Matching prevention to epidemic types and evidence

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World Bank
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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 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

• Insufficient recognition of global epidemic diversity
Transmission sources vary widely by region

- Heterosexual
- MSM
- IDU
- MTCT
Women a majority of those infected in one region - Africa

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N America</td>
<td>21</td>
</tr>
<tr>
<td>W Europe</td>
<td>27</td>
</tr>
<tr>
<td>E Asia</td>
<td>27</td>
</tr>
<tr>
<td>Oceania</td>
<td>30</td>
</tr>
<tr>
<td>E Europe</td>
<td>31</td>
</tr>
<tr>
<td>L America</td>
<td>32</td>
</tr>
<tr>
<td>S/SE Asia</td>
<td>37</td>
</tr>
<tr>
<td>Caribbean</td>
<td>50</td>
</tr>
<tr>
<td>Africa</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>
Core program science focus on epidemic typologies

- Core program science distinction between CONCENTRATED and GENERALIZED epidemics
- Not based on arbitrary <> 1% 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 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

- Mumbai, 1997
- Cambodia, brothel based 1997
- Mumbai, 2006
- Hanoi, 2006 (17% of sex workers in Hanoi inject drugs)
- Bangkok, brothel, 1994
- East Timor, 2003
- Bangkok, non-brothel, 1994
- Indonesia, 2004
- Da Nang, 2006
- Sichuan, 2004

Average number of clients per sex worker per week vs. Per cent HIV positive.
• 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 globally
We know the elements of effective SW interventions

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

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Percentage</th>
<th>Clients per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seaters (Professional, self-identifying)</td>
<td>57%</td>
<td>28</td>
</tr>
<tr>
<td>Roamers (Non self-identifying)</td>
<td>29%</td>
<td>18</td>
</tr>
<tr>
<td>Bar waitresses</td>
<td>40%</td>
<td>2-3</td>
</tr>
<tr>
<td>Mobile traders</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Students selling sex</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Beer brewers/sellers</td>
<td>15%</td>
<td></td>
</tr>
</tbody>
</table>
And concerted SW investments are elusive
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 - injecting drug use fuels HIV in sex work, fundamentally amplifying epidemic potential.
Initiators of HIV epidemics in Asia

- Mainly SW initiated
- Mainly IDU initiated
- Mainly MSM
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 major IDU epidemics

• 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

- Hungary: 20
- Czech Rep: 17
- Croatia: 13
- Lithuania: 10
- Estonia: 7
- Moldova: 6
- Slovakia: 3
- Kyrgyzstan: 3
- Ukraine: 2
- Georgia: 1
- Belarus: 1
- Kazakhstan: 1

Other countries: 0
Addressing concentrated MSM epidemics

• Greatly underestimated contribution of MSM to HIV transmission in developing countries
MSM epidemics may incubate slowly then surge

*HIV virus is introduced into the MSM population in the year 2000*

*HIV prevalence starts appreciable growth in the MSM population around the year 2010*
HIV prevalence among MSM in Latin America

- Mexico
- Trinidad & Tobago
- Bolivia
- Colombia
- Uruguay
- Ecuador
- Brazil
- Honduras
- Paraguay
- Peru
- Argentina
- Guatemala
- Panama
- Nicaragua
- El Salvador
- Puerto Rico

HIV Prevalence (%)

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

- Argentina: Buenos Aires (Provinces: 7 cities)
- Bolivia: La Paz, Santa Cruz (Border cities with Argentina)
- Chile: Santiago
- Colombia: Bogotá

- Ecuador: Quito, Guayaquil (Other city ports: 4)
- Paraguay: Asunción and 4 other cities
- Peru: Lima (Provinces)
- Uruguay: Montevideo (Border cities with Brazil)
- Venezuela: Isla Margarita (0.0%)

Legend:
- Red: Female sex workers
- Green: Men who have sex with men
HIV prevalence among MSM in Asia

![HIV prevalence among MSM in Asia graph](image-url)
HIV prevalence among MSM in India

<table>
<thead>
<tr>
<th>State</th>
<th>HIV Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>7.4</td>
</tr>
<tr>
<td>Karnataka</td>
<td>17.6</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>17</td>
</tr>
<tr>
<td>Manipur</td>
<td>16.4</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>11.8</td>
</tr>
<tr>
<td>Delhi</td>
<td>11.7</td>
</tr>
<tr>
<td>Gujarat</td>
<td>8.4</td>
</tr>
<tr>
<td>Goa</td>
<td>7.9</td>
</tr>
<tr>
<td>Orissa</td>
<td>7.4</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>6.6</td>
</tr>
<tr>
<td>West Bengal</td>
<td>5.6</td>
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</tbody>
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HIV prevalence among MSM in China

- 25+: 2.8 (2007), 5.7 (2009)
HIV prevalence among MSM in Chongqing, China

- 2006: 10.4%
- 2007: 10.8%
- 2008: 16.3%
- 2009: 19.2%
HIV prevalence among MSM in Sichuan, China
HIV prevalence and incidence among MSM and FSW in Mombasa, Kenya

- MSM: Prevalence 23, Incidence 8.6
- FSW: Prevalence 32, Incidence 3.2
Addressing concentrated MSM epidemics

- Despite developed world successes, few developing country MSM programs have demonstrably reduced HIV incidence at scale.
- 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, China or Nepal, where implementation at scale is the greatest challenge – 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.
Let’s remind ourselves what generalized epidemics look like.
Zambia: Relative Proportion of Incident Cases (modeled)

Estimated National Adult HIV Prevalence: 16.5%

- 92.5% Other General Population Heterosexual Transmission
- 0.1% Partner→CSW
- 0.9% CSW→Partner
- 2.9% CSW→Regular Partner
- 1.5% Reg Partner→CSW
- 1.7% Minibus Drivers
- 0.5% Uniformed Personnel
- 0.0% Long Distance Truckers
Household HIV prevalence in Francistown, Botswana
Addressing generalized epidemics

• Do we have proven interventions in generalized epidemics?

• Consider this updated familiar summary of 50 HIV prevention randomized controlled trials, including 37 completed/stopped studies, with HIV incidence end-points
## Results of HIV prevention trials

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Number</th>
<th>Completed/Stopped</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbicides</td>
<td>12</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Behavior change</td>
<td>9</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>STI treatment</td>
<td>8</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>HIV vaccines</td>
<td>5</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>PEP</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Male circumcision-male acquisition</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>HIV treatment as prevention</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PREP</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>37</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>
Addressing generalized epidemics

• 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, advancing slowly

• Yet immense potential – safe circumcision in Eastern and Southern Africa countries could prevent 2+ million deaths

• Swaziland – more providers than clients
• 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
HIV incidence and behavior change in Zimbabwe

Proximate factors

- Starting sex
- Multiple partnerships
- Condom use
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?

• WHO WILL PAY???
Conclusion – why program science matters so much

- **CONCENTRATED** formal SW epidemics preventable, but protecting informal SW in Africa, MSM and IDU in repressive contexts requires creative approaches.

- In **GENERALIZED** epidemics, core challenge to reallocate resources from unproven approaches to proven but sensitive approaches such as male circumcision and partner reduction and to figure out role of ART-based prevention.

- Common challenge is to align investments to epidemic dynamics and interventions to evidence.

- Need clear distinction between contexts where we have the evidence and the challenge is implementation, implementation, implementation (most concentrated epidemics) and contexts where we lack decisive evidence (behavior change in hyper-epidemics).