



Financial limitations: The price is wrong



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04 December 2013

What are some challenges facing treatment and prevention of AIDS in the developing world?



Highly effective drugs exist to treat HIV infection

How to prevent HIV is well-known

**Why is it still such a HUGE problem, particularly
in some areas?**

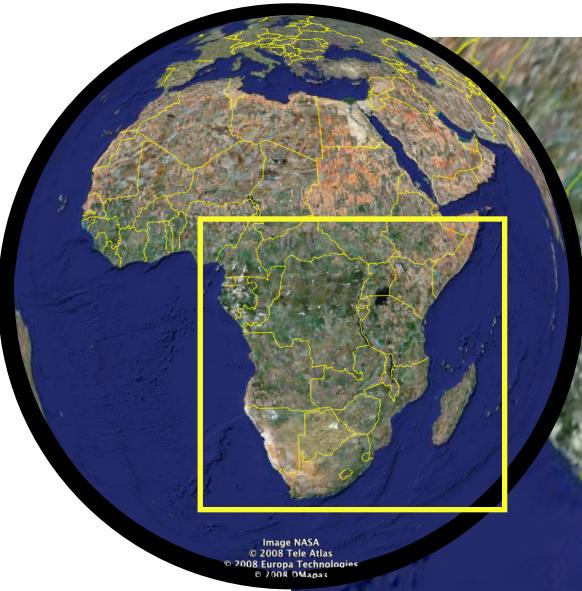


Overview

- ▶ **Background**
 - ▶ a picture of the epidemic in Sub-Saharan Africa
 - ▶ AIDS is not just a health problem: economics, demographics, politics.
 - ▶ Challenges are MUCH greater in developing countries
 - ▶ Low economic development inhibits access to information, medicine, nutrition
 - ▶ Potential approaches to combatting HIV in an era of **austerity**
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Image NASA
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Dem. Rep. of
Congo

Angola

Namibia

Botswana

South Africa

Uganda
Kenya

Tanzania

Malawi

Mozambique

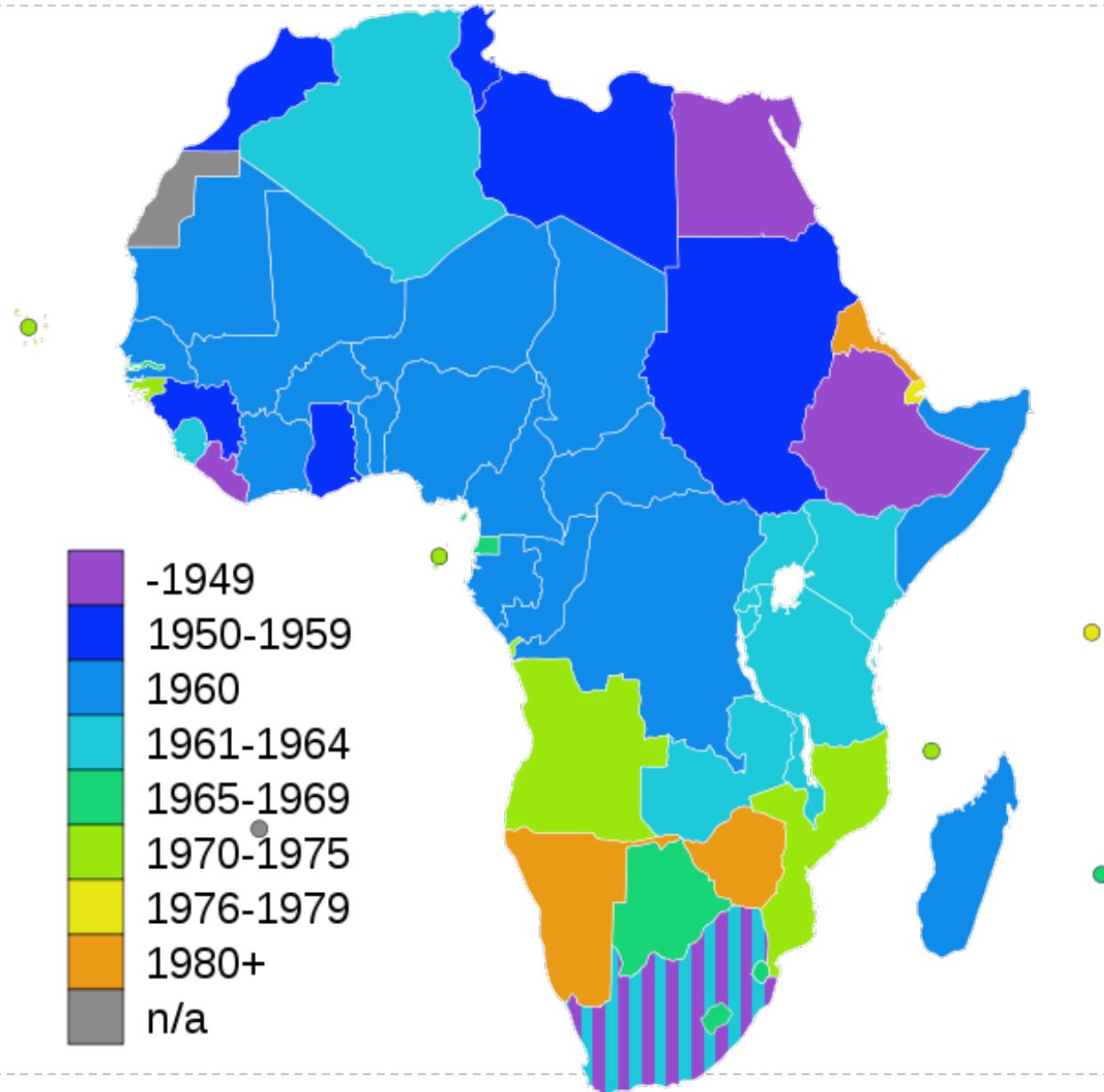
Zimbabwe

Swaziland

Lesotho

© 2008 Tele Atlas
Image NASA
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Image © 2008 TerraMetrics

