The economics of TasP

David Wilson and Nicole Fraser
Global HIV/AIDS Program
The World Bank

23 September, 2013

The economics of TasP

- **Public goods**
- Burden of AIDS
- Population level effectiveness and implementability of TasP
- Cost-effectiveness of TasP
- Current AIDS financing
- Required AIDS financing
- Smarter implementation
- Conclusion

Public goods

- Public goods non-excludable and non-rivalrous:
  - individuals can’t be excluded from use
  - use by any individual doesn’t reduce availability to others
  - Eg. clean air and street lighting

Public goods – TasP and HIV?

- TasP not a public good but ART has major positive externalities
- Elimination of HIV a public good – non-excludable and non-rivalrous
- Economic analysis of TasP must focus on feasibility, affordability, probability and cost-effectiveness of eliminating HIV

From the positive externalities of TasP to the public good of AIDS elimination

Positive externalities

- ART
  - Benefits to non users, including reduced HIV transmission, health and social expenses, increased productivity, household income and parental participation

Public good

- AIDS elimination
  - Benefits everyone, without excluding anyone

Feasibility, affordability, probability and cost-effectiveness of eliminating HIV

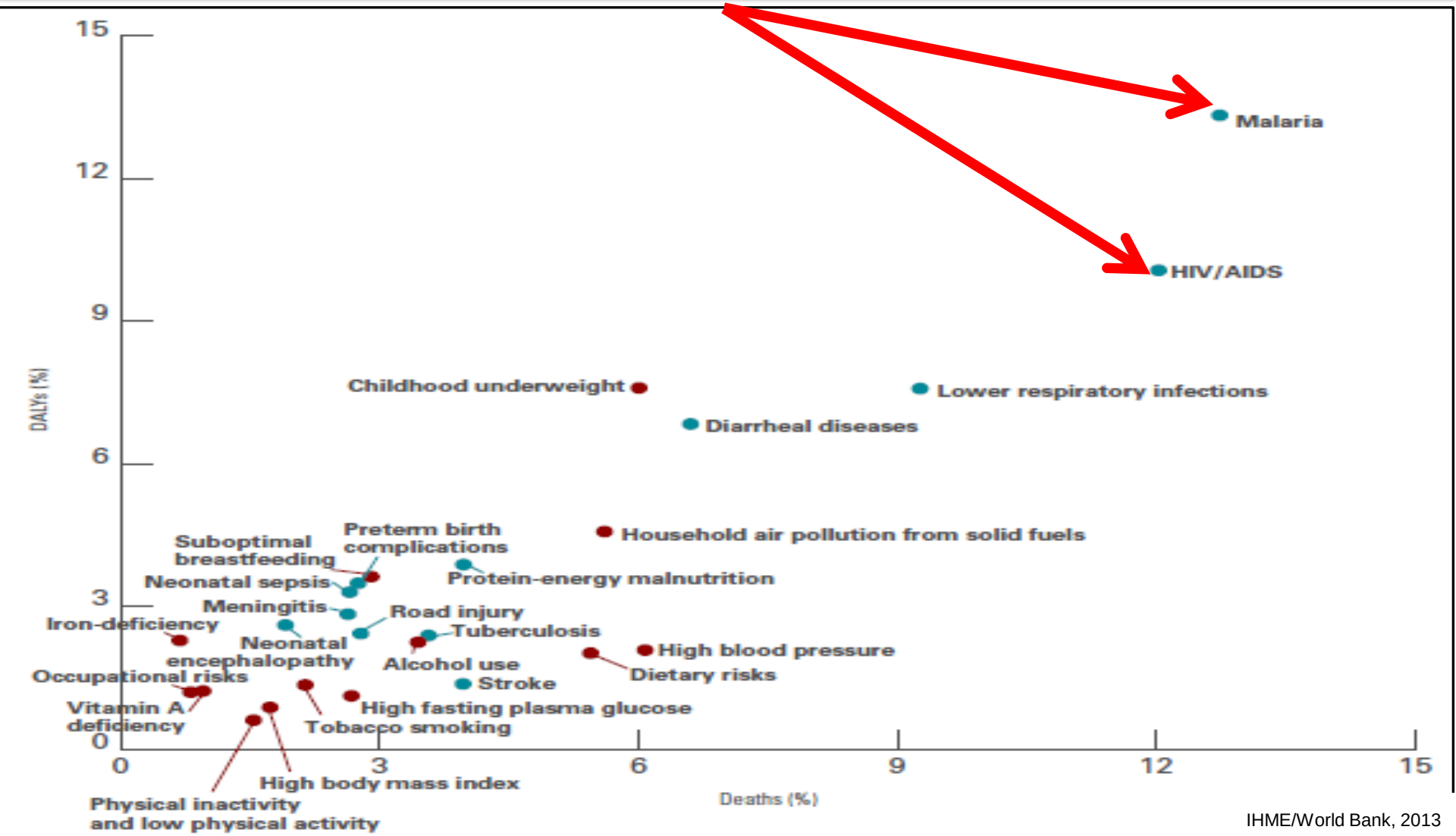
The economics of TasP

- Public goods
- **Burden of AIDS**
- Population level effectiveness and implementability of TasP
- Cost-effectiveness of TasP
- Current AIDS financing
- Required AIDS financing
- Smarter implementation
- Conclusion

AIDS fastest growing cause of disease burden globally in last 20 years

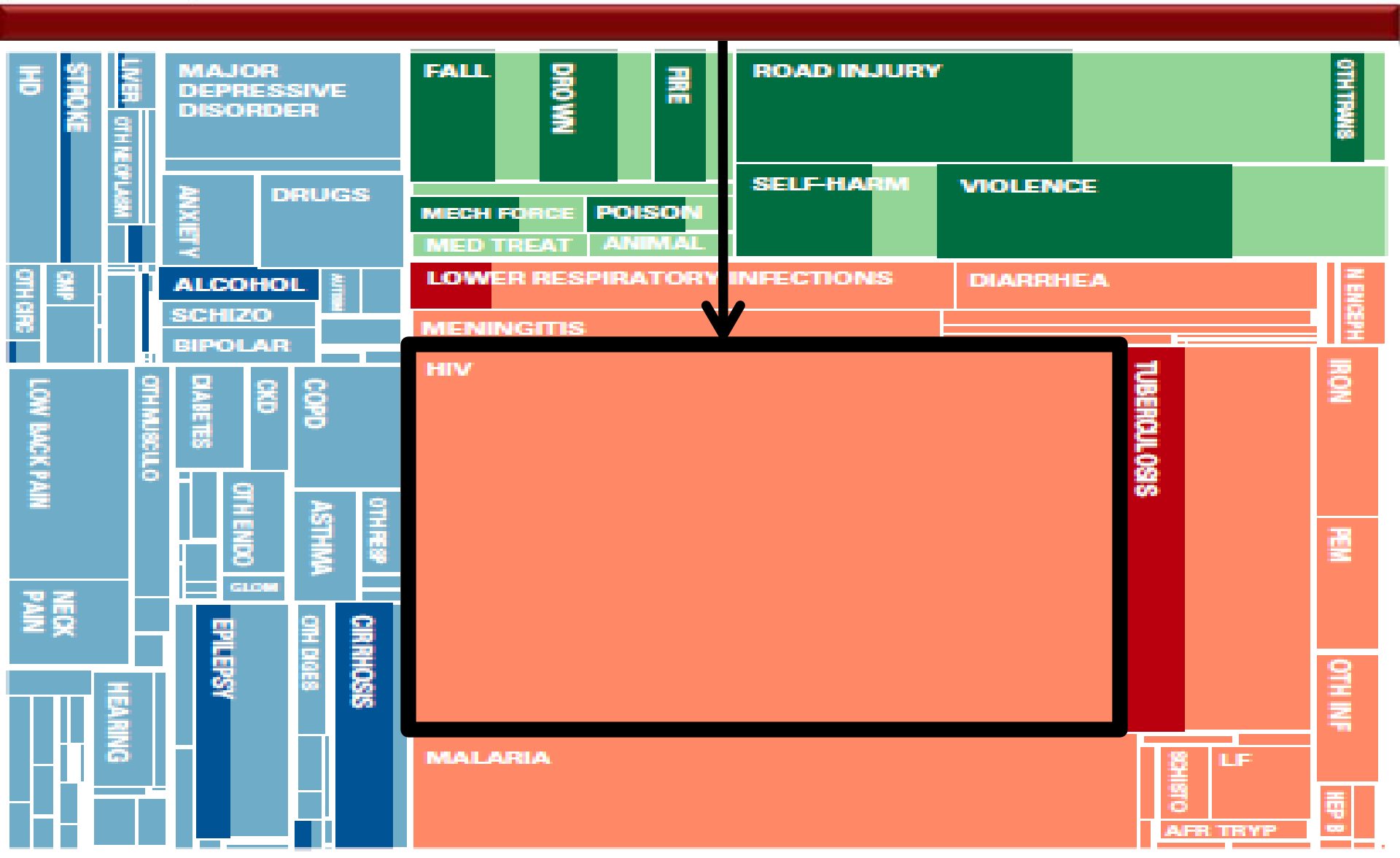
IHME/World Bank, 2013

AIDS and malaria greatest causes of disease burden in Sub-Saharan Africa



IHME/World Bank, 2013

AIDS by far the largest cause of disease burden in Uganda



The economics of TasP

- Public goods
- Burden of AIDS
- **Population level effectiveness and implementability of TasP**
- Cost-effectiveness of TasP
- Current AIDS financing
- Required AIDS financing
- Smarter implementation
- Conclusion

Population level effectiveness of TasP

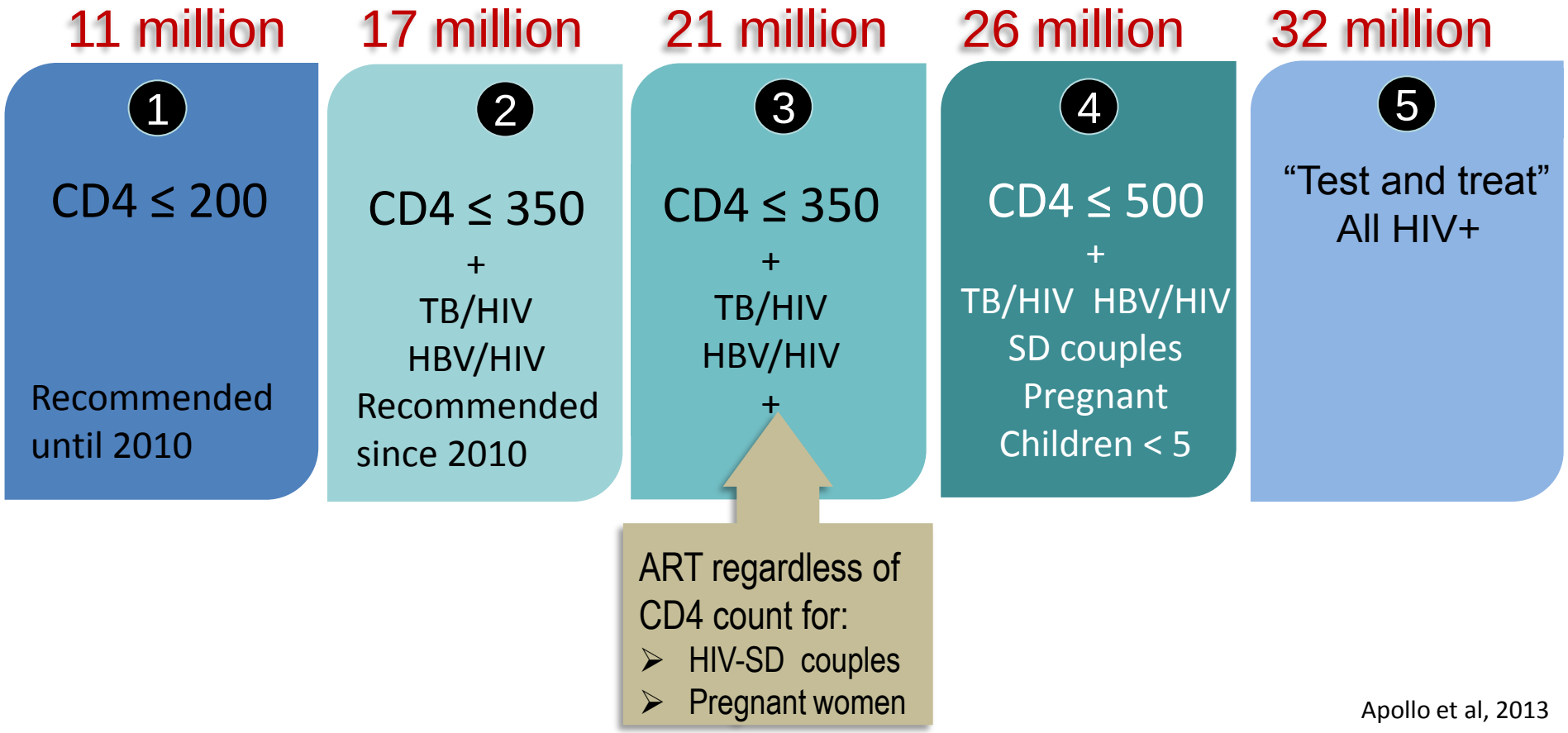
- **TAsP clinical trial efficacy** 96%+
- **TAsP real world effectiveness** lower?
  - Infection 34% lower in area with 30%-40% ART coverage (the effect saturation point) than area with <10% coverage in KZN (Tanser et al, 2013)
  - Infection 26% lower in discordant couples in China - for transfusion or sexually infected but not IDU infected indexes (Jia, 2012)
  - No difference in discordant couples in Uganda (Birungi et al. 2013)
  - HIV infections rising in highly treated MSM communities in developed countries (Wilson et al, 2012)
  - Less effective in MSM epidemics? (Cohen 2013)
  - With ~85% on ART at CD4<350, Swaziland has measured HIV incidence of 2.4% on top of 26% adult prevalence (SHIMS, 2013)

