Love, Behavior, and Incentives in the Time of HIV/AIDS

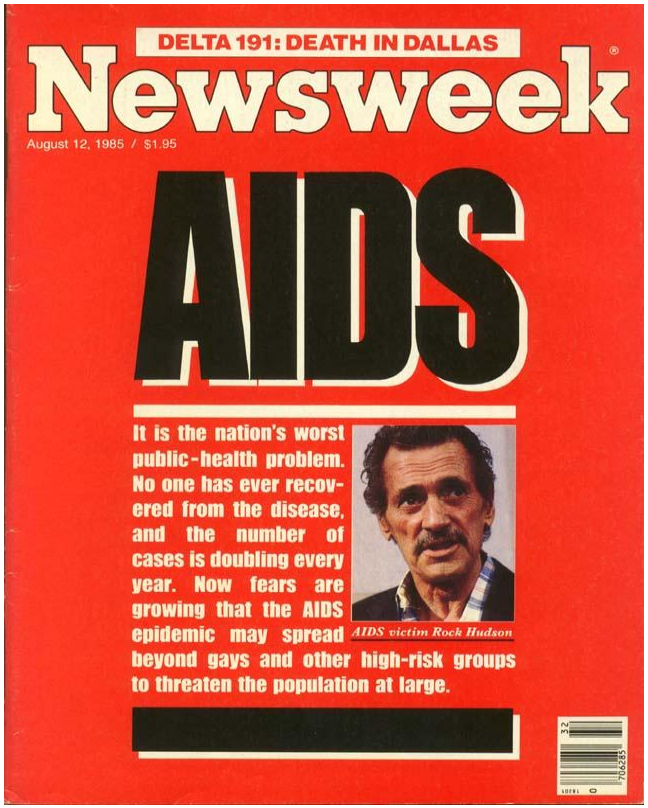
(And a postscript on responding to Ebola)

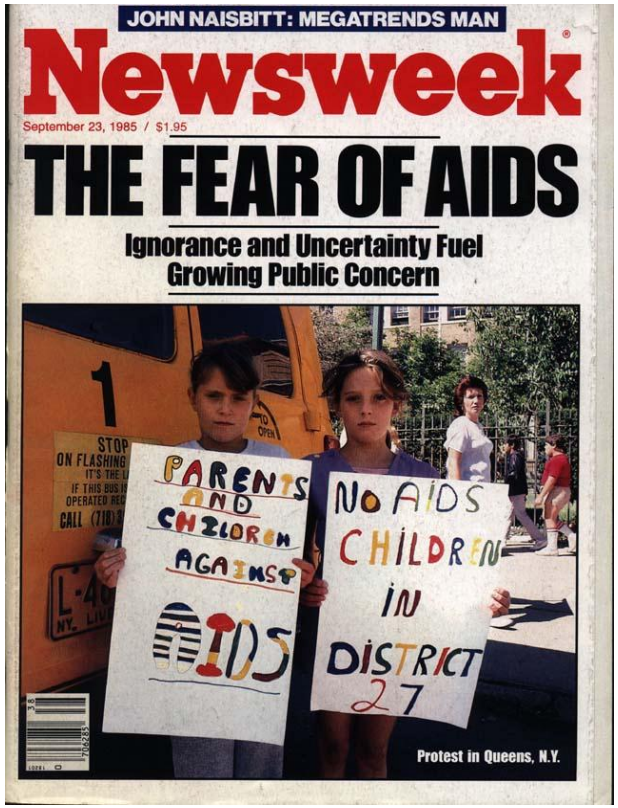
Damien de Walque,
Development Research Group (DECHD)
The World Bank

DEC Policy Research Talk
February 23, 2015

1985

1985


DELTA 191: DEATH IN DALLAS
Newsweek
August 12, 1985 / $1.95
AIDS
It is the nation's worst public-health problem. No one has ever recovered from the disease, and the number of cases is doubling every year. Now fears are growing that the AIDS epidemic may spread beyond gays and other high-risk groups to threaten the population at large.
AIDS victim Rock Hudson


JOHN NAISBITT: MEGATRENDS MAN
Newsweek
September 23, 1985 / $1.95
THE FEAR OF AIDS
Ignorance and Uncertainty Fuel Growing Public Concern
PARENTS AND CHILDREN AGAINST AIDS
NO AIDS CHILDREN IN DISTRICT 27
Protest in Queens, N.Y.

FOREIGN POLICY FUMBLES
Reagan on the Defensive
Newsweek
FUTURE SHOCK
AIDS
How the spreading epidemic will affect health care, government policy, civil liberties and attitudes toward sex
AIDS IN AFRICA
The Future Is Now