Independence dates

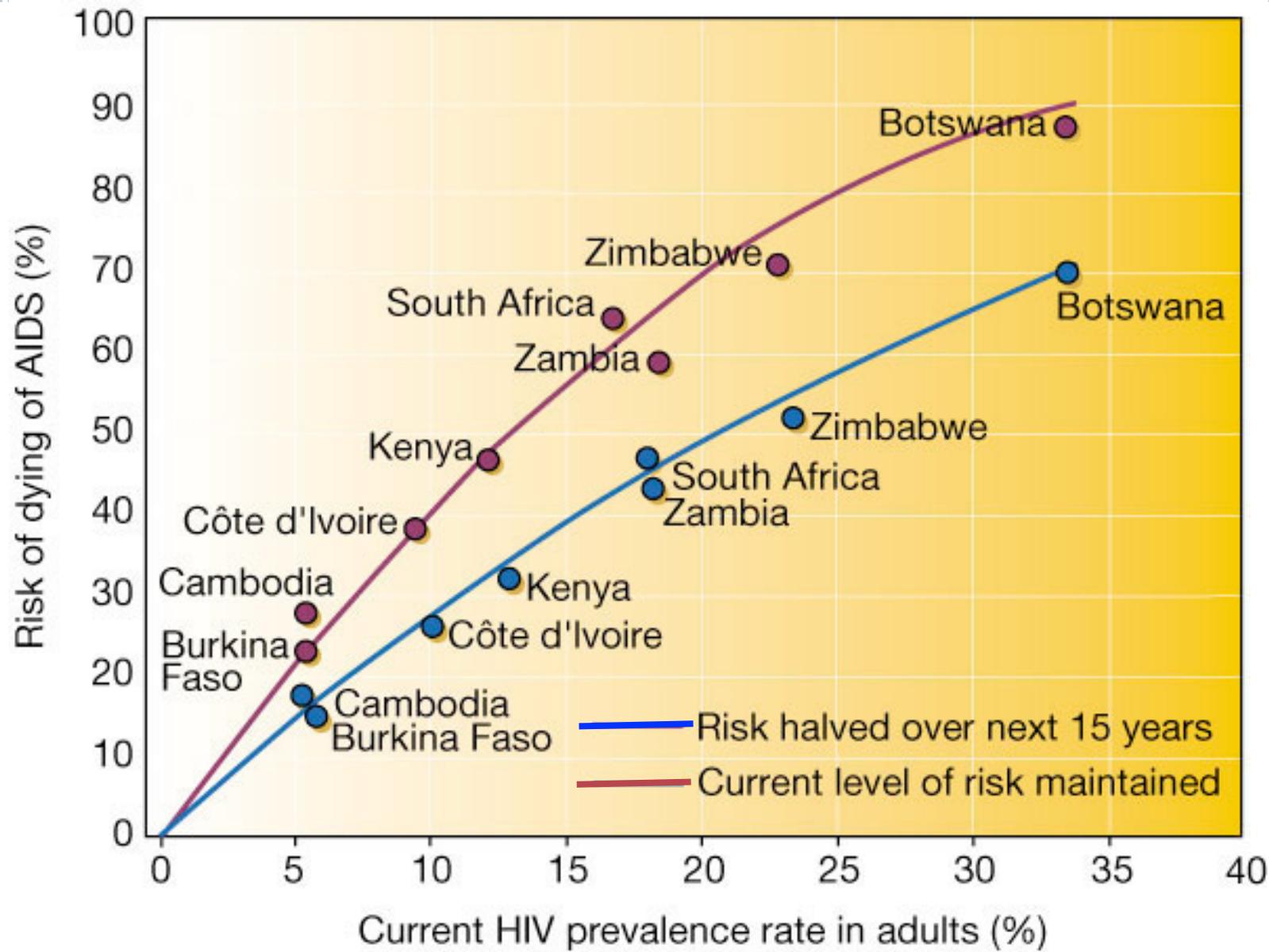


[http://en.wikipedia.org/wiki/Decolonization_of_Africa \(and refs therein\)](http://en.wikipedia.org/wiki/Decolonization_of_Africa (and refs therein))

Adults and children estimated to be living with HIV | 2012



Lifetime risk of AIDS for 15 year olds in 2000



Poverty Trap

- ▶ Poor unable to escape from extreme material deprivation
- ▶ Not on the “development ladder”
- ▶ Finances are used just to survive



Poverty

- ▶ **Extreme Poverty** - $\leq \$1.25/\text{day}$
 - ▶ Households cannot meet basic needs for survival
 - ▶ 1.1 billion people
- ▶ **Moderate Poverty** - Below \$2/day
 - ▶ Basic needs are met but “just barely”
 - ▶ 2.7 billion people
- ▶ **Relative Poverty** - household income level below a given proportion of average national income
 - ▶ In a rich community, the relatively poor might be very wealthy



J. Sachs (2005), *The End of Poverty*

What are some factors that contribute to the poverty trap?



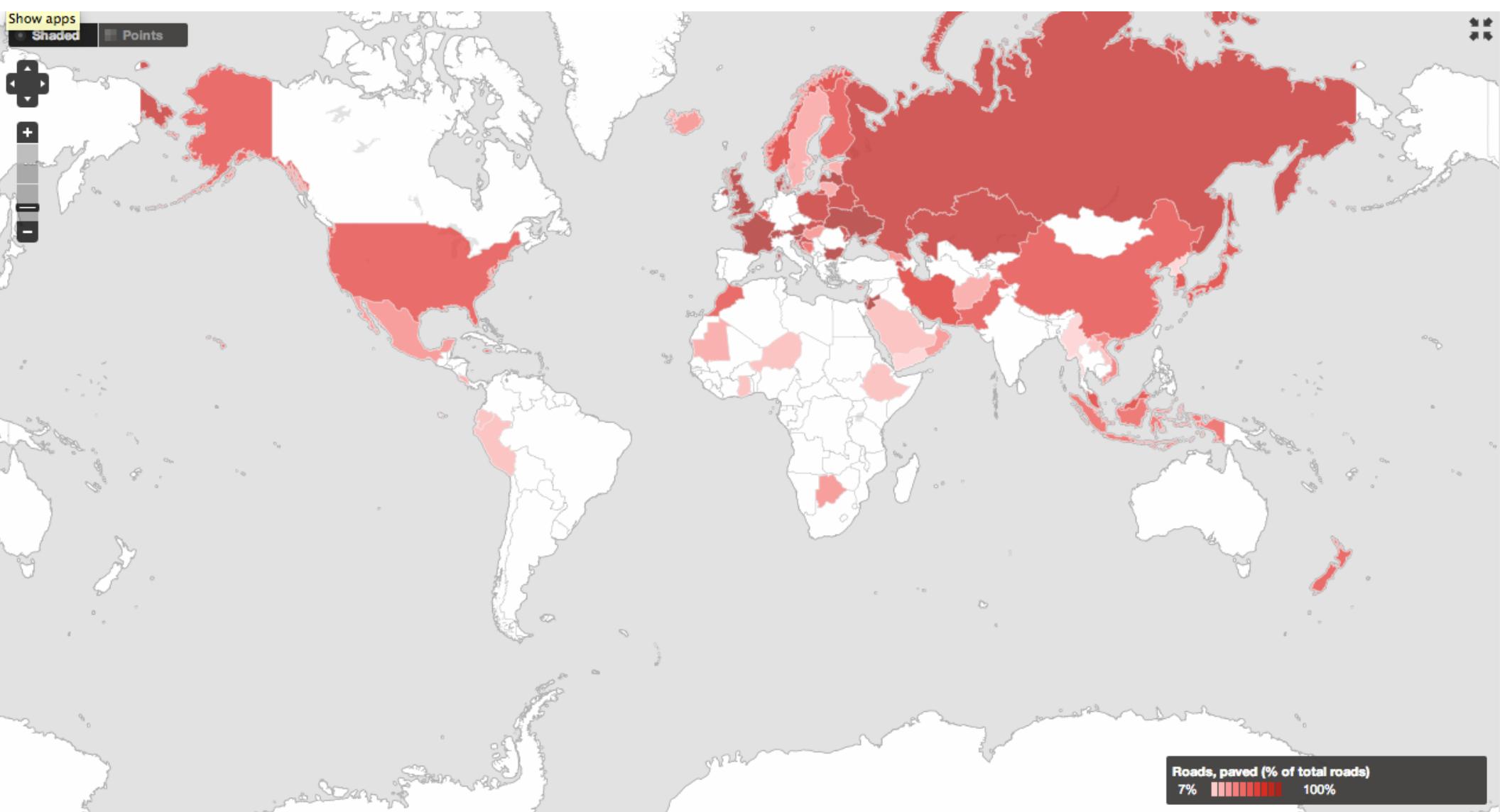
The poverty trap

- ▶ Isolation: rural; lack of basic infrastructure
- ▶ Geography: population concentrated inland; poor soil, little irrigation, dry climate; poor nutrition
- ▶ Disease: malaria, TB, AIDS deplete workforce
- ▶ Population growth / high fertility rate: decline in funds per capita; environmental degradation

