

The ABC's of AIDS Prevention What's the Controversy?

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News

Abstinence programmes do not reduce HIV prevalence in Uganda

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Boston

Use of condoms and death explain the substantial decline in the prevalence of HIV in Uganda in the past decade. The reduction had previously been credited to ABC programmes (abstinence, be faithful, and use condoms). A longitudinal study, presented at the 12th retroviral conference in Boston, however, challenges the contributions of abstinence and fidelity. The study included a door to door survey of about 10 000 adults aged 15-49 in 44 villages in the Rakai district of southern Uganda.

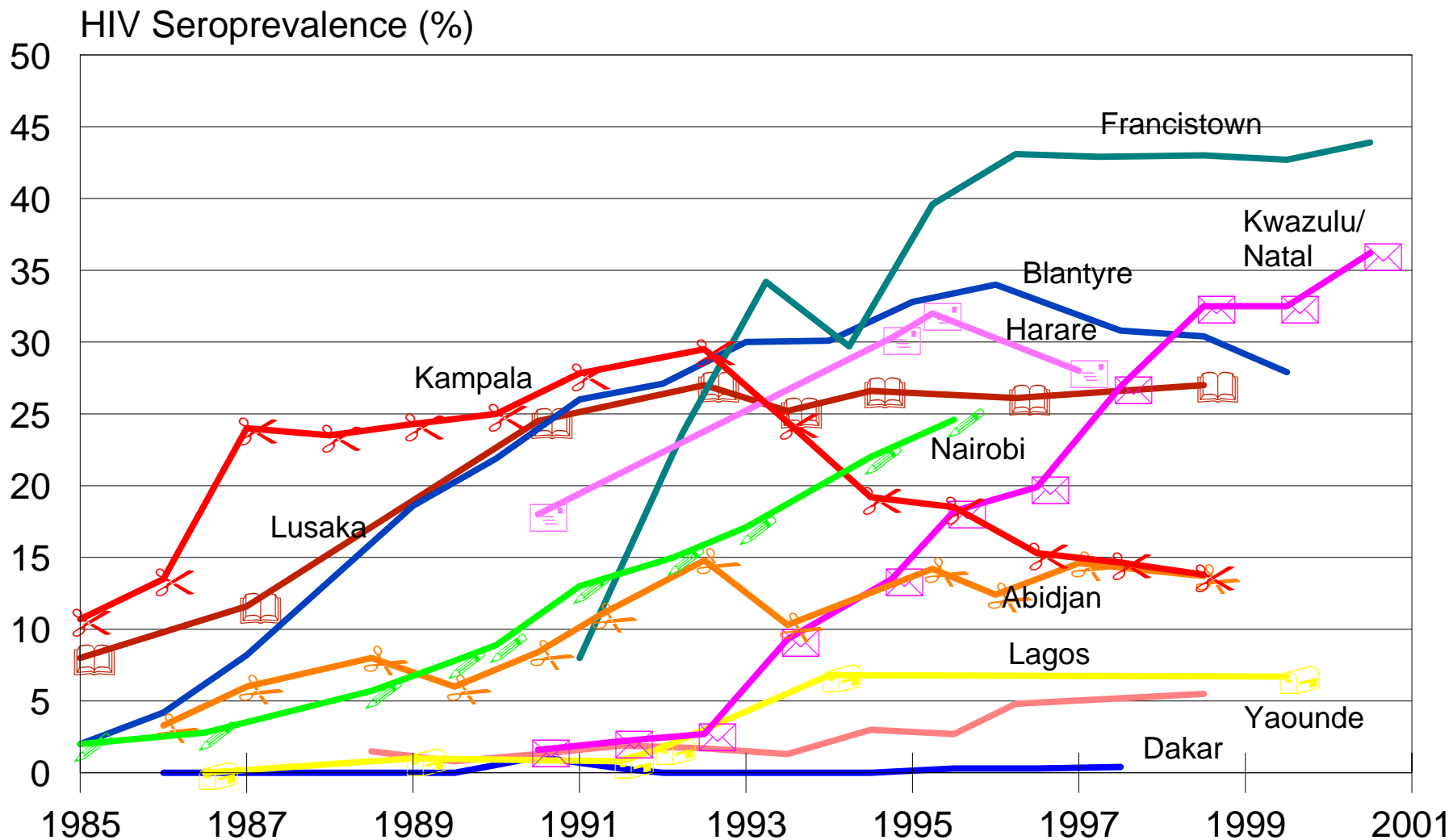
Questions

- What do we know about AIDS epidemiology?
- What do the Rakai study authors say they found?
- What does the Rakai study data actually show, and what does it not show?
- What are the implications for ABC program strategies?

What do we know about AIDS epidemiology?

- What are the trends in HIV prevalence Africa?
 - The following slides shows steadily rising prevalence in all African countries throughout the 1980s.
 - Some countries show a leveling off of prevalence in the 1990s
 - Uganda uniquely shows a steadily declining prevalence in the the 1990s

HIV Seroprevalence for Pregnant Women Selected Urban Areas of Africa: 1985-2000



Note: Includes infection from HIV-1 and/or HIV-2.

Source: U.S. Census Bureau, HIV/AIDS Surveillance Data Base, 2000.

What do we know about AIDS epidemiology?

- What can account for variations in HIV prevalence in populations?
 - The prevalence of any disease in a population is a product of only two factors:
