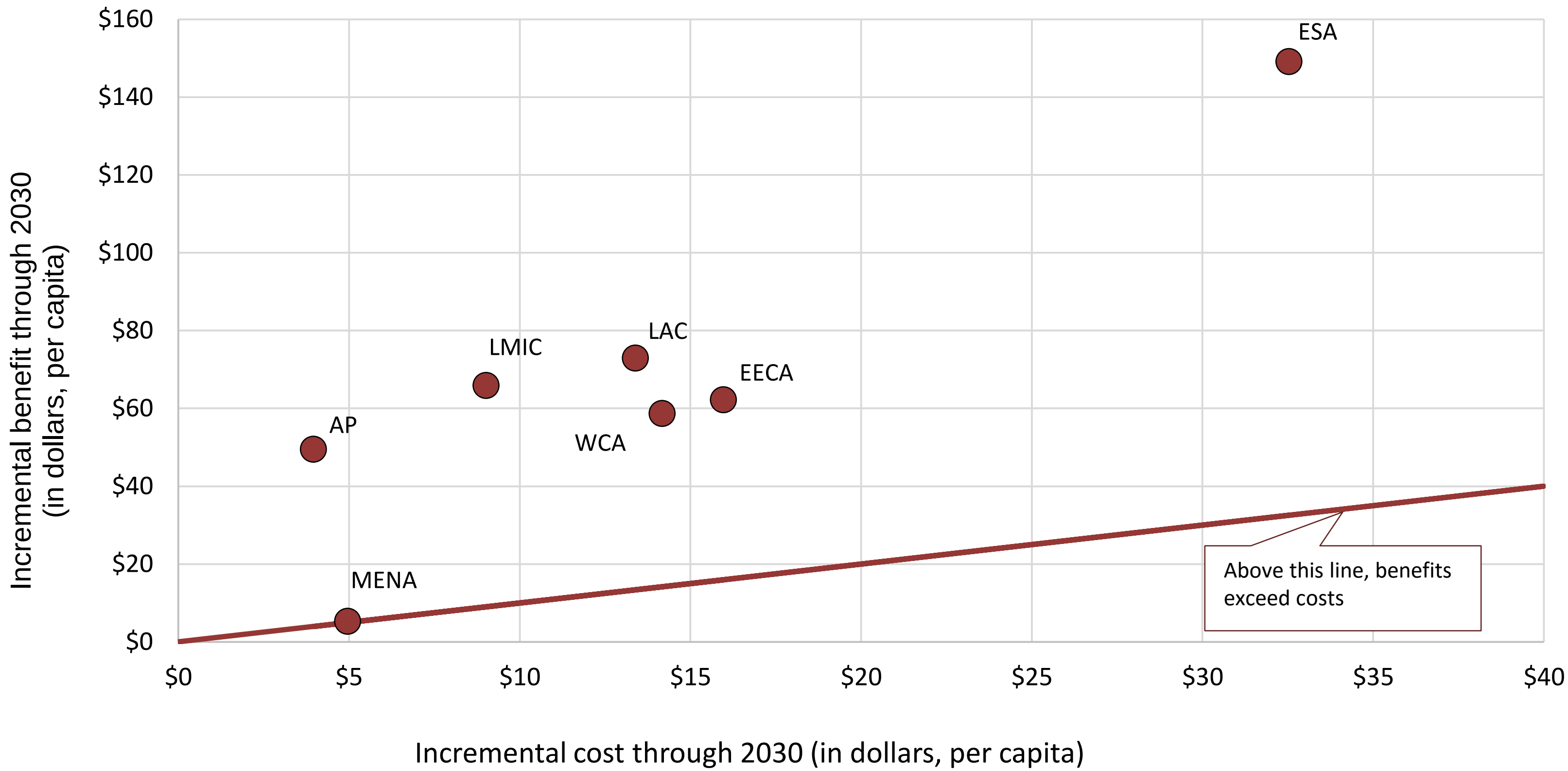
Applying the full income approach to ending AIDS by 2030

All low- and middle-income countries, 2016-2030		Incremental gains between Fast-Track and Constant scenarios: If improvement in efficiency and unit costs applies to both scenarios 2030	Incremental gains between Fast-Track and Constant scenarios: If improvement in efficiency and unit costs applies to Fast Track only 2030
1	Population, billions	6.76	
2	per capita income	3,444	
Present value of incremental future costs per capita			
3	Incremental expenditures (USD billions)	60.95	38.43
4	Incremental expenditures per capita (USD)	9.02	5.69
Present value of incremental future benefits per capita			
5	Reduction in mortality(in SMU) in 2030 = $\sum_{2016}^{2030} (SMU_t^{FT-CC} - SMU_{t-1}^{FT-CC})\ r$ Where $SMU_t^{FT-CC} = (reduc\ mort_t^{FT-CC}/pop_t)\ 10^4$	1.06	
6	VSMU = (180 GDPpc) 10^{-4}	0.018	
7	Value of mortality reduction per capita (rows 2 x 5 x 6)	65.87	
Benefit-cost calculations			
8	Benefit: cost ratio (row 7÷row 3)	7.30	11.58