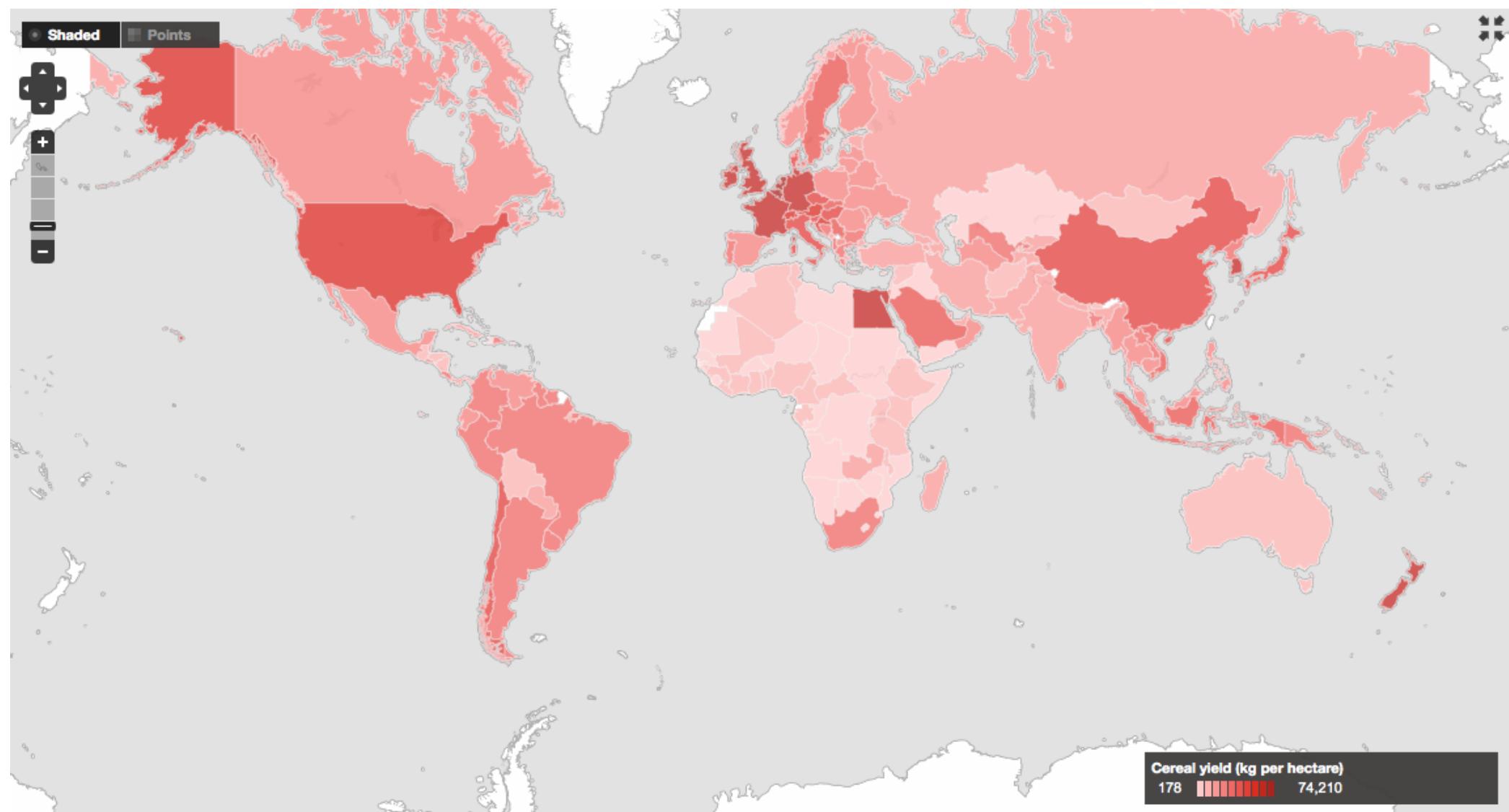


▶ J. Sachs (2005), *The End of Poverty*; Photo courtesy of Dr. Thomas Friedrich

A small percentage of roads are paved



Cereal yield (kg/hectare)



The poverty trap

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- ▶ Population growth: decline in funds per capita; environmental degradation
- ▶ Must use income to survive; impossible to accrue savings



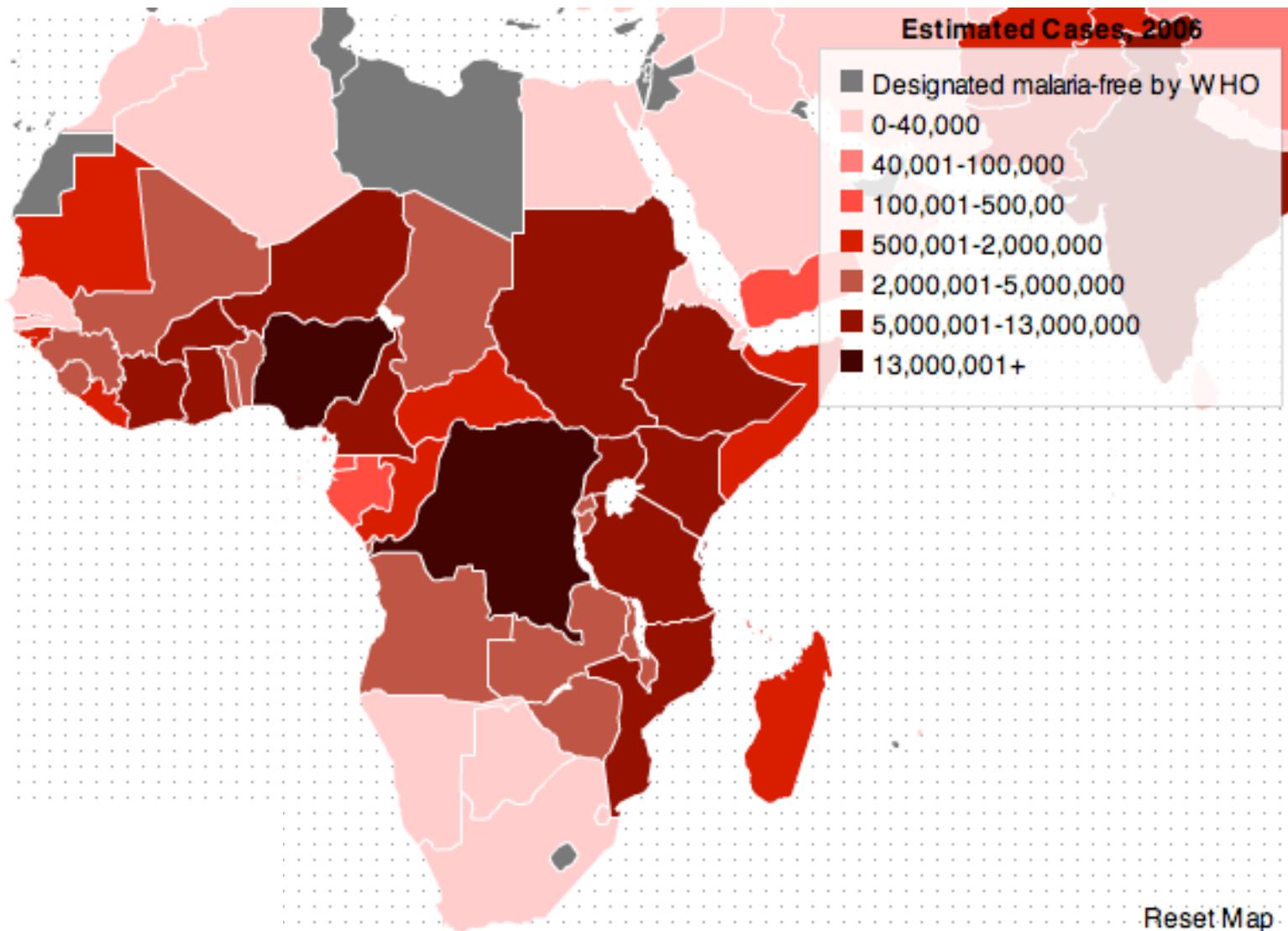
▶ J. Sachs (2005), *The End of Poverty*; Photo courtesy of Dr. Thomas Friedrich

Malaria

- ▶ A parasite - a protist, not a virus, not a bacteria
- ▶ Transmitted by bites from female mosquitos of the genus *Anopheles*
- ▶ Resides in the liver and periodic ‘episodes’ of replication in red blood cells cause severe fever, hallucinations and occasionally death
- ▶ No vaccine available



Malaria distribution (in 2006) similar to HIV in Africa



Malaria and AIDS in Africa

- ▶ Direct consequence of co-infection
 - ▶ HIV-infected people with malaria have significantly higher viral loads
 - Viral loads were double
- ▶ Since 1980 in Kisumu, Kenya (~200,000 people)
 - ▶ Malaria has resulted in 8,500 excess HIV infections
 - ▶ HIV has resulted in 980,000 excess malaria episodes
- ▶ Children with severe malaria often require blood transfusions
 - ▶ Blood supply in Africa not completely HIV-free



JG Kublin et al. 2005 *The Lancet*; J. Sachs & P. Malaney 2002. *Nature*; Abdu-Raddad et al. 2006 *Science*

How might poverty contribute
to the prevalence of malaria?

How might malaria contribute
to the prevalence of poverty?



The relationship between malaria and poverty

- ▶ “The combined causal effects of health on poverty and poverty on health implies a positive feedback system.”
- ▶ Poverty causes increased incidence of malaria
 - ▶ reduced access to treatment
 - ▶ reduced access to prevention measures
- ▶ Malaria causes poverty
 - ▶ Missed school
 - ▶ Impaired cognitive and physical development
 - ▶ Reduced savings - cannot work
 - ▶ Inhibited movement of people
 - ▶ Reduced foreign investment and trade
 - ▶ Increased fertility rate
 - ▶ Can affect immune responses to other diseases