 - Incidence rate – the number of new cases occurring in any time period
 - Duration of disease among persons affected. The duration in turn depends on how long it takes a case to fully recover, or to die.

Explaining Changes in Prevalence

- Prevalence (P) = Incidence rate per year X
Duration of disease in years
 - Duration of untreated disease in Africa is known to be about 7.5 years (average)
 - $1/\text{Duration} = \text{annual death rate}$
so, $1/7.5 \text{ years} = 0.133$ or 13.3% per year
- Therefore, with untreated HIV infection:
 $P = \text{Incidence per year} \times 7.5 \text{ years}$

Example

Under constant conditions:

Prevalence rate (%)	Incidence rate per year (estimated)
1%	0.13%
5%	0.66%
10%	1.33%
20%	2.67%
30%	4.00%
40%	5.33%

What Can Cause a Decline in Prevalence?

- If $P = I \times D$ then there must be either:
 - a decline in I , meaning FEWER new infections
 - a decline in D , meaning a HIGHER rate of dying (since $D = 1/\text{death rate}$)
- Which is more plausible?

How Can New Infections (Incidence) Be Prevented or Reduced?

- A = abstinence, i.e., delaying sexual debut
- B = be faithful, i.e., avoid, or reduce multiple (concurrent) sexual partners
- C = condoms, i.e., *consistent** condom use if one (or one's partner) has multiple concurrent sexual partners (assuming one does not *increase* multiple partnering with the use of condoms)

* Consistent condom use is only 80% (or less) protective; inconsistent use has minimal or no protection.

What Conclusions Come From Rakai?

Declines in HIV Prevalence in Uganda: Not as Simple as ABC – Marie Wawer, et al. (As summarized in the *BMJ* news)

"Overall, the HIV prevalence over the last decade declined 6.2 percentage points."