Population level effectiveness of TasP

	HPTN 071 (PopART)	TasP	Botswana/ HSPH	SEARCH
Sites	Lusaka, Cape Town	South Africa	Mochudi, Botsana	Kenya, Uganda
Design	Cluster RCT 24 @ 55,000 3 arm	Cluster RCT 34 @ 1,250 2 arm	Paired cluster RCT, 30 @ 5,000, 2 arm	Paired cluster RCT, 32 cl @ 10,000, 2 arm
Intervention	**Immediate ART if HIV+** HCT, VMMC, condom, risk reduction counselling	**Immediate ART if HIV+** HCT home-based	**ART for CD4<350, WHO I/II or VL>10,000** HCT, VMMC, PMTCT-B	**Immediate ART if HIV+** Combination HIV prevention package
Outcome	2 year HIV incidence in cohort	2 year HIV incidence in cohort	Cumulative 2 year HIV incidence in cohort	Cumulative HIV incidence 3 + 5 years, cross-sectional

Implementability of TasP: Numbers

- **9.7 million on ART - 26 million eligible at CD4<500 and 32 million eligible for "test and treat"**



Apollo et al, 2013

Implementability of TasP: Access and implicit rationing

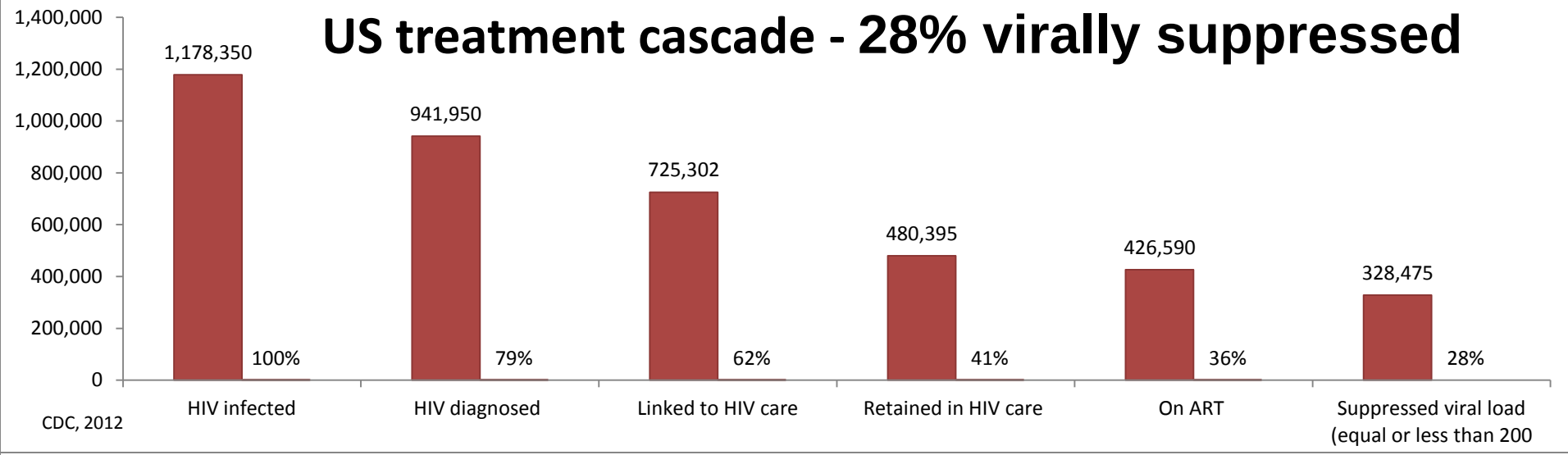
KAMPALA, 12 June 2013 - Uganda has **run out of most ARVs,** HIV testing kits, drugs to treat OIs, according to a recent Ministry of Health stock status report (1)

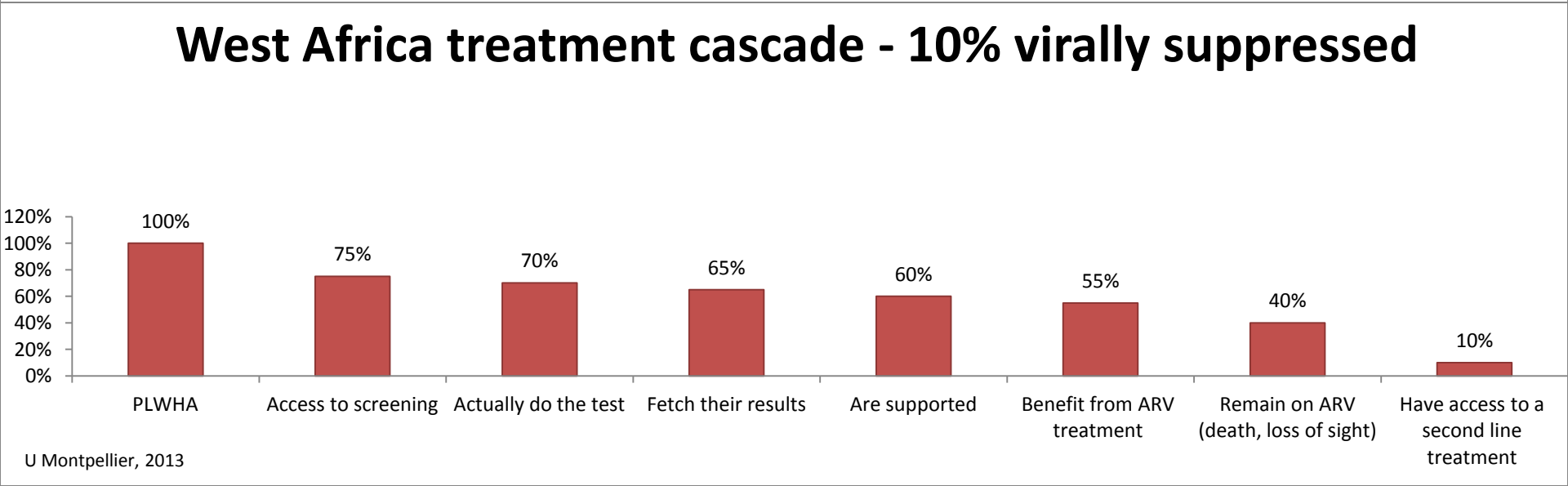
Malawi: Insufficient resources **prevent switch to tenofovir** – HIV+ pregnant women, patients co-infected with HIV and TB, and those with severe reactions to stavudine are being prioritized (2)

Zambia, 21 Aug 2013 - The Zambian government has **introduced a rationing system** for antiretroviral drugs causing concern among people living with HIV (3)

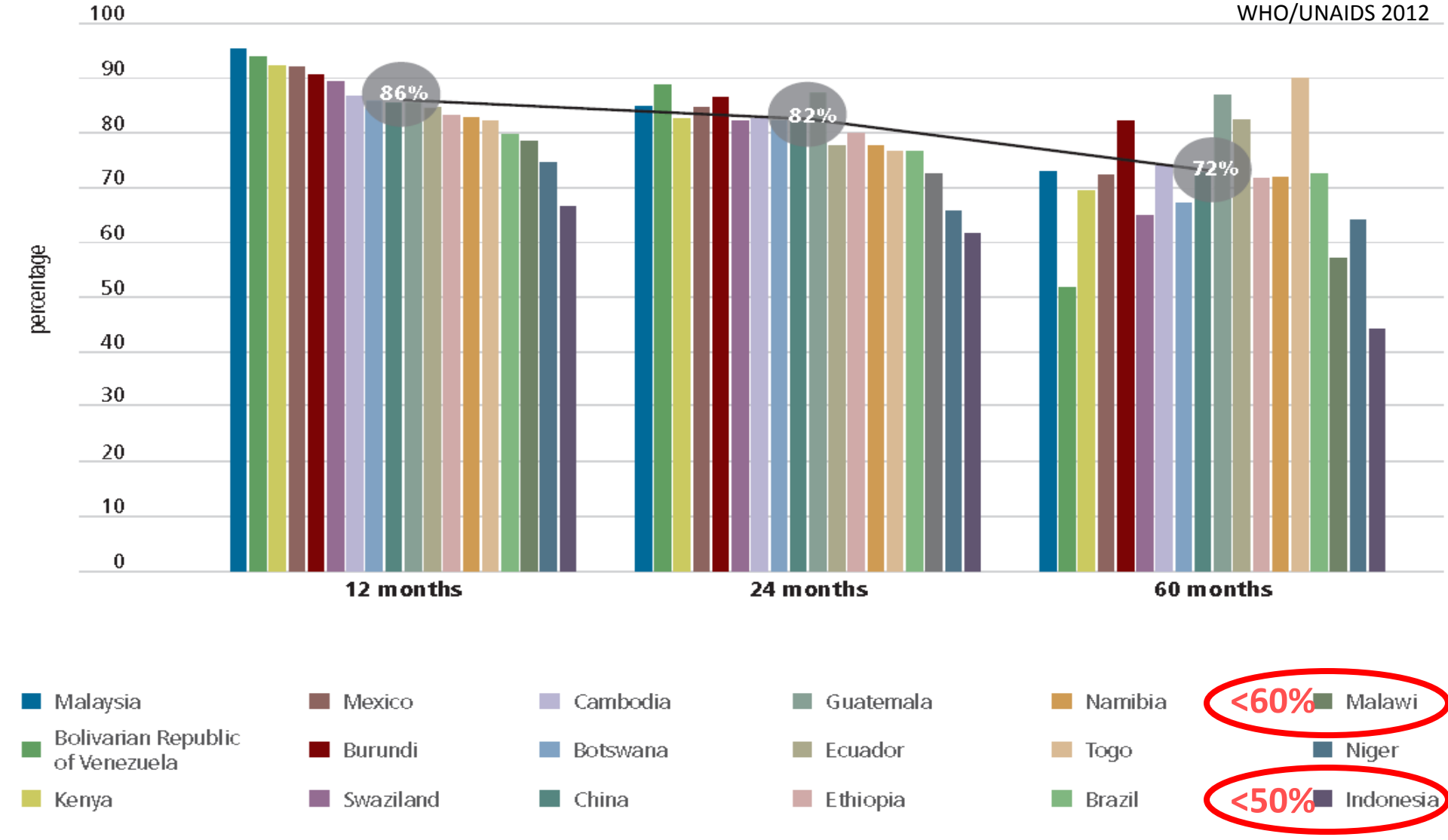
1. http://www.irinnews.org/report/98217/uganda-running-out-of-arvs-hiv-test-kits
2. http://www.irinnews.org/report/95904/africa-domestic-investment-in-hiv-up-but-uneven
3. http://www.trust.org/item/20130821105629-gn26o