2015

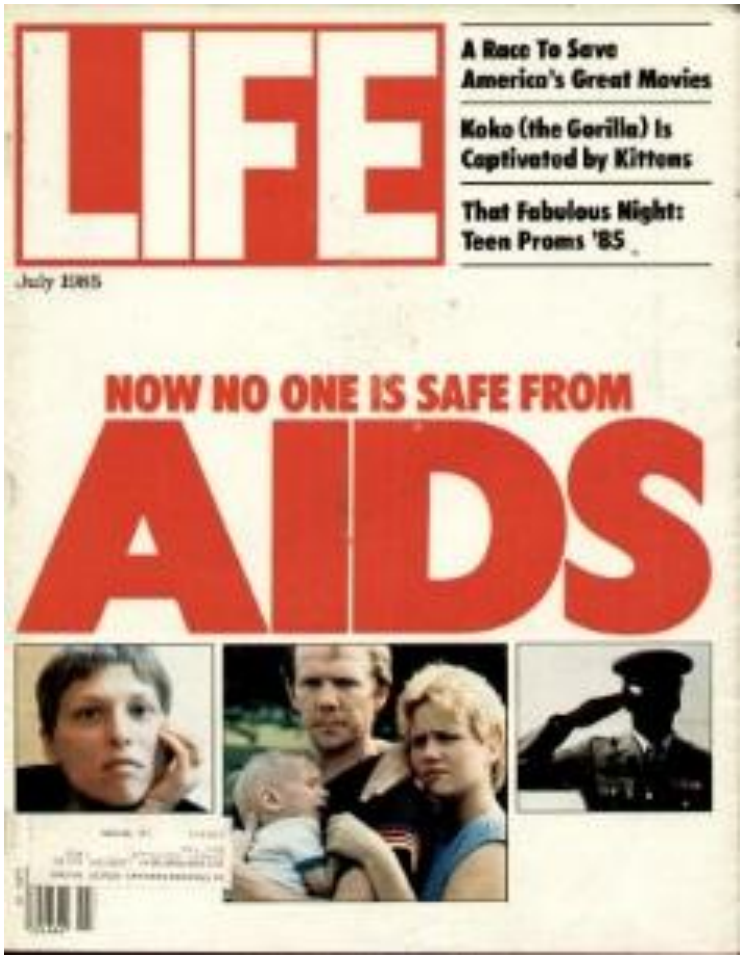
2015

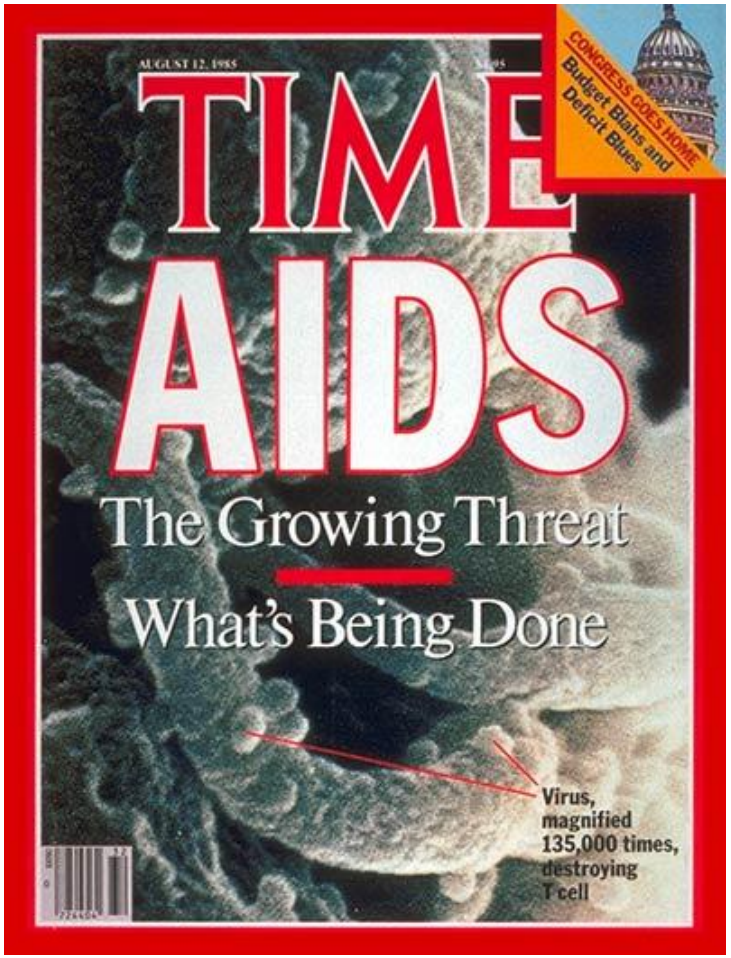
EBOLA
in AMERICA
EBOLA: "THE ISIS OF BIOLOGICAL AGENTS?"
LIVE
CNN
ON CNN
MIKE ROWE HAS A NEW SHOW ON CNN -- SOMEBODY'S GOT

Bloomberg
Businessweek
EBOLA IS COMING
The U.S. had a chance to stop the virus in its tracks. It missed.

Post-Post Racial America
Undercover Abortion Wars
Newsweek
08.29.2014
A BACK DOOR FOR EBOLA
SMUGGLED BUSHMEAT COULD SPARK A U.S. EPIDEMIC

Were the dire predictions of 1985 about AIDS correct?

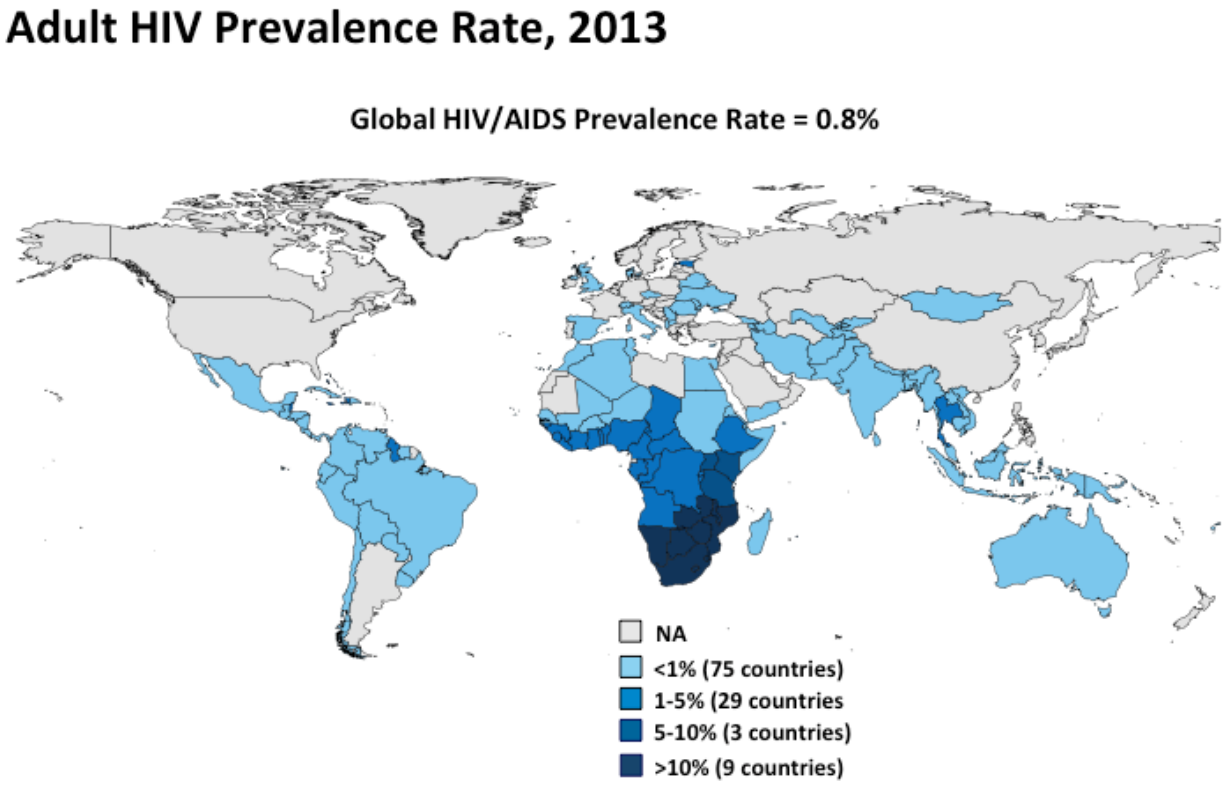




To a large extent: yes

- Worldwide 35 million people are currently living with HIV. Since the start of the epidemic, around 78 million people have become infected with HIV and 39 million have died of AIDS-related illnesses.
- In 2013, 2.1 million people became newly infected with HIV and 1.5 million died from AIDS.