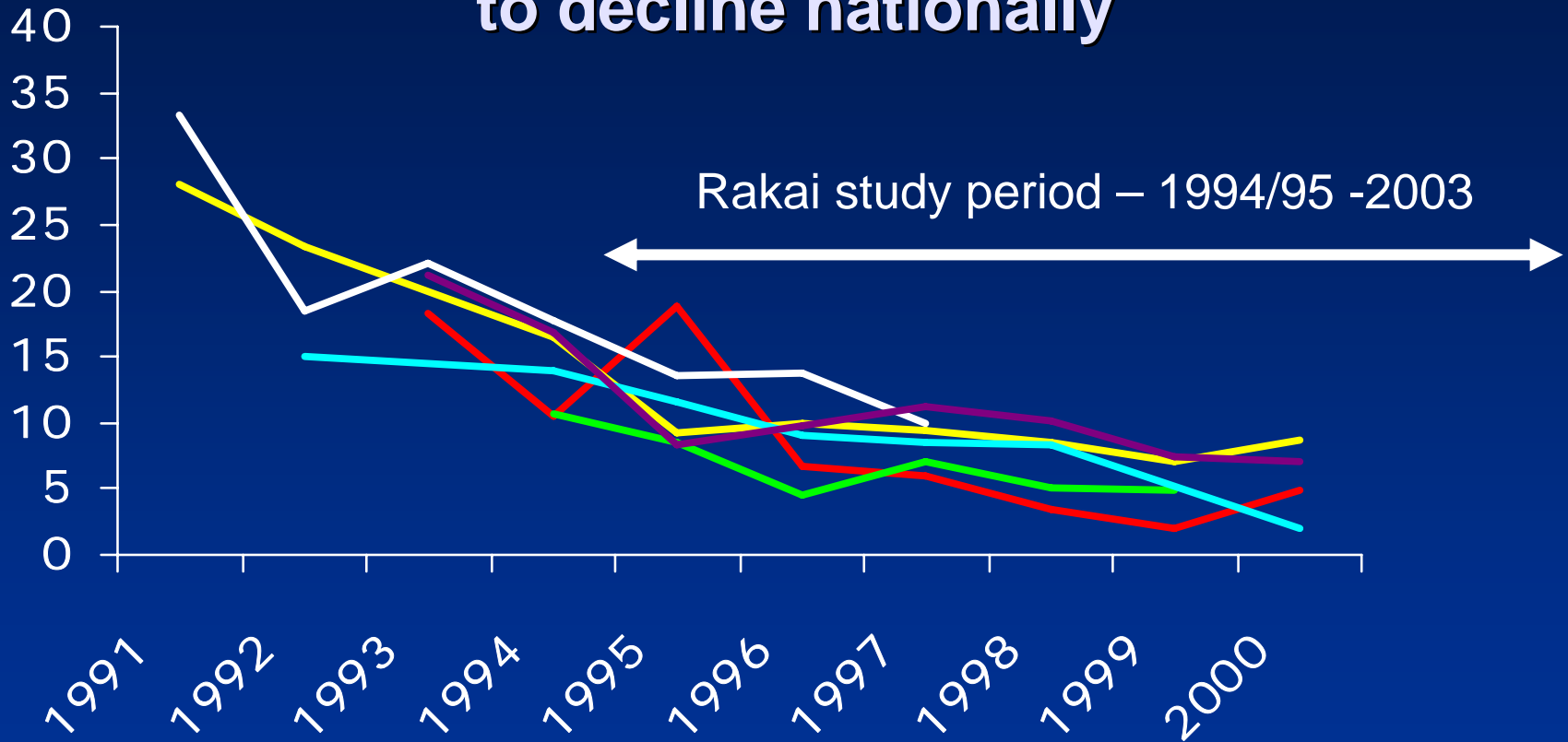
- What do the data actually show?

“...the last decade...” refers to the period of observation *in their study*.

This was 1994/95 to 2003, well after the decline in HIV prevalence had begun in Uganda. (See next slide)

Thus, the Rakai study provides *no data* on causes of HIV decline that began several years earlier

HIV prevalence among 15-19 year old Ugandan antenatal women, 1991-2000, illustrating timing of Rakai Study well after HIV prevalence began to decline nationally



— Rubaga — Nsambya — Jinja
— Fort Portal — Mbarara — Gulu

What Conclusions Come From Rakai?

Declines in HIV Prevalence in Uganda: Not as Simple as ABC – Marie Wawer, et al. (As summarized in the *BMJ* news)

“We estimate that mortality alone contributed five percentage points of the decline.”

What do the data actually show?