Implementability of TasP: Cascades

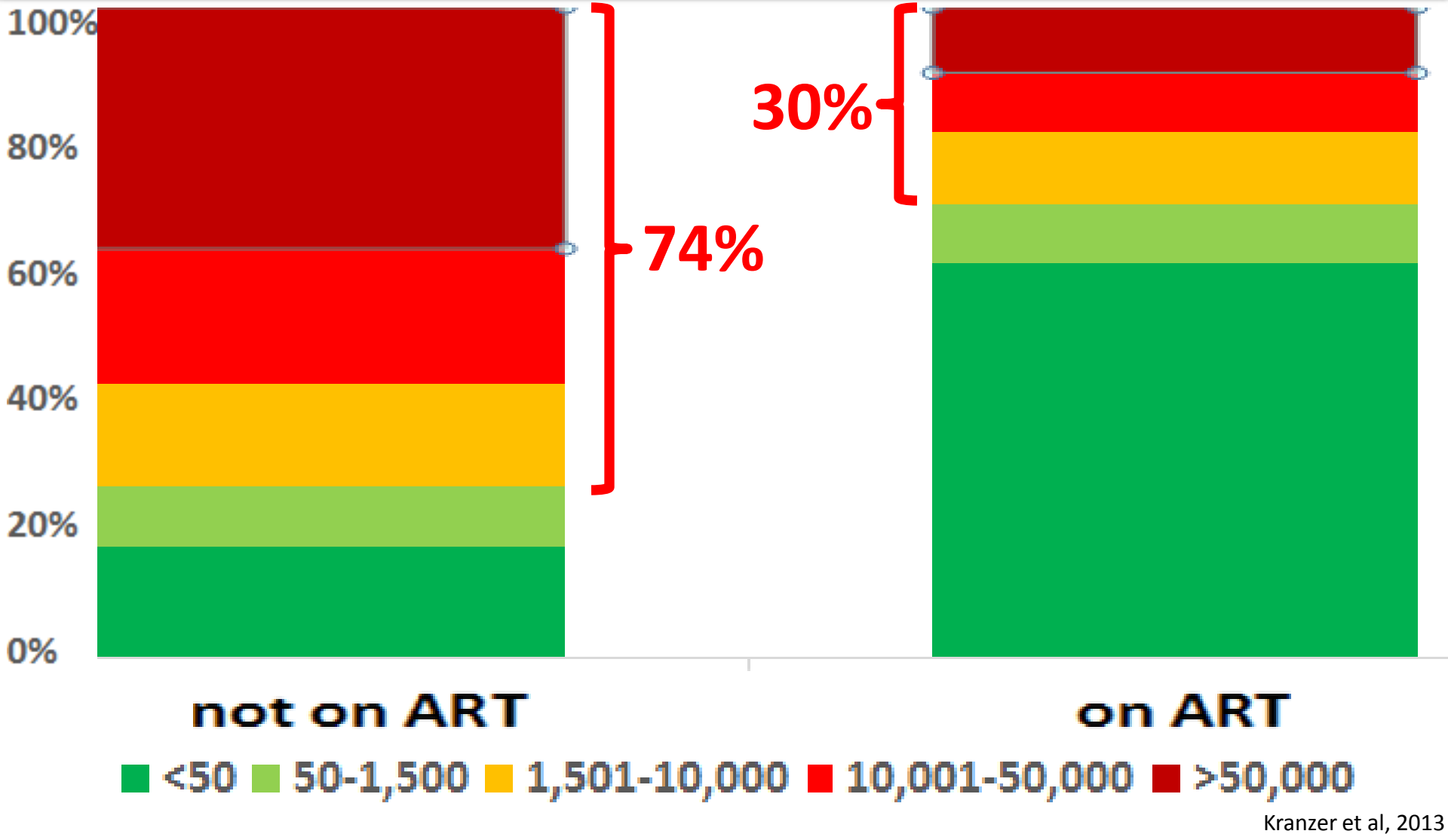




Implementability of TasP: Retention

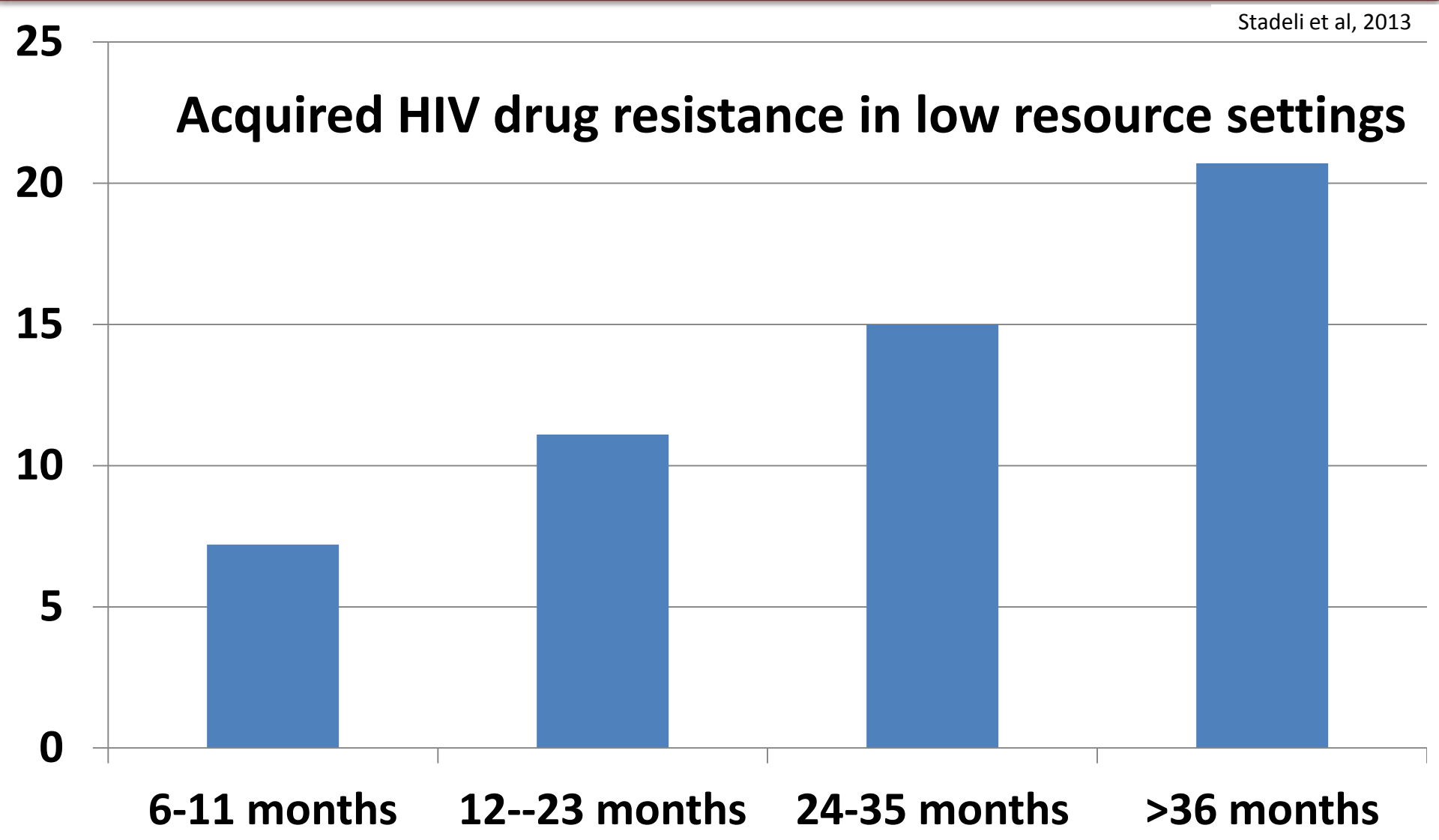


Implementability of TasP: Viral load



Kranzer et al, 2013

Implementability of TasP: Resistance



Implementability of TasP: Unknowns

- Feasibility and cost of identification, enrolment, retention and adherence of:
  - Last 20-30%
  - Most marginalized
  - The healthy

The economics of TasP

- Public goods
- Burden of AIDS
- Population level effectiveness and implementability of TasP
- **Cost-effectiveness of TasP**
- Current AIDS financing
- Required AIDS financing
- Smarter implementation
- Conclusion

Positive externalities of treatment

- After treatment:
  - All adult mortality declined by 20% in Africa (Herbst et al, 2009)
  - Population level life expectancy increased by 11 years in South Africa (Bor et al, 2013)
  - Adult working hours increased, child labor declined and children's nutrition and school attendance increased in Kenya (Goldstein et al, 2010)
  - Absenteeism declined to pre-infection levels in Botswana Habyarimana J et al, 2007)

Cost-effectiveness of TasP: South Africa

- Barninghausen et al examined cost-effectiveness of ART, MC and TasP in South Africa from 2009-2020
- All cost-effective at WHO rule of 3x/per capita GDP
- Significant cost savings through optimal intervention mix without compromising prevention or mortality
- High ART+MC coverage similar HIV incidence reduction as TasP
- High ART+MC coverage $5 billion less expensive than TasP
- Increased MC ($1,100 per infection averted) outperforms ART ($6,800) and TasP ($8,400)
- Most cost-effective prevention and mortality scenario is MC first then ART - 50% ART and 60% MC coverage optimal
- MC more cost-effective than TasP because cost is one-ninth, accrued once versus lifetime
- As only half needing ART at CD4<350 receive it, increasing treatment in this group should precede treatment expansion to earlier disease stages

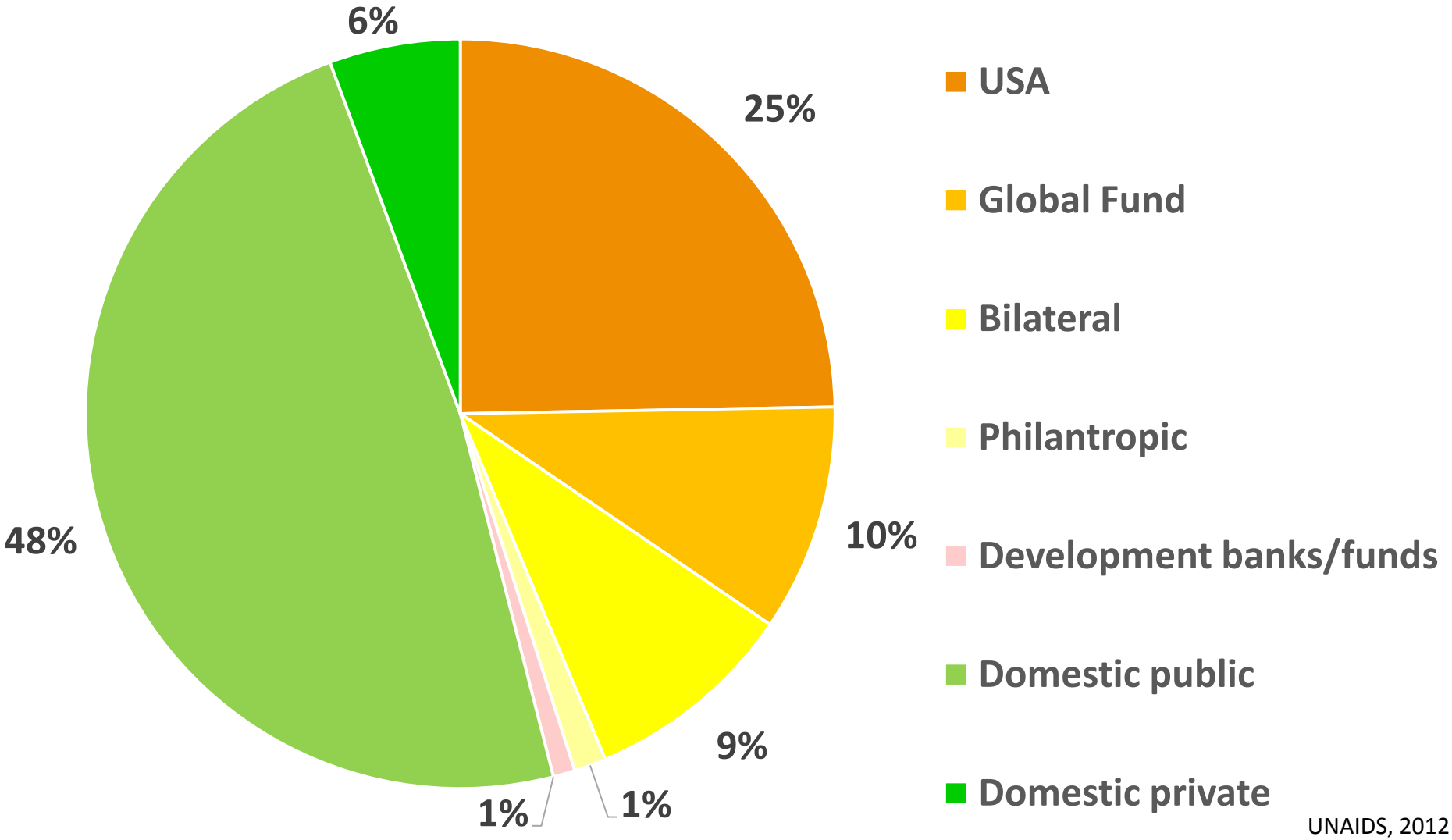
Cost-effectiveness of TasP: India

	Mysore	Belgaum	Bellary	Guntur
Size of general population	480,000	460,000	490,000	620,000
Size of FSW population	2300	2000	4300	6400
% gen pop HIV positive	0.94%	0.63%	1.36%	1.9%
Cost of testing general population every 5 years (US$)	960,000	920,000	980,000	1,240,000
Estimate of annual test-and-treat costs	4,600,000	3,200,000	6,300,000	10,600,000
Annual cost of core group intervention	470,000	400,000	570,000	1,200,000