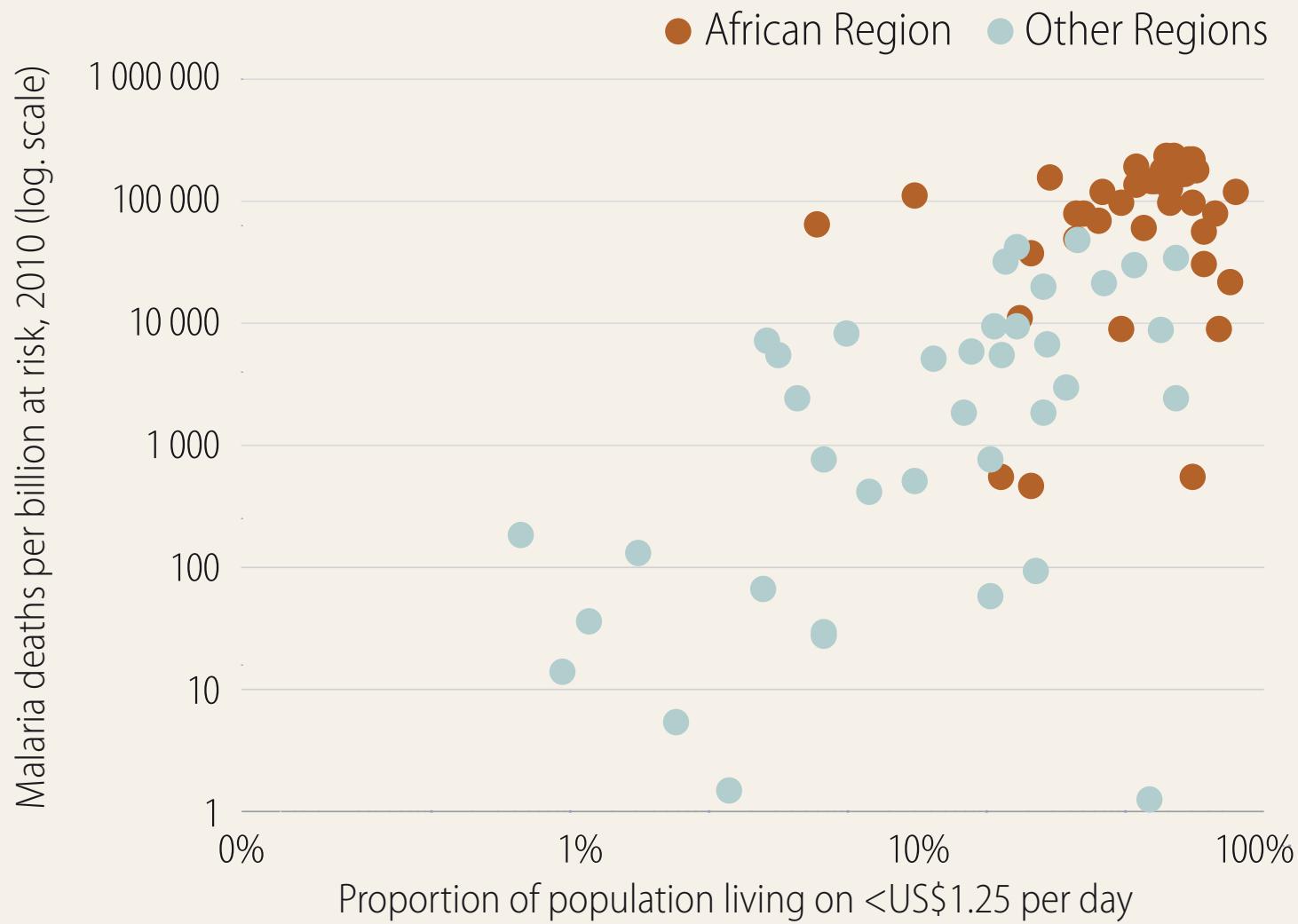
Malaria and Poverty

“Where malaria prospers most, human societies have prospered least.”

- ▶ Every day 2,200 Africans die of malaria
 - ▶ 85% are under 5 years old
- ▶ Rural and poor are most affected
 - ▶ Rates of infection highest during rainy season - time of intense agricultural activity
 - ▶ Families affected by malaria clear 60% less crops
- ▶ Malaria costs Africa more than \$12 billion every year in lost GDP
 - ▶ Could be controlled for far less (estimated at \$3 billion/yr)



Relation between proportion of country's population living in poverty and malaria mortality rates



Source: WHO estimates, Human Development Report 2011

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How do we fight HIV?

- ▶ How can we most effectively fight HIV and promote “global health?”
- ▶ Who pays for HIV and global health programs?
- ▶ How will economics impact funding for global health?
- ▶ What will give us the biggest bang for our buck?

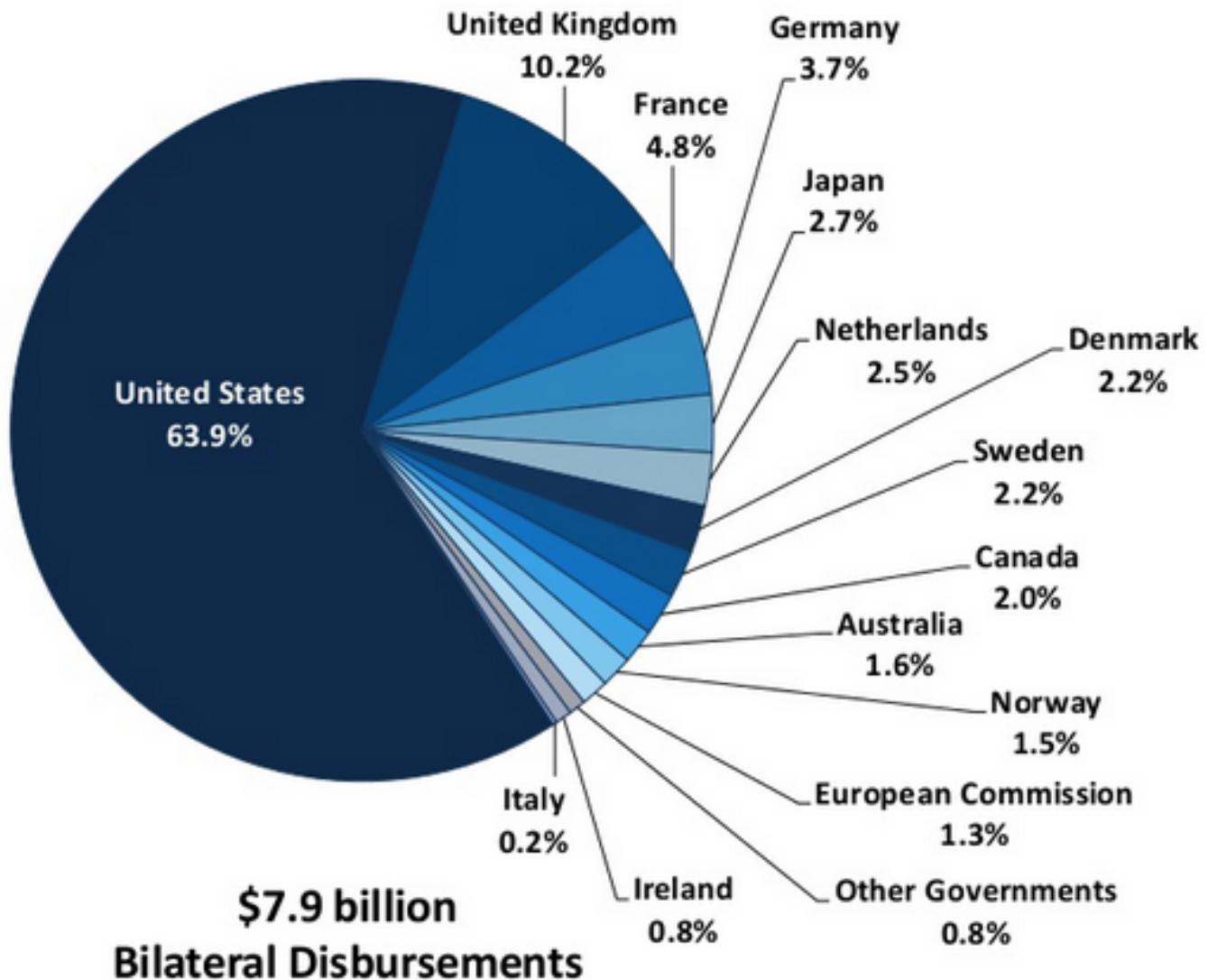


“ The continued need for both prevention and treatment funding for HIV/AIDS is combined with stagnant or even diminishing financial resources.

Although funding has increased substantially in the last decade, spending remained approximately the same between 2008 and 2009, only increasing from US\$15.6 billion to US\$15.9 billion. Because the funding need increased over that year, the funding gap increased from US\$7.7 billion in 2008 to US\$10 billion in 2009 [UNAIDS, 2010]. ”

Who pays for international HIV/AIDS programs?

International HIV Assistance: Donor Governments as a Share of Total Donor Government Disbursements, 2012



SOURCES: UNAIDS and Kaiser Family Foundation analysis, September 2013; Global Fund to Fight AIDS, Tuberculosis and Malaria online data query, January 2013; UNITAID Annual Report, 2012; OECD CRS online data queries.

