

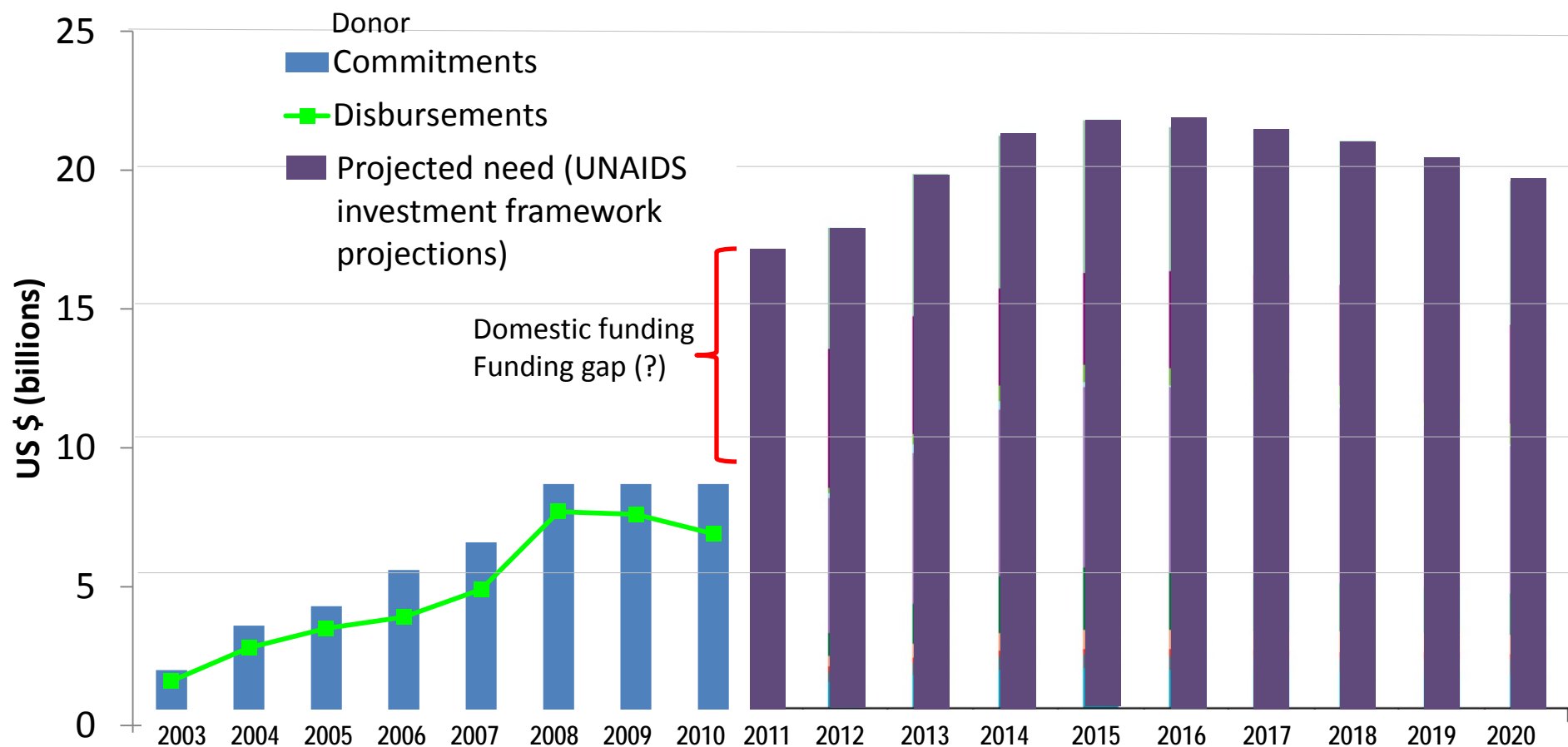


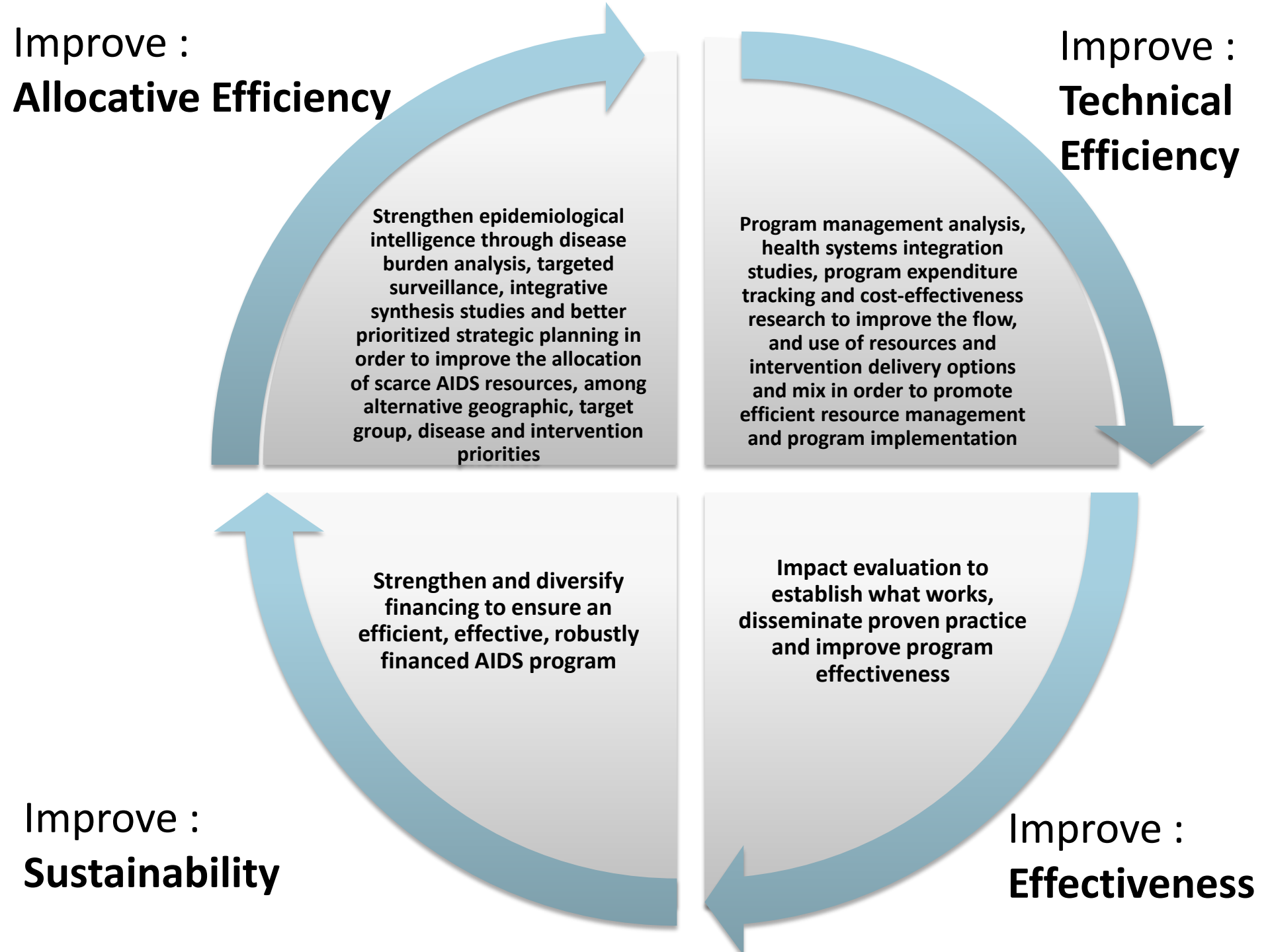
# **Program Science – Approaches to Maximize Return on Investment in HIV Prevention**

**David Wilson, World Bank  
Program Science Symposium  
Minneapolis, 12 March, 2012**

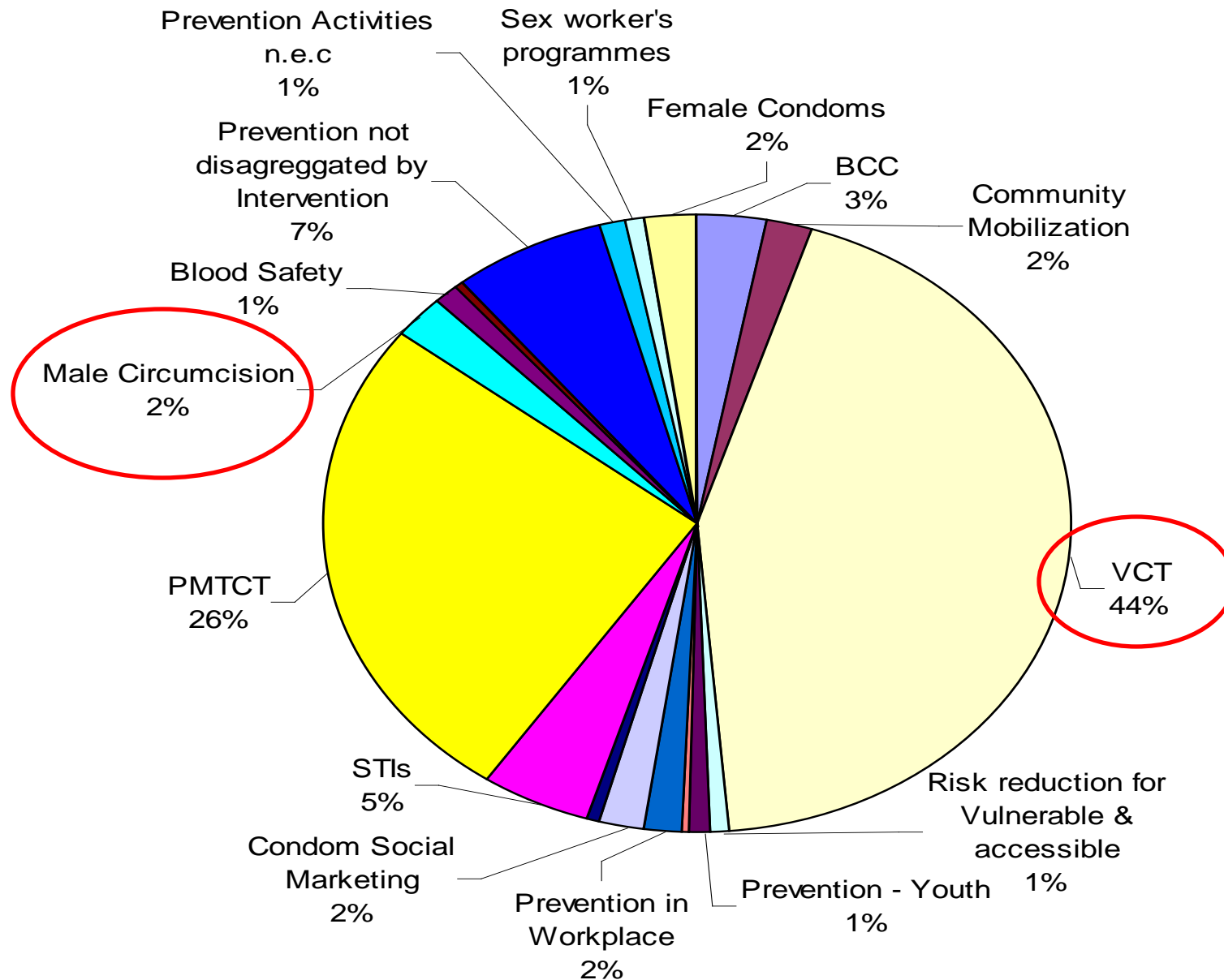


# The widening HIV financing gap



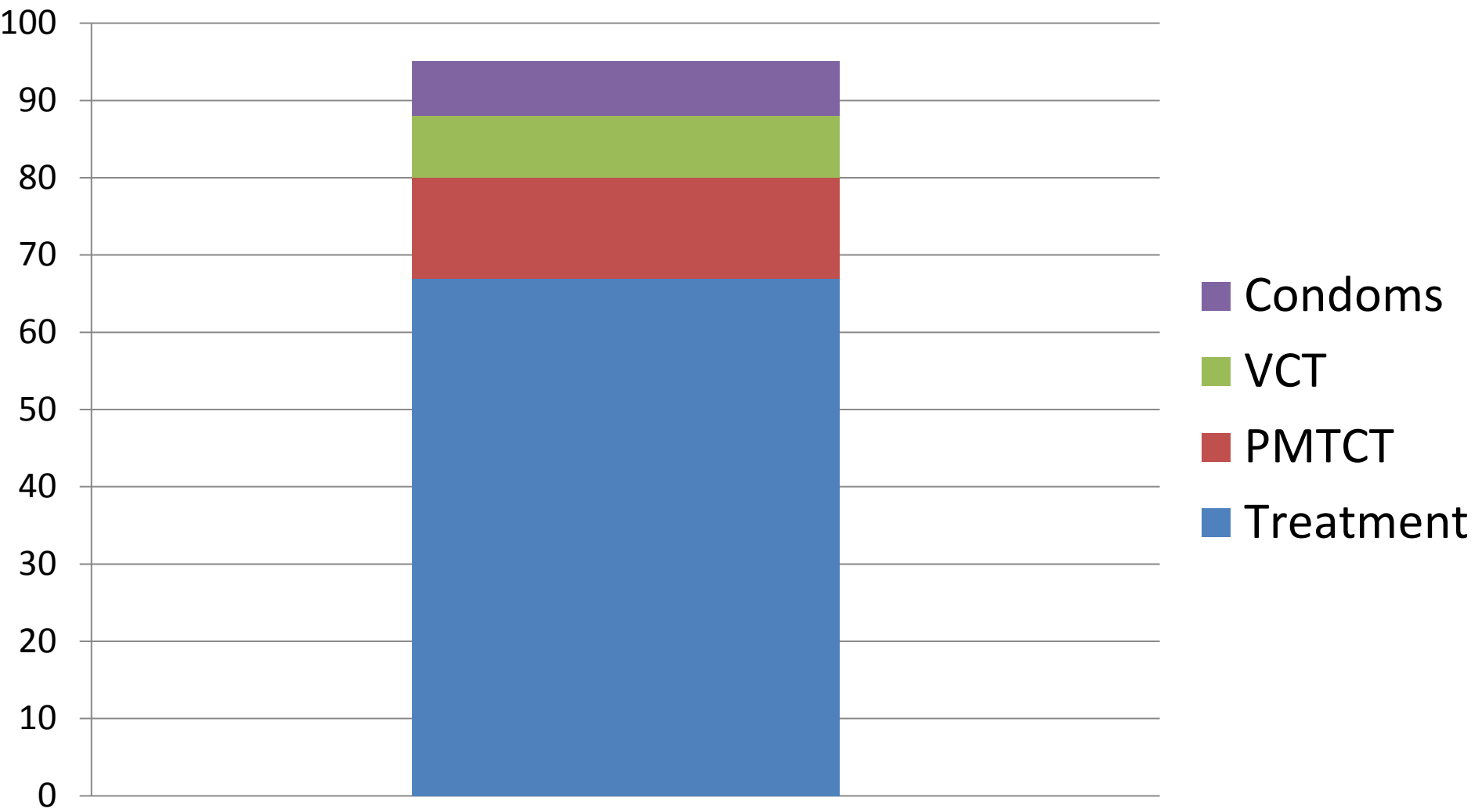


# Allocative efficiency: Lesotho, 2010





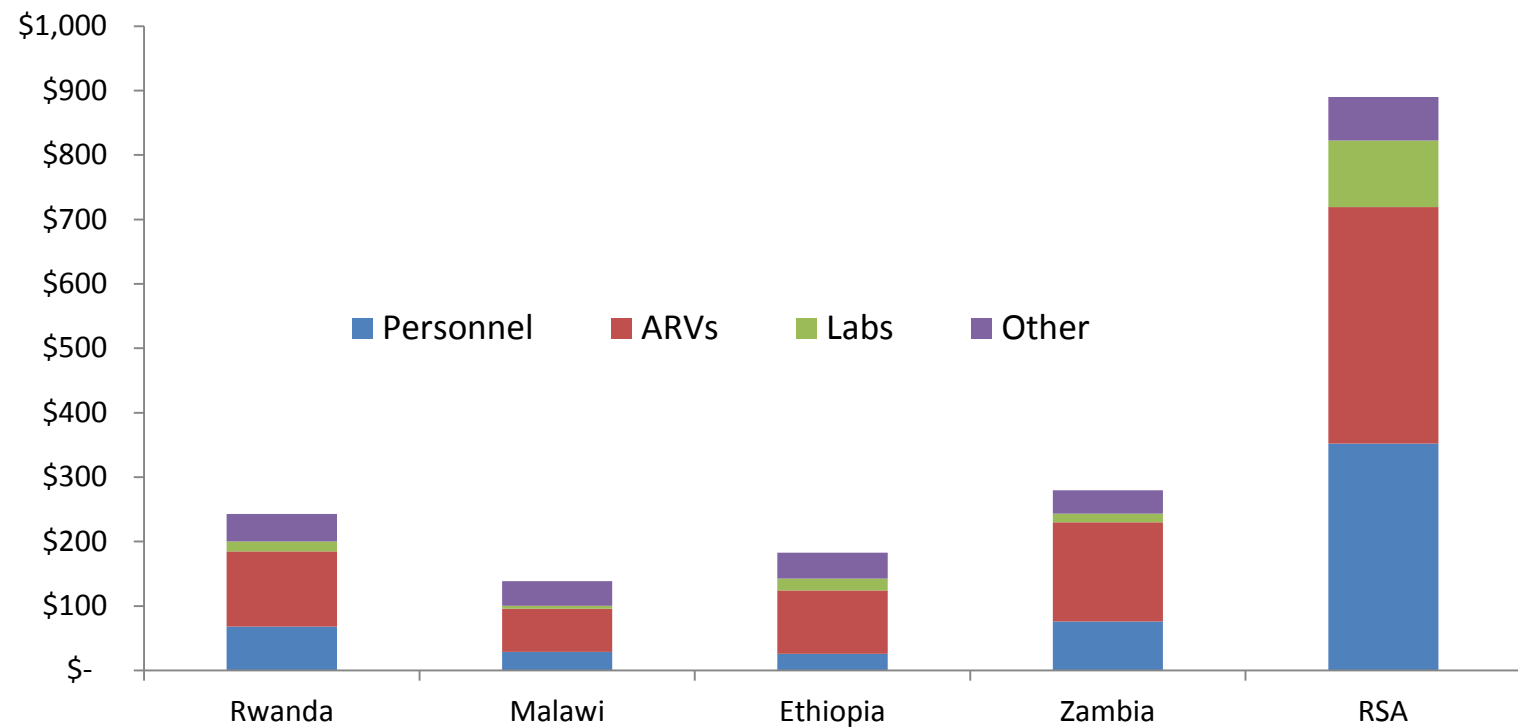
# Allocative and technical efficiency: the South African conundrum