The economics of TasP

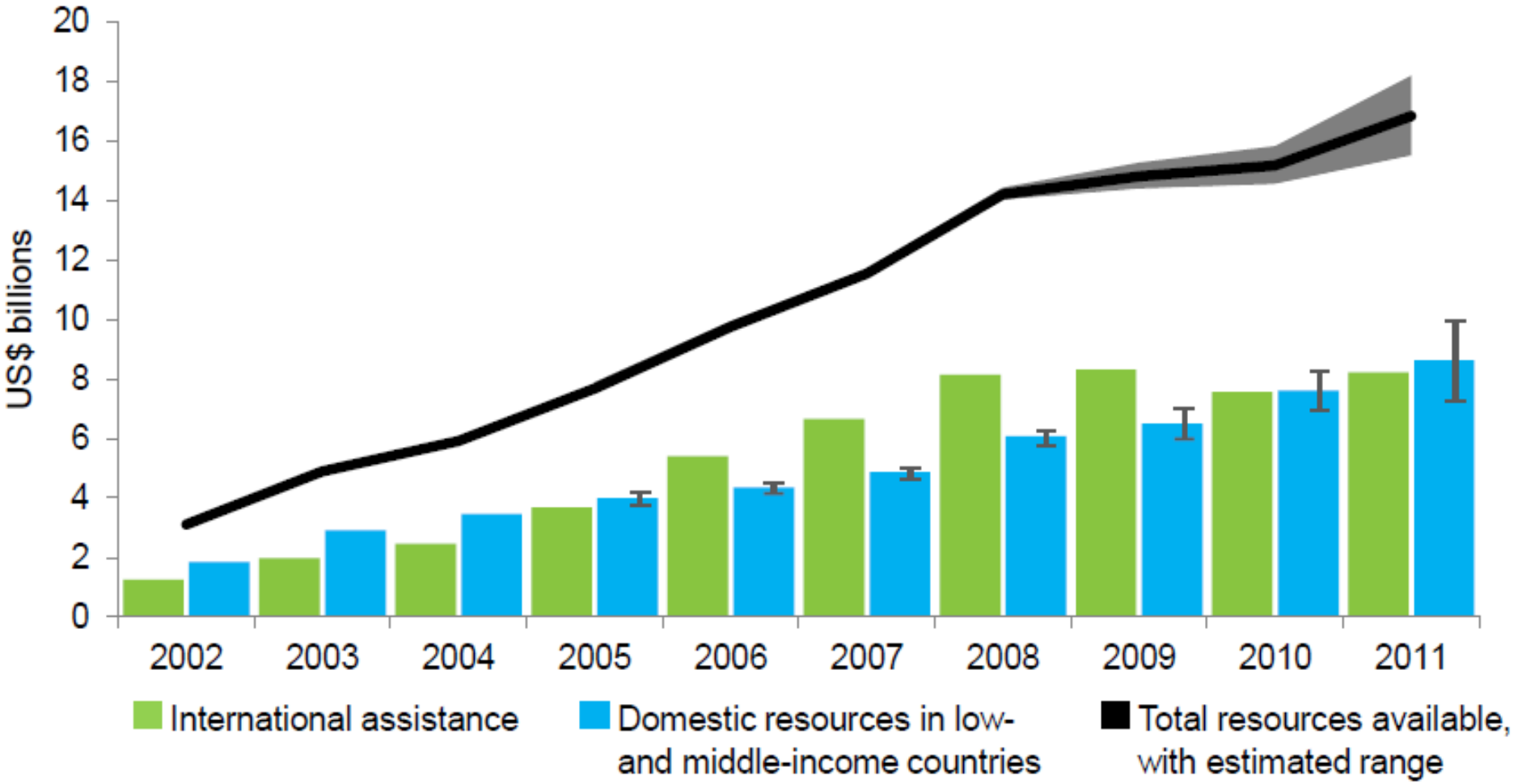
- Public goods
- Burden of AIDS
- Population level effectiveness and implementability of TasP
- Cost-effectiveness of TasP
- **Current AIDS financing**
- Required AIDS financing
- Smarter implementation
- Conclusion