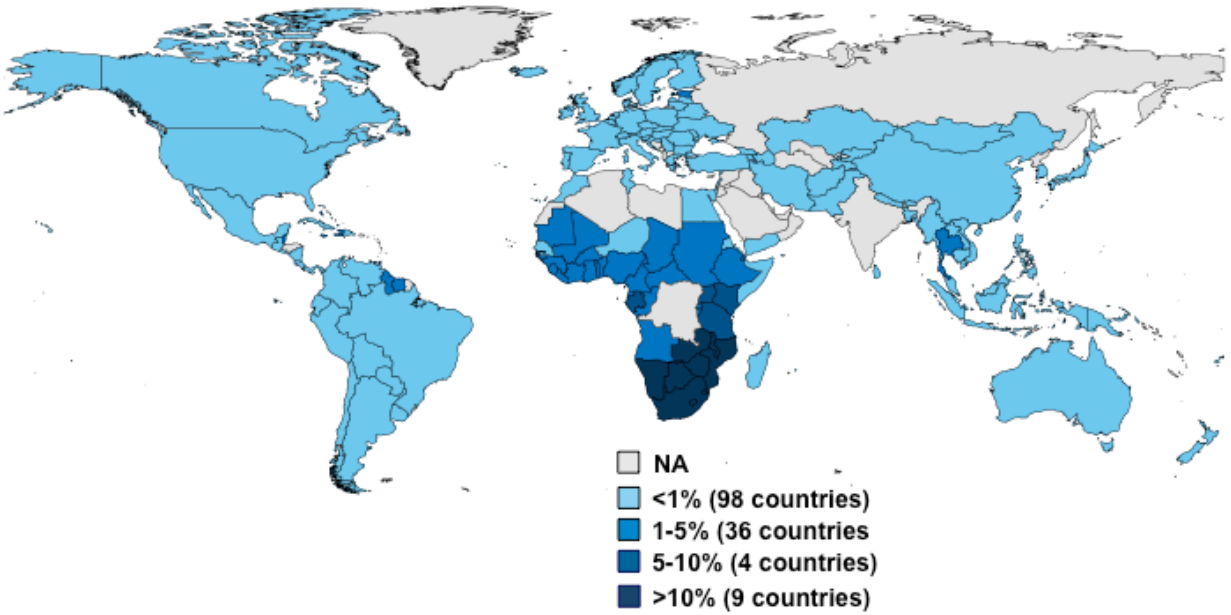
But large geographical disparities



NOTES: Data are estimates. Prevalence rates include adults ages 15-49. The estimate for Sudan represents data for Sudan only. The estimate for South Sudan is 2.2%.
SOURCE: Kaiser Family Foundation, www.GlobalHealthFacts.org, based on UNAIDS, GAP Report; 2014.

Adult HIV Prevalence Rate, 2011

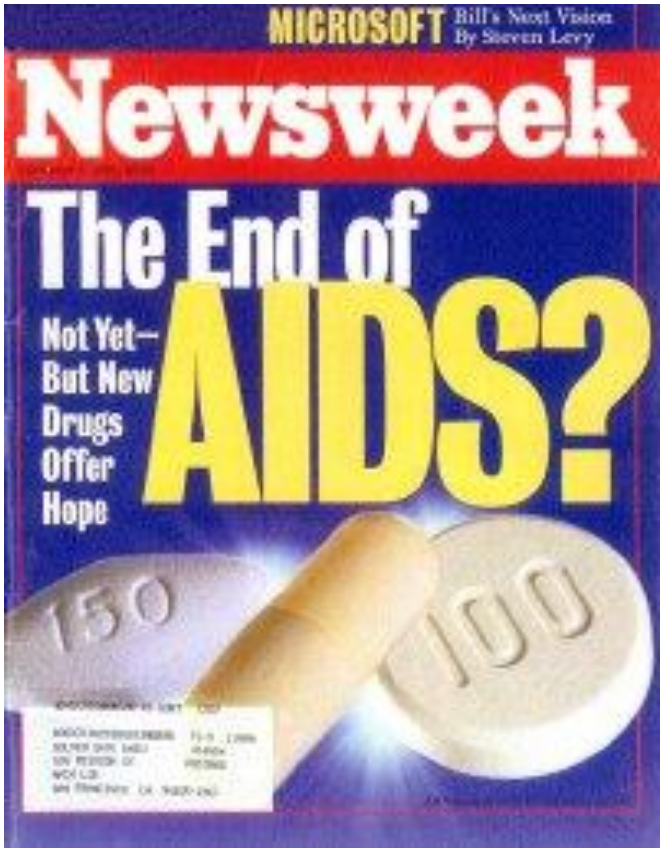
Global HIV Prevalence Rate = 0.8%



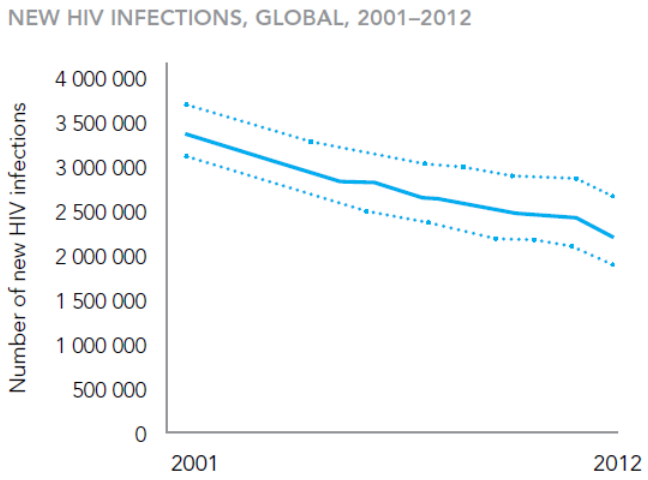
NOTES: Data are estimates. Prevalence rates include adults ages 15-49. The estimate for Sudan represents data for South Sudan. An estimate was provided for Sudan and is <1%.
SOURCE: Kaiser Family Foundation, www.GlobalHealthFacts.org, based on UNAIDS, Report on the Global AIDS Epidemic; 2012.

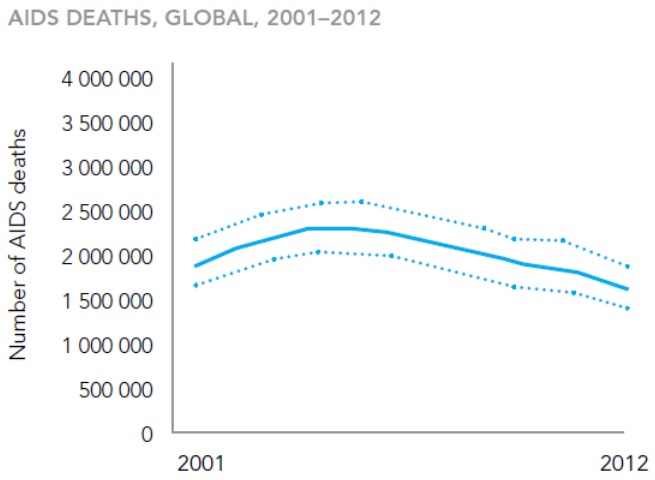
THE HENRY J. KAISER FAMILY FOUNDATION

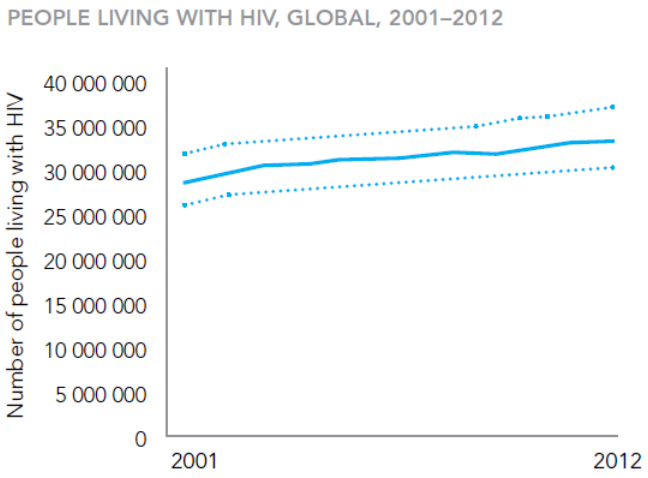
And in the last decade positive developments

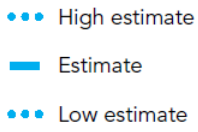


Numbers of people living with HIV, new HIV infections, and AIDS deaths, 2001-2012, globally