# Technical efficiency starts with service unit costs

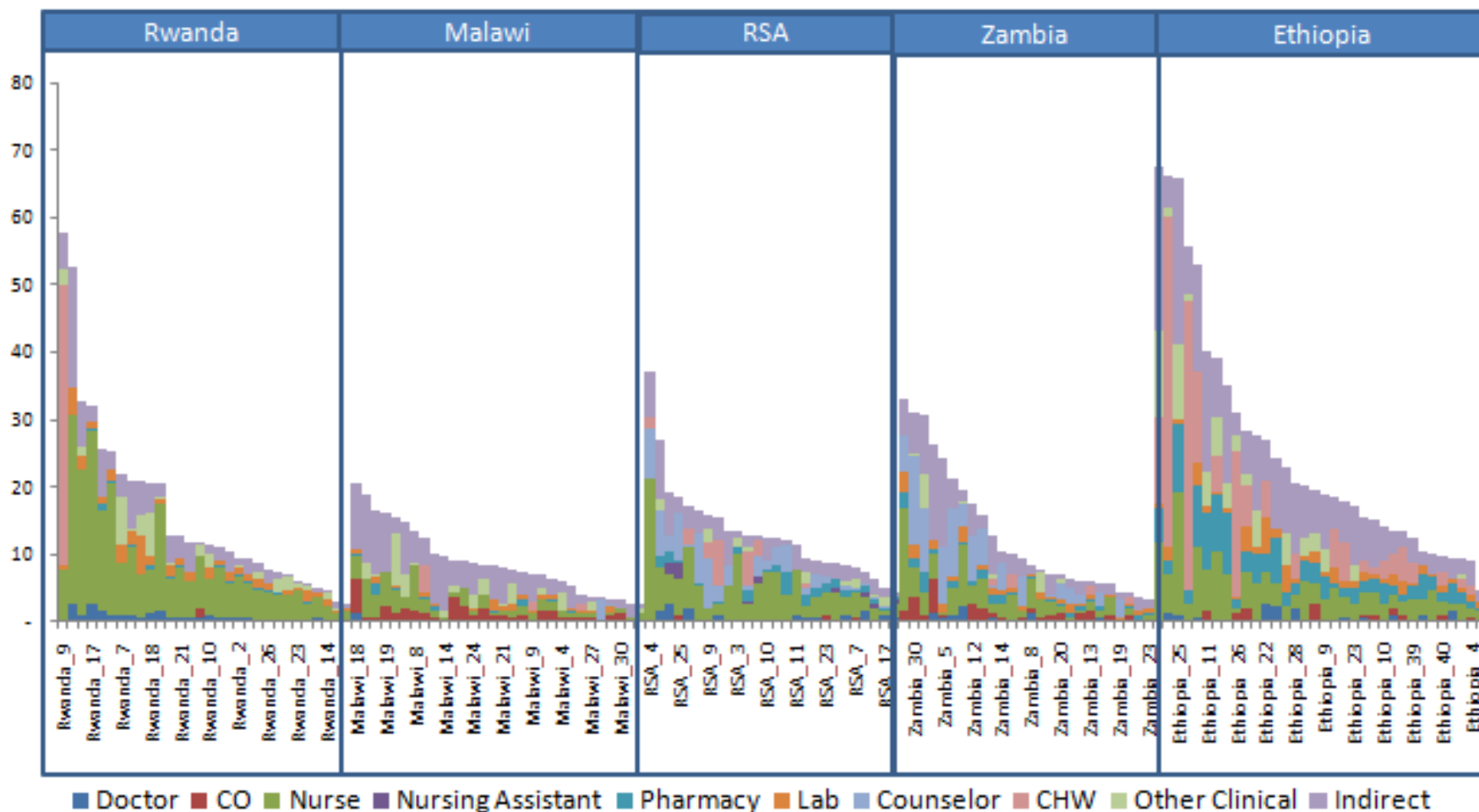
Unit Costs for Delivering ART



Source: CHAI, 2011



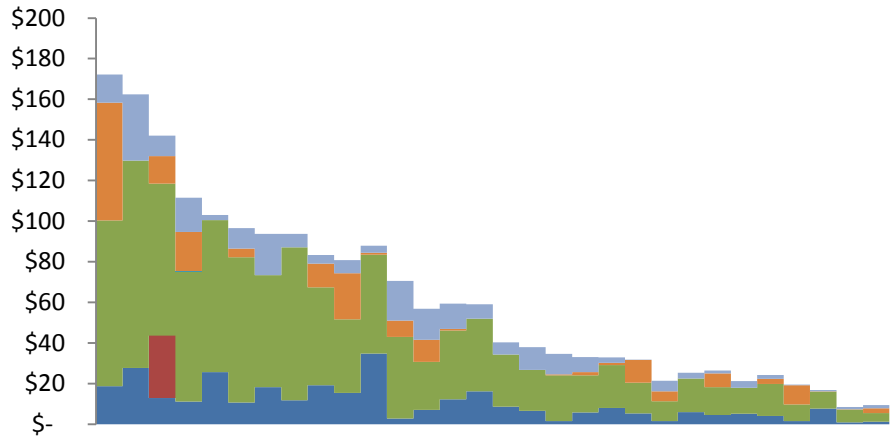
FTE per 1000 patients



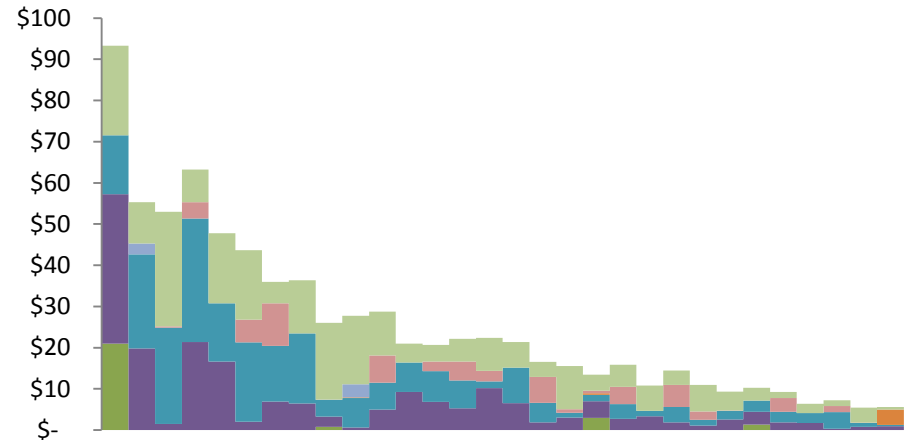


# Reducing unit cost drivers: staffing model

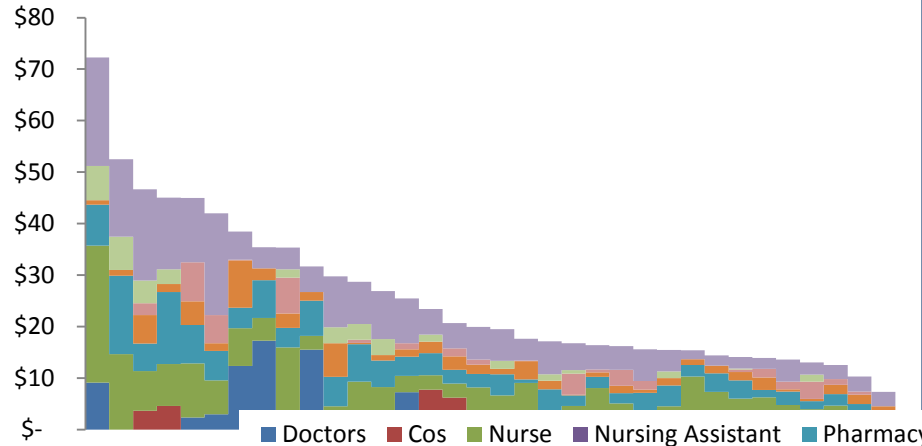
**Rwanda – Heavily nurse centered model with roving doctor supporting multiple sites. Heavy use of CHWers**



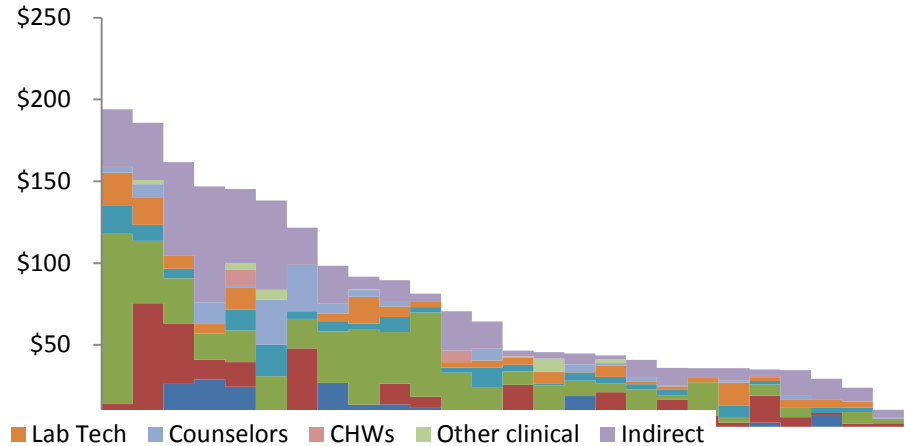
**Malawi – Clinical officers are playing the doctor's role in all HC's, and admin clerks are acting as nursing assistants**



**Ethiopia –Cost driven primarily by nurses and pharmacists. Private facilities have heavier staffing levels leading to higher cost**



**Zambia – Preliminary data indicates a wide variety of models being used**







# Reducing unit cost drivers: too much equipment

## Average Loaded CD4 Test Cost

US Dollar

| Component     | Rwanda          | Malawi         | Ethiopia      | Zambia         | RSA           |
|---------------|-----------------|----------------|---------------|----------------|---------------|
| CD4 Unit Cost | \$ 6.28         | \$7.21         | \$7.11        | \$6.20         | \$8.42        |
| Personnel     | \$ 3.00         | \$8.11         | \$0.49        | \$2.19         | \$ -          |
| CD4 Machine   | \$ 0.69         | \$19.21        | \$1.99        | \$2.30         | \$ -          |
| Buildings     | \$-             | \$0.32         | \$0.06        | \$0.19         | \$0.10        |
| Running Costs | \$ 0.70         | \$9.19         | \$0.15        | \$0.39         | \$0.28        |
| Training      | \$ 0.25         | \$ -           | \$0.17        | \$0.33         | \$ -          |
| <b>Total</b>  | <b>\$ 10.93</b> | <b>\$44.04</b> | <b>\$9.98</b> | <b>\$11.59</b> | <b>\$8.79</b> |



- Fully loaded cost of CD4 test is high in Malawi. Driven by installed capacity of 1.5 million test per year running 180,000 tests per year.
- Low availability of sample transport a real barrier to Improved utilization, which would reduce price per test significantly



# Sustainability: In Africa, only South Africa and Botswana finance their own AIDS programs

| Table 1 SADC: HIV/AIDS Spending and Financing |      |                          |          |                   |                                    |                       |
|-----------------------------------------------|------|--------------------------|----------|-------------------|------------------------------------|-----------------------|
| Country                                       | Year | HIV/AIDS spending        |          |                   | External financing<br>(% of total) | GDP per capita (US\$) |
|                                               |      | Total<br>(US\$ millions) | % of GDP | Per capita (US\$) |                                    |                       |
| Angola                                        | 2009 | 33.7                     | 0.05     | 1.9               | n.a.                               | 3,972                 |
| Botswana                                      | 2008 | 348.1                    | 2.6      | 194.4             | 32.1                               | 7,552                 |
| Congo, Dem.<br>Rep. of                        | 2008 | 96.4                     | 0.8      | 1.5               | 86.0                               | 184                   |
| Lesotho                                       | 2008 | 56.4                     | 3.6      | 22.9              | 53.1                               | 645                   |
| Madagascar                                    | 2008 | 12.0                     | 0.1      | 0.6               | 54.7                               | 468                   |
| Malawi                                        | 2008 | 107.4                    | 2.6      | 7.8               | 97.6                               | 298                   |
| Mauritius                                     | 2008 | n.a.                     | n.a.     | n.a.              | n.a.                               | 7,330                 |
| Mozambique                                    | 2008 | 146.4                    | 1.5      | 7.1               | 95.6                               | 478                   |
| Namibia                                       | 2007 | 18.5                     | 0.2      | 9.1               | 49.2                               | 4,341                 |
| Seychelles                                    | 2009 | 0.6                      | 0.1      | 6.8               | 19.4                               | 8,973                 |
| South Africa                                  | 2009 | 2,088.0                  | 0.7      | 42.3              | 27.3                               | 5,824                 |
| Swaziland                                     | 2006 | 48.5                     | 1.8      | 47.7              | 61.3                               | 2,698                 |
| Tanzania                                      | 2008 | 465.0                    | 2.3      | 11.7              | 98.1                               | 519                   |
| Zambia                                        | 2008 | 279.3                    | 2.6      | 23.5              | 97.1                               | 901                   |
| Zimbabwe                                      | 2009 | 54.1                     | 1.2      | 4.6               | 69.8                               | 375                   |
| Total (latest years) <sup>a</sup>             |      | 3,745.5                  | 0.8      | 14.7              | 49.9                               | 1,782                 |



## The three core HIV prevention questions we want program science to help us answer

- **Where** do new HIV infections come from?
- **What** proven, feasible interventions do we have for each major source of new infections?
- **How** do we implement, monitor and evaluate the delivery of proven feasible interventions for each major source of new infections?



# The role of program science

- The first duty of program science
  - Knowing our epidemics
  - Understanding our last 1,000 infections
  - Understanding transmission dynamics
- And fundamentally, making sure the ***money follows the epidemic and the interventions follow the evidence***



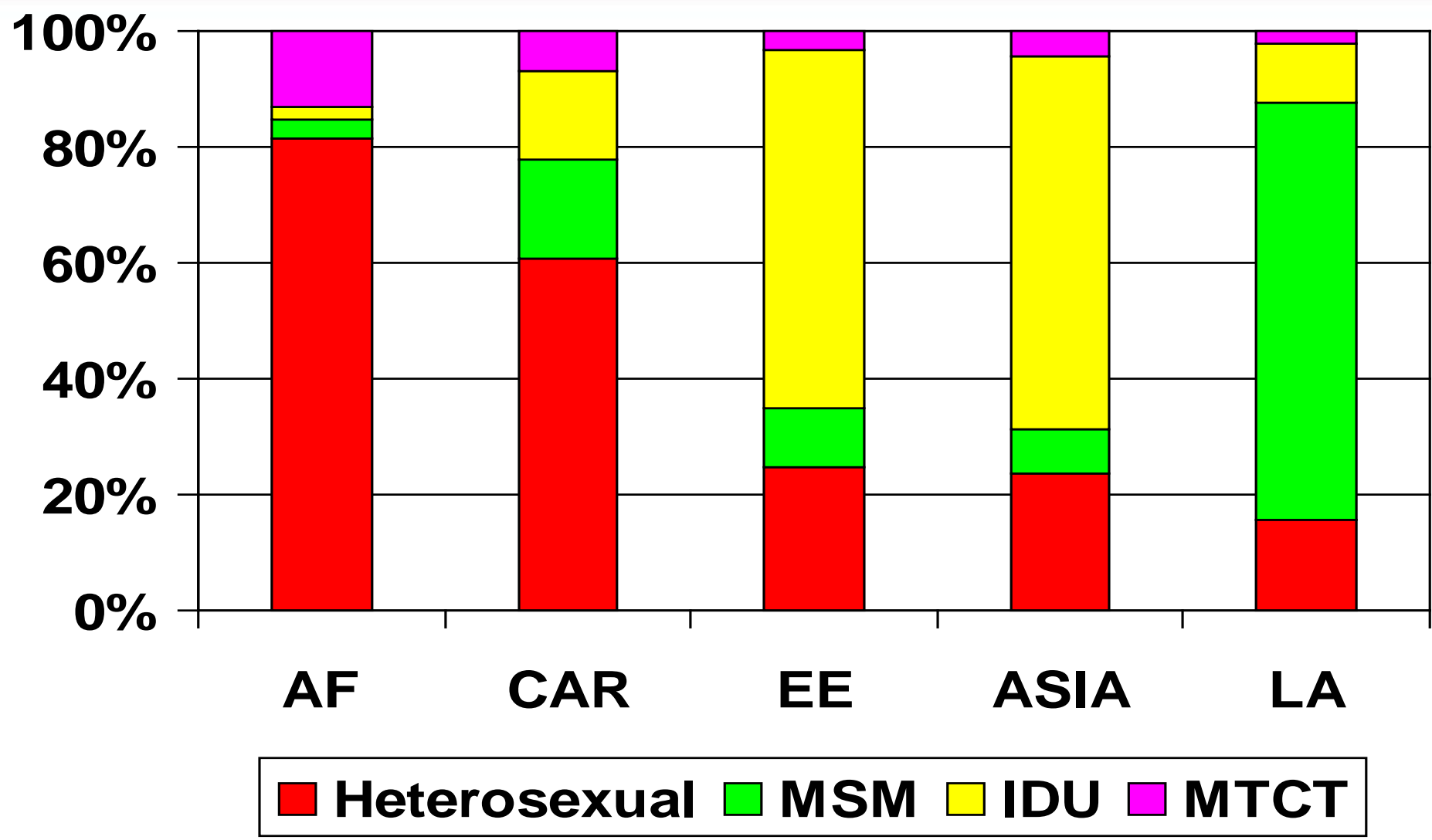
# Global epidemic diversity

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- Insufficient recognition of global epidemic diversity