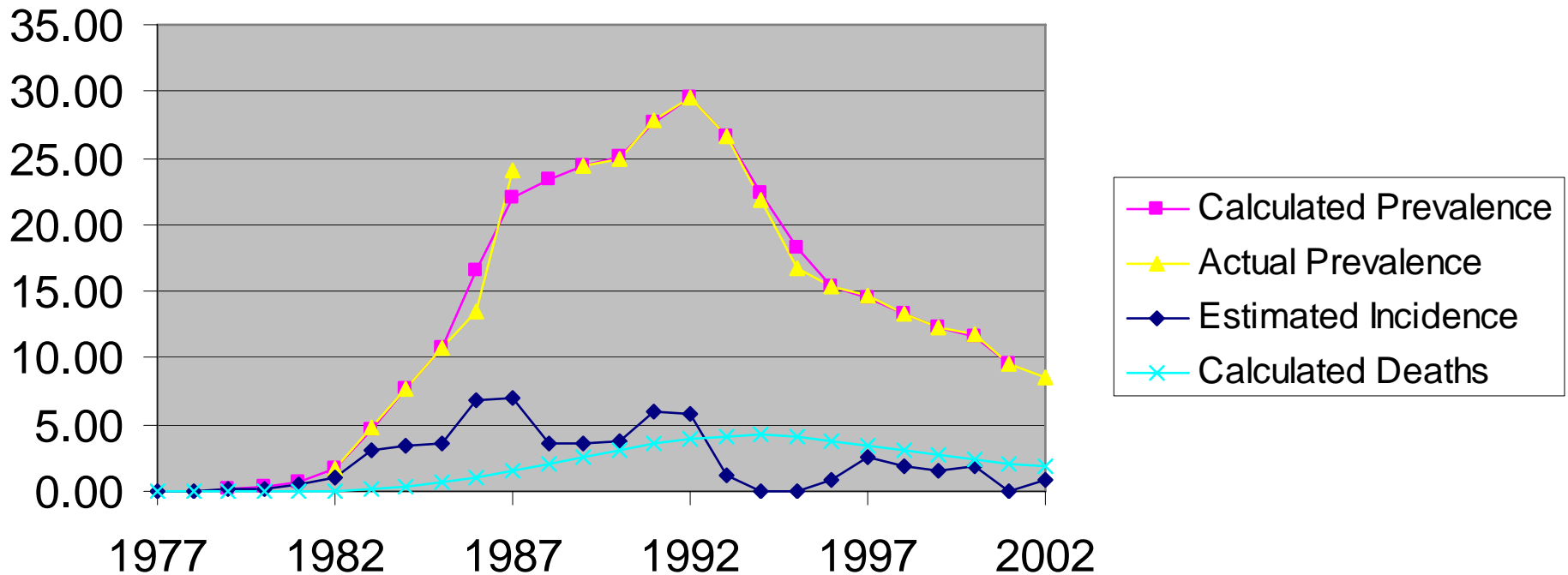
- During the period of observation, the numbers of AIDS deaths every year exceeded the numbers of new HIV infections, thus the HIV prevalence steadily declined.

What is the correct interpretation of this?

- Because AIDS deaths in any given year result from HIV infections acquired about 7 years earlier, this simply confirms that there was a higher infection rate (incidence) in the past, prior to the study period.

An Illustration of the Relationship of Prevalence to Incidence and Deaths

Figure 4: HIV Incidence, Prevalence, and Deaths in Nsambya Hospital, Assuming an 86/87 Spike



Note that when incidence starts to decline, prevalence begins to decline, but the *deaths continue to increase* for a few years because they come from the higher incident cases in the past.

What Conclusions Come from Rakai?

- Declines in HIV Prevalence in Uganda: Not as Simple as ABC – Marie Wawer, et al. (As summarized in the BMJ news)
- *The remaining share {of prevalence decline in the study period} could not be attributed to abstinence. The proportion of men reporting sexual abstinence in the past year declined, but the proportion among women did not change. Nor could the decline be credited to fidelity because the proportion of men reporting two or more partners in the past year increased in the decade.*
- *Use of condoms increased dramatically. "Condom use is much higher with casual partners than with their married partner," Dr Wawer said. "Condom use is associated with the significant reduction of HIV acquisition in this population."*

What do the data show?