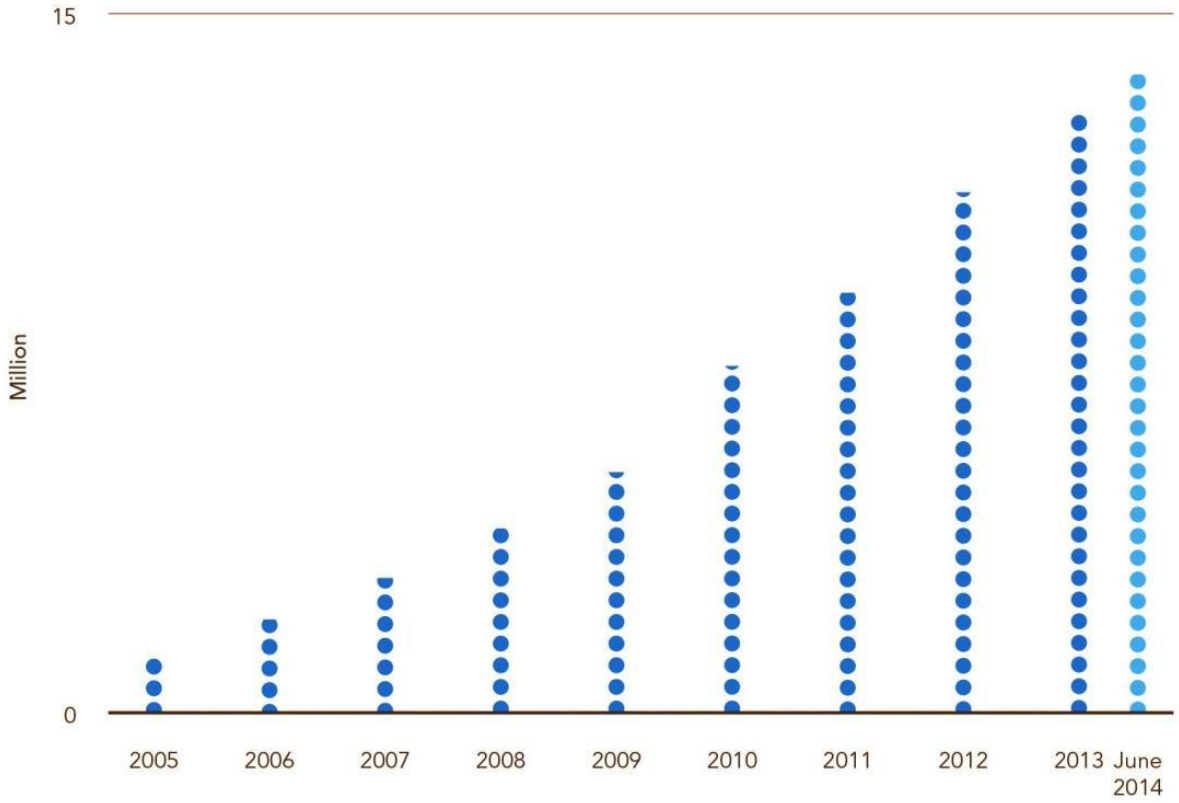






Source: UNAIDS 2012 estimates.

People receiving antiretroviral therapy, 2005 to June 2014, all countries

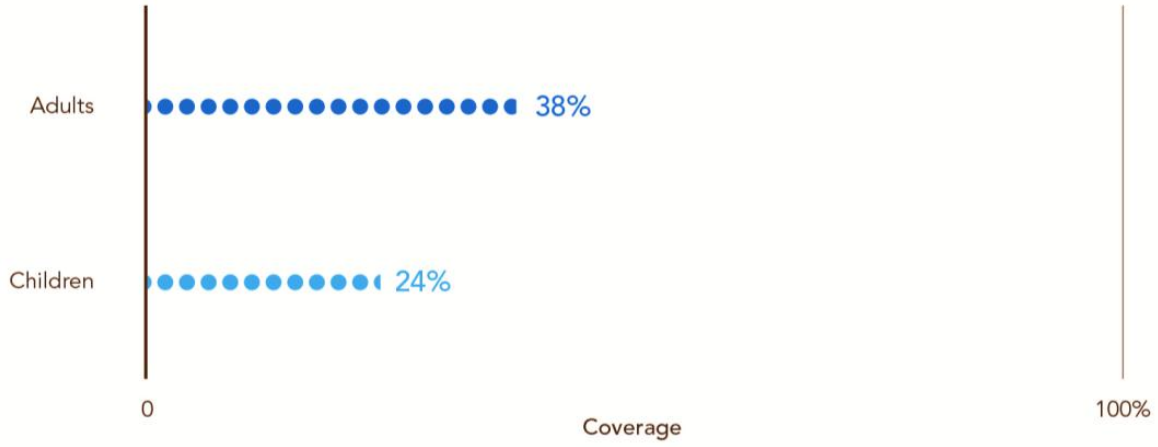


13.6 MILLION

People receiving antiretroviral therapy, June 2014

UNAIDS

Antiretroviral therapy coverage for adults and children, 2013



UNAIDS

The Moral and Fiscal Implications of Anti-Retroviral Therapies for HIV in Africa

Collier, Sterck and Manning, 2015

- Thanks to anti-retroviral therapies, people living with HIV in developing countries can now have a near-normal life at a cost of a few hundred dollars per year.
- Given this low cost of maintaining lives, there is a moral duty to rescue those who are infected.
- But treatment is life-long.
- Fiscal consequences of this duty create a financial quasi-liability which for some African countries is comparable to their debt-to-GDP ratios.

The Moral and Fiscal Implications of Anti-Retroviral Therapies for HIV in Africa (2)

Collier, Sterck and Manning, 2015

- Expenditures on prevention can pre-empt some of these liabilities.
- Extending the model to two players, they show that if the international community accepts part of the quasi-liability,(as it does), it should finance an equal share of prevention and treatment efforts.
- Any imbalance in this distribution would introduce moral hazard and lead to a sub-optimal level of prevention.

There ain’t no cure for love!
And there is still no cure for AIDS…

For prevention, we need to understand behavior

For prevention, we need to understand behavior

MAX $_{c1,\ c2,\ n1,\ n2,\ \pi1,\ \pi2}$

$$U(c_1) + \mathrm{V}(\mathrm{n}_1) + \beta Q[U(c_2) + V(n_2)]$$

s.t.

$$c_1 + (p_n + p_\pi \pi_1) n_1 + \frac{Q}{1+r}[\mathrm{c}_2 + (p_n + p_\pi \pi_2) n_2] = W(Ki)(1 + \frac{Q}{1+r})$$

$$Q = Q(\gamma_1 n_1\ (1 - \pi_1)$$

STIs?
HIV?
~~STIs~~
~~HIV~~

Determinants of behavior: Example: education

Author's personal copy

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Journal of Development Economics 84 (2007) 686–714