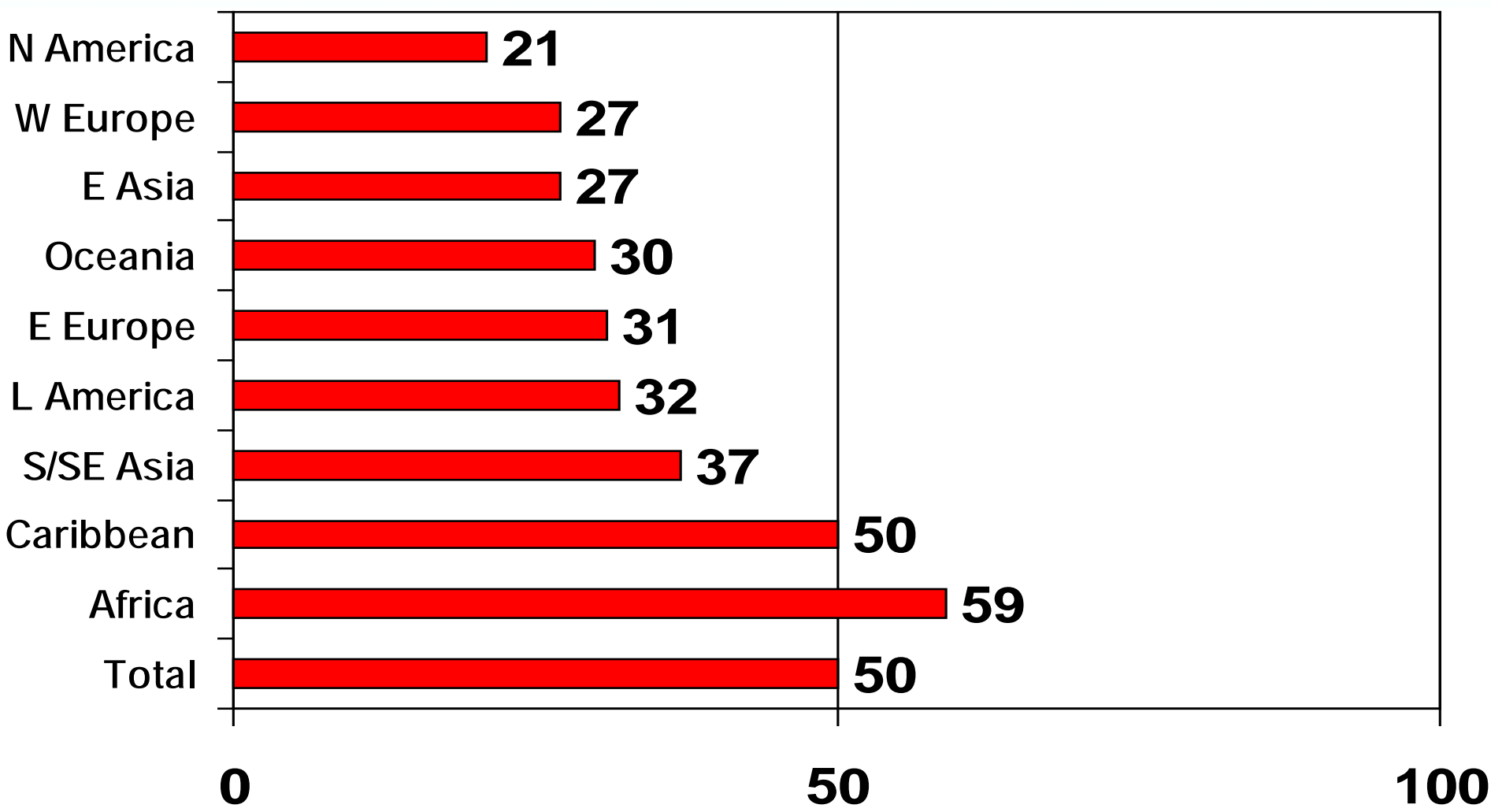


# Transmission sources vary widely by region





# Women a majority of those infected in one region - Africa





# Global epidemic diversity

- Southern Africa only region of world where HIV is existential threat:
  - Southern Africa - 2% of world population and over 33% of HIV infections
  - Almost 1 in 5 people with HIV globally South African

**Remarkable epidemic diversity -era of standard global prevention guidance truly over**

*No single set of prescriptions relevant across, say, South Africa, Ukraine and PNG*





## Core program science focus on epidemic typologies

- Core program science distinction between **CONCENTRATED** and **GENERALIZED** epidemics
  - Not based on arbitrary prevalence thresholds, but transmission patterns
- Epidemics **CONCENTRATED** if protecting SW, MSM, IDU would prevent wider epidemic
  - Epidemics **GENERALIZED** if epidemics would persist despite effective SW, MSM, IDU programmes

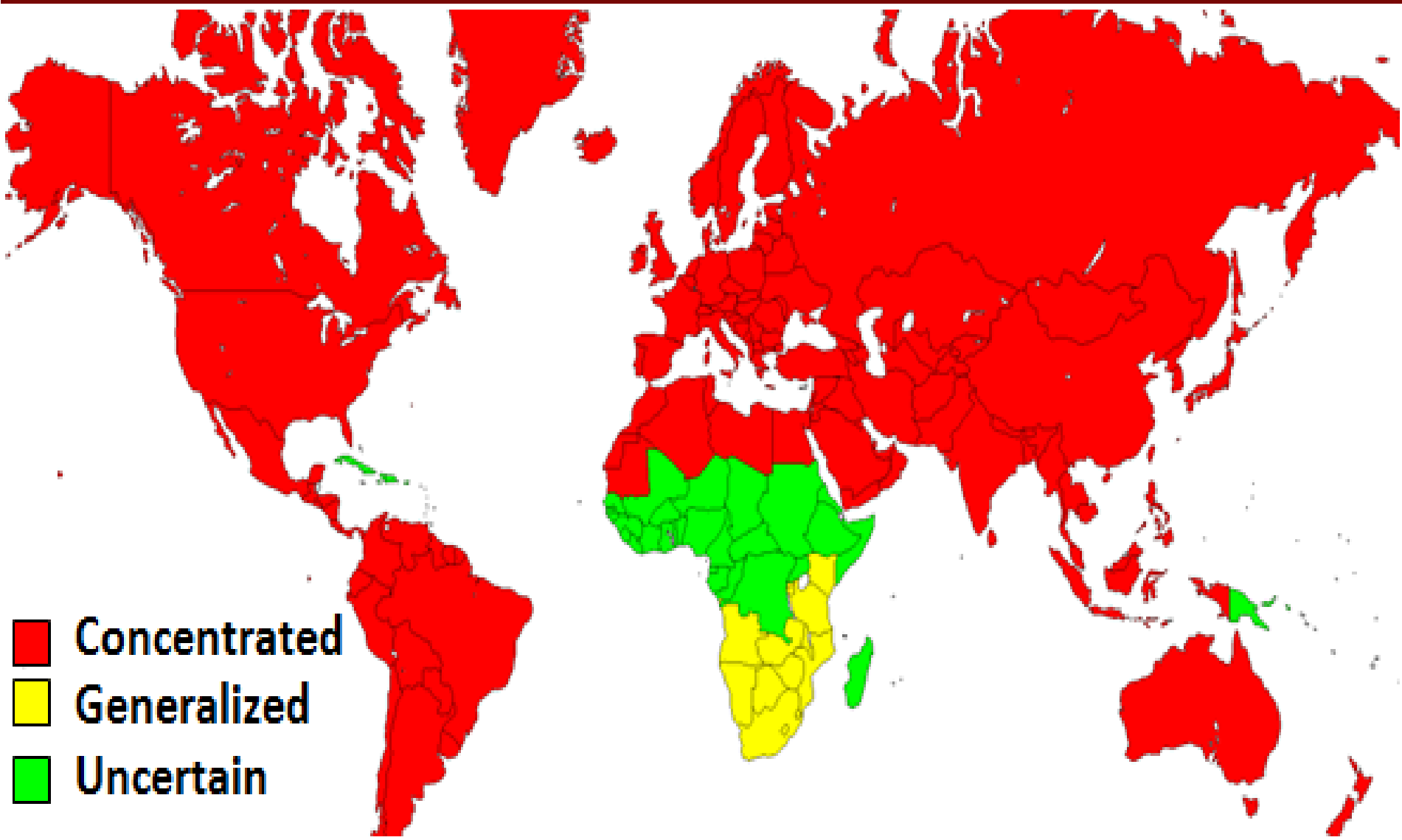


## Most HIV epidemic are concentrated

- Improved surveillance shows HIV outside Southern Africa lower – **and more concentrated**

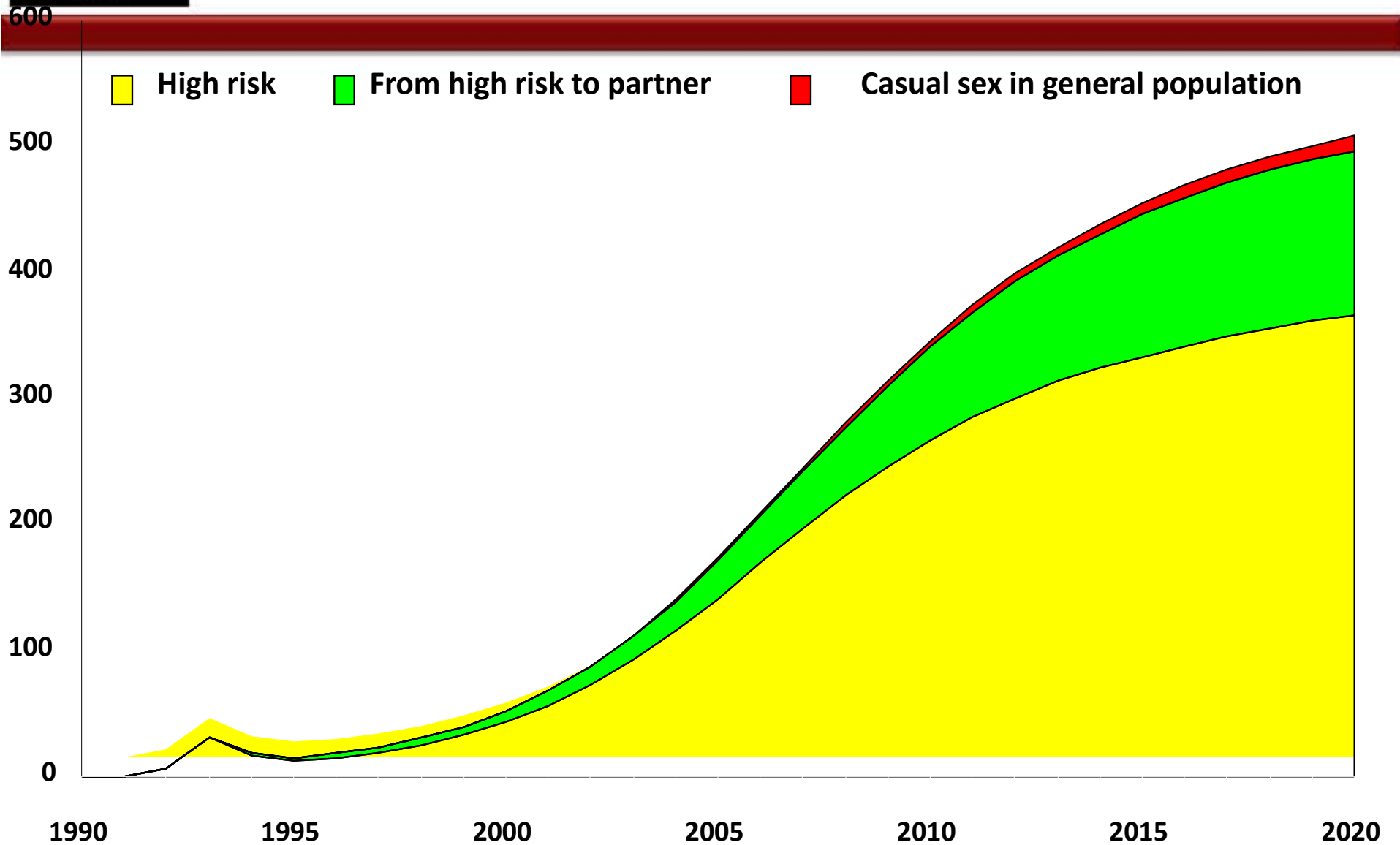


# Most epidemics globally are concentrated





# Asian epidemic are not driven by the general population





## Can we respond effectively?

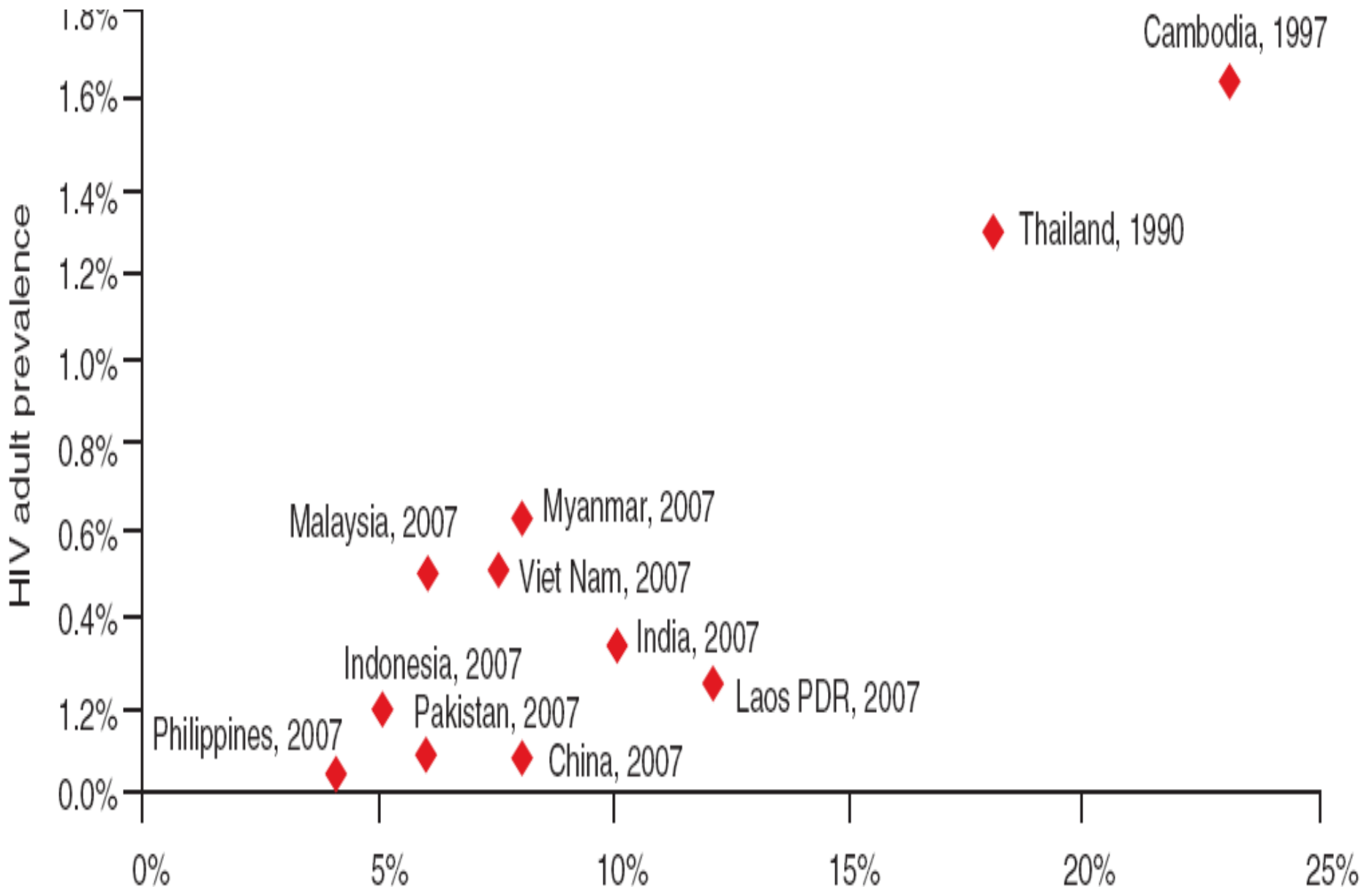
- Once we better understand our epidemics, can we respond effectively with proven approaches?
- Experience sobering in both concentrated and generalized epidemics