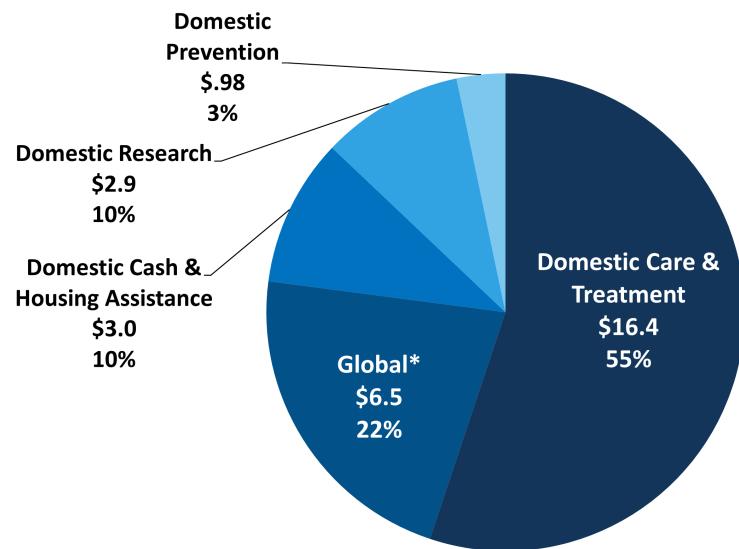
How much does the US spend for domestic HIV/AIDS care?

How much does the US spend on HIV/AIDS domestically?

Total requested domestic funding for HIV/AIDS for 2014 is 16.4 billion (55% of the HIV/AIDS budget)

2.5x the global HIV/AIDS budget

Federal Funding for HIV/AIDS by Category, FY 2014 Budget Request (US\$ Billions)

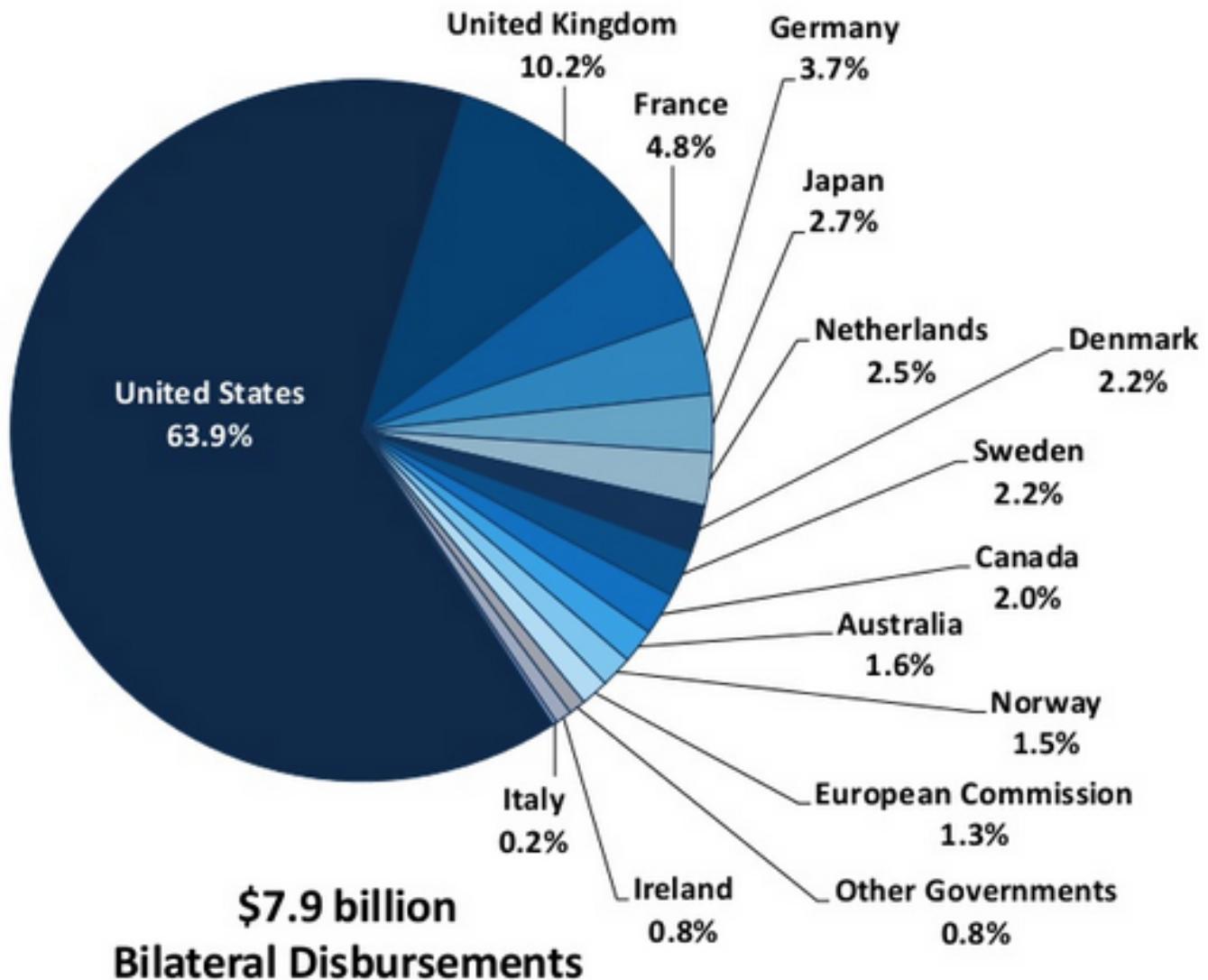


*Categories may include funding across multiple agencies/programs; global category includes international HIV research at NIH.

Rich countries, led by US, pay for most HIV/AIDS interventions in the developing world.

(How might global economy affect provision of aid to developing countries?)

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Who are the key players in HIV/AIDS

- ▶ PEPFAR, 2012
 - ▶ \$7.2 billion in 2012; \$6.4 billion in 2013 (11% reduction)
 - ▶ Priorities: care & treatment; prevention
- ▶ Global Fund, 2011
 - ▶ Varies widely by country
- ▶ Gates Foundation, 2010
 - ▶ \$2.2 billion in direct funding; \$650 million to Global Fund
 - ▶ Only major aid organization to support basic research

Quizzes due Friday

- ▶ Requires you to suggest a response to HIV/AIDS epidemic in Lesotho
- ▶ You will need to decide the single best solution and this will mean forsaking other solutions.
- ▶ Be prepared to justify your responses.



The HIV Epidemic in Lesotho

- ▶ Population of 2.2 million and adult seroprevalence of **23%**
- ▶ 360,000 people living with HIV
- ▶ 15,000 HIV deaths and 150,000 orphans under age 17 in 2012



Challenges in Lesotho

- ▶ ART coverage remains below 60% and 25% children
- ▶ Fewer than 50% people report using condoms the last time they had sex
- ▶ 35% adults report never having an HIV test
- ▶ Large portions of young people have sex before 15
- ▶ Fewer than 10% of men 15 and over have been circumcised



The poverty trap in Lesotho

- ▶ 49% of the population is below the poverty line
 - ▶ Unemployment is ~45% (12th highest in the world)
 - ▶ 23% children 5-14 are working
 - ▶ Gross National Income per Capita: 1,447 (US\$)

 - ▶ 20% paved roads

 - ▶ Physician Density: 1 per 20,000 people
-
-
- ▶ <http://data.un.org/CountryProfile.aspx?crName=Lesotho> | <https://www.cia.gov/library/publications/the-world-factbook/geos/lt.html> | <http://www.indexmundi.com/g/r.aspx?t=0&v=74&l=en>

What are some interventions that might be effective at stopping the spread of HIV?

“Pharmaceutical” interventions

Pharmaceutical Interventions

Intervention	effectiveness	base cost	comments
ART	hptn 052: 95% (best case)	\$750 per person per year	PrEP, Treatment as prevention, Option B+
PMTCT	Highly effective in the US	Option A: \$5,710 Option B: \$5,630	
Female Topical Microbicide	male: unknown female (caprisa): 39%	\$200 per person per year (Ring is \$10 each)	
Male Circumcision	male: 60% female: 0%	\$90 per person	
Vaccine	thai trial: 30%	\$45	One time delivery; does not include development



“Non-pharmaceutical” interventions

Non-Pharmaceutical Interventions

Intervention	effectiveness	base cost	comments
HIV testing and counseling (HTC)	none in randomized controlled trials	\$42 per person per year	
Universal voluntary testing and counseling; CCT	none in randomized controlled trials	\$5 per person per year	Conditional cash transfers: provide cash only if the person does something (it's conditional)
Train and deploy community health workers (w/ HIV testing?)	Decrease MTCT; Decrease maternal/child mortality	\$5 per person treated + \$2.50 per person tested	



Non-Pharmaceutical Interventions (cont.)