JOURNAL OF Development ECONOMICS

www.elsevier.com/locate/econbase

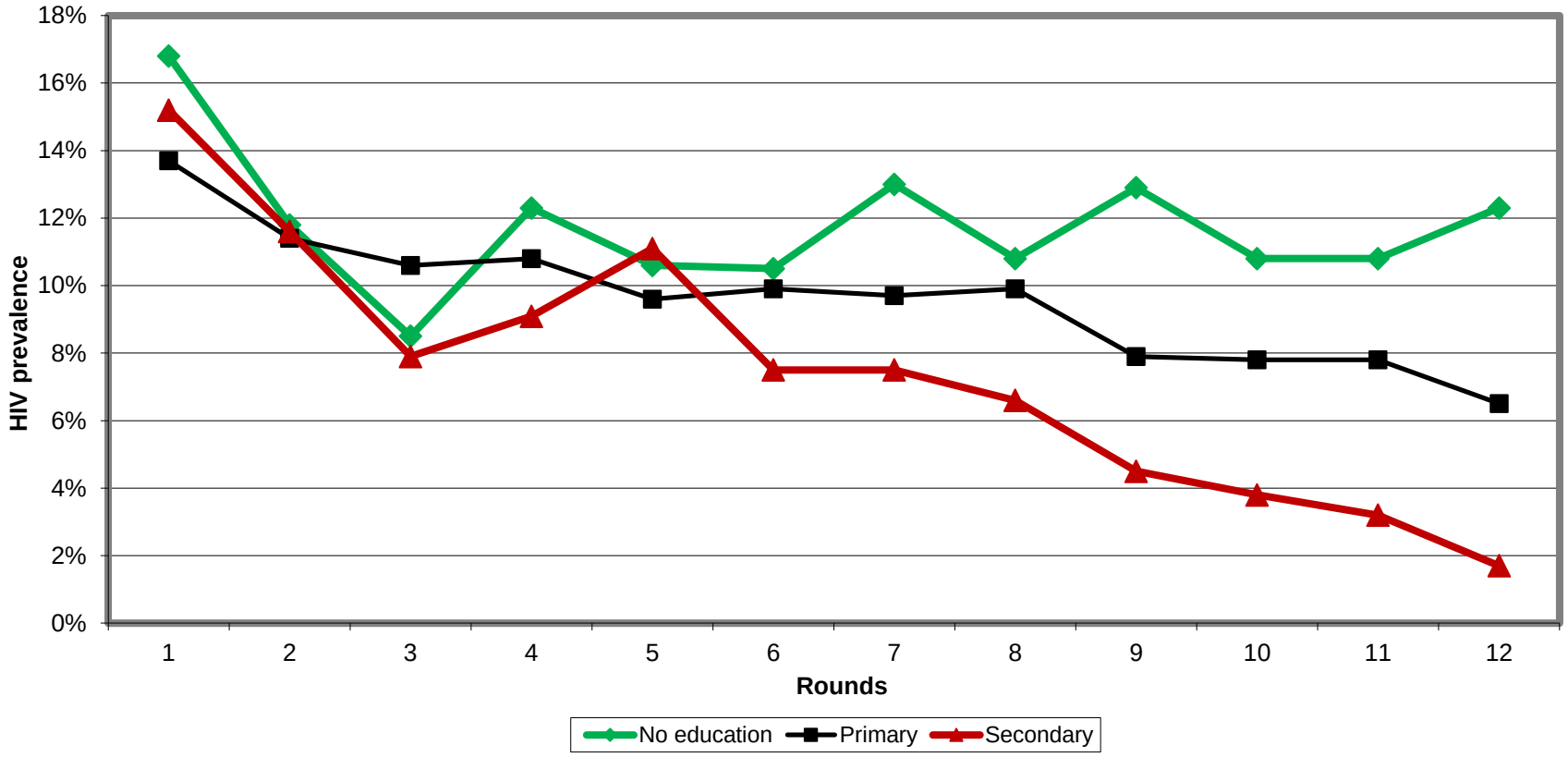
How does the impact of an HIV/AIDS information campaign vary with educational attainment? Evidence from rural Uganda ☆

Damien de Walque *

The World Bank, Development Research Group, 1818 H Street, NW, Washington, DC 20433, United States

Determinants of behavior: Example: education

Figure 2: HIV prevalence by education category, MRC General Population Cohort, Rural Uganda, 1990-2001. Individuals aged 18-29



Determinants of behavior: Example: occupation

Journal of African Economies Advance Access published March 15, 2012

Journal of African Economies, Vol. 0, number 0, pp. 1–34
doi:10.1093/jae/ejs005

Mines, Migration and HIV/AIDS in Southern Africa

Lucia Corno[a] and Damien de Walque[b,*]

Determinants of behavior: Example: gender

Sero-Discordant Couples in Five African Countries: Implications for Prevention Strategies

DAMIEN DE WALQUE

HIV status in discordant couples in sub-Saharan Africa: a systematic review and meta-analysis

Oghenowede Eyawo, Damien de Walque, Nathan Ford, Gloria Gakii, Richard T Lester, Edward J Mills

Lancet Infect Dis 2010; 10: 770–77

Published Online October 5, 2010

Summary

Background Most couples affected by HIV/AIDS in sub-Saharan Africa live in discordant relationships. Men are thought to be the index case in most relationships, and most social marketing and awareness campaigns are focused on men. We investigated serodiscordance in stable relationships to establish the gender balance of index-case infections.

Research on sero-discordant couples, as summarized on a blog

Karen Grepin's Global Health Blog

global health policy issues

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A public health approach to suicide prevention from pesticides

Where I will be next week: Surgery Conference in Boston

Men are Dogs. Aren't they?

On October 29, 2010, in Africa, behavior, global health, HIV/AIDS, prevention, research, by Karen Grepin

An interesting phenomenon in the HIV epidemic is that among African couples where at least one member is infected with HIV, in nearly two thirds of the cases only one member is actually infected – that is that there is a very high prevalence of "serodiscordance". Serodiscordance can happen when transmission has not yet occurred between new couples or in a stable relationship when one partner acquires the virus elsewhere an introduces it into the relationship (for example if one member is cheating). Transmission of virus within existing couples is an important source of new infections and therefore prevention messages must still be targeted towards married or other stable couples. It is also part of the appeal of the "concurrency" hypothesis as a dominant mode of HIV transmission.

The stereotypical view of this situation is that African men are ones that introduce HIV into relationships – they are the ones that engage in extra-marital relationships, they are the ones that hire prostitutes, they are polygamous, they have more power in sexual relationships, etc – in short, they are dogs [exaggeration added]. A new study, which includes both a meta-analysis as well as secondary analysis using population based DHS data, sugests that this stereotype may not be justified – that women might be as likely to be the "index case" as men.

Oghenowede Eyawo and co-authors find:

> The proportion of HIV-positive women in stable heterosexual serodiscordant relationships was 47% (95% CI 43–52), which shows that women are as likely as men to be the index partner in a discordant couple. DHS data (46%, 41–51) and our sensitivity analysis (47%, 43–52) showed similar findings.

Of course there might be biases that occur outside of relationship formation that might lead to more gender balance in more stable relationship vs. other forms of relationships that we might also care about. But the findings of this study are very interesting from a policy perspective because much HIV programming focuses more on men as index case than women and if this is not true than additional efforts must also be directed at women as well.