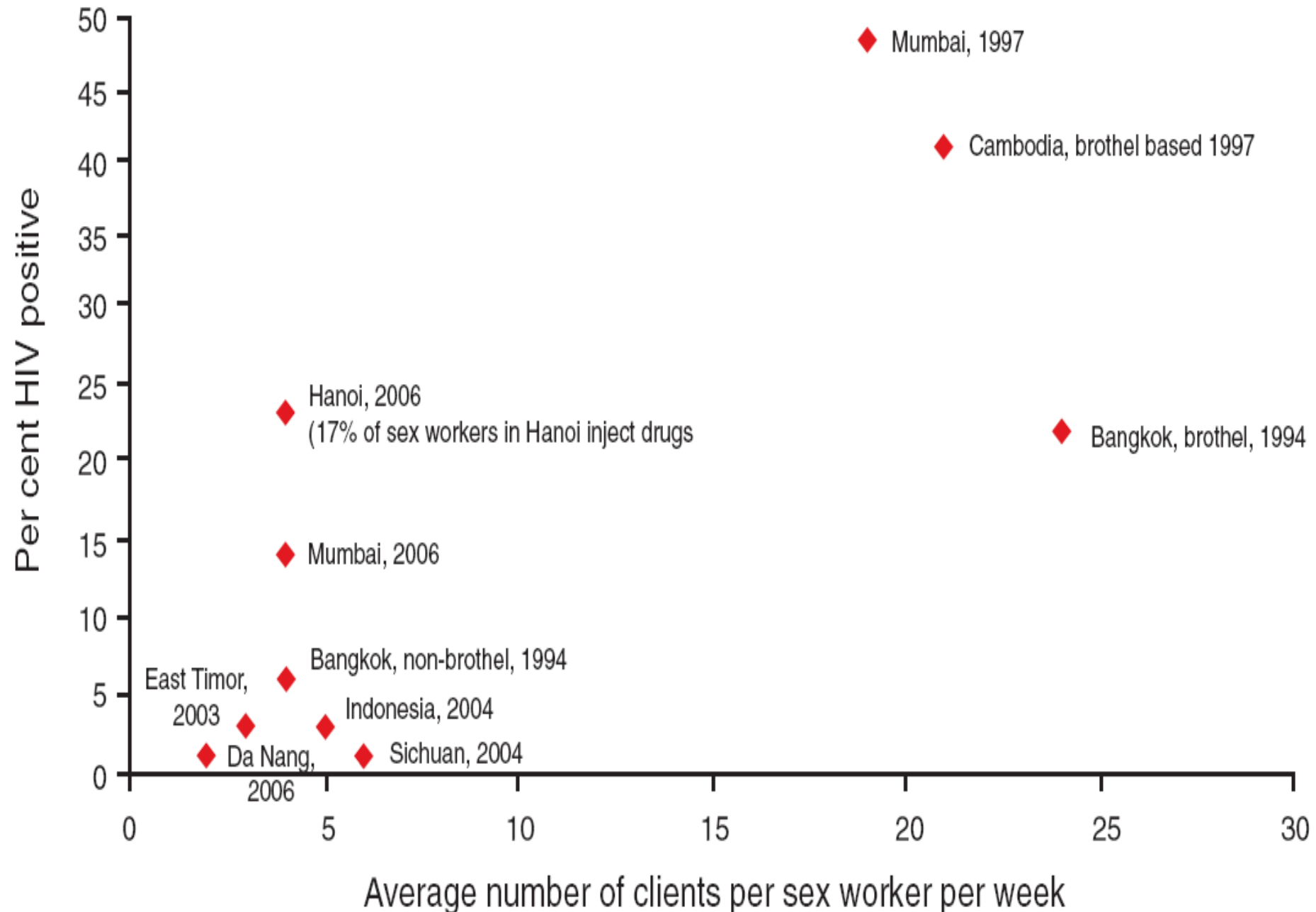
# Addressing concentrated SW epidemics

- Consider concentrated epidemics initiated by SW
- Asian epidemics are only initiated by sex work if:
  - Men uncircumcised
  - Many men visit sex workers (> 10%)
  - Sex workers have many clients (> 20 weekly)
- Thus, first wave of epidemics in Asia - Thailand, Cambodia, India (outside North East) – largely ignited by SW

# HIV prevalence by percentage of men visiting sex workers, Asia



# HIV prevalence by number of clients per sex worker







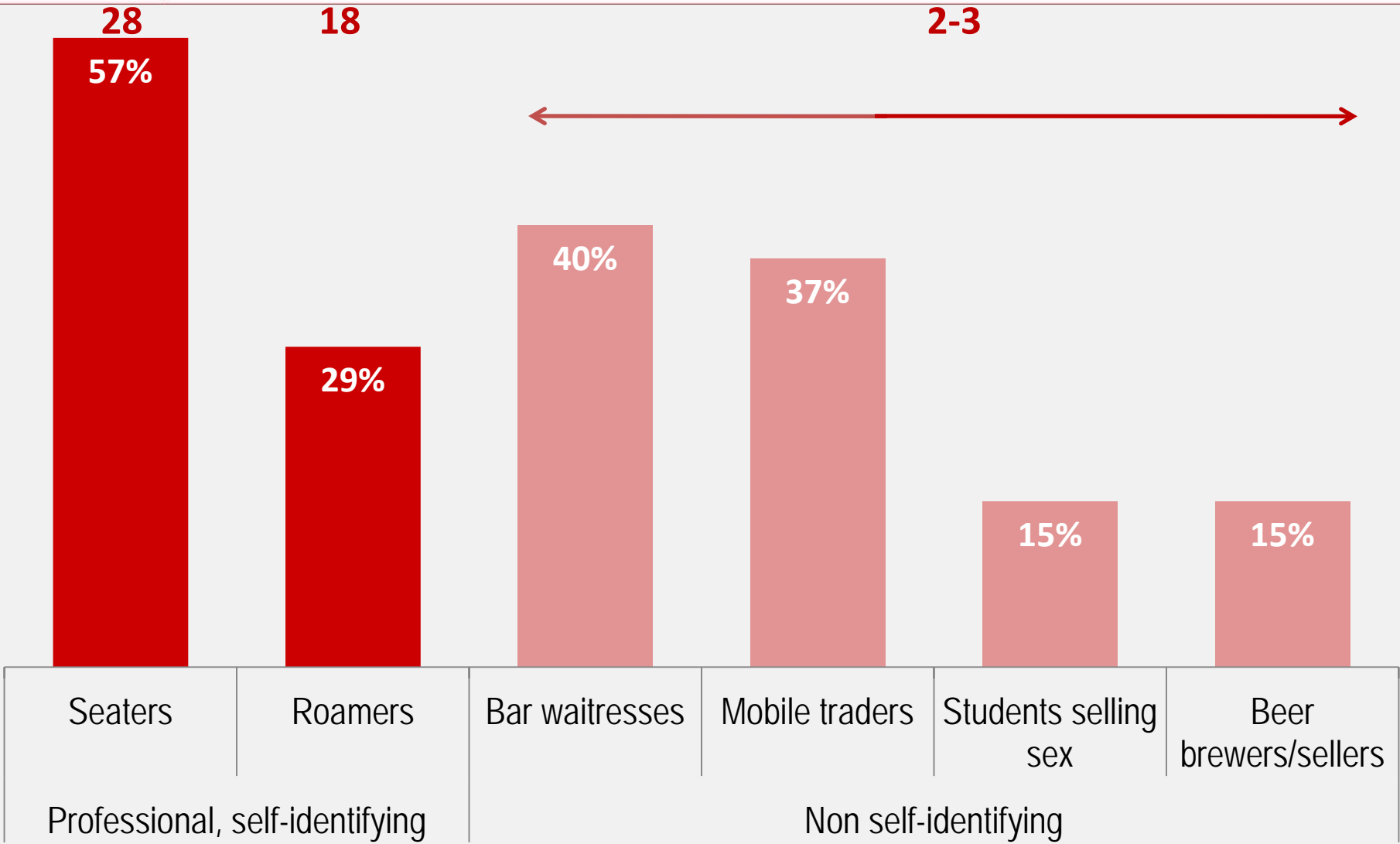
# Addressing concentrated SW epidemics

- Concentrated SW epidemics - know what to do in real world at scale
- Have successfully checked numerous SW epidemics in virtually all regions – perhaps the most robust single prevention success



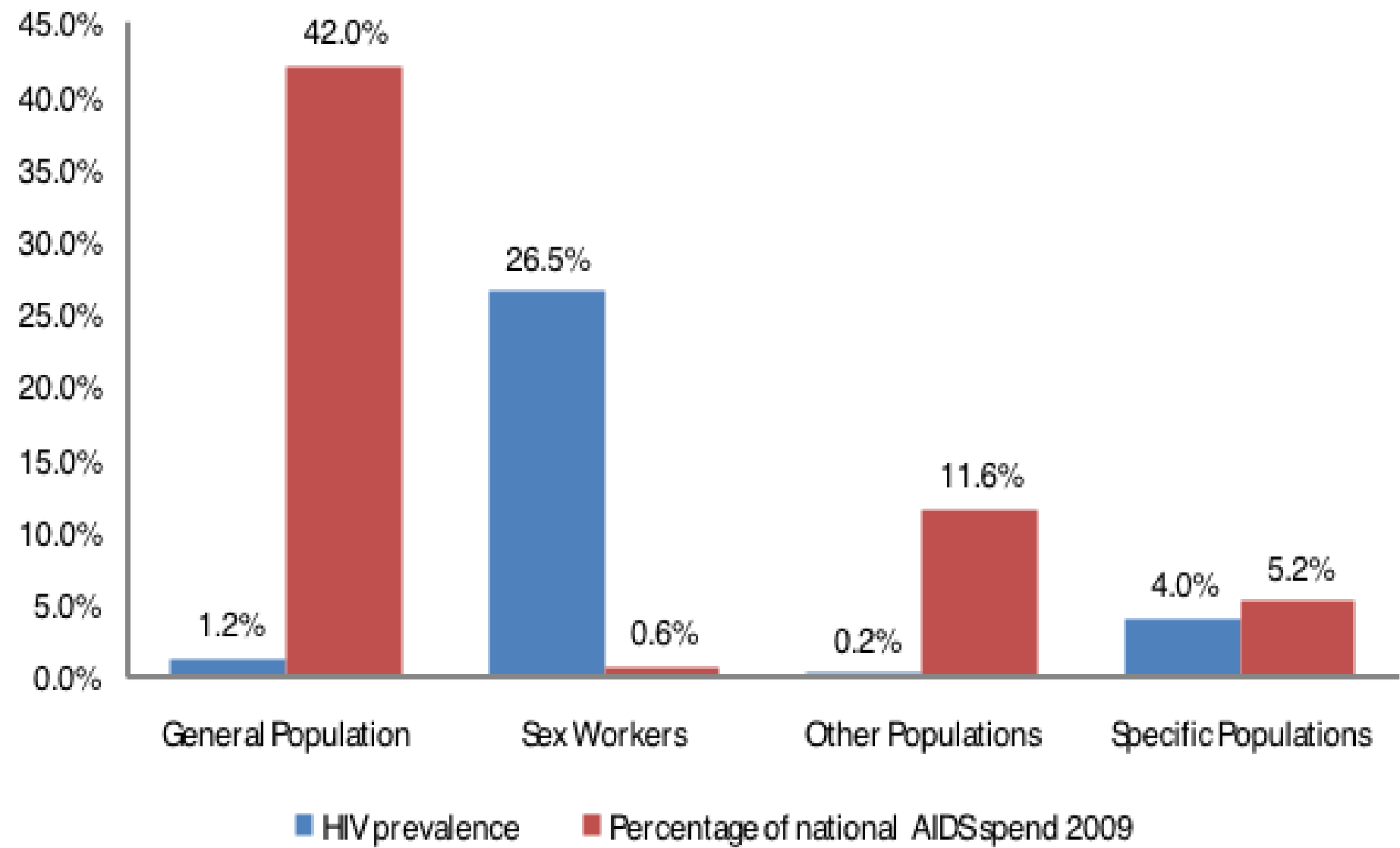
# However, the complexity of sex work in Africa poses a challenge

Clients per week





# And concerted SW investments are elusive





# **We know the elements of effective SW interventions**

- **Effective SW programs have six tightly interconnected components:**
  - **Behavior change communication usually through peer education**
  - **Condom promotion and provision**
  - **Tailored sexual health services**
  - **HIV testing and counseling**
  - **Solidarity and group empowerment**
  - **A supportive local and national legal environment**

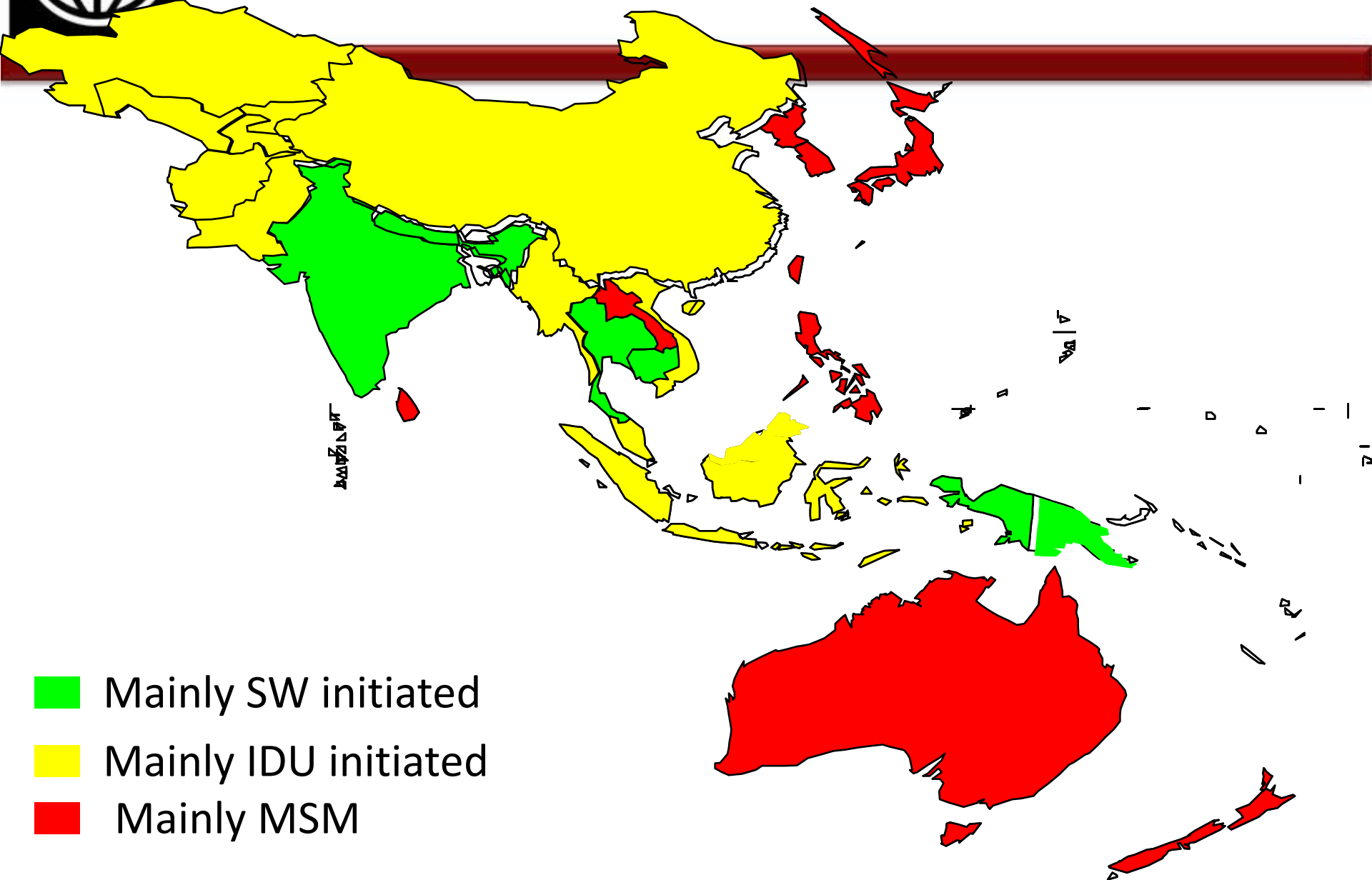


# Addressing concentrated IDU epidemics

- Throughout Asia and Eastern Europe, IDU drives HIV, directly and by injecting HIV into commercial sex networks
- Injecting drug use the spark plug that ignites sexual transmission, sex work the engine that maintains it
- European and Asian data shows how injecting drug use fuels HIV in sex work, fundamentally amplifying epidemic potential
- Eastern Europe, Central Asia, Iran, Afghanistan, Pakistan, Indonesia, Philippines lands of opportunity - effective IDU programs can radically curtail sexual epidemics