Intervention	effectiveness	base cost	comments
Keeping girls in secondary school using CCTs	Tanzania: 25% Malawi: 60%	\$173 per person per year	
Adding HIV and gender training to micro finance programs	Reduce partner violence; increase testing uptake	\$13 per person per year	
New “community support” and stigma-reduction programs	Reduce partner violence; increase testing uptake	\$1.05 per person per year (median)	
Enacting and collecting alcohol consumption tax	33% reduction in syphilis in the US	\$0.20 per person per year	Takes money to make money



Walking through an example: PrEP

- ▶ The Population
 - ▶ 50% of Lesotho population is between ages of 15-54
 - ▶ $2.2\text{million people} \times .50 = 1.1 \text{ million people (at risk)}$
 - ▶ $1.1\text{million} - 0.23*1.1\text{million} = 847 \text{ thousand without HIV}$
- ▶ The Cost
 - ▶ $847 \text{ thousand people} \times \$750 \times (54-15) = \$24.7 \text{ billion}$

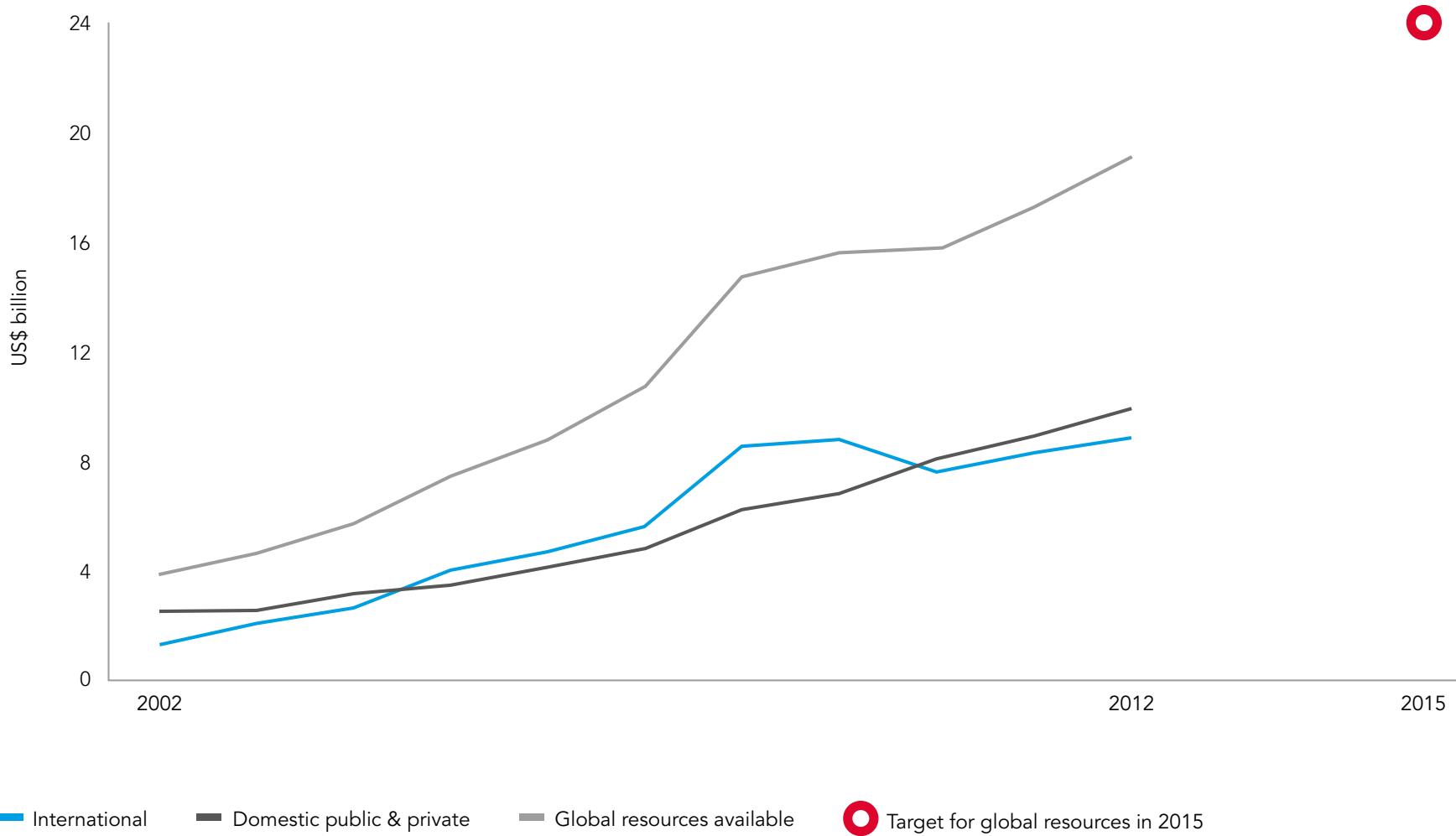
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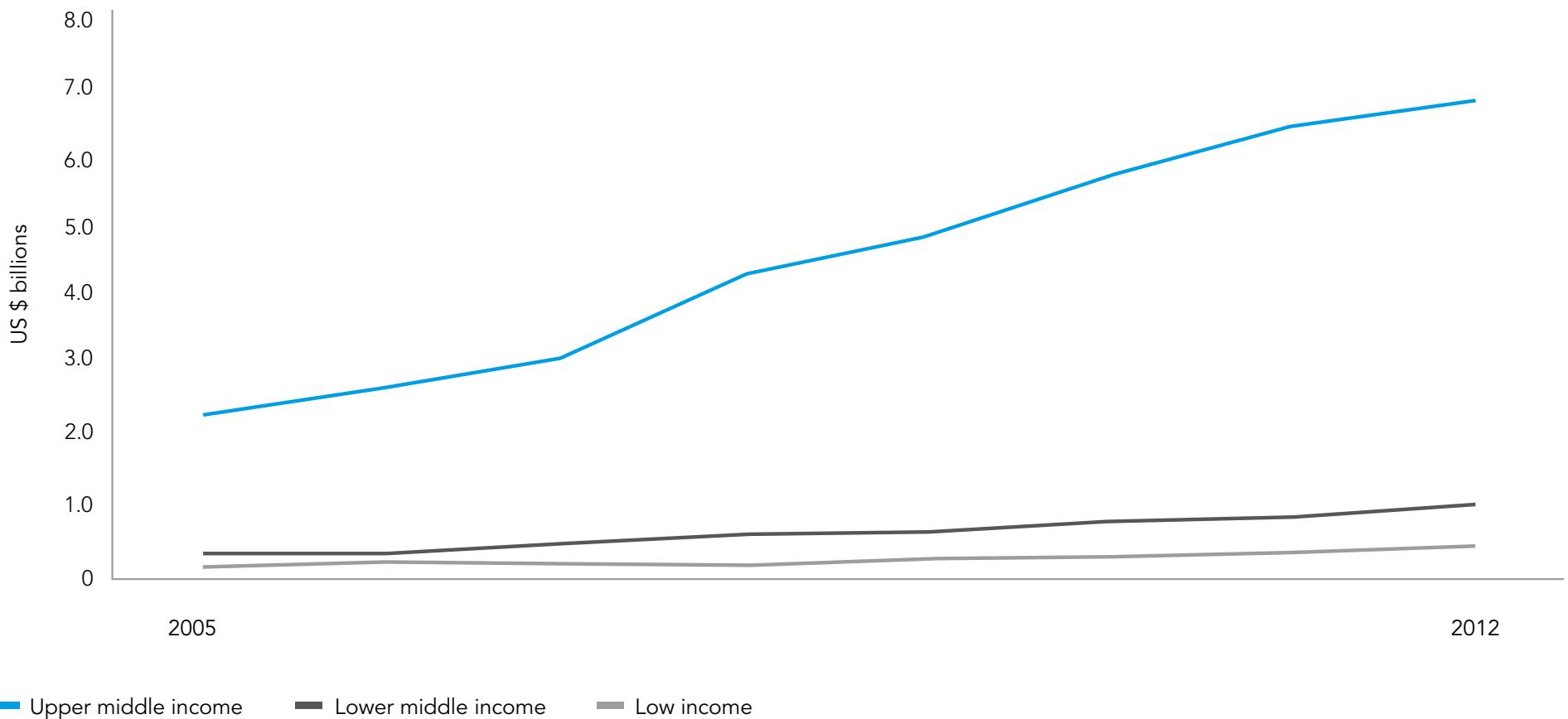
Resources available for HIV in low- and middle-income countries, 2002–2012 and 2015 target*



Source: UNAIDS estimates.

* The UN General Assembly 2011 Political Declaration on HIV and AIDS set a target of US\$ 22bn – 24bn by 2015.

Domestic public funding for HIV in low- and middle-income countries, by income category, 2005–2012



Source: UNAIDS estimates.



So a global response to HIV and other diseases requires action by rich countries.

As the global economy falters, governments may choose austerity (cuts).

What happens to aid for other countries?