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“Discordant couples”

- Not analysis of marital disagreement!
- Analysis of HIV status with the couple as the unit of observation
- Interesting to study the dynamics of HIV infection inside couple
- Formally married couple and couples in unions (living together for at least 12 months)

Pervasive, if unstated, belief

- Unfaithful males are the main link between "high risk" groups and the general population.
- UNAIDS, UNFPA, UNIFEM, 2004:
- *"Nearly universally, cultural expectations have encouraged men to have multiple partners, while women are expected to abstain and be faithful".*
- *"Faithfulness offers little protection to wives whose husbands have several partners or were infected before they were married".*

Discordance in HIV status

- Concordant negative: both HIV negative
- Concordant positive: both HIV positive
- Discordant male: male positive, female negative
- Discordant female: male negative, female positive

HIV Status

HIV status of the couple	Burkina Faso (n = 2157)		Cameroon (n = 2015)		Ghana (n = 1825)		Kenya (n = 1086)		Tanzania (n=2214)	
Concordant negative	0.9690	n.a.	0.9257	n.a.	0.9584	n.a.	0.8906	n.a.	0.8952	n.a.
	[0.0058]		[0.0074]		[0.0058]		[0.0126]		[0.0087]	
Concordant positive	0.0045	0.1483	0.0235	0.3168	0.0091	0.2205	0.0364	0.3336	0.0259	0.2479
	[0.0016]	[0.0492]	[0.0043]	[0.0445]	[0.0024]	[0.0505]	[0.0071]	[0.0509]	[0.0038]	[0.0311]
Discordant male	0.0169	0.5492	0.0242	0.3261	0.0167	0.4026	0.0284	0.2601	0.0439	0.4195
	[0.0046]	[0.0826]	[0.0035]	[0.0362]	[0.0032]	[0.0606]	[0.0058]	[0.0419]	[0.0055]	[0.0377]
Discordant female	0.0093	0.3024	0.0265	0.3569	0.0156	0.3768	0.0444	0.4062	0.0348	0.3324
	[0.0022]	[0.0627]	[0.0037]	[0.0405]	[0.0032]	[0.0617]	[0.0070]	[0.0507]	[0.0046]	[0.0367]

Surprising statistics (1)

At least 2/3 of the infected couples are **discordant** couples.

- This means that there is scope for prevention among couples.
- Could be due to the fact that couples are good at protecting themselves once one is infected.
- But unlikely, given that at least 71.5% (C) of couples where none has been for voluntary testing and that at least 88.9% (BF) agree that they did not use a condom at their last sexual intercourse

Surprising statistics (2)

Between 30.2% and 40.6% of infected couples are "discordant female", where the woman is infected and not the man.

- At odds with common perception that unfaithful males are the "bridging" population between high-risk groups and the general population
- Apparently difficult to reconcile with self-reported levels of extra-marital sexual activity among married women.

Potential explanations for sizeable fraction of “discordant females”

- Extra-marital sex by married women is more common than reported.
- Extra-marital sex by married women is a very risky activity (male-to-female transmission rate higher, low condom use, extra-marital partner very likely to be infected).
- HIV infection of woman dates from before marriage or from previous marriage.

Women who have been in only one marriage and for at least 10 years

HIV status of the couple	Burkina Faso (n = 1002)		Cameroon (n = 748)		Ghana (n = 812)		Kenya (n = 482)		Tanzania (n=784)	
Concordant negative	0.9701	n.a.	0.9565	n.a.	0.97	n.a.	0.9224	n.a.	0.9079	n.a.
	[0.0089]		[0.0078]		[0.0063]		[0.0169]		[0.0123]	
Concordant positive	0.0048	0.1617	0.0175	0.4033	0.0105	0.3507	0.0321	0.4147	0.0320	0.3484
	[0.0025]	[0.0762]	[0.0053]	[0.0948]	[0.0039]	[0.1077]	[0.0104]	[0.1136]	[0.0071]	[0.0632]
Discordant male	0.017	0.5709	0.0113	0.2604	0.0135	0.4535	0.0217	0.2808	0.0397	0.4317
	[0.0074]	[0.1462]	[0.0037]	[0.0785]	[0.0041]	[0.1097]	[0.0082]	[0.0818]	[0.0080]	[0.0698]
Discordant female	0.0079	0.2673	0.0146	0.3361	0.0058	0.1957	0.0235	0.3043	0.0202	0.2197
	[0.0030]	[0.0953]	[0.0045]	[0.0884]	[0.0030]	[0.0913]	[0.0082]	[0.0806]	[0.0057]	[0.0518]

Results confirmed in subsequent meta-analysis

(Eyawo, de Walque, et al. 2010)

The proportion of HIV-positive women in stable heterosexual serodiscordant relationships was 47% (95% CI 43–52), which shows that women are as likely as men to be the index partner in a discordant couple. DHS data (46%, 41–51) and our sensitivity analysis (47%, 43–52) showed similar findings.

Conclusions on “Discordant female”

- Difficult to explain without sexual intercourse outside the union among women
- Need to keep in mind that not all extra-marital sex is consensual (rape, sexual harassment).
- It might be because extra-marital sex is more common than reported, or because, even if infrequent, women are very vulnerable to infection during extra-marital sex (ex: less likely to use condoms than single women and than married men)
- In any event, this seems to be an important source of vulnerability that needs to be targeted in prevention efforts.

Other conclusion: women have more agency in sexual relationships than sometimes thought in Geneva (or Washington)

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Social Science & Medicine 64 (2007) 1090–1101

SOCIAL SCIENCE & MEDICINE

www.elsevier.com/locate/socscimed

Sex in Geneva, sex in Lilongwe, and sex in Balaka

Linda Tawfik[a,*], Susan Cotts Watkins[b]

How can we influence behaviors?

- Mass information, education, and communication (IEC) campaigns: are important, but might be complemented by strengthening motivation to act on that information.

- Research finds HIV testing and counseling, condom distribution can be cost-effective... but by themselves may not change trajectory of the epidemic.

- In Tanzanian youth:
  - Awareness of HIV prevention methods is high, but use of those methods is low.
  - Condoms are cheap, but low use

How can we influence behaviors?

- Novel approaches needed! Conditional cash transfers (CCT) have been promising in other domains …

- Could they be used/adapted to help slow the AIDS epidemic?

$ → ↓HIV?

STIs?
HIV?

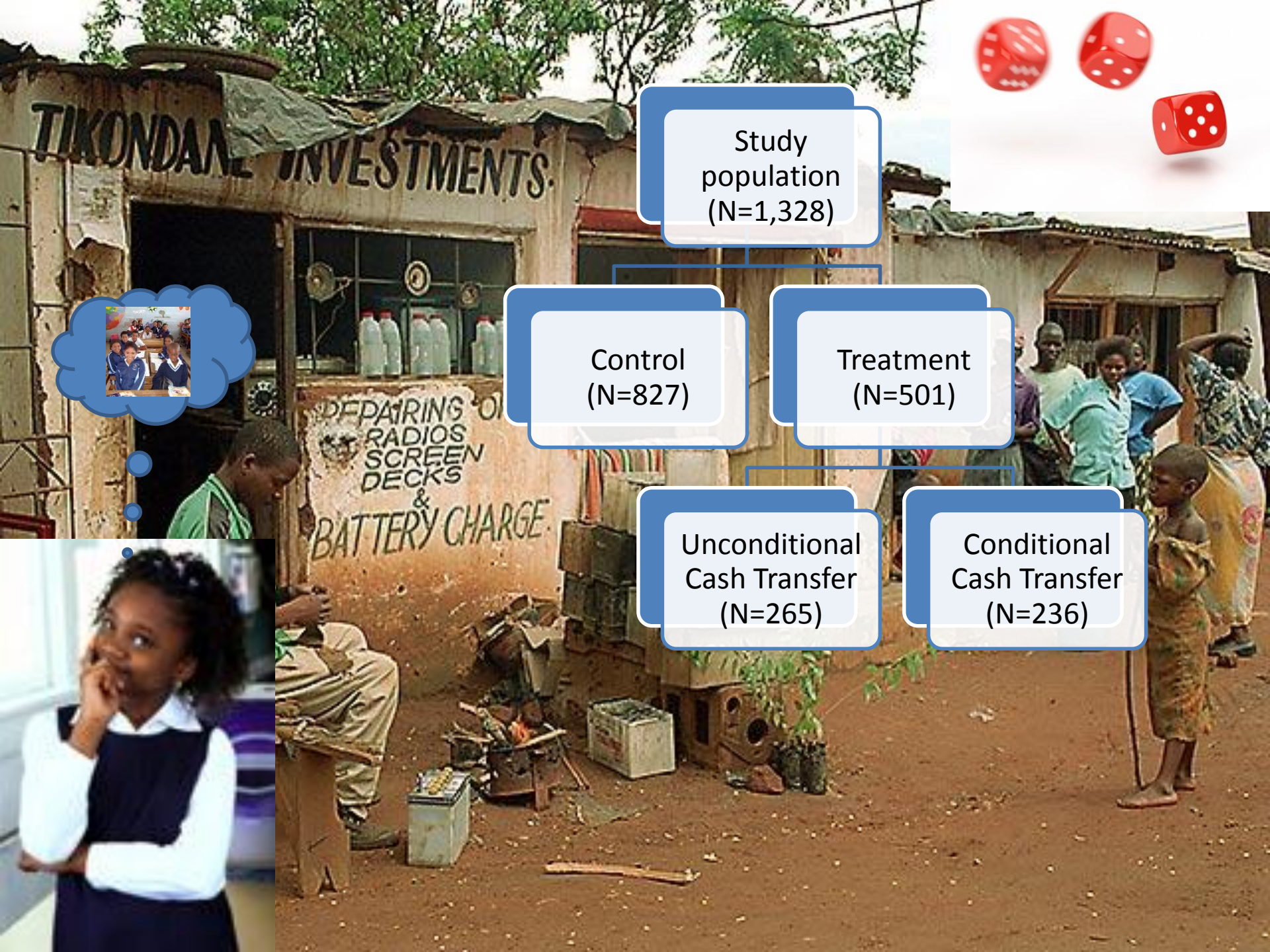
Baird, Garfein, McIntosh and Özler, 2012.