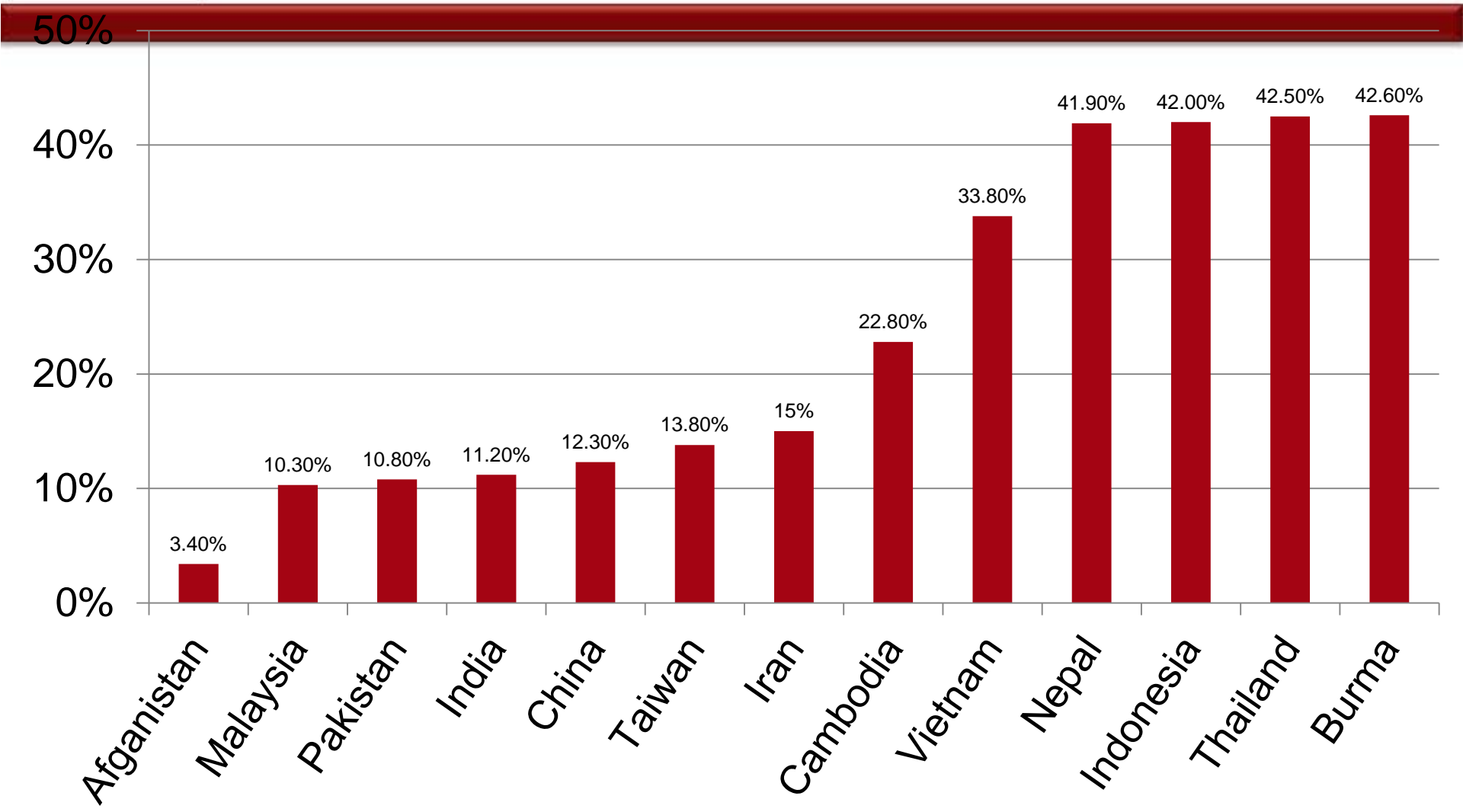
# Initiators of HIV epidemics in Asia



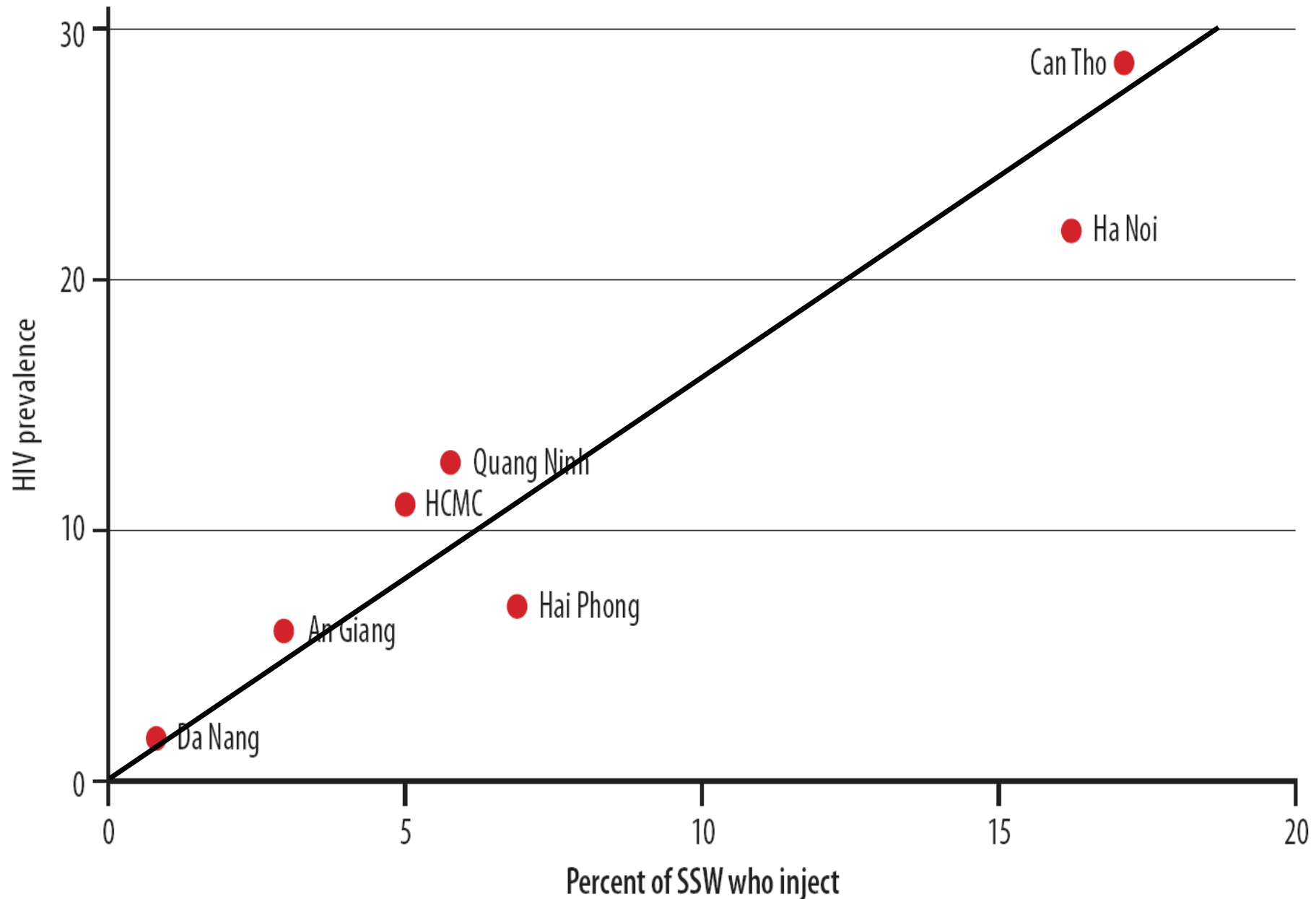
- Mainly SW initiated
- Mainly IDU initiated
- Mainly MSM



# HIV prevalence among IDU in Asia



# HIV higher in SW who inject drugs in Vietnam







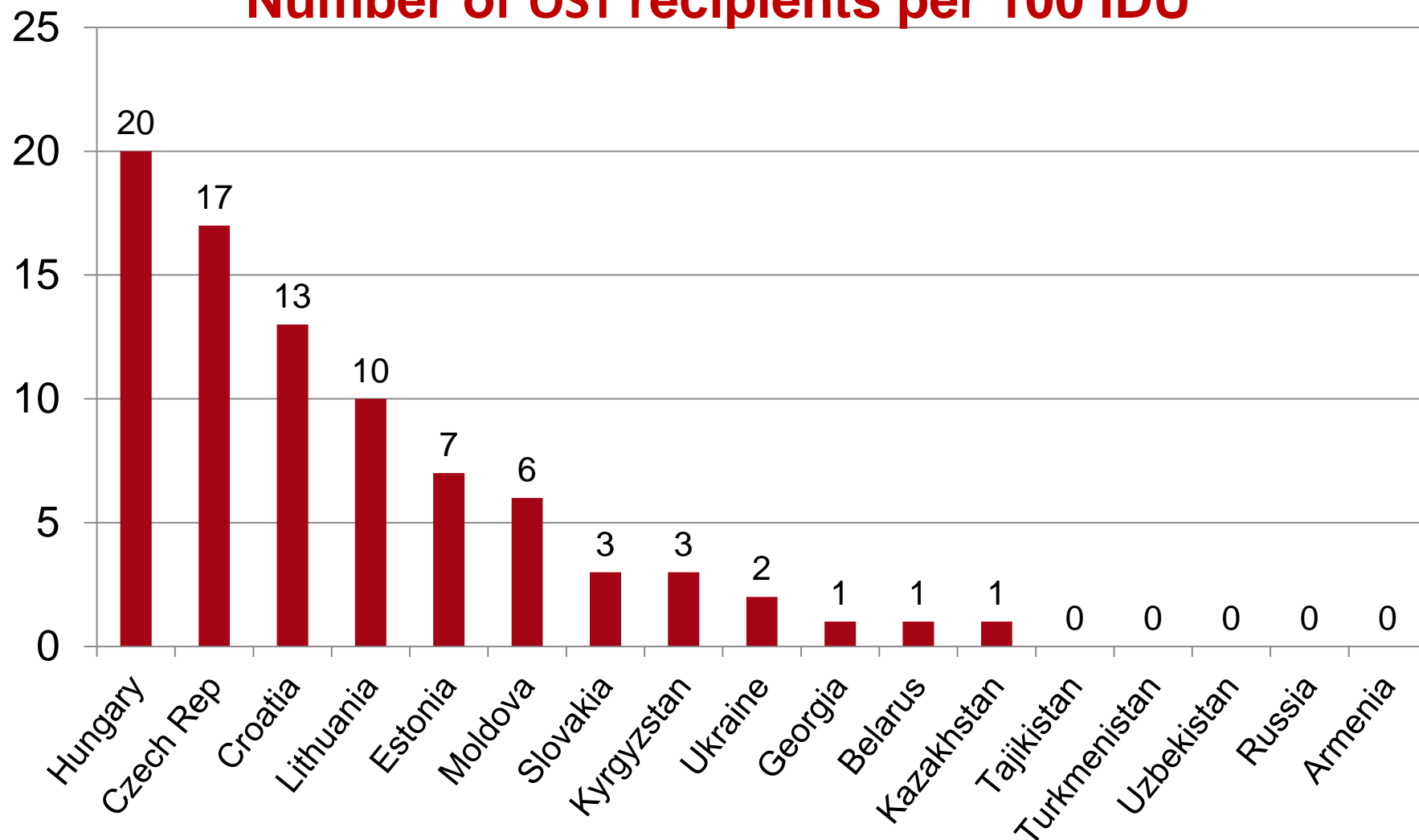
# Addressing concentrated IDU epidemics

- Yet real world experience discouraging
- Can we keep saying that harm reduction works, for example, in former Soviet Union or Asia, when we can't convince authorities it is preferable to coercion?
- Limited progress towards large-scale harm reduction programs in Asia, with partial exception of substitution therapy in China
- Yet, if we can increase programs, we have inherent advantages - unlike condoms, which inhibit spontaneity, no-one WANTS to share dirty needles



# Access to opioid substitution therapy in Eastern Europe and China

## Number of OST recipients per 100 IDU



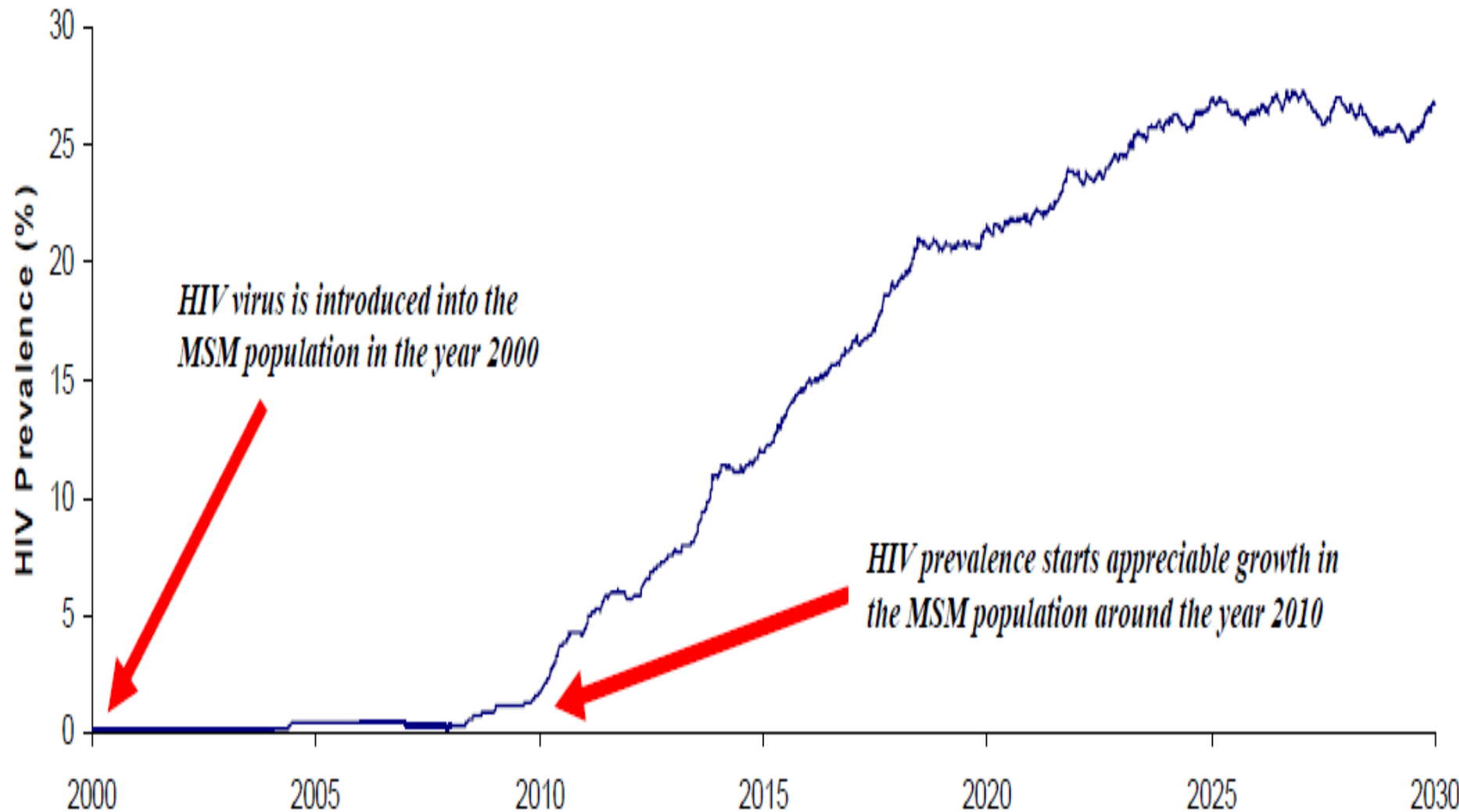


# Addressing concentrated MSM epidemics

- Greatly underestimated contribution of MSM to HIV transmission in developing countries