Republican National Debate, 2011



**How much of their total budgets do the US
and other rich countries allocate to aid?**

“Foreign aid” is 1% of US budget

Mandatory

\$2.5 trillion

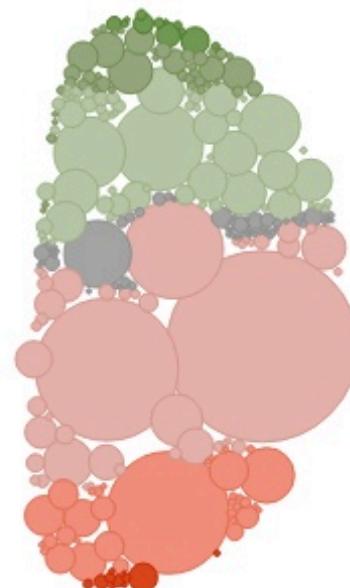
About 70 percent of budgetary spending is controlled by existing laws, including entitlements like Medicare, Medicaid and Social Security.



Discretionary

\$1.1 trillion

Only about 30 percent of the budget is controlled by the annual budget process. Last August, the White House and Congress agreed to a cap on this spending.



\$37.4 billion

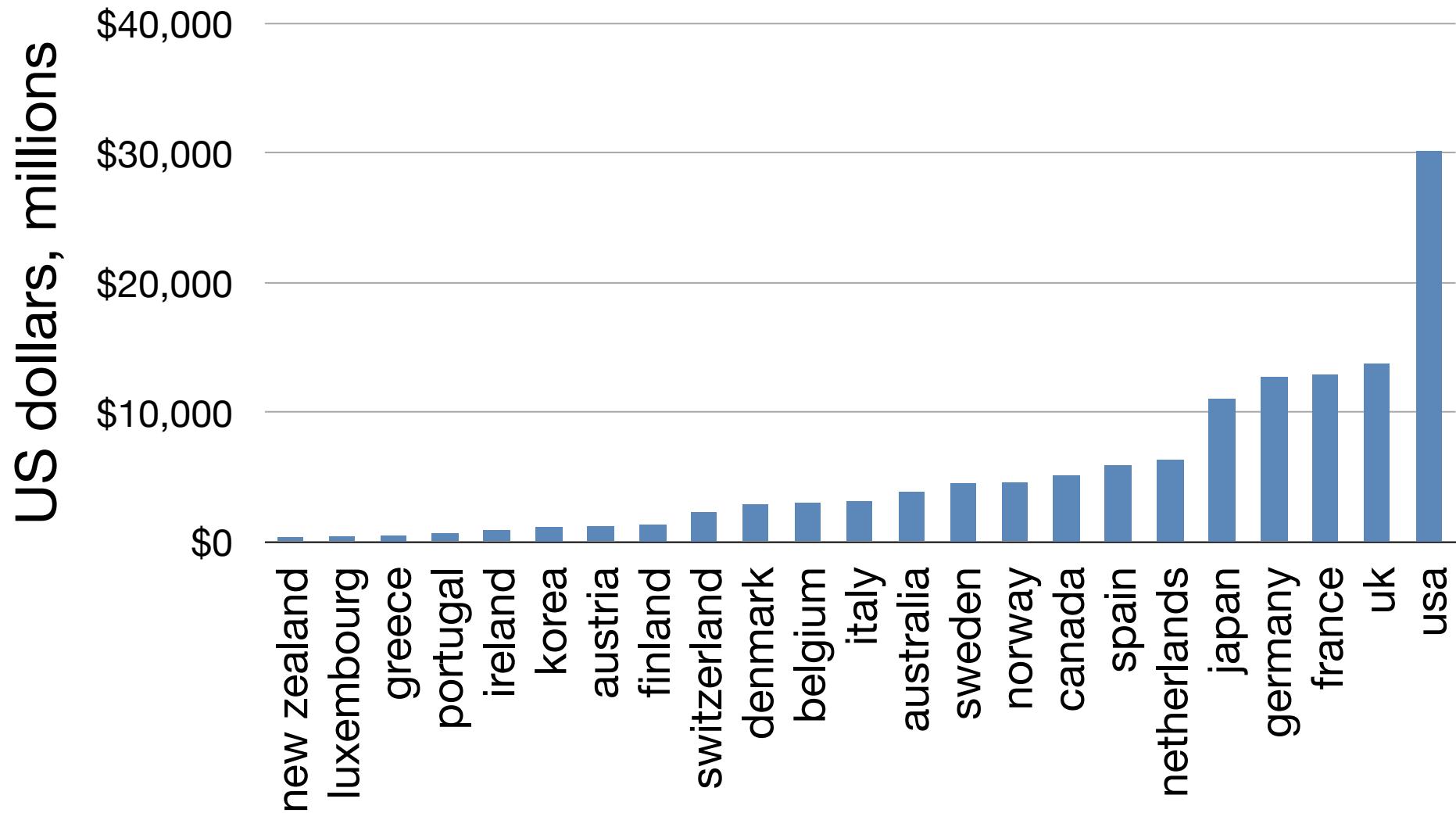
International



“International” category is 1% of \$3.7 trillion FY2013 budget request.