$16.8 billion AIDS financing in 2011



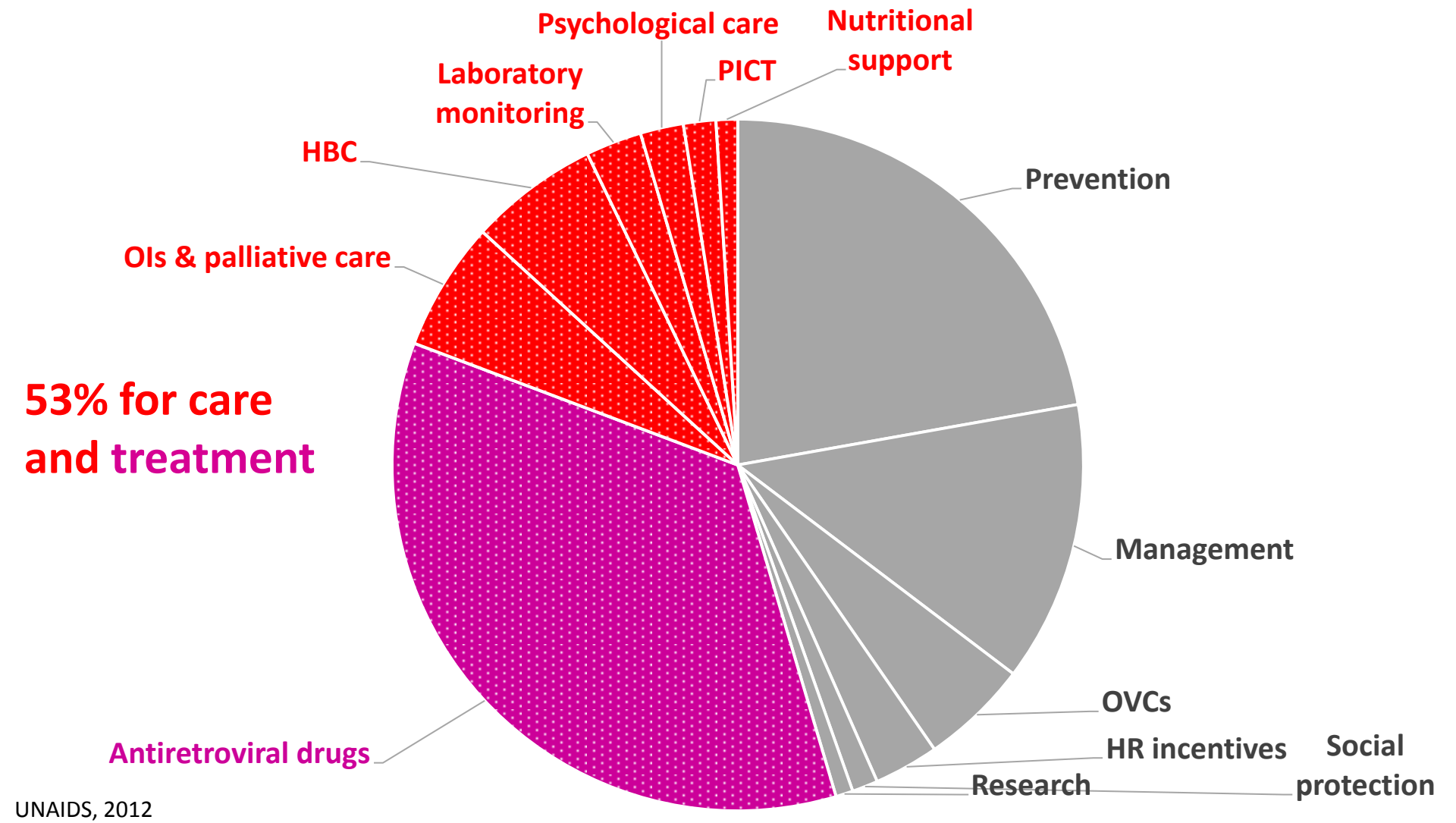
UNAIDS, 2012

Trajectory and sources of AIDS financing



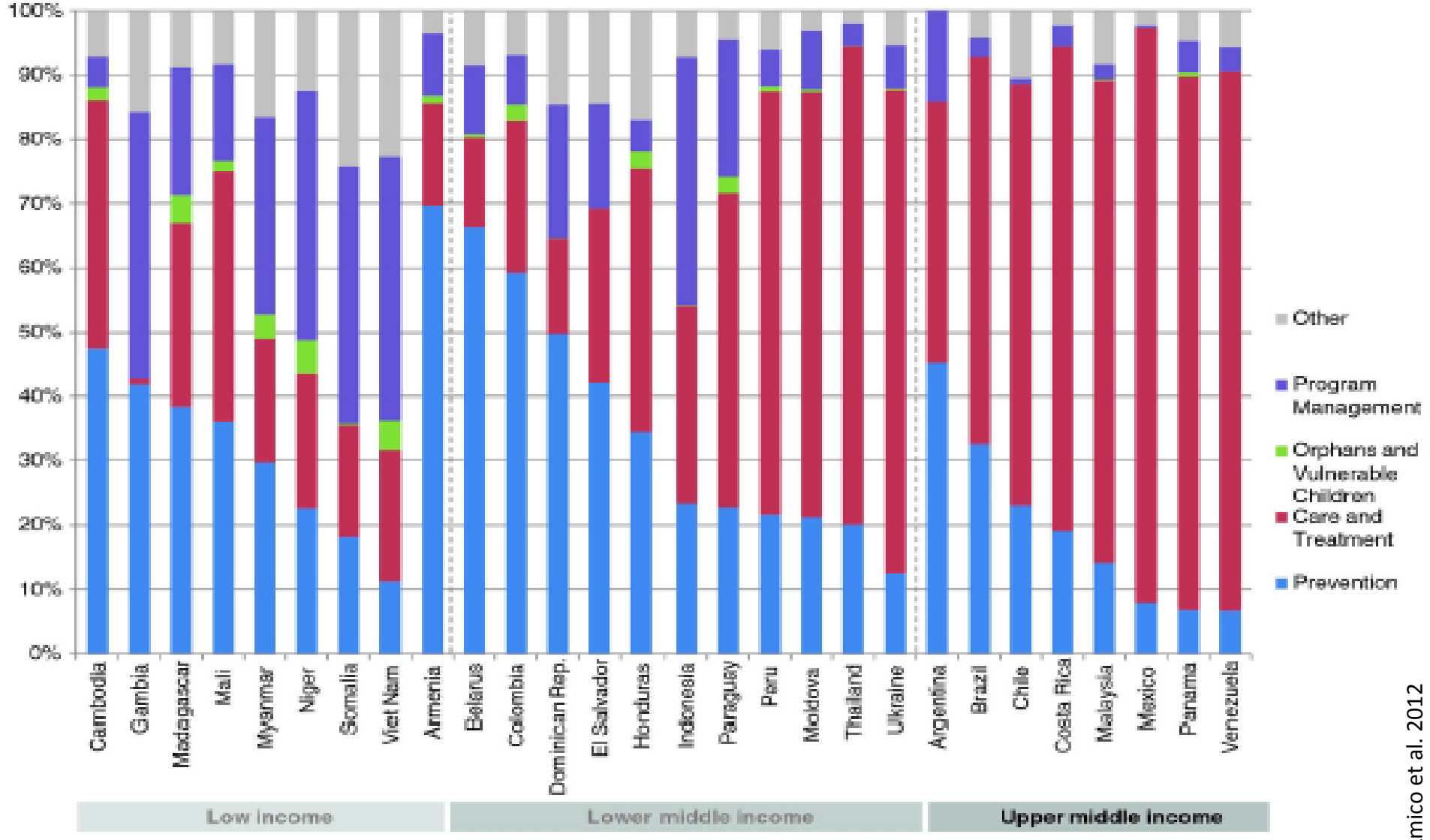
UNAIDS, 2012

Allocation of AIDS financing, 2009-2011



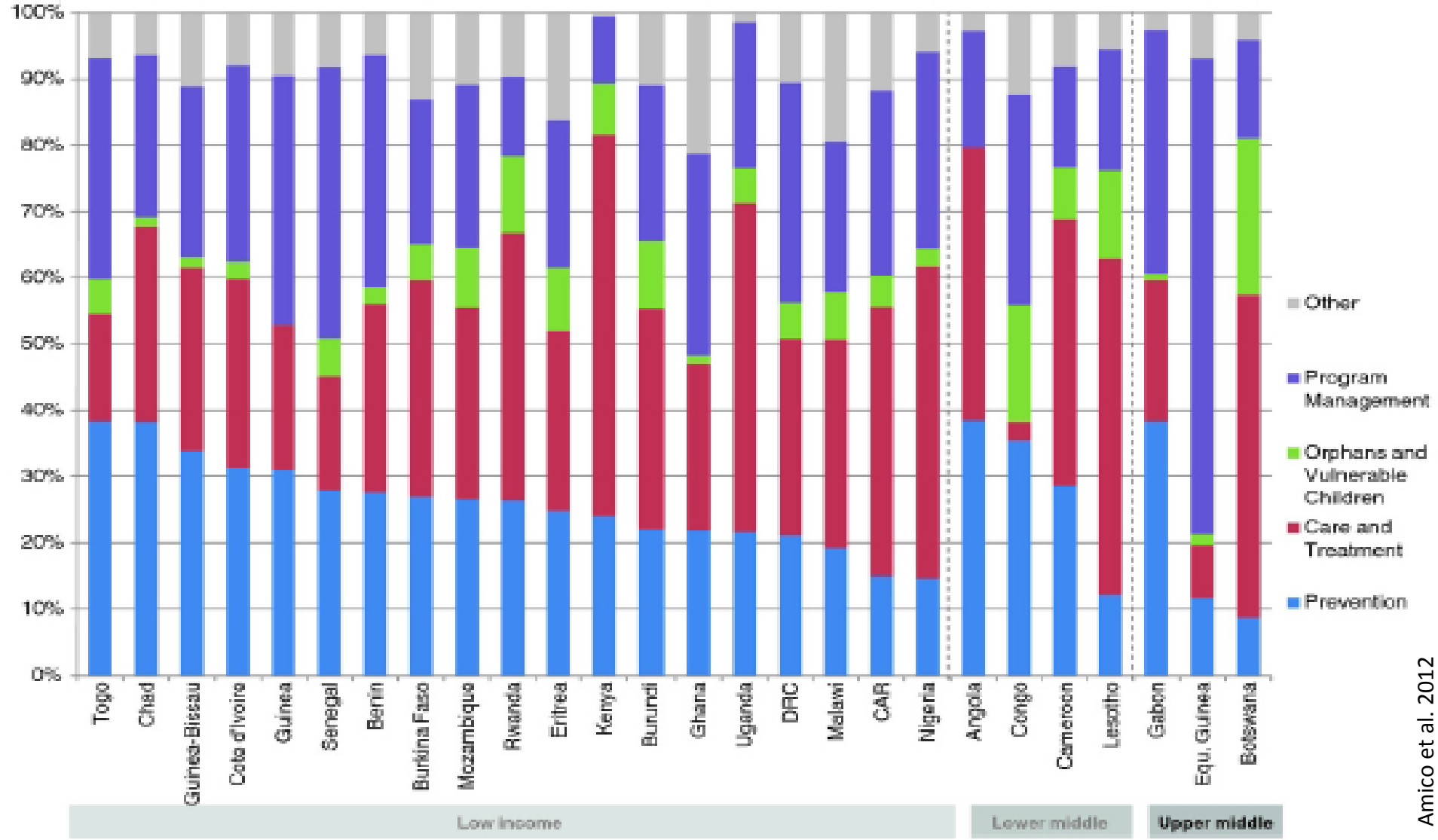
UNAIDS, 2012

Treatment dominates HIV budgets in concentrated epidemics



Amico et al. 2012

Treatment increasingly dominates budgets in generalised epidemics

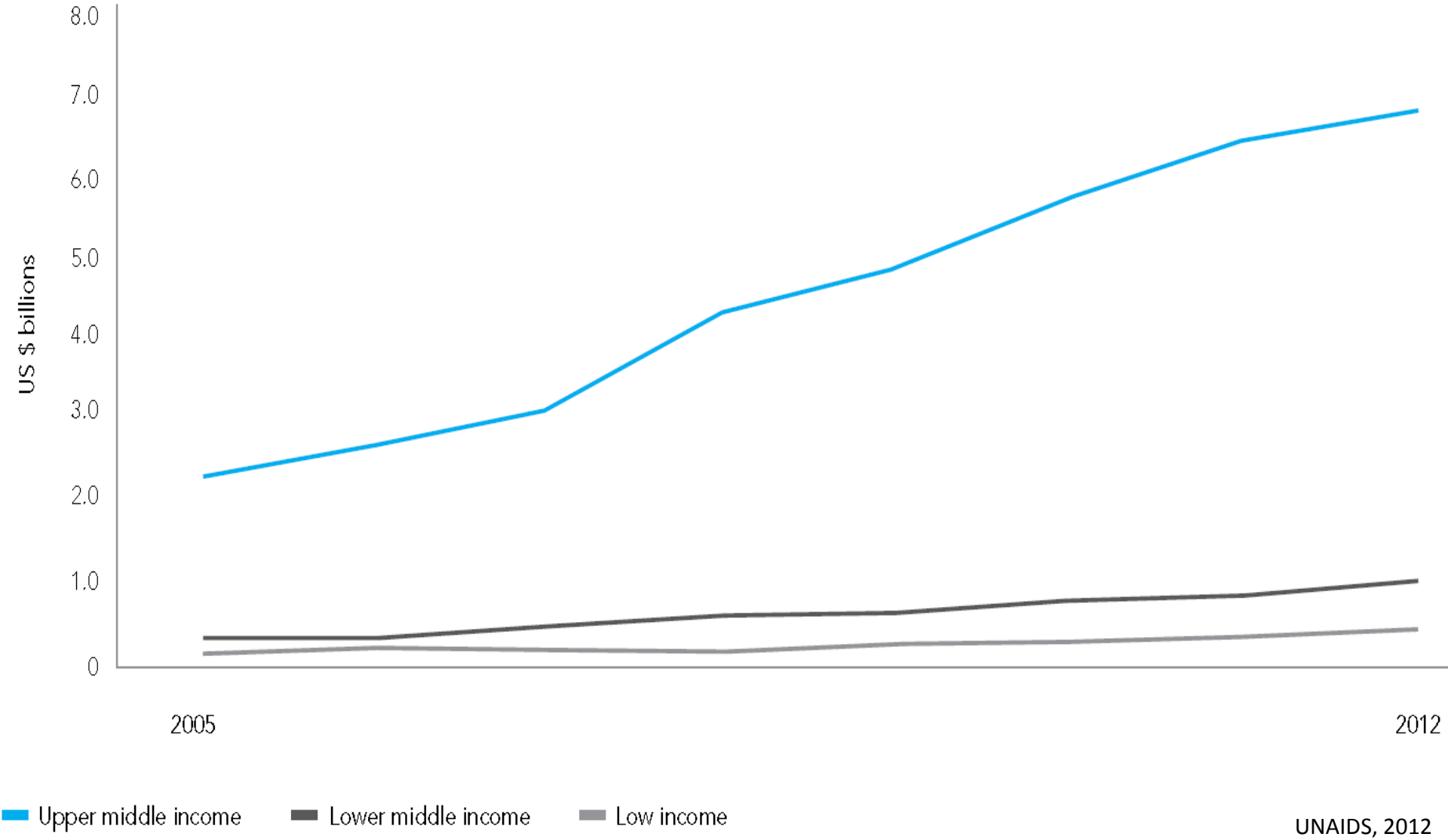


Amico et al. 2012

Treatment still reliant on international financing

- 43 LMIC finance over 75% of treatment costs from international sources
- Another 59 LMIC finance over half of treatment costs from international sources
- In Malawi, treatment costs externally financed and almost equal to total health budget

LMIC domestic AIDS spending has grown, especially in UMC

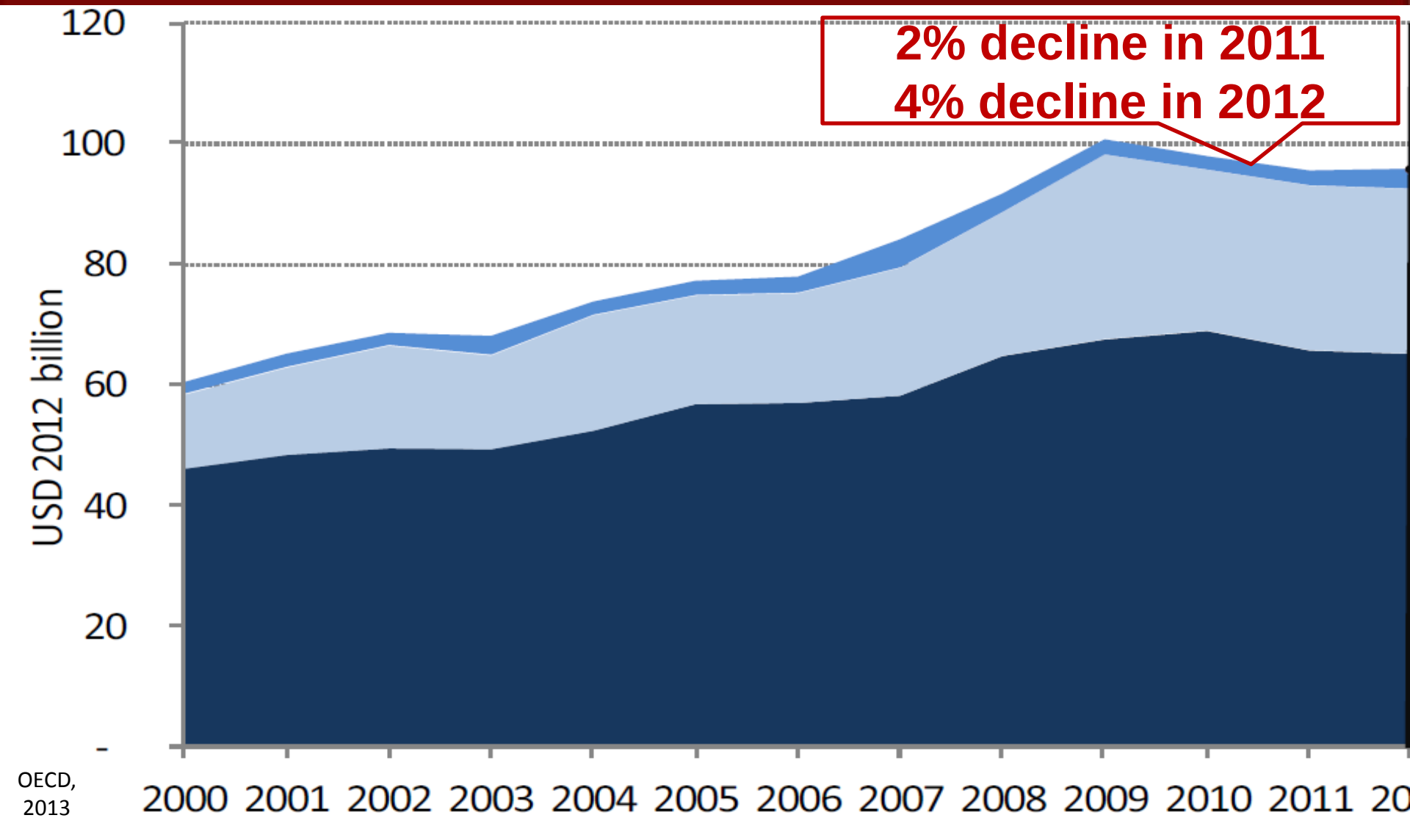


UNAIDS, 2012

The BRICS have stepped up

- Brazil and Russia now fund almost all their AIDS programs
- China will fund its entire AIDS program after GF resources end
- India funds 93% of its AIDS program
- South Africa's AIDS budget grew 500% in a decade to $1.9 billion, the second largest globally

Declining overall development assistance



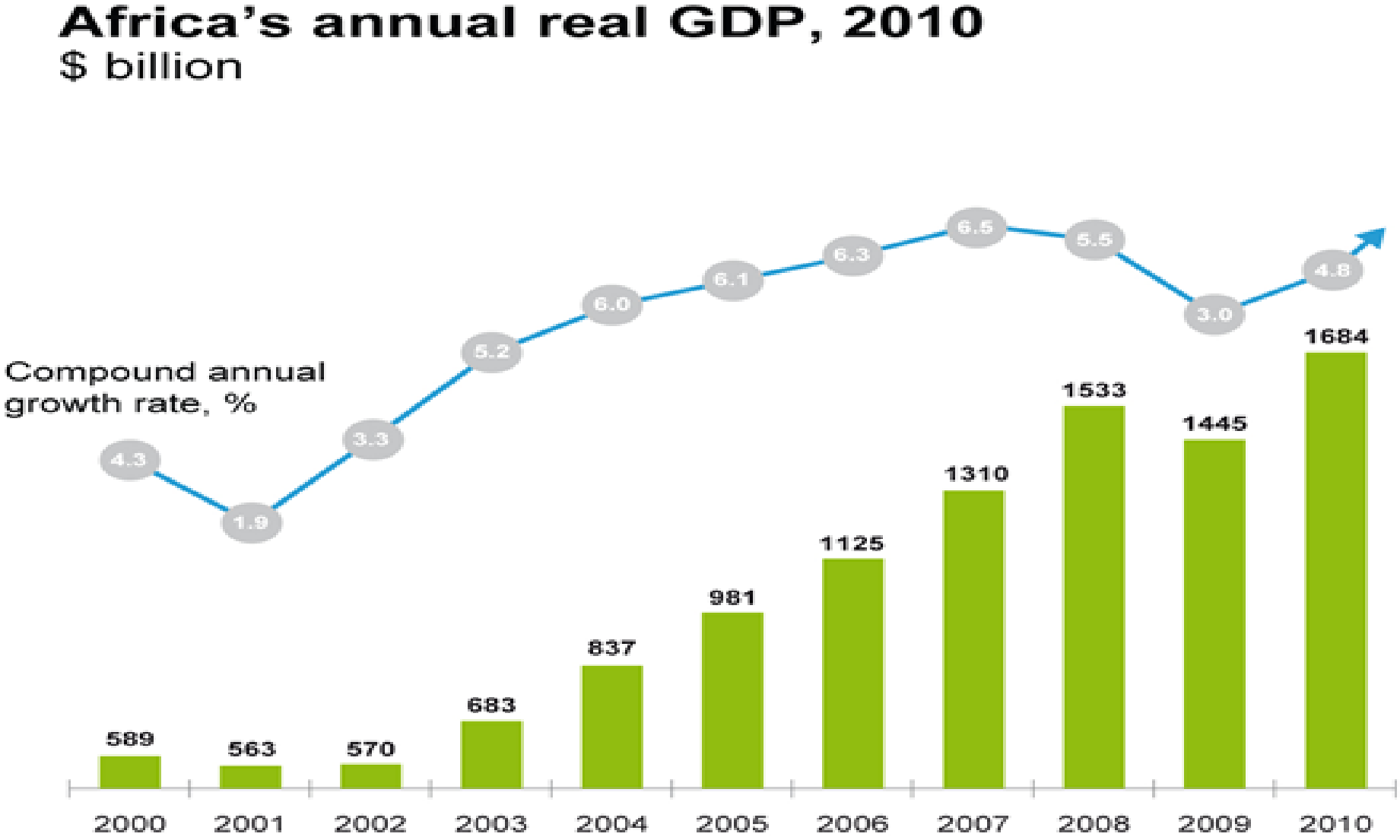
OECD, 2013

Many competing priorities:

Post-2015 MDG High Level Panel Report Word Cloud

Wagstaff, 2013

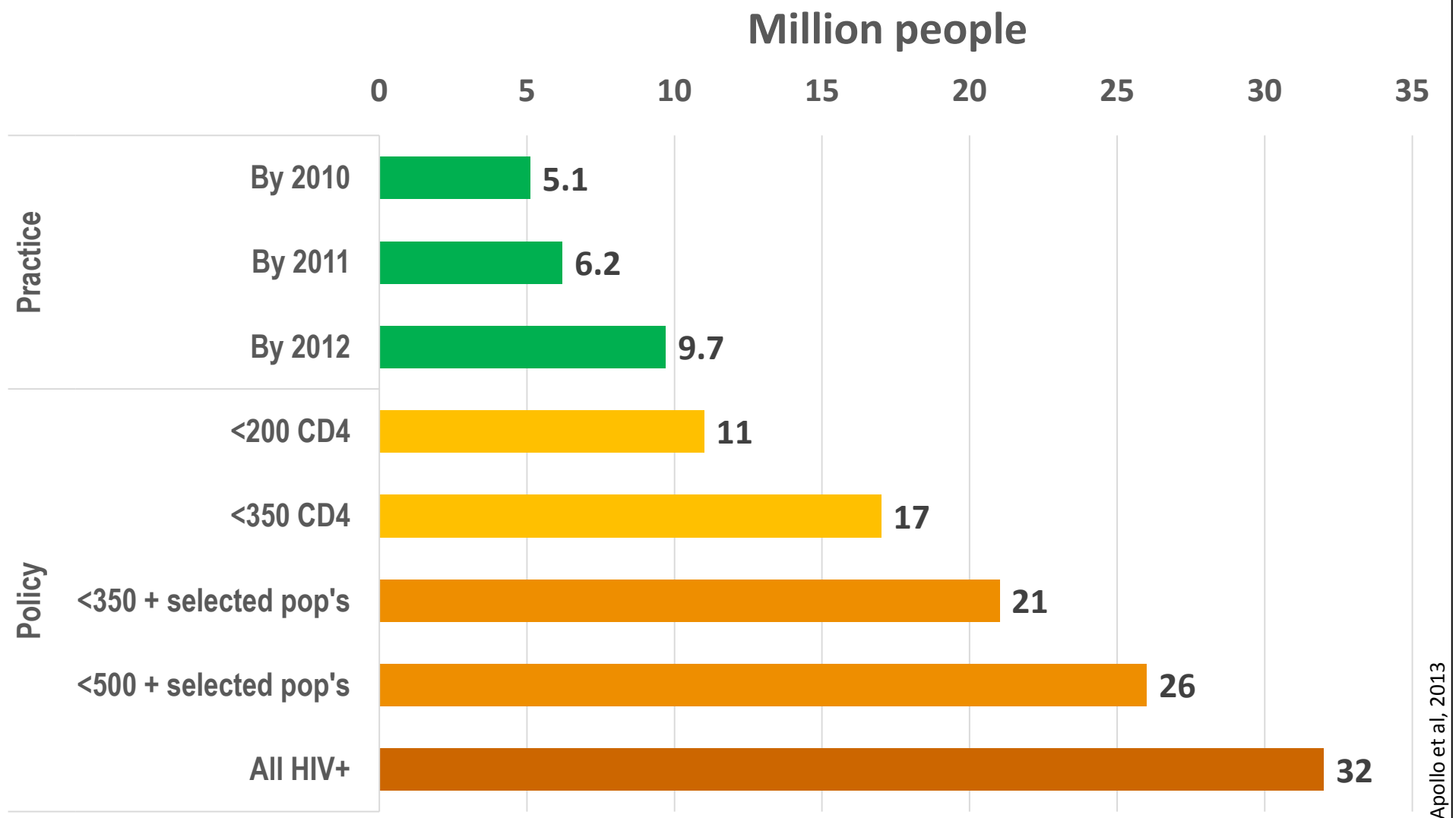
Africa's rapid economic growth since 2000



The economics of TasP

- Public goods
- Burden of AIDS
- Population level effectiveness and implementability of TasP
- Cost-effectiveness of TasP
- Current AIDS financing
- **Required AIDS financing**
- Smarter implementation
- Conclusion

Treatment expansion scenarios

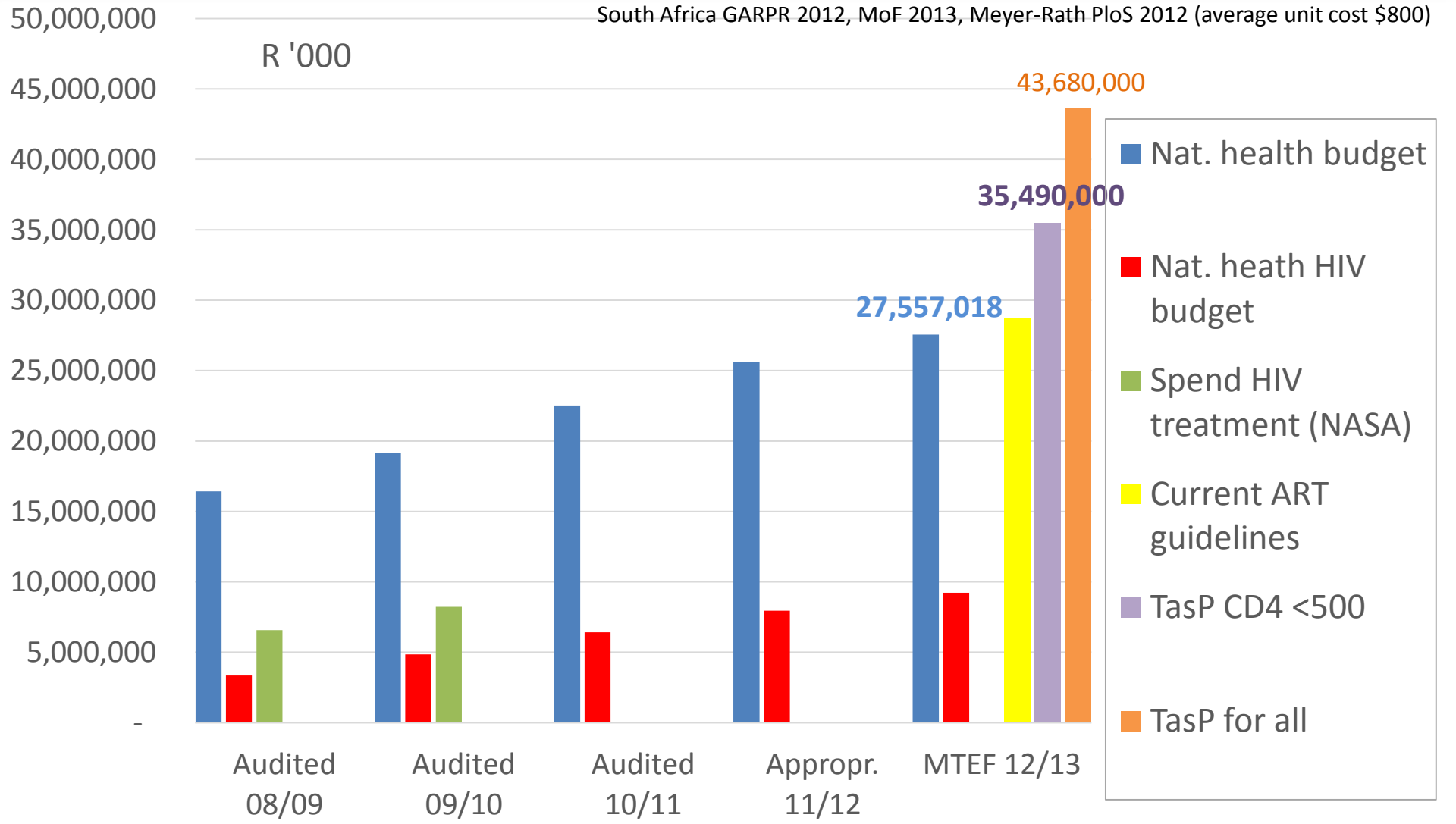


Required global financing

- In 2011, global AIDS care and treatment spending was $5 billion
- Treating all 26 million PLHIV at CD4<500 could cost $16 billion annually
- Treating all PLHIV could cost $20 billion annually
- Economies of maturity and scale offset by greater cost to reach and retain hard to reach and healthy

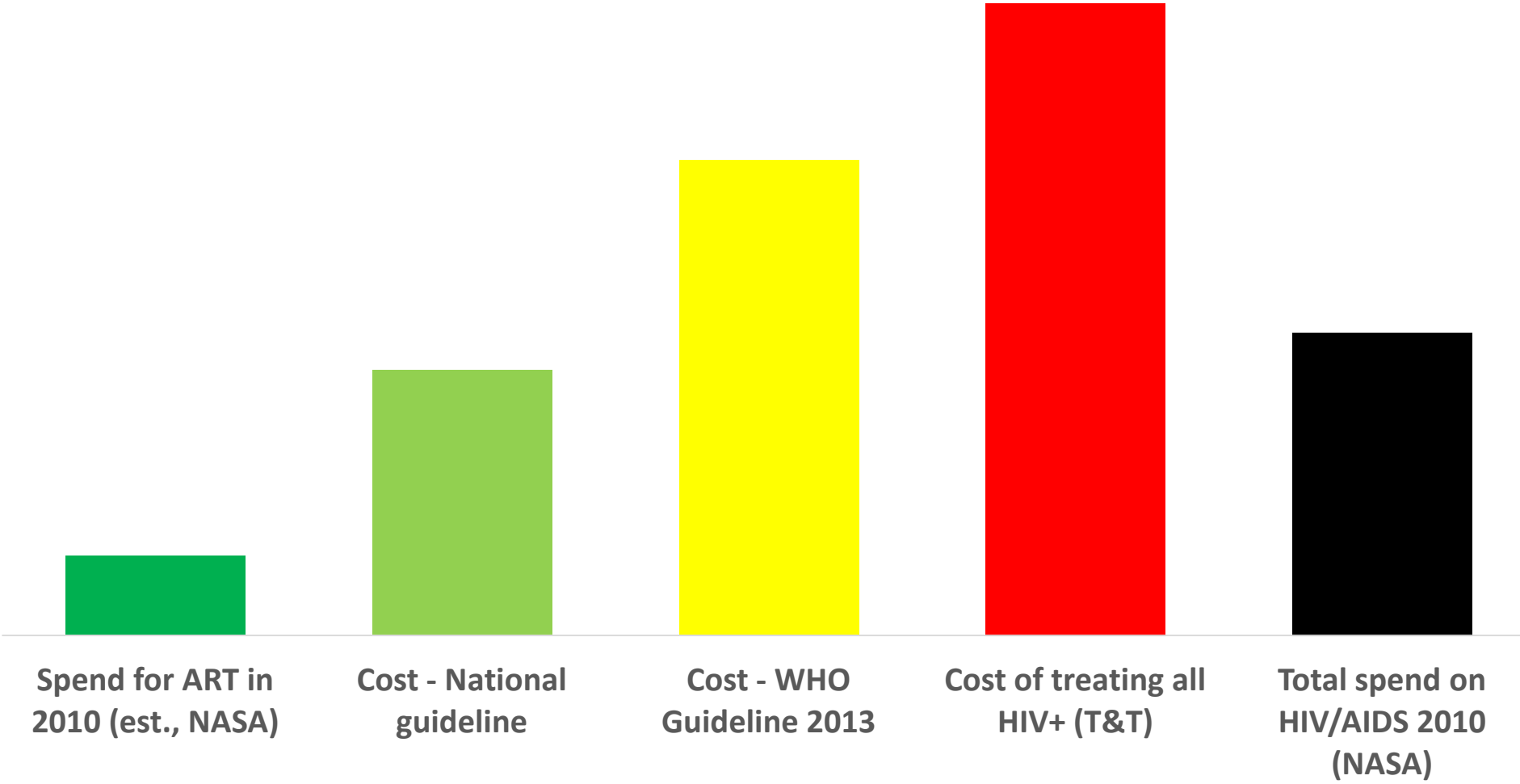
Treatment at CD4<500 could equal South Africa's entire health budget

South Africa GARPR 2012, MoF 2013, Meyer-Rath PloS 2012 (average unit cost $800)