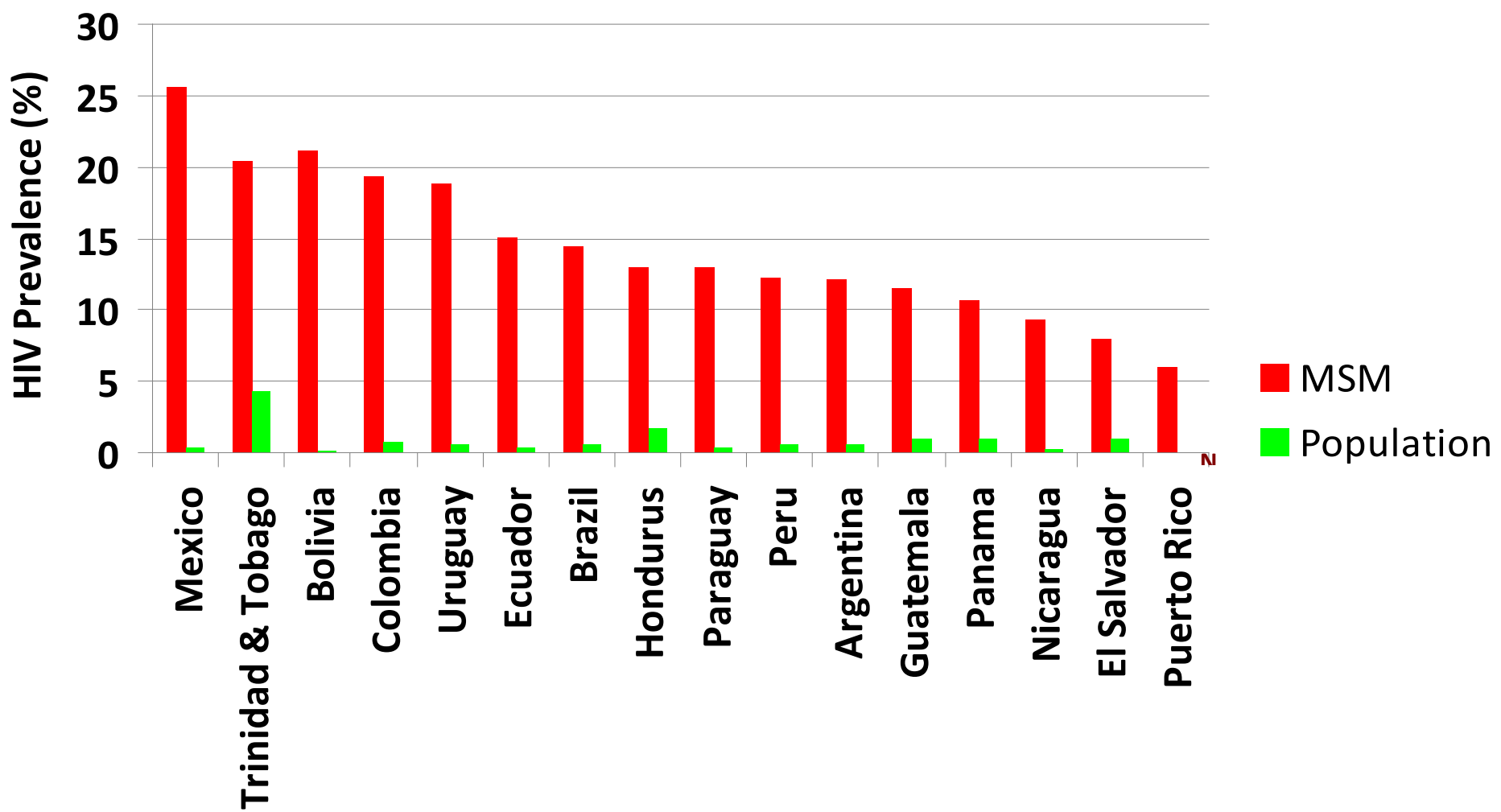


# MSM epidemics may incubate slowly then surge



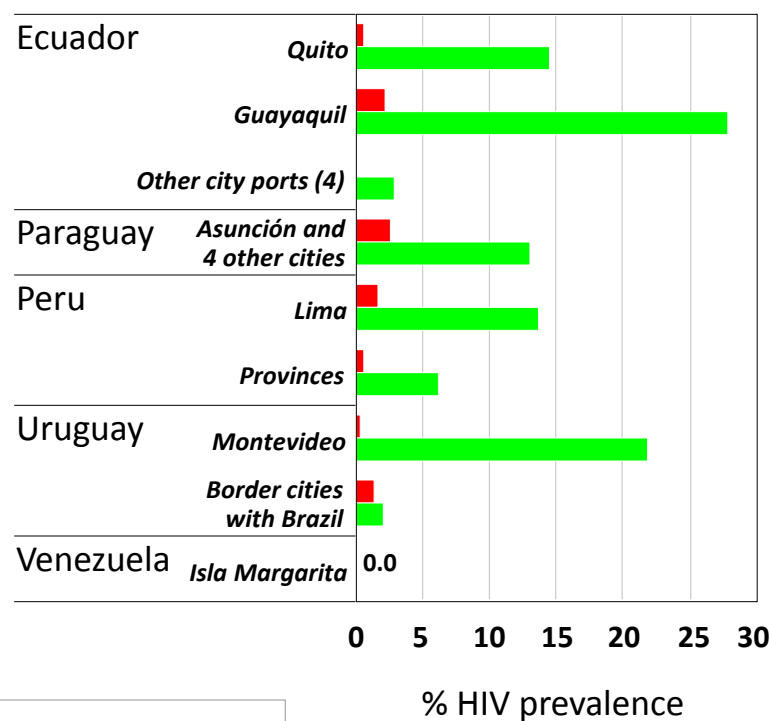
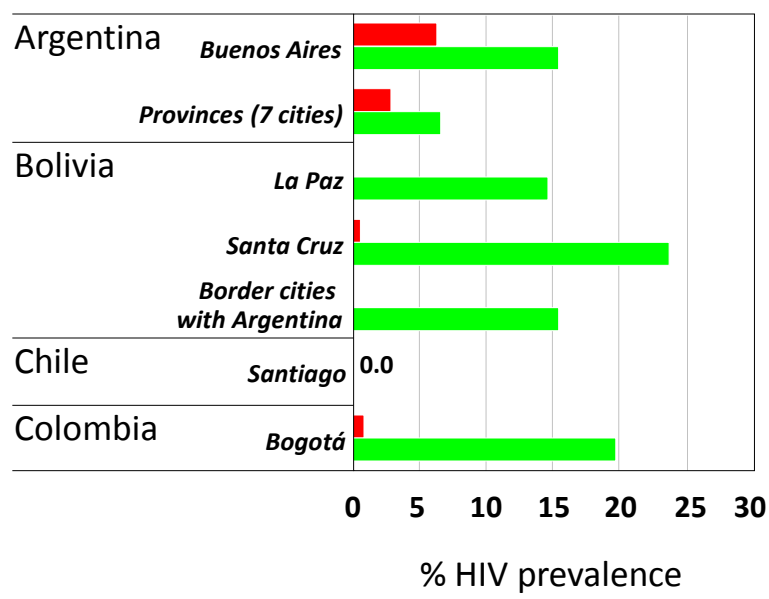


# HIV prevalence among MSM in Latin America





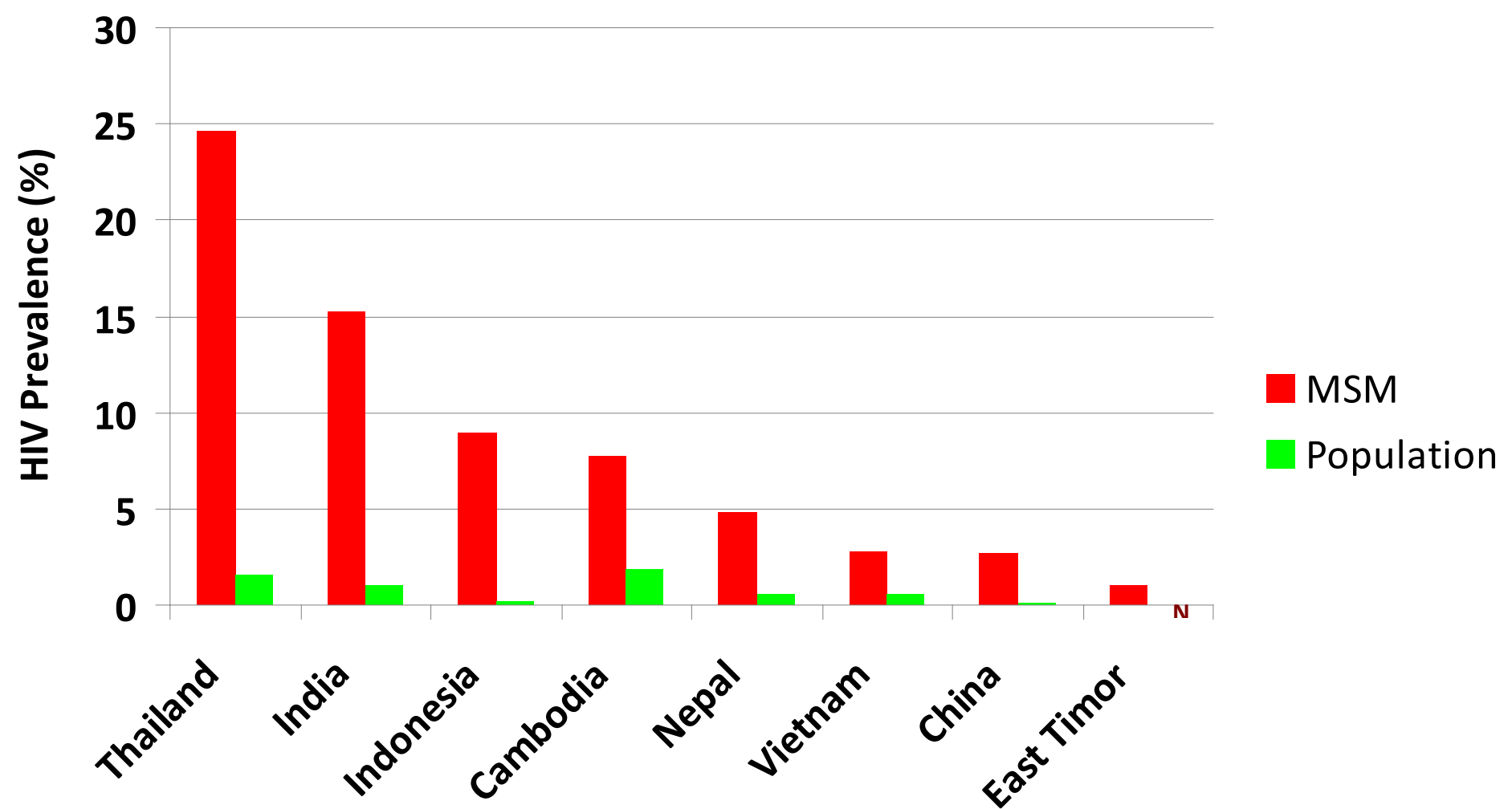
# HIV prevalence far higher in MSM than FSW in Latin America