Source: authors calculations

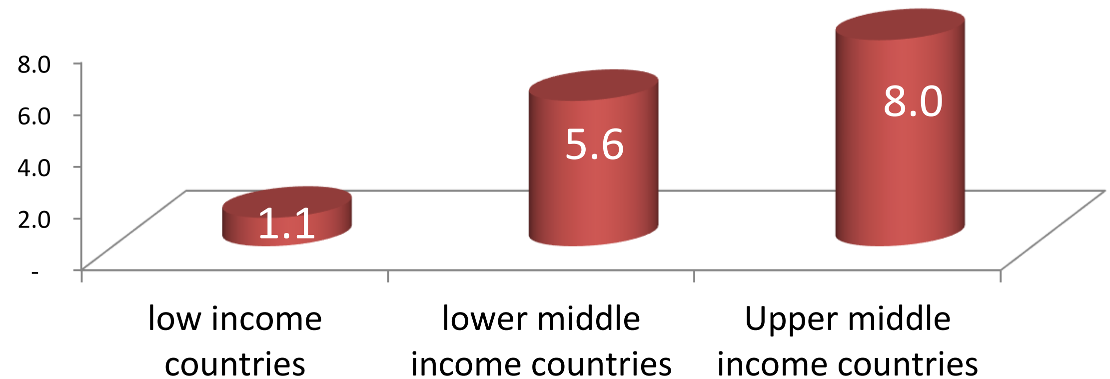
All values are in USD (real, 2015). R =3%, value of a standardised life year = 180 GDPpc as per Jamison et al (2013)

Economic returns of ending AIDS by 2030 full income approach



Incremental benefit and cost of the Fast-Track scenario under the full income approach
Source: Authors calculations
real USD, discounted (r=3%); Value of a SMU = 1.80% GDPpc; Income elasticity of a SMU = 1

Economic returns of ending AIDS by 2030 per additional dollar, per income level



Source: Authors calculations

- Benefits are proportionately higher as the income level of the countries increases
- MoF of middle-income countries should find it attracting to invest domestic resources to end AIDS
- High relevance for international community to support poorest countries where returns on investment of domestic resources, although positive, are lower

Conclusion

- The full income approach enables to reflect the effects of HIV programmes in terms of income growth plus the value of the change in mortality (or life expectancy)
- The economic returns of Ending AIDS by 2030 for all LMIC is between US$ 7.3 and US$ 11.6 dollars of benefit for US$ 1 of additional expenditure
- Investment of domestic resources is particularly attractive for Ministers of Finance of middle-income countries
- The positive but smaller returns in low-income countries brings a rationale for sustained international support to end AIDS in these particular countries

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Appendix

Full income approach
Methods (1/2)

V(e_i, e_j, *y*) : is a annual value of changing life expectancy from e_i years to e_j years when income is *y*

$$V(e_i, e_j, y) = \int_0^\infty n(a)\, VSMU(a)\, \Delta SMU(e_i, e_j) da \qquad (1)$$

Where

$$VSMU\ (a) = \frac{e_a}{e_{35}} [VSMU(35)] \qquad (2)$$

$$VSMU\ (35) = 180(GDPpc) * 10^{-4} \qquad (3)$$

Equation 1 becomes

$$V(e_i, e_j, y) = 0.018\, y \int_0^\infty n(a)\ \frac{e_a}{e_{35}}\ \Delta SMU(e_i, e_j)\, da \qquad (4)$$

Where the Lancet Commission uses :

- VSMU(35) = VSL * 10^{-4} . Jamison *et al (2013)* use VSL = 180 x GDP
- n(a) = density of the age distribution of a country's population (from UN WPP)
- $\Delta SMU(e_i, e_j)$ = annual mortality rate from Japan for different L. E
- $\frac{e_a}{e_{35}}$ = data on SMU adjusted for age (a) from Human Mortality Database

Methods (2/2)

$V(e_i, e_j, y)$: is an annual value of changing life expectancy from e_i years to e_j years when income is *y*

assuming this change in life expectancy is permanent (*i.e.* the reduction in mortality occurs year after year). We can then use discount rate (*r)* to get the present value of this permanent change in L.E.

Standardising to get the value of a 1-year gain in life expectancy (or VLY) by dividing by the difference between the two LE, we find:

$$VLY = r^{-1} V(e_i, e_j, y) / (e_j - e_i) \quad (5)$$

Setting aside the current year gives:

$$VLY = \frac{vly}{r} \quad (6)$$