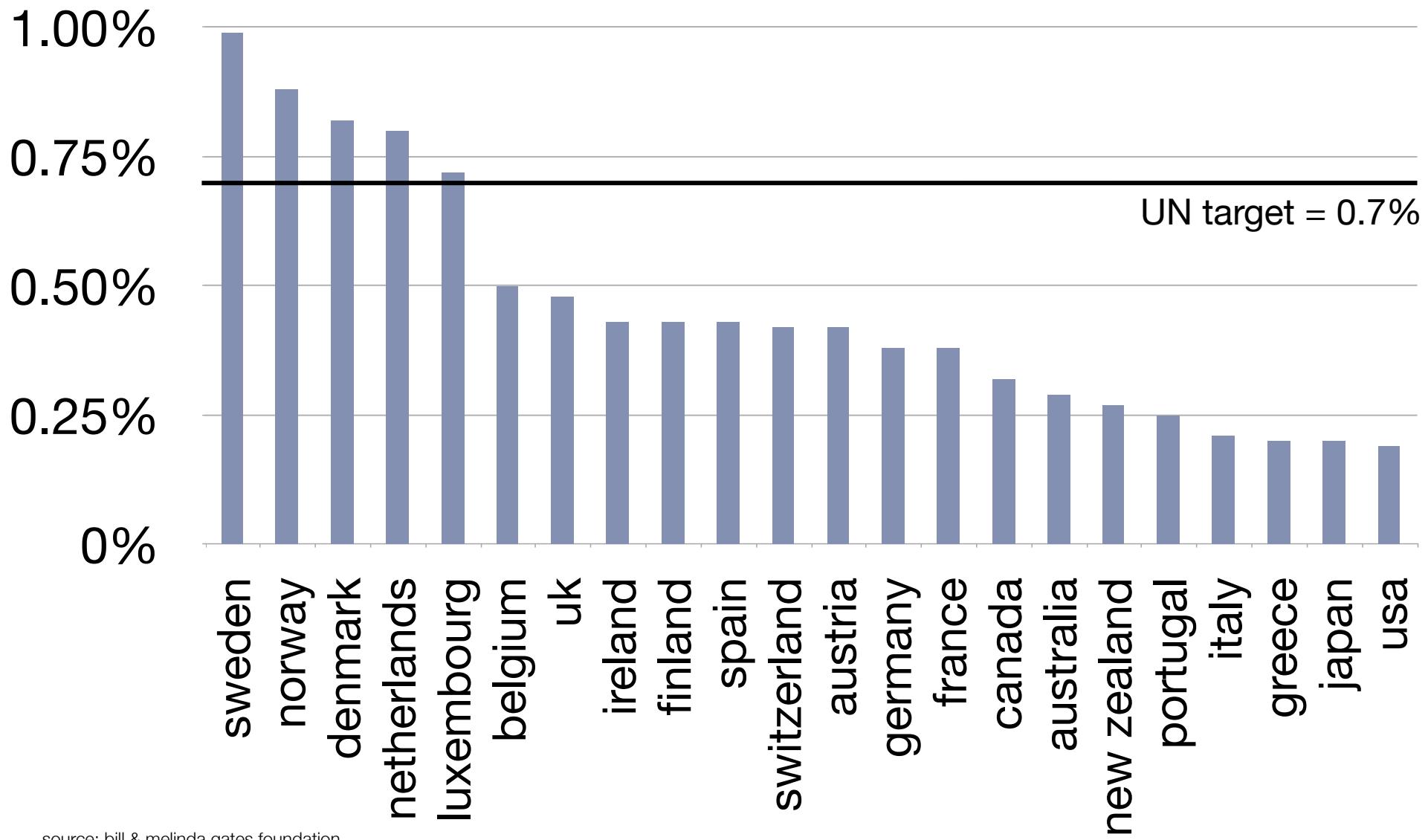
Foreign aid disbursements, 2010

Total foreign aid spent, 2010: \$128.7 billion

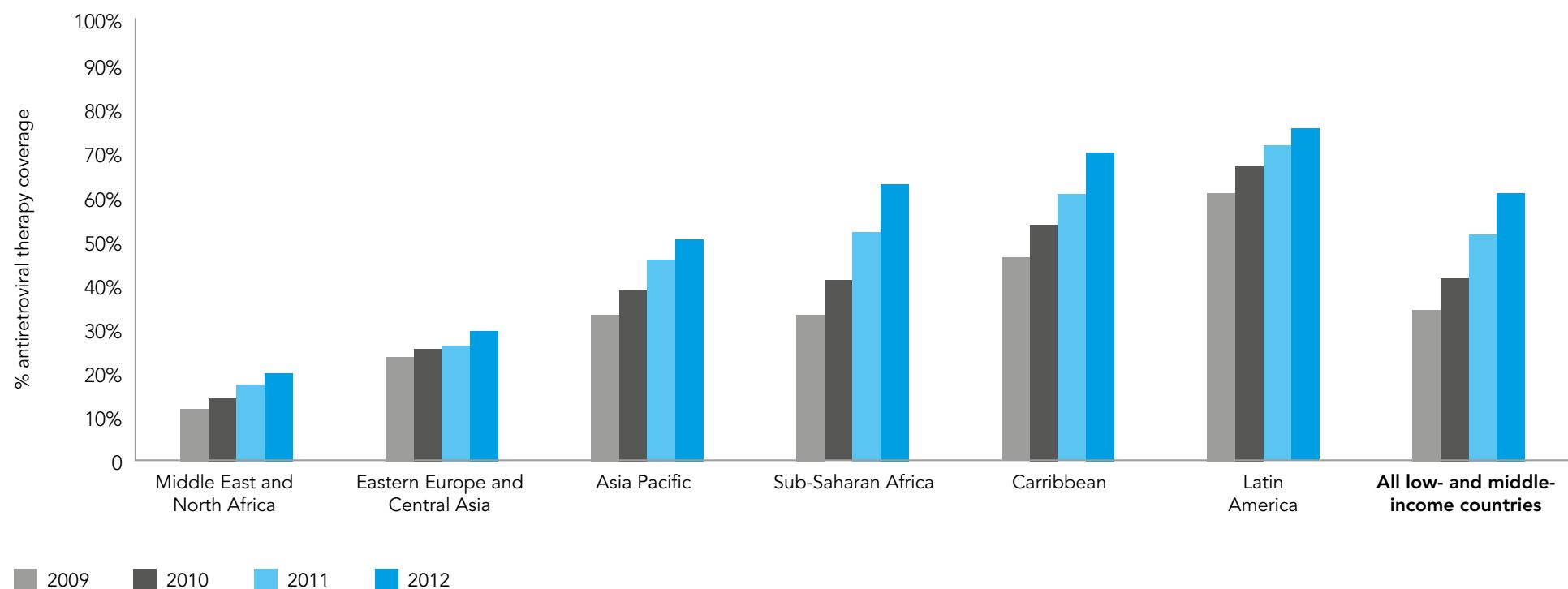


Foreign aid disbursements, 2008

Total foreign aid as % of GDP



Percentage of people eligible who are receiving antiretroviral therapy (based on 2010 WHO guidelines) in low- and middle-income countries, by region, 2009–2012



Source: UNAIDS 2012 estimates.

Sustainability and impact are emerging as main criteria for development aid.

Is HIV the biggest threat to global health?

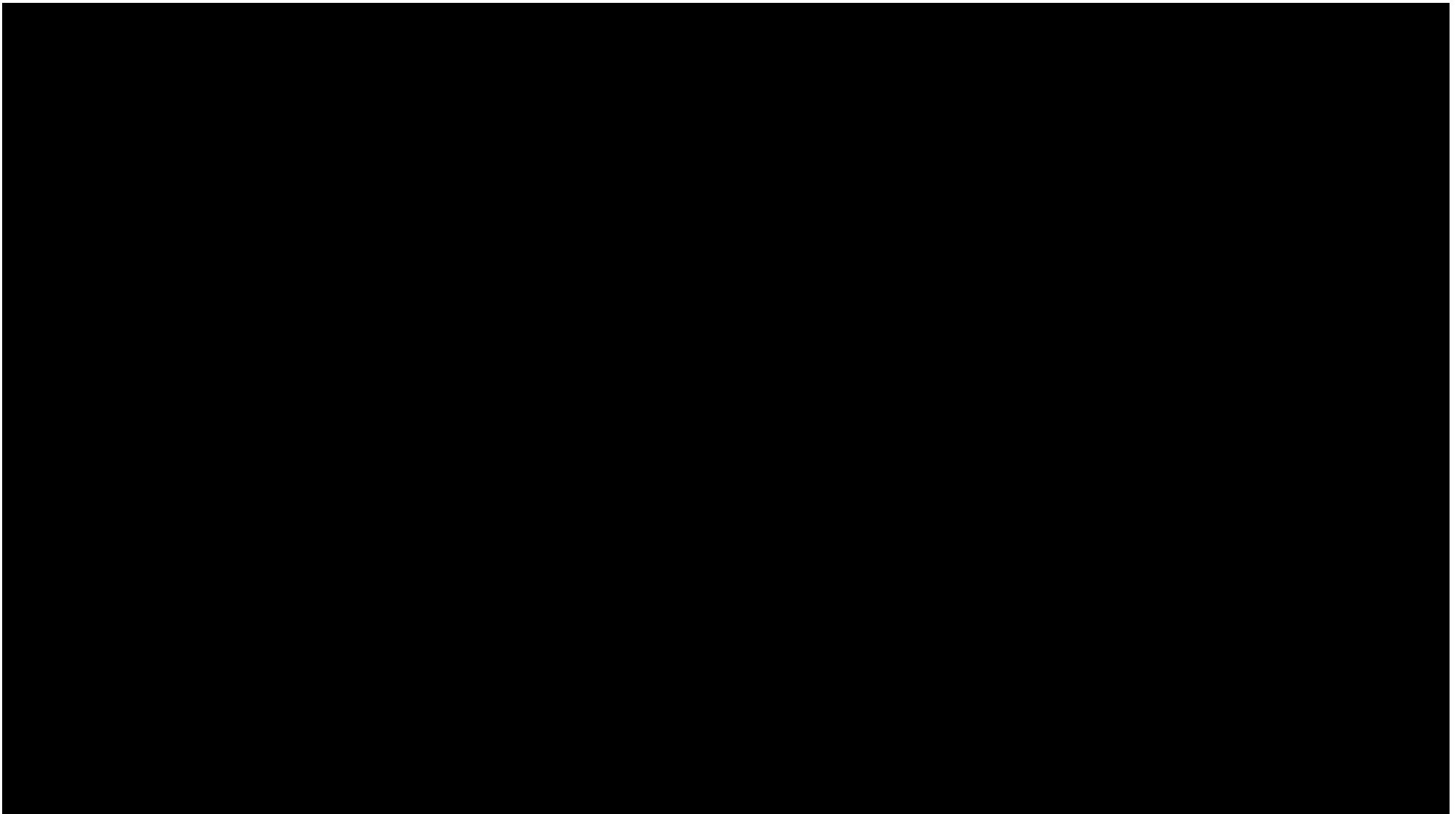
What are other serious threats to global health?

Leading causes of death, low-income countries, 2008

Cause	Deaths (millions)	% of total
Lower respiratory infections	1.05	11.3%
Diarrheal diseases	0.76	8.2%
HIV/AIDS	0.72	7.8%
Ischemic heart disease	0.57	6.1%
Malaria	0.48	5.2%
Stroke, cerebrovascular disease	0.45	4.9%
Tuberculosis	0.40	4.3%
Prematurity and low birth weight	0.30	3.2%
Birth asphyxia and birth trauma	0.27	2.9%
Neonatal infections	0.24	2.6%

source: who factsheet nr. 310, june 2011: <http://www.who.int/mediacentre/factsheets/fs310/en/index.html>

GAVI Alliance has initiated rotavirus vaccinations



<http://www.youtube.com/watch?v=MTgDR0uUySE>

Key concepts and prep for Friday

- ▶ New developments in “biomedical” HIV prevention are exciting, but costly
- ▶ HIV/AIDS is one (extremely important) aspect of global health. Should aid focus on HIV exclusively?
- ▶ Developing countries cannot yet implement full range of interventions on their own
- ▶ Austerity forces tough choices—sustainability, cost-effectiveness
- ▶ **Where should we go from here?**