■ Female sex workers    ■ Men who have sex with men

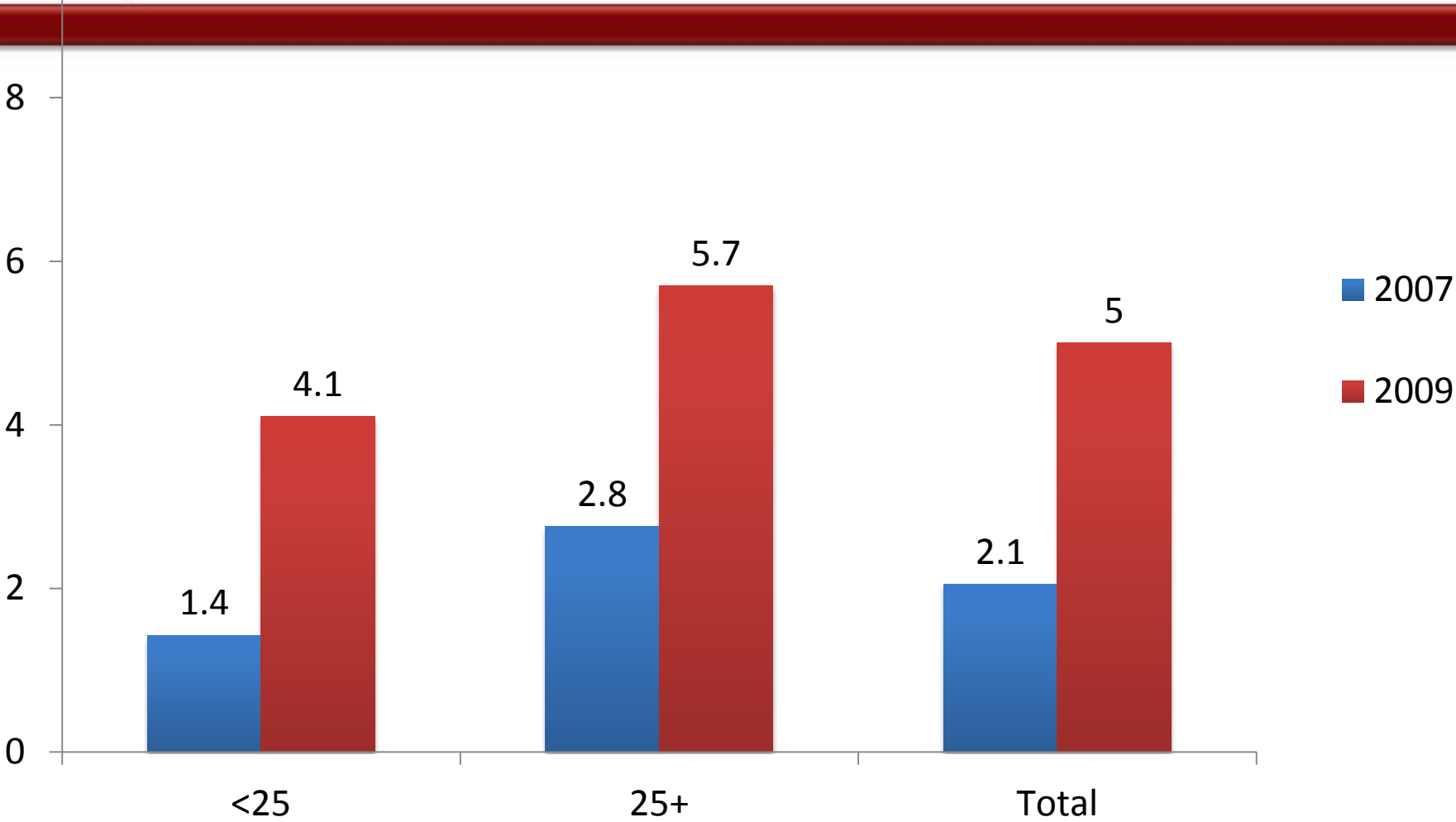


# HIV prevalence among MSM in Asia





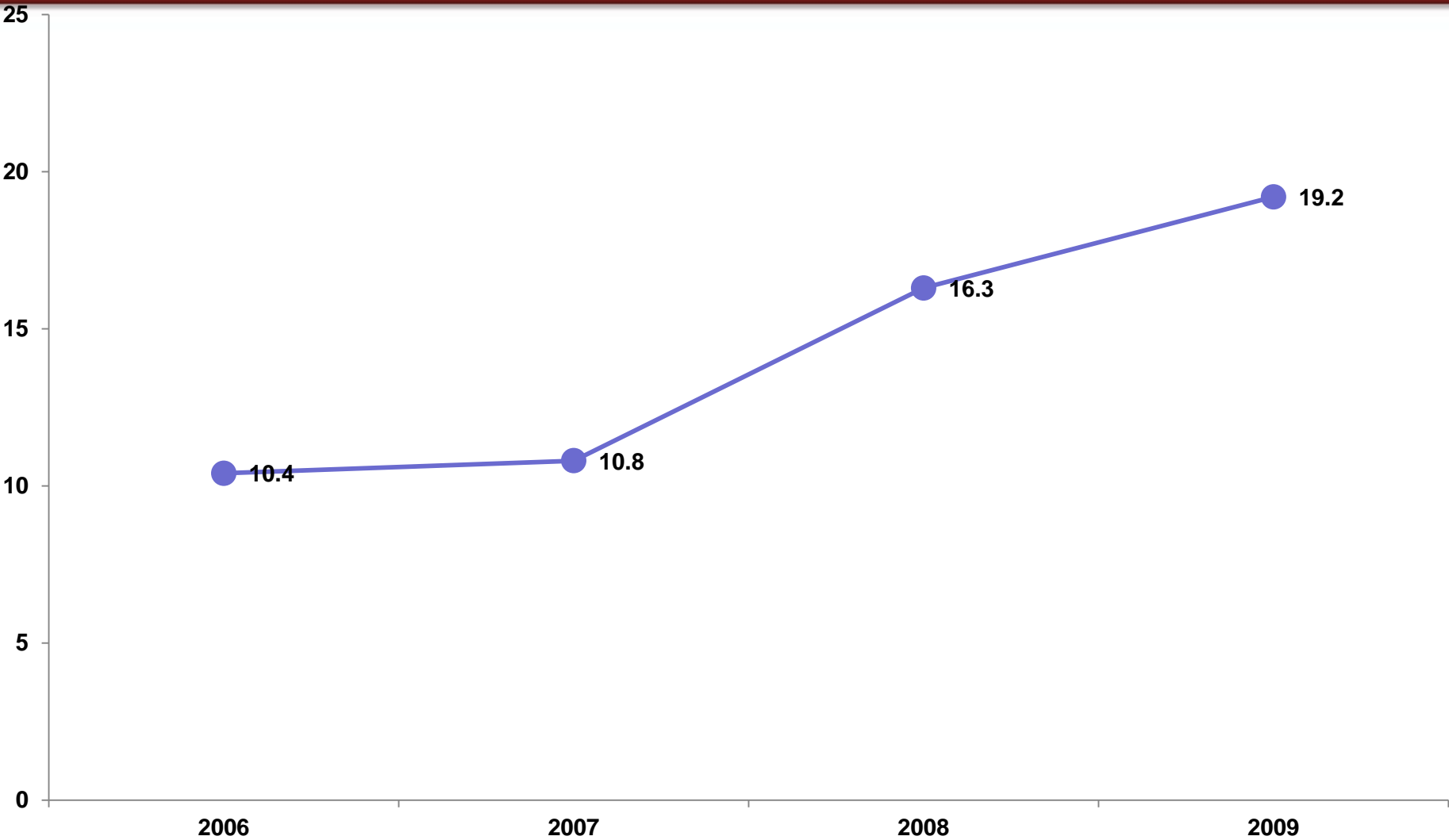
# HIV prevalence among MSM in China





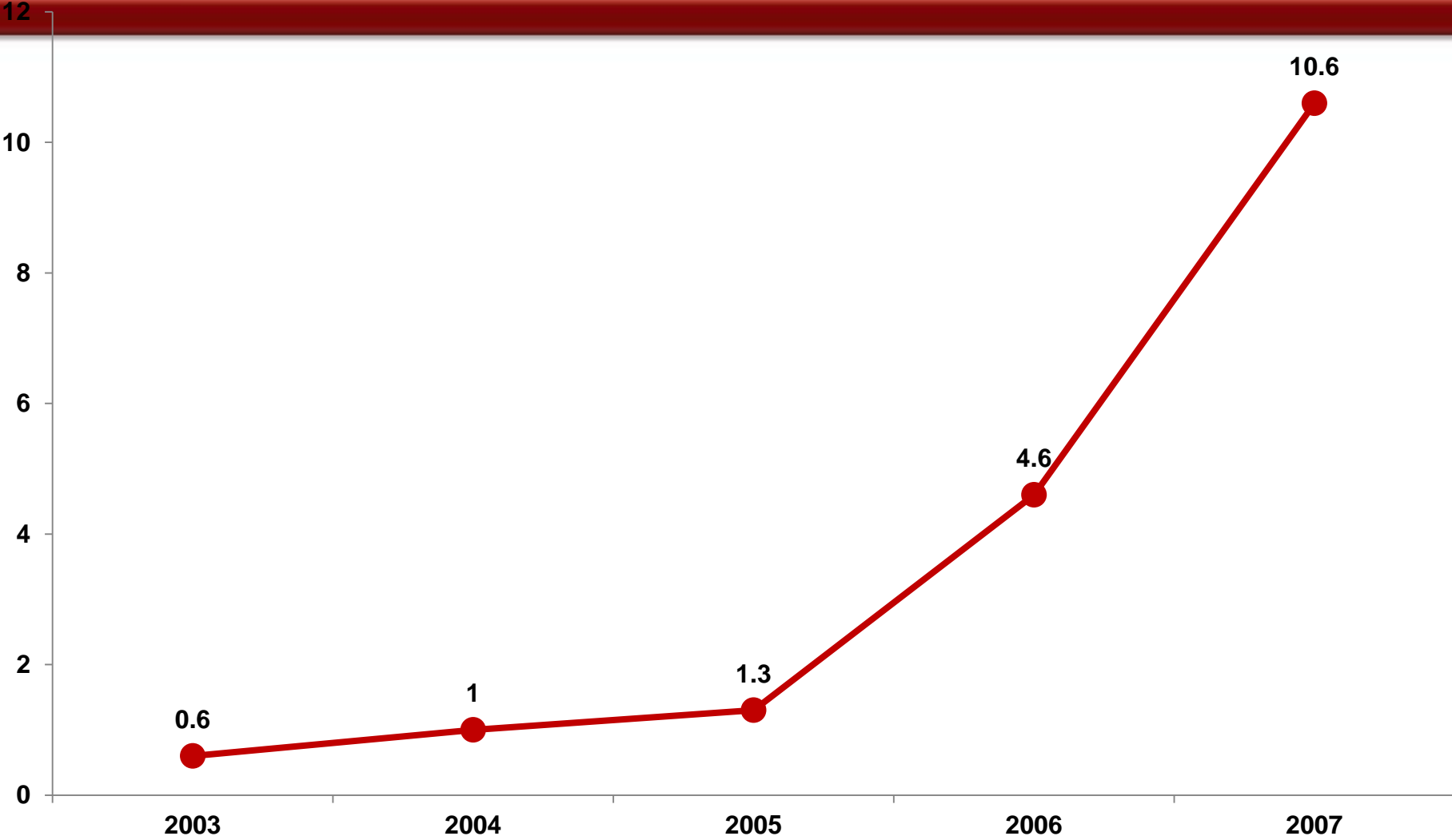


# HIV prevalence among MSM in Chongqing, China



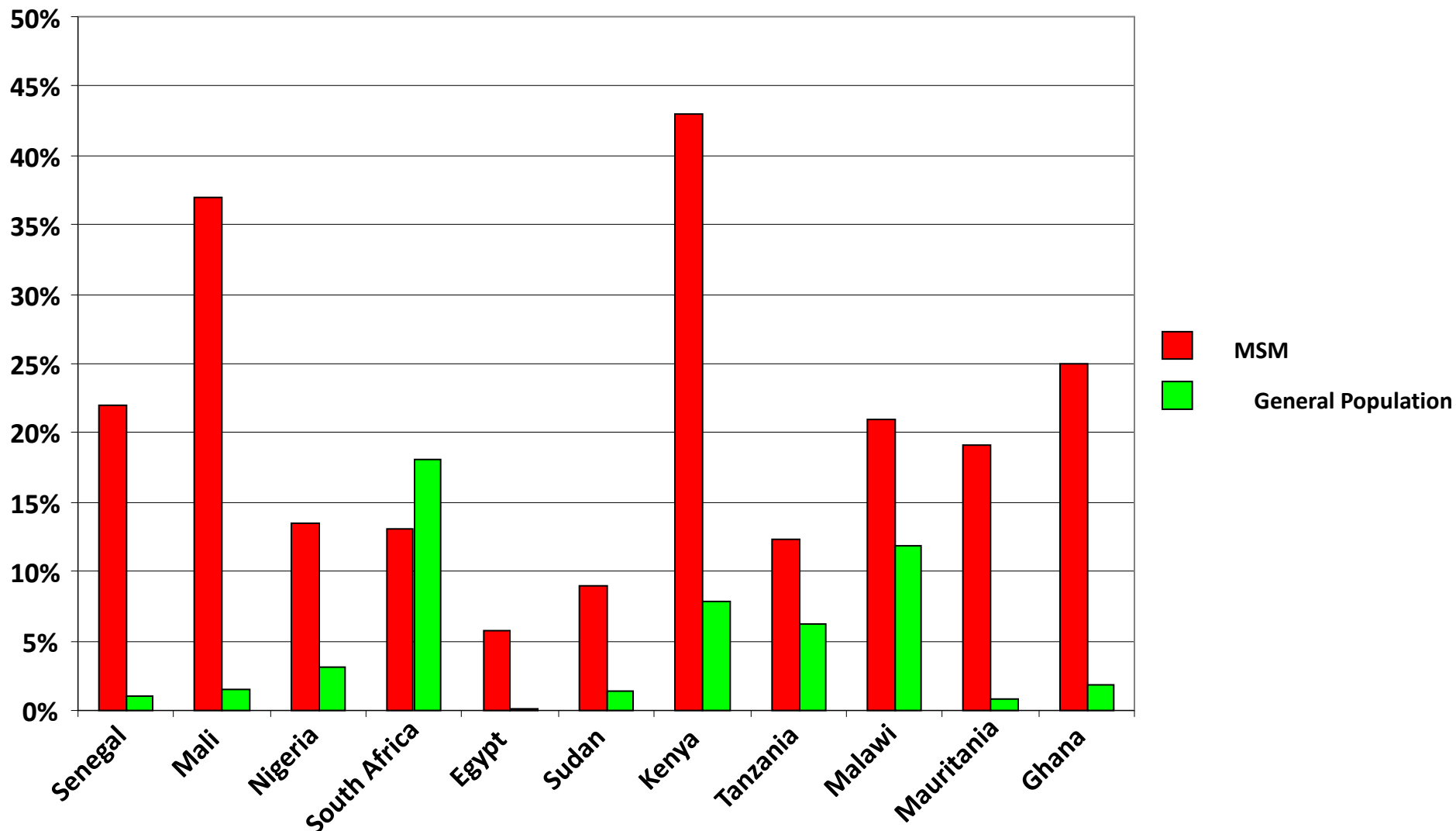


# HIV prevalence among MSM in Sichuan, China

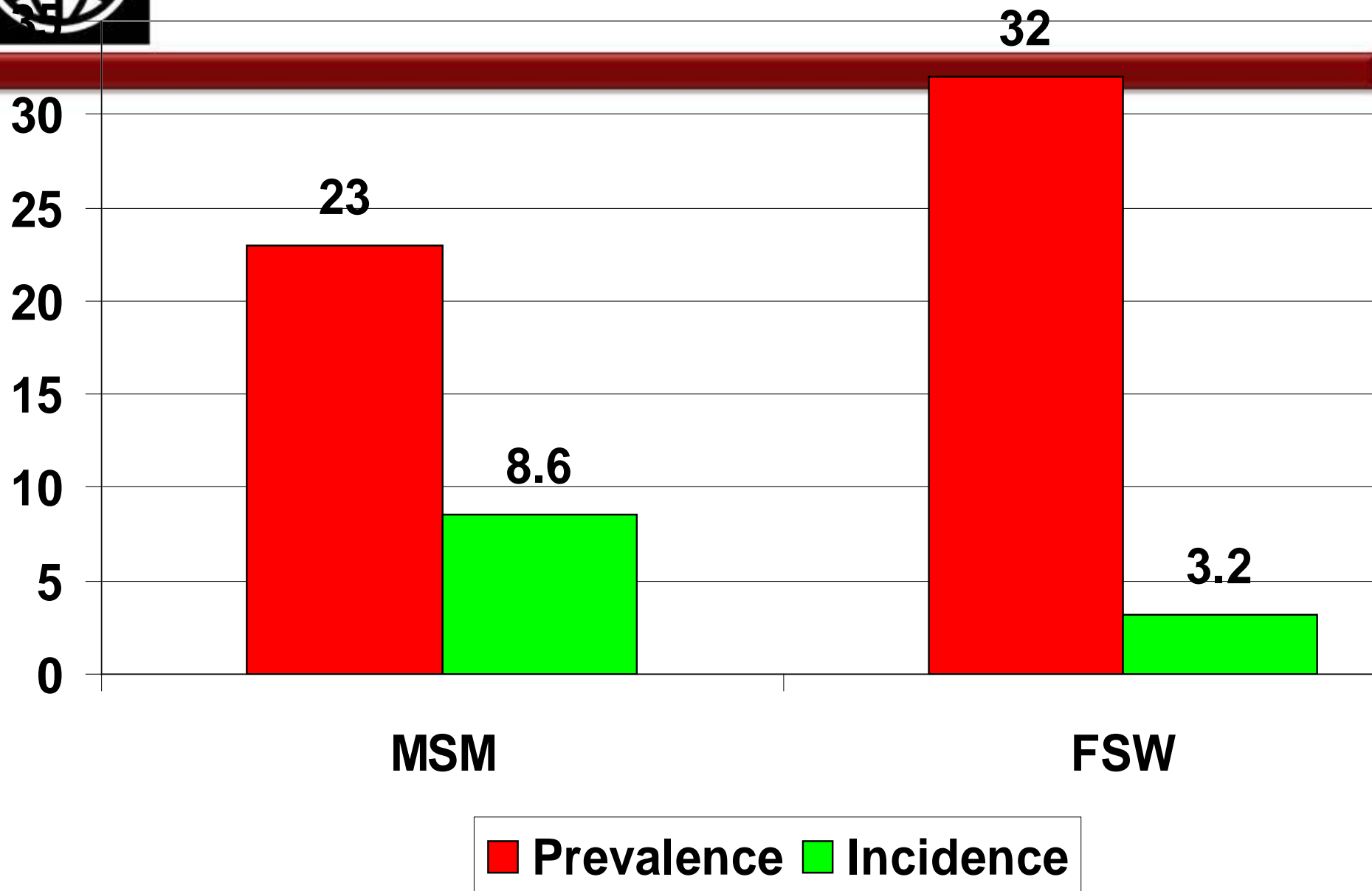




# HIV prevalence among MSM in Africa



# HIV PREVALENCE AND INCIDENCE AMONG FSW AND MSM IN MOMBASA, KENYA





# Addressing concentrated MSM epidemics

- Despite developed world successes , few developing country MSM programs have demonstrably reduced HIV incidence
- In developing countries, know little about how to reach hidden MSM, reduce stigma, effect policy change and manage large-scale programs
- Easier in contexts open to homosexuality, such as India or Nepal – than more repressive contexts
- Still need to navigate between southern unwillingness to address male-male sexuality and northern temptation to frame response within western constructs of limited relevance to developing countries

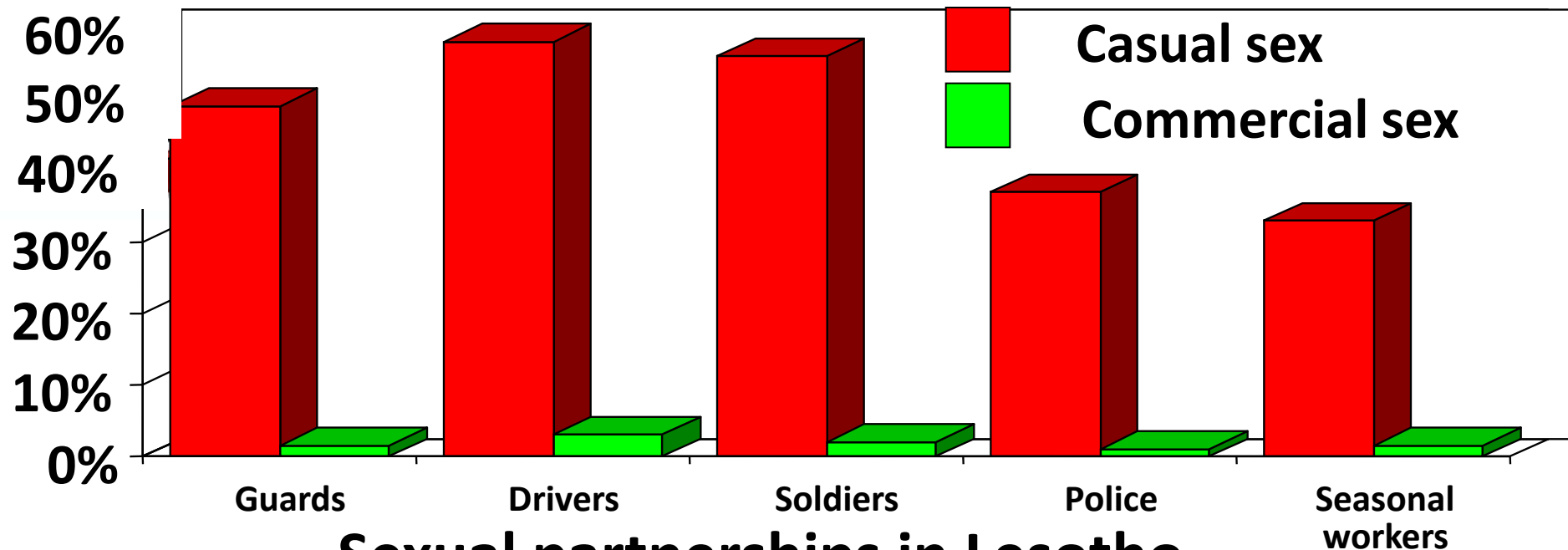


# Addressing generalized epidemics

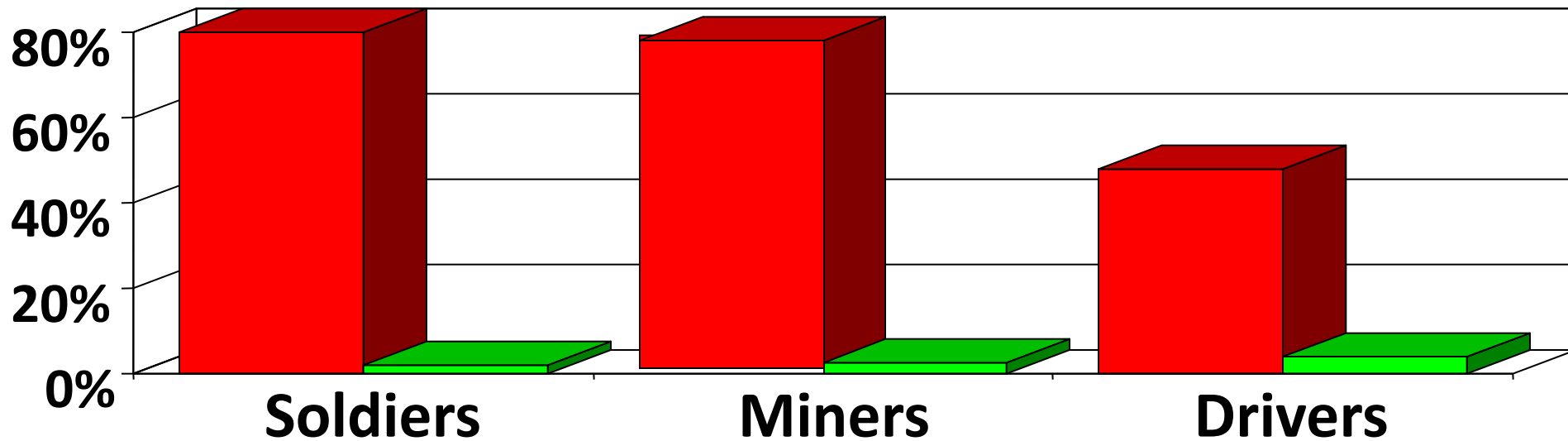
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- ❑ Let's remind ourselves what generalized epidemics look like