The incidence of new infections remains relatively constant during the study period in spite of the dramatic increase in condom use. (See next slide for interpretation.)

What do the Rakai data tell us about abstinence, multiple partners, condoms and new infections in the study period?

1. Condom use is increasing dramatically—
BUT at the same time:
Abstinence is declining
Multiple partners are increasing
2. The net effect of these countervailing changes in behavior is there is NO real change in the incidence of new HIV infections!

What Is Happening in Rakai Now?

- Even a large increase in condom use could fail to reduce HIV at **population level** in two ways:
 - Condoms are more attractive to persons not engaged in risky behaviors so one would not expect to see a decline in HIV incidence as use rises,
 - or,
 - Risk-compensation – condom users may more likely to switch from a safer strategy of partner reduction to riskier strategy of higher rates of partner change by relying on condoms for protection*

*Note: Studies in Rakai by Ahmed, et al., have documented that “consistent” condom use is only 63% protective against HIV infection, while “inconsistent” use has no significant protection.

Is There Behavioral Disinhibition?

- There is a concern – condom use may engender *behavioral disinhibition*
- *Behavioral disinhibition* refers to an increase in high-risk sexual behavior among condom users in response to perceptions of safety conferred by the condoms as a physical barrier.

Behavioral Disinhibition – What Is It?

“Circus performers take fewer chances when practicing without nets”

(Hemenway, cited in MacCoun)

- Behavioral disinhibition originated in the psychological literature
- It refers to risk-taking behaviors
- It is also viewed as “risk-compensation” or “risk-homeostasis”

Is Behavioral Disinhibition Actually Occurring in Rakai?*

- It is difficult to determine the direction of causality, and it would be inappropriate to infer that condoms were a cause of behavioral disinhibition rather than an adaptive correlate of high risk sex.
- Study, however, shows that adoption of condom use was associated with a subsequent increase in casual sex and a lesser reduction of high risk sexual behaviors.
- It is possible that condom use provides a sense of protection and deters reduction in high-risk sexual practices.

*Source: S. Ahmed, personal communication

What can we learn from Rakai

1. HIV incidence had been declining from much higher levels prior to the study period (1994/95-2003) when intensive observations began in Rakai District
2. This earlier higher incidence levels accounted for the high mortality and the corresponding decline in prevalence observed during the observation period.

What can we learn from Rakai

3. The Rakai data provide no explanation for the earlier dramatic decline in incidence going back at least to the late 1980s.
4. The Rakai data, however, do confirm that condom use was still very low by the mid-1990s, indicating that condoms could not have been a significant factor contributing to this earlier decline.
5. (Independent data from many other sources document widespread practice of delay in sexual debut and partner reduction in Uganda in this earlier period.)

What Rakai Actually Tells Us

4. In the period of observation (1994/95 – 2003) there was a large increase in condom use –
5. However, there was also a concurrent decline in abstinence and an increase in multiple partnering
6. The net effect of these countervailing changes was no decline in HIV incidence during the study period

What Rakai Actually Tell Us

7. Rakai, therefore, provides empirical documentation of what is likely the phenomenon “behavioral disinhibition” also called “risk compensation”
8. This phenomenon of risk compensation could be an explanation of why condom programs alone have not been associated with any amelioration of population-wide heterosexual AIDS epidemics in many sub-Saharan African countries.

Explanatory Note

- This presentation is based on: my review of the Abstract and slides of the Rakai data presented by Dr. Marie Wawer at the 12th Retroviral Conference Boston in February, 2005; my participation in a Seminar at Johns Hopkins University in May, 2005 where Dr. Wawer again presented essentially these same data, and my communication with many knowledgeable scientists.
- The slides here do not include any data from the Rakai study that has not been published.