TasP could equal 10% of Nigeria's health budget

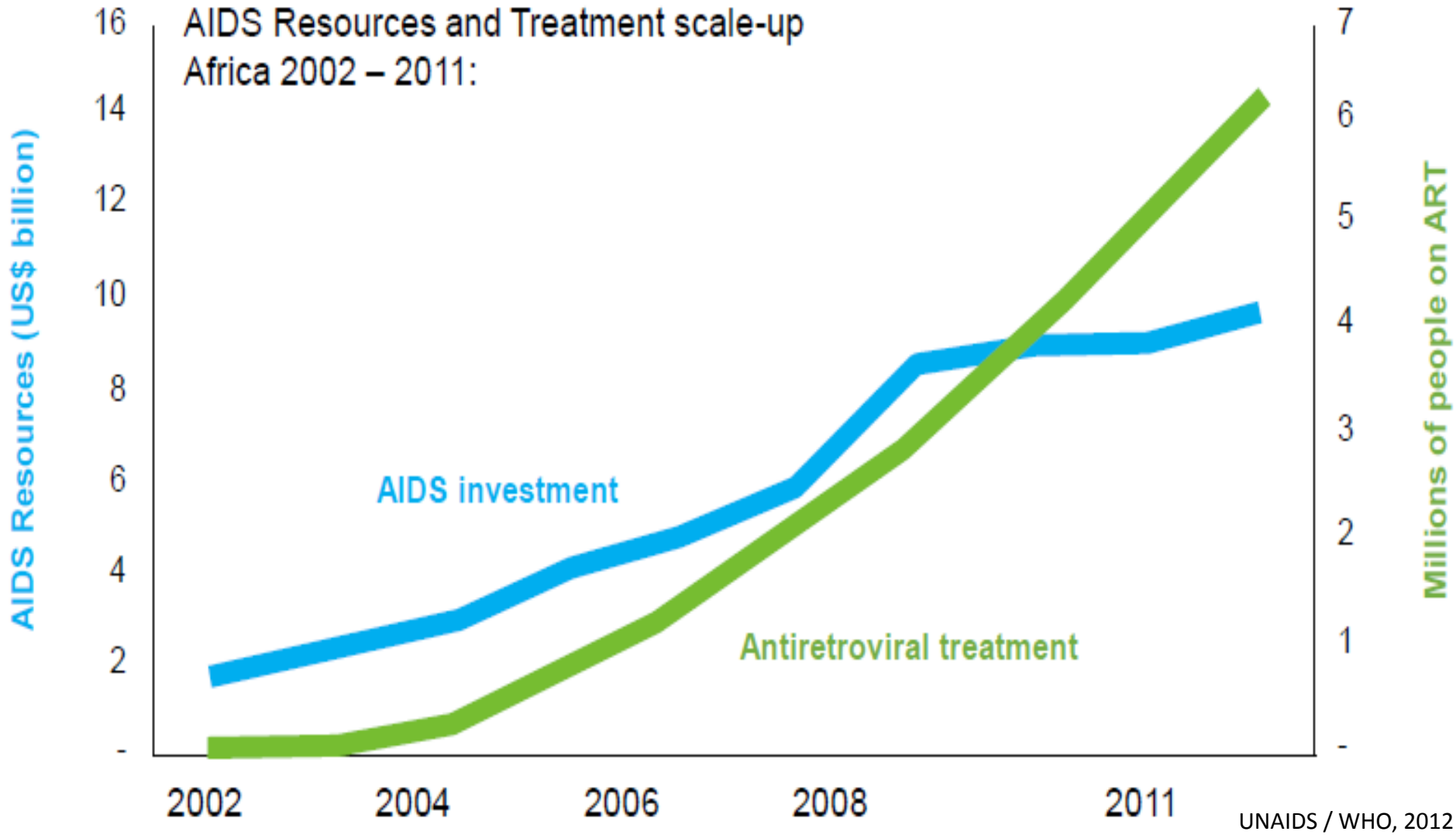
NASA 2010, GARPR 2012, NACA fact sheet 2011 on ART, Aliyu HB et al JAIDS 2012, Health expenditure/ capita World Bank



The economics of TasP

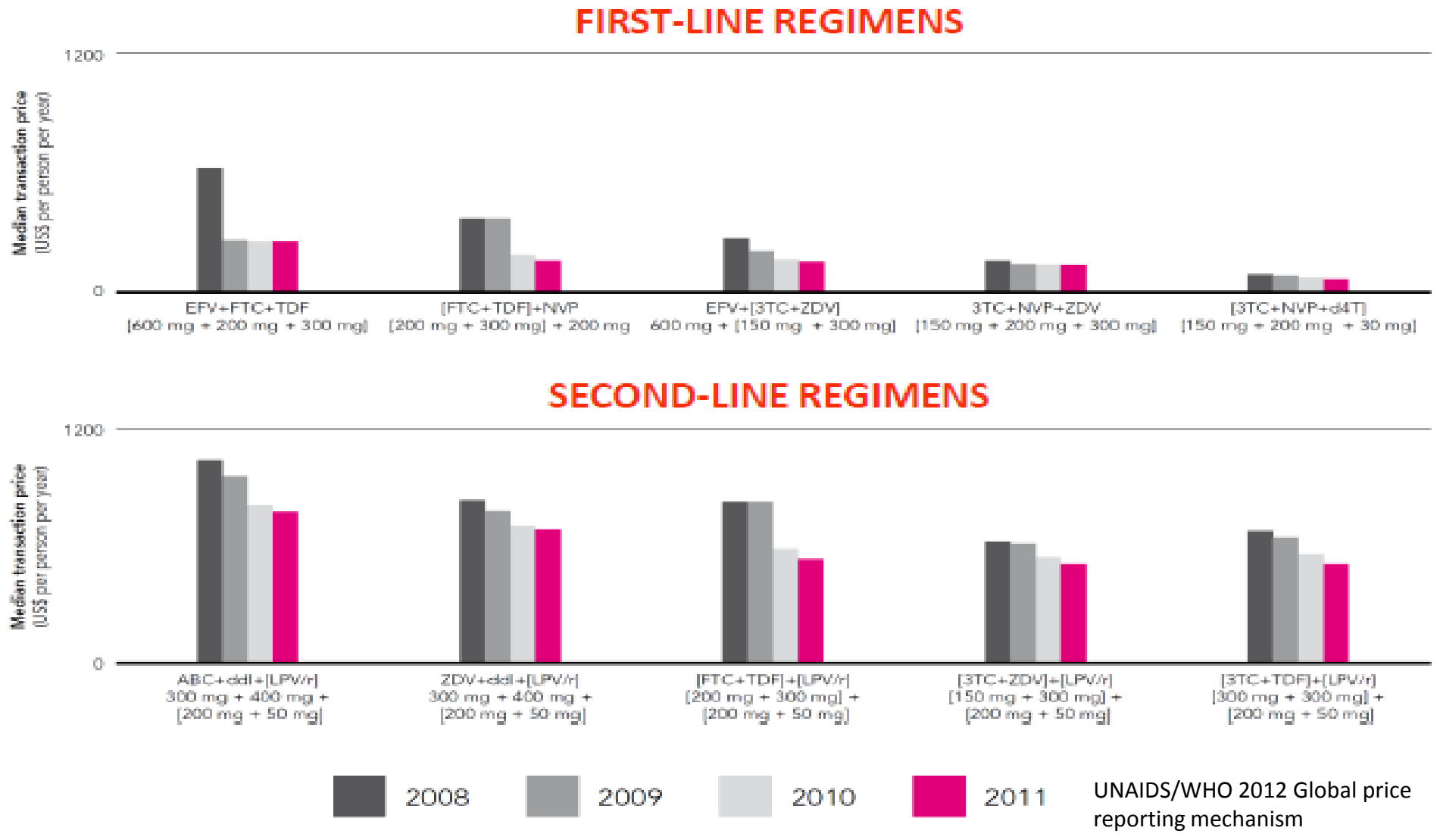
- Public goods
- Burden of AIDS
- Population level effectiveness and implementability of TasP
- Cost-effectiveness of TasP
- Current AIDS financing
- Required AIDS financing
- **Smarter implementation**
- Conclusion

Treatment expansion outpaced resource growth as efficiency increased



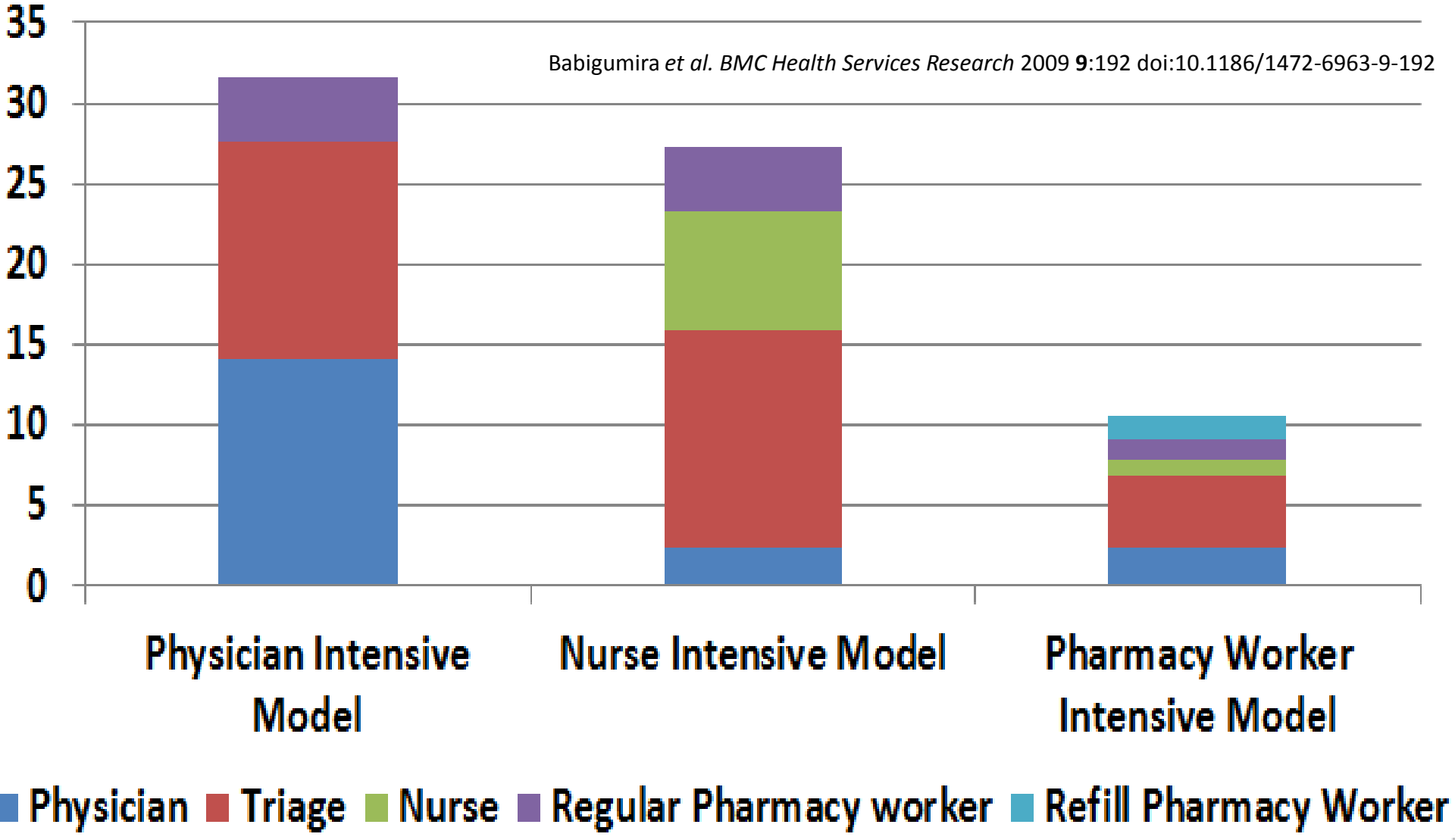
UNAIDS / WHO, 2012

Major declines in drug costs, 2008-2011



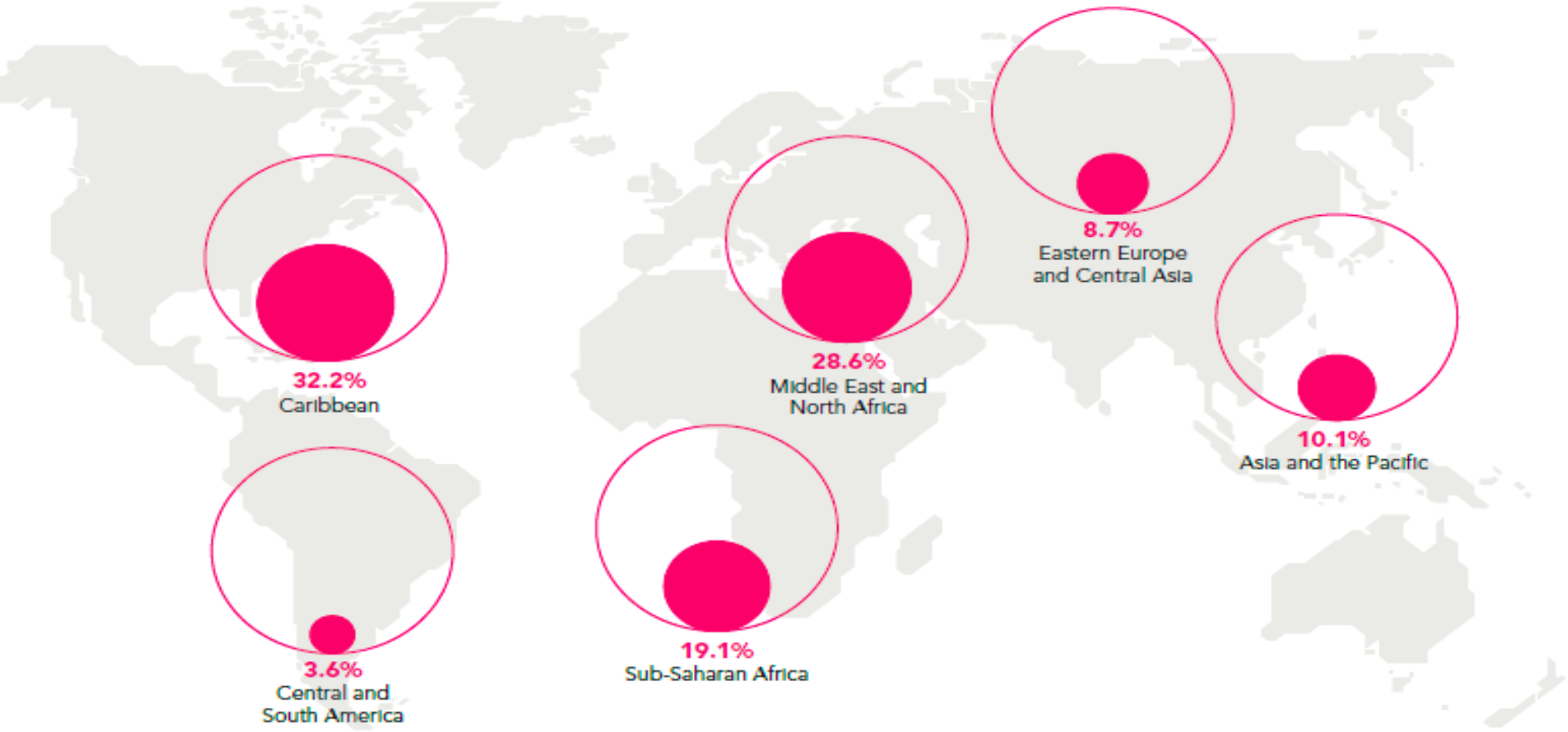
UNAIDS/WHO 2012 Global price reporting mechanism