## Sexual partnerships in Swaziland

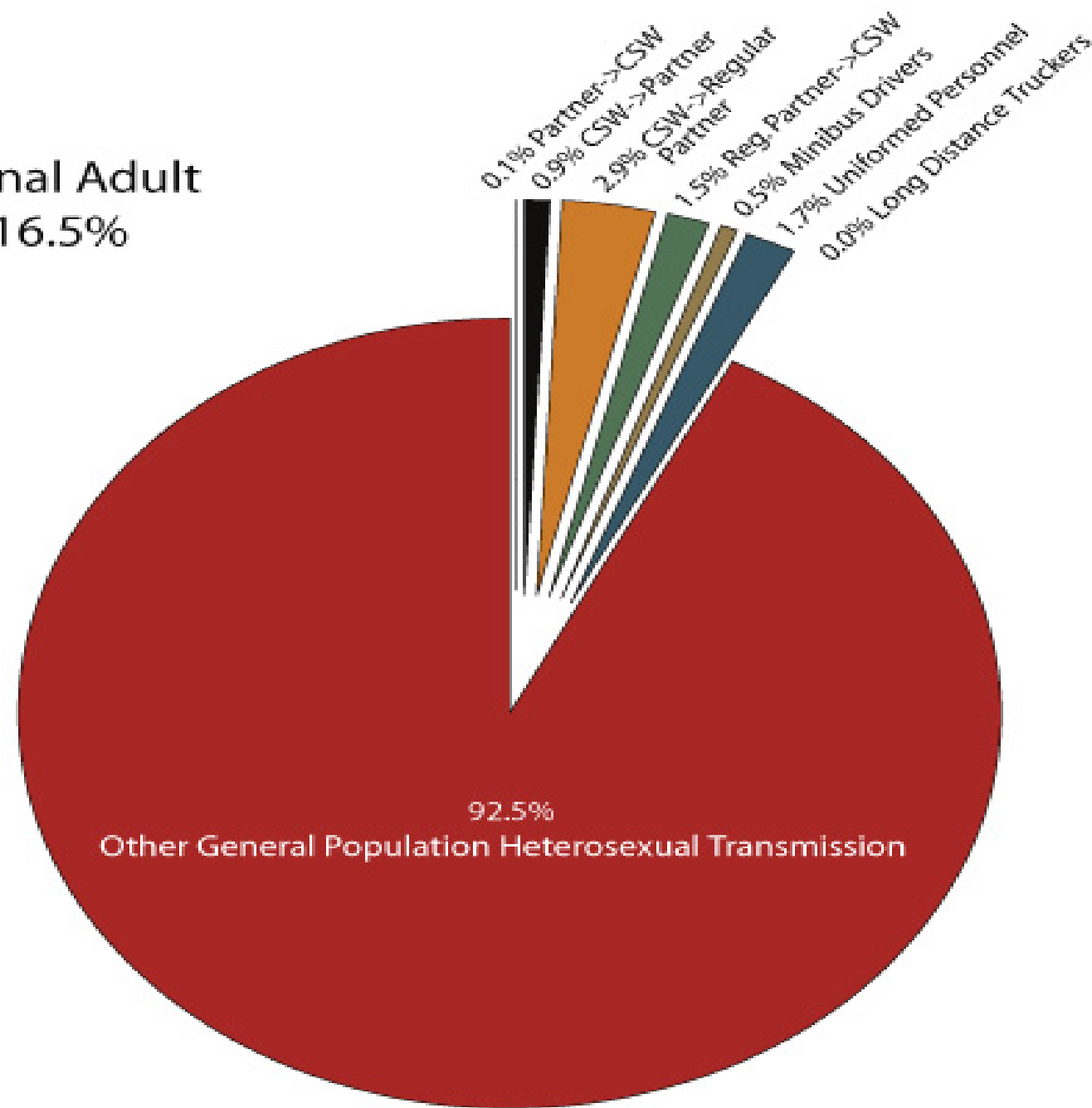


## Sexual partnerships in Lesotho



# Zambia: Relative Proportion of Incident Cases (modeled)

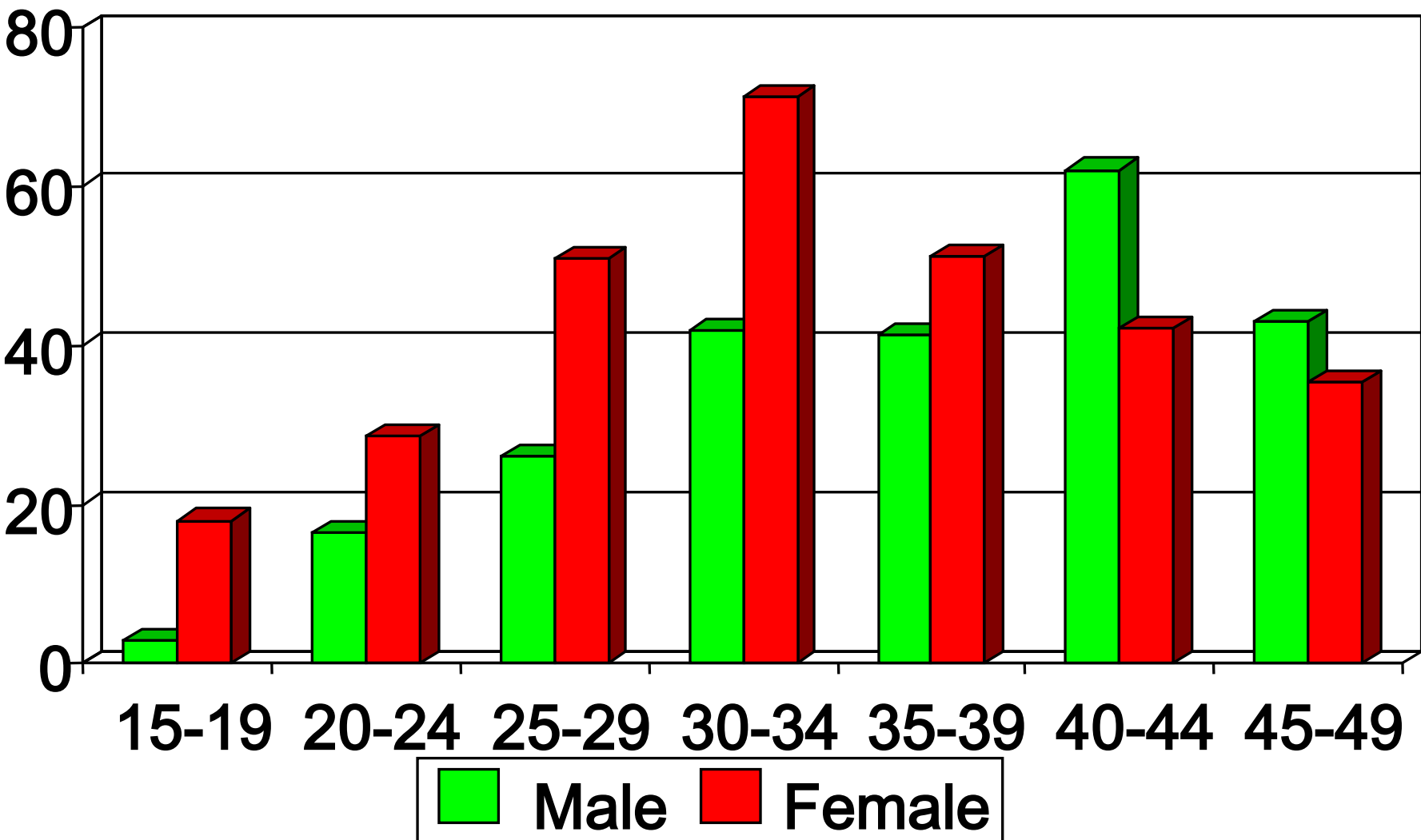
Estimated National Adult  
HIV Prevalence: 16.5%







# Household HIV prevalence in Francistown, Botswana





## Addressing generalized epidemics

- Do we have proven interventions in generalized epidemics?
- Consider this updated familiar summary of 49 HIV prevention randomized controlled trials, including 37 completed/stopped studies, with HIV incidence end-points



# Results of HIV prevention trials

| Intervention                       | Number | Completed/<br>Stopped | Effective |
|------------------------------------|--------|-----------------------|-----------|
| Microbicides                       | 12     | 10                    | 1         |
| Behavior change                    | 9      | 8                     | 0         |
| STI treatment                      | 8      | 7                     | 1         |
| HIV vaccines                       | 5      | 4                     | 0         |
| PEP                                | 5      | 1                     | 0         |
| Male circumcision-male acquisition | 3      | 3                     | 3         |
| HIV treatment as prevention        | 3      | 1                     | 1         |
| PREP                               | 3      | 2                     | 1         |
| Total                              | 49     | 37                    | 7         |



# Addressing generalized epidemics

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- Four major challenges
- First, many trusted interventions – treatment of sexually transmitted infections, testing and counseling, school and youth programs, condom promotion - at best unproven, at worst disproven, for reducing HIV incidence



## Addressing generalized epidemics

- Second, best proven intervention, male circumcision, barely advancing - since 3 trials were terminated early 2 years ago, few extra men protected
- Yet immense potential – 7 of 8 highest prevalence countries globally have male circumcision rates below 20% and expanding safe circumcision services in these countries could prevent 2+ million deaths
- In countries such as Zambia, with 15% adult HIV prevalence and a billion dollars in annual AIDS financing, little funding for male circumcision, despite growing waiting lists at public facilities



## Addressing generalized epidemics

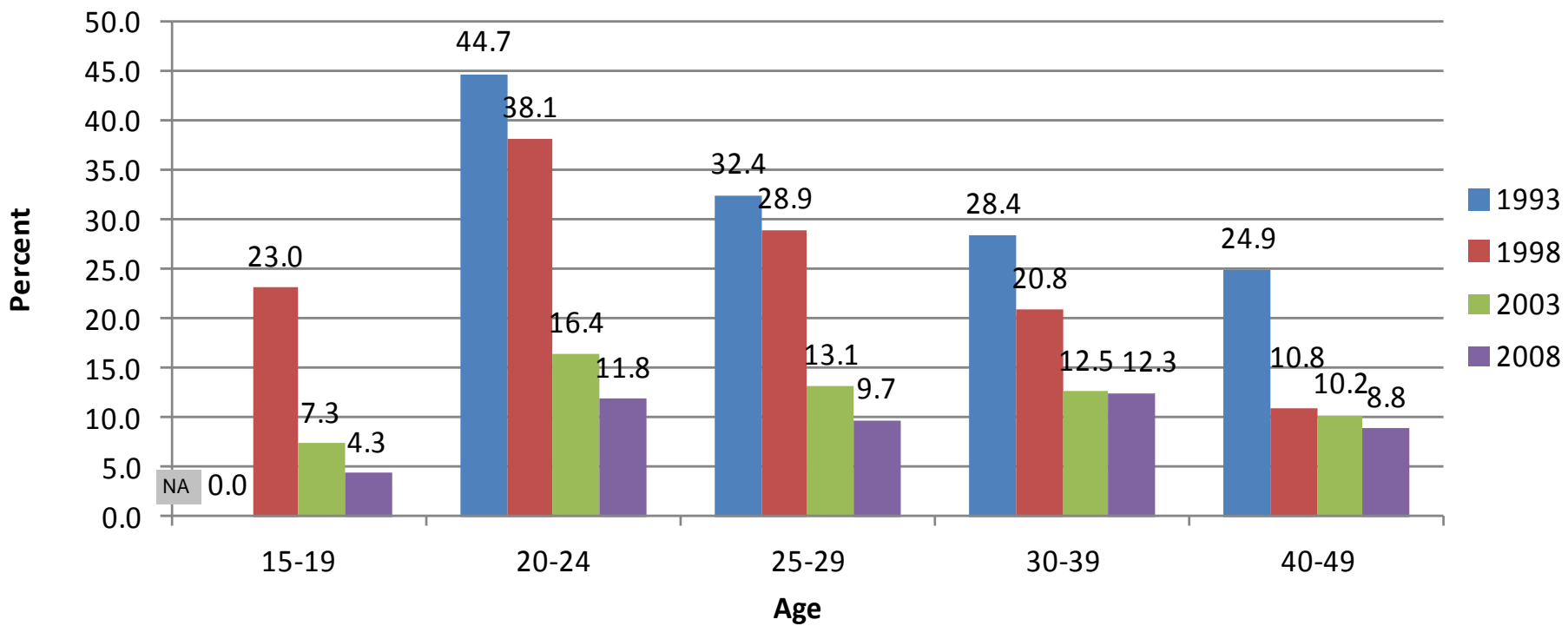
- Third, major contributor to reduced HIV transmission in generalized epidemics is partner reduction – have seen this in country after country
- Yet, partner reduction investment, implementation and evaluation still neglected

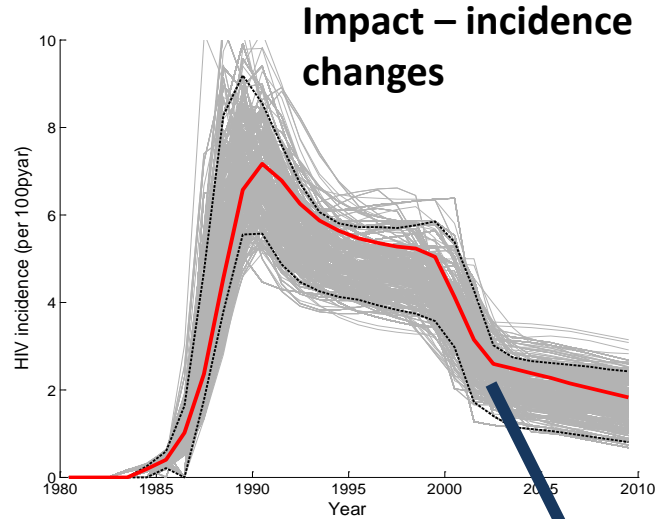


# Kenya's changes ... but have programmes contributed?

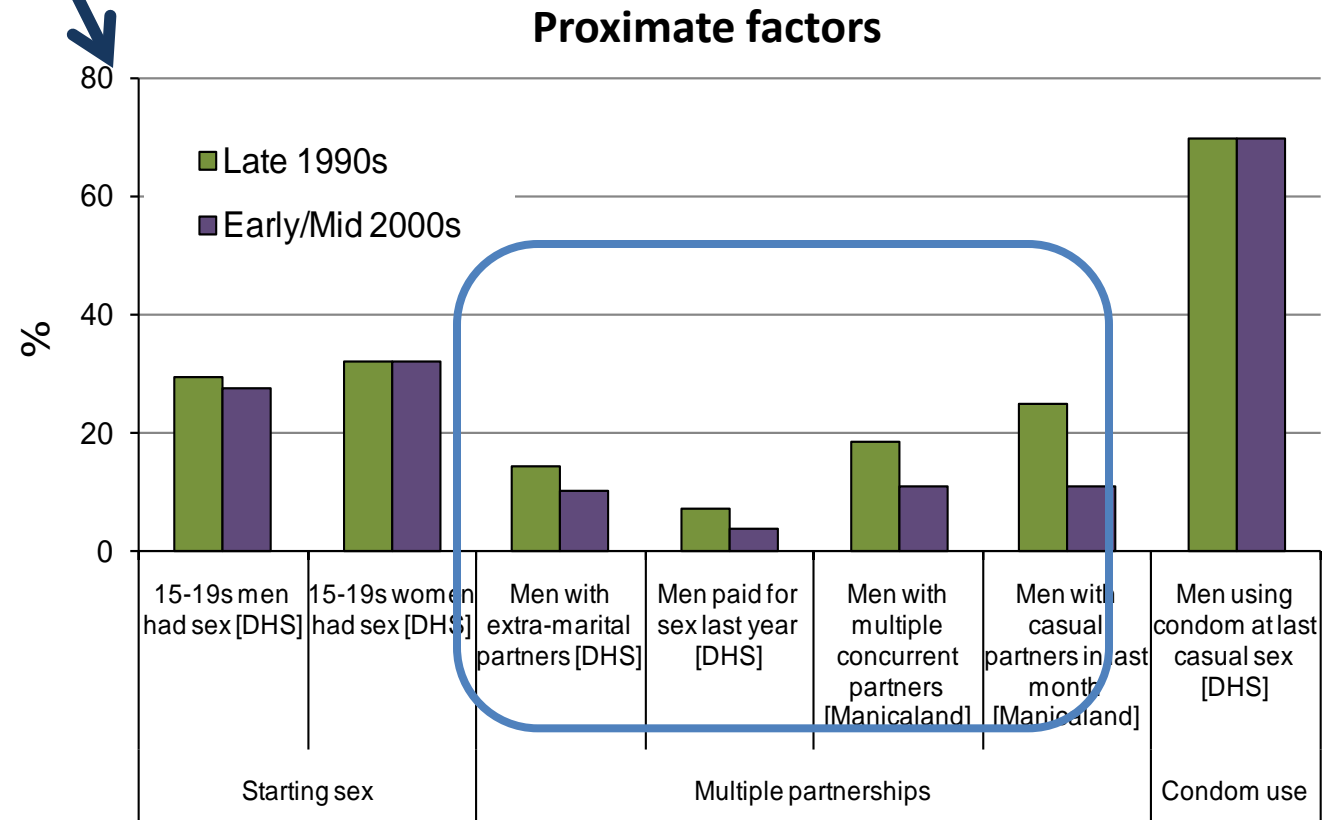
## Percent of Men with 2 or More Partners, Kenya 1993-2008

(In last 6 months for 1993, in last 12 months for 1998 and 2008)





# HIV incidence and behavior change in Zimbabwe







# RESPONDING TO GENERALIZED EPIDEMICS

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- Fourth, what do we do about ART-based prevention, including treatment as prevention and PREP? How do we establish real world effectiveness, finance it and balance ART-based prevention with obligation to treat the sick?



# Conclusion – why program science matters so much

- **CONCENTRATED** SW epidemics preventable, but protecting MSM and IDU in developing countries requires new and creative approaches
- In **GENERALIZED** epidemics, core challenge to reallocate resources from unproven or disproven approaches to proven but sensitive approaches - male circumcision and partner reduction – and to figure out role of ART-based prevention
- Clear challenge - insufficient effort to align prevention priorities with epidemic transmission dynamics, compromising prevention with mismatched or unfocused responses and insufficient effort to align interventions with evidence
- Global AIDS community slow to implement genuinely proven approaches at adequate scale - with knowledge we already have, far more can be done to curb HIV globally