$ → ↓HIV?

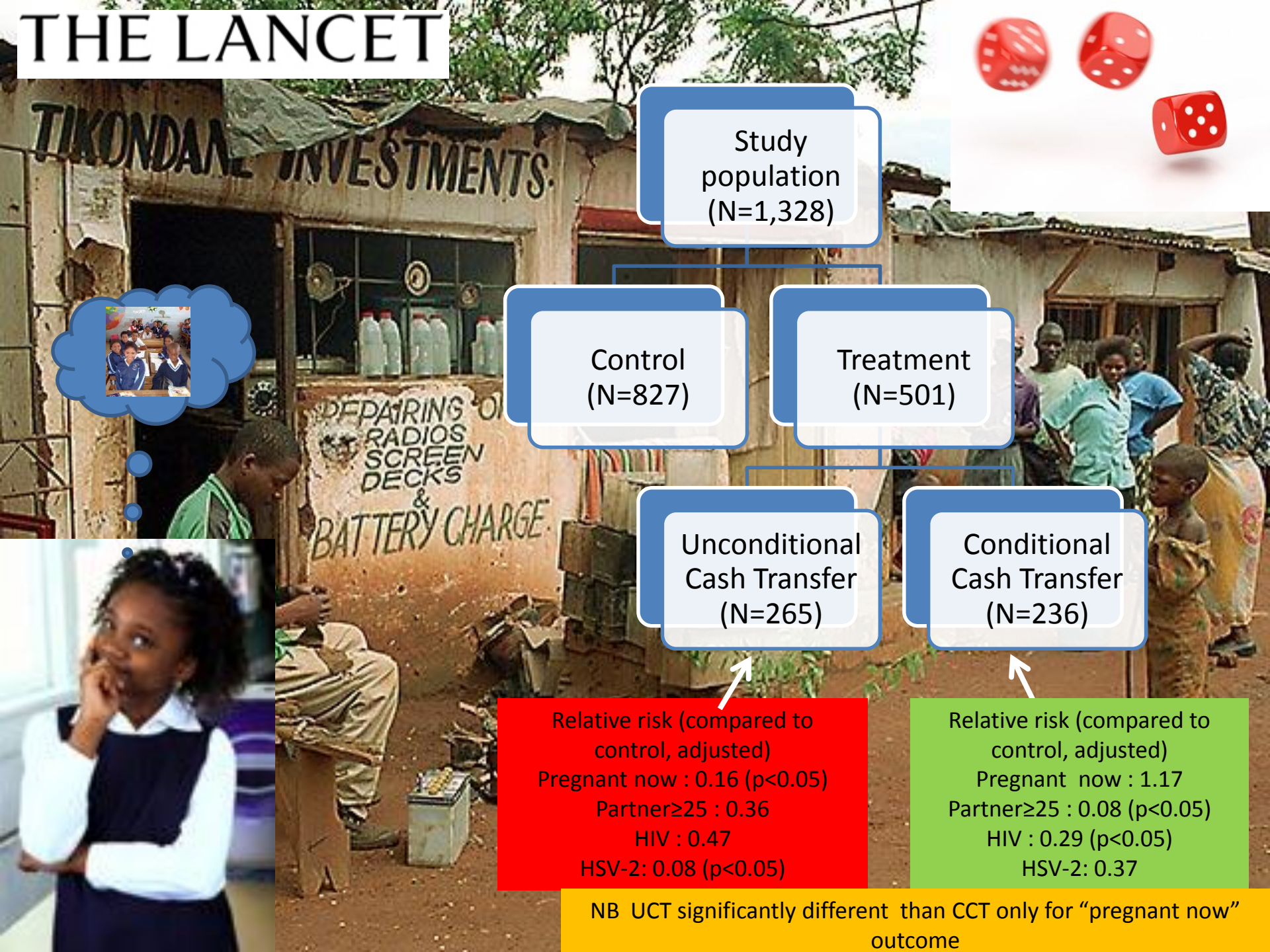
STDs?
HIV?

+

STIs?
HIV?


TIKONDA INVESTMENTS
REPAIRING
RADIOS
SCREEN
DECKS
&
BATTERY CHARGE
Study population (N=1,328)
Control (N=827)
Treatment (N=501)
Unconditional Cash Transfer (N=265)
Conditional Cash Transfer (N=236)

THE LANCET



Study population (N=1,328)

Control (N=827)

Treatment (N=501)

Unconditional Cash Transfer (N=265)

Conditional Cash Transfer (N=236)

Relative risk (compared to control, adjusted)
Pregnant now : 0.16 ($p<0.05$)
Partner≥25 : 0.36
HIV : 0.47
HSV-2: 0.08 ($p<0.05$)

Relative risk (compared to control, adjusted)
Pregnant now : 1.17
Partner≥25 : 0.08 ($p<0.05$)
HIV : 0.29 ($p<0.05$)
HSV-2: 0.37

NB UCT significantly different than CCT only for "pregnant now" outcome

Bribing Africans to be careful is bizarre – and worth a try

The Financial Times

$ → ↓HIV?

STIs?
HIV?

~~STIs~~
~~HIV~~

De Walque, Dow, Nathan et al. 2012

$ → ↓HIV?

STIs?
HIV?

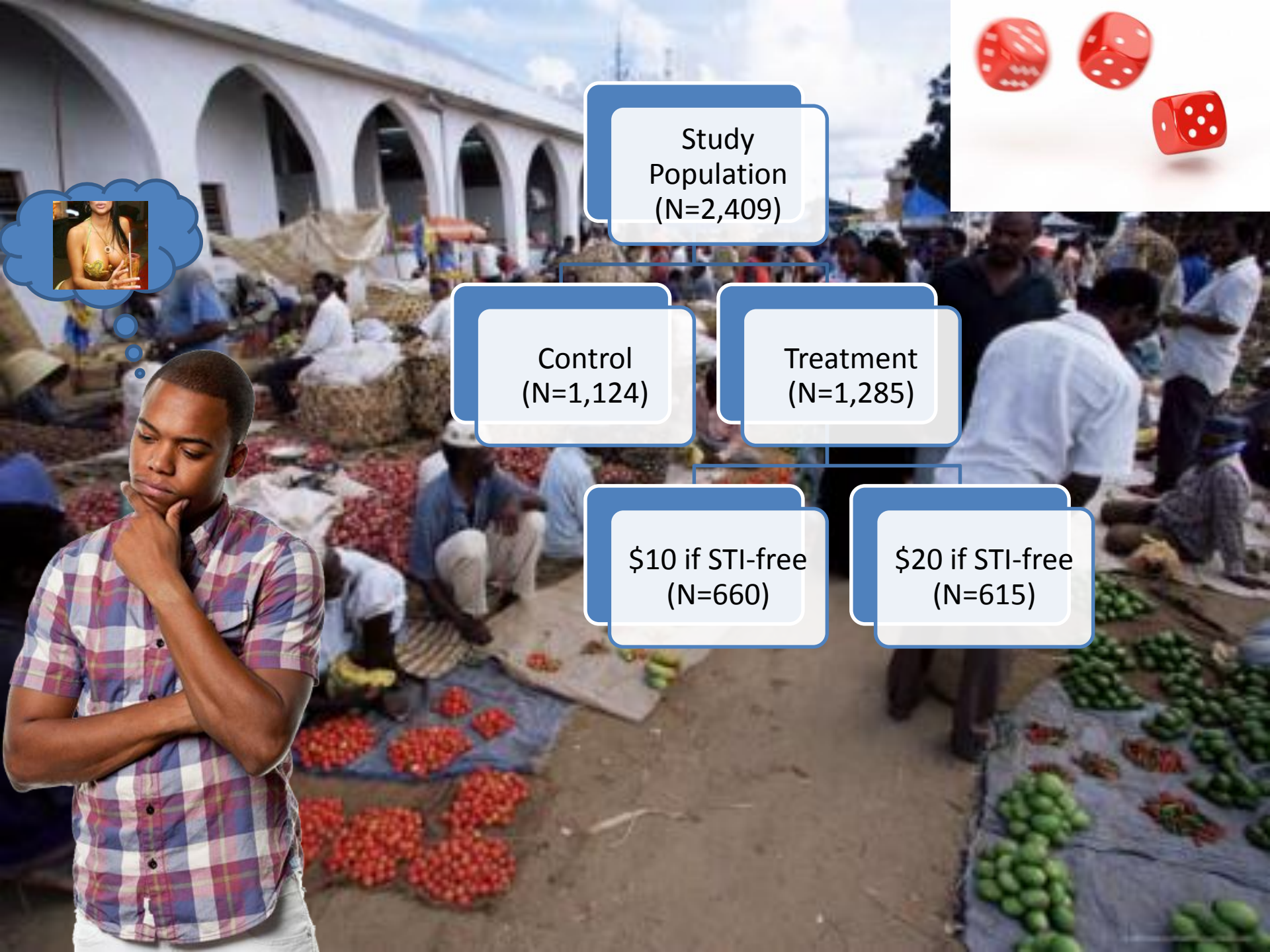
~~STIs~~

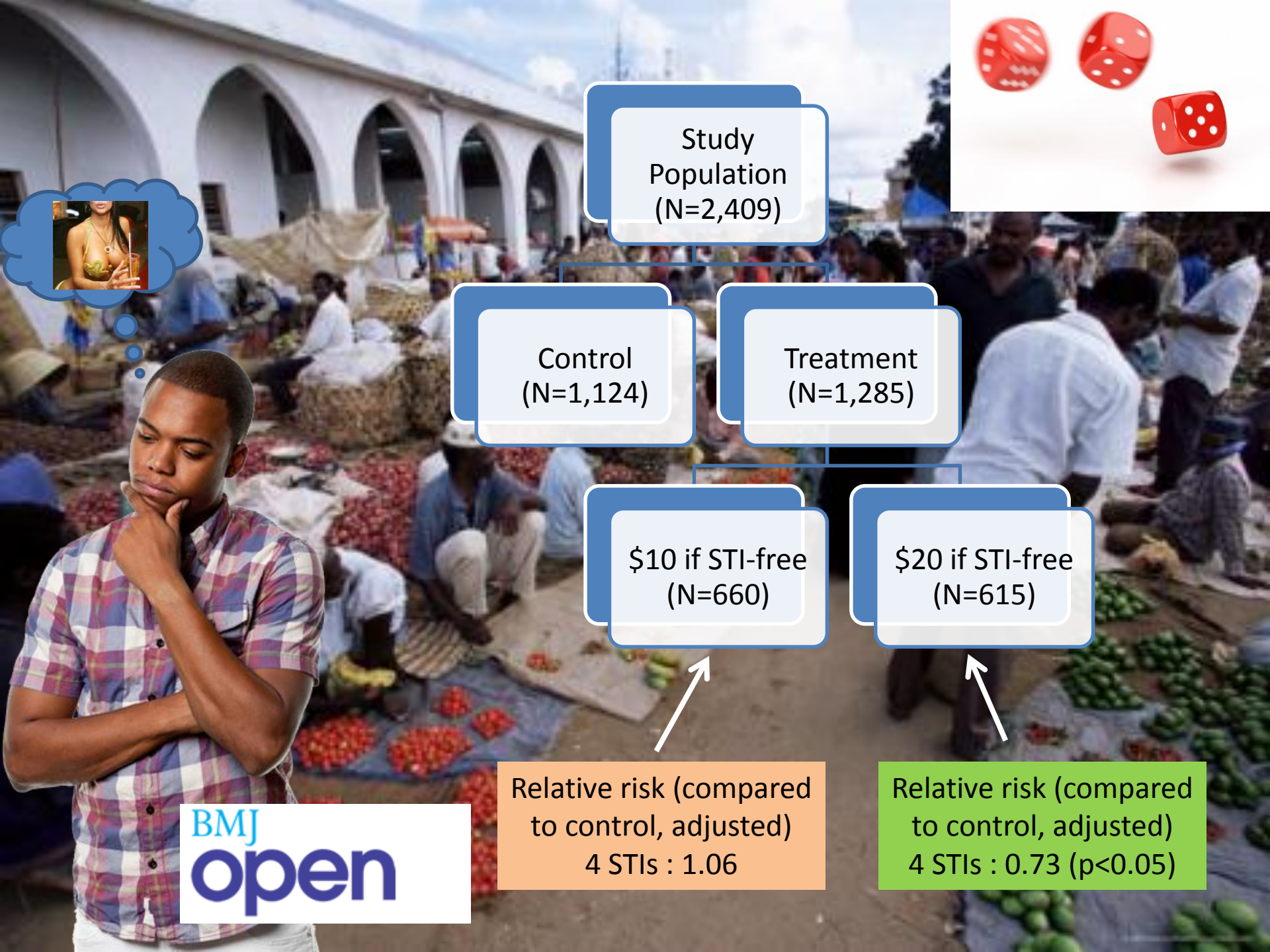
~~HIV~~

STIs?
HIV?

~~STIs~~