Task shifting to reduce personnel costs in Kampala, Uganda



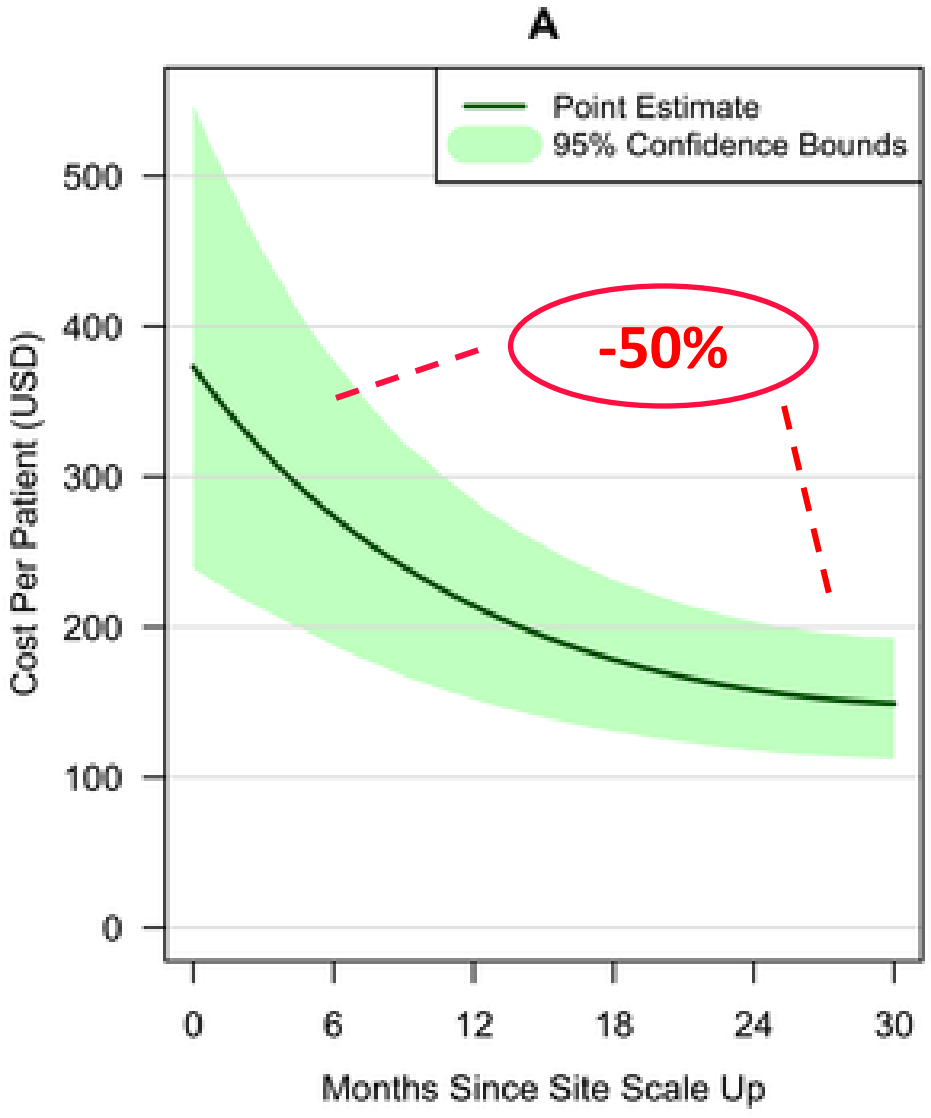
Reduce management costs to increase efficiency

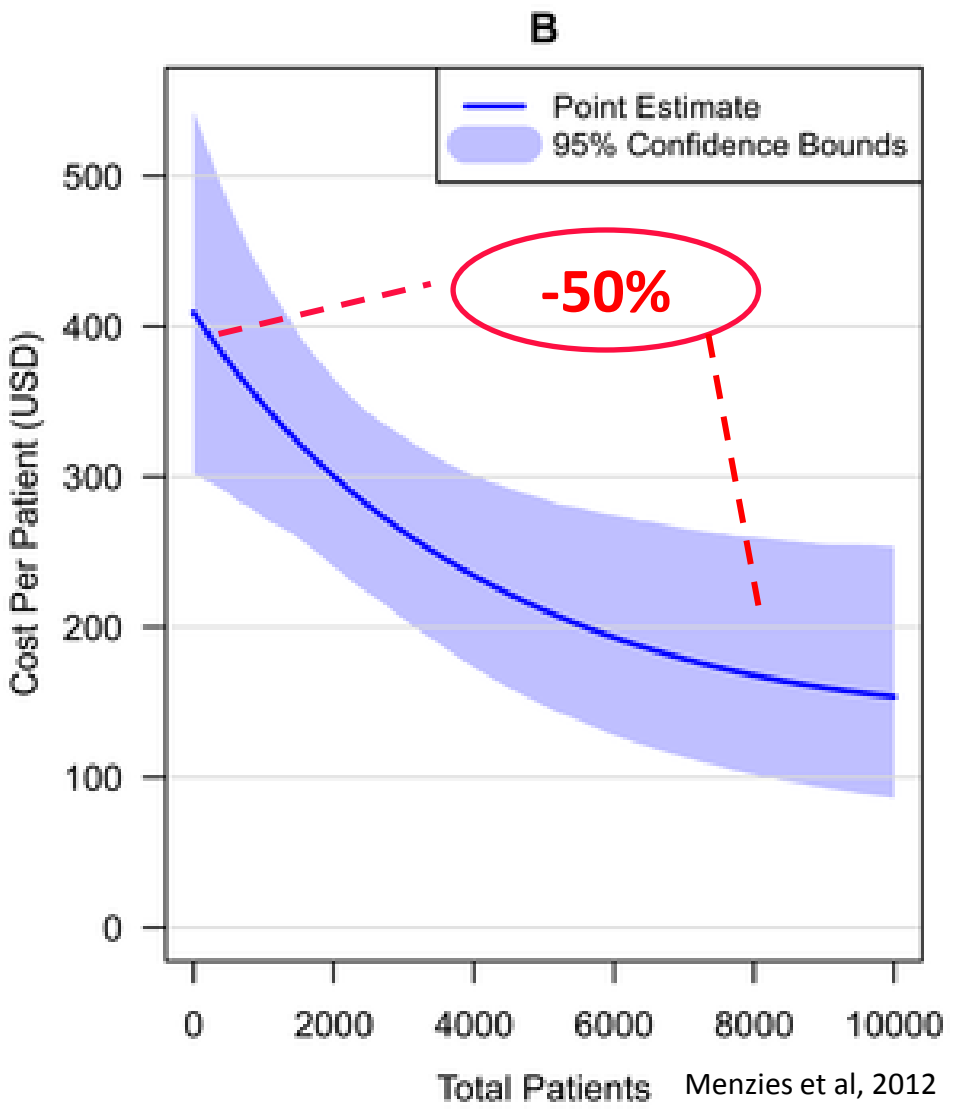
Proportion of total HIV resources spent on programme management by region, 2007–2009



Note: UNGASS 2010 data (or last year available). Programme management includes planning, coordinating and managing programmes, such as administering the disbursement of funds, drug supply, monitoring and evaluation, information and communication technology and infrastructure.

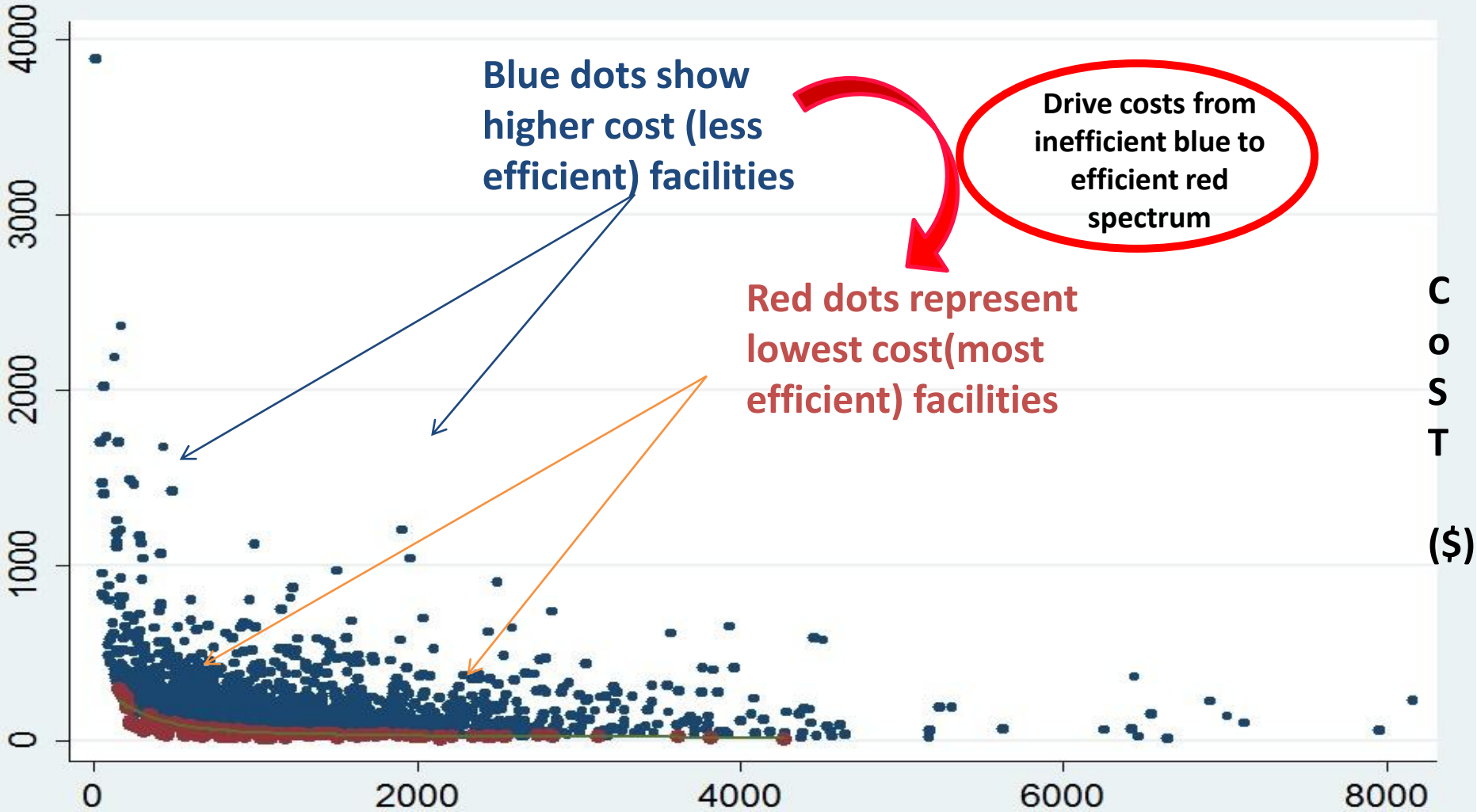
Site maturity and client volume major determinants of cost per patient





Menzies et al, 2012

Major variations in treatment costs in Kenya



NACC/World Bank, 2012

Scientific innovation may further reduce costs

- Cheaper, better diagnostics?
- Longer acting ART?
- Lower dose ART?
- Treatment interruption with early initiation or new drugs?

The economics of TasP

- Public goods
- Burden of AIDS
- Population level effectiveness and implementability of TasP
- Cost-effectiveness of TasP
- Current AIDS financing
- Required AIDS financing
- Smarter implementation
- **Conclusion**

Conclusion

- TasP feasible in high income countries with limited epidemics and early treatment initiation
- In lower income countries with large epidemics, approach TasP with progressively earlier initiation of those with more advanced infection

→ CD4<200 → CD4<350 → CD$<500

- Redouble focus on male circumcision
- In high burden counties, TasP progress painstaking, incremental, patient-by-patient, building demand, sustaining quality – no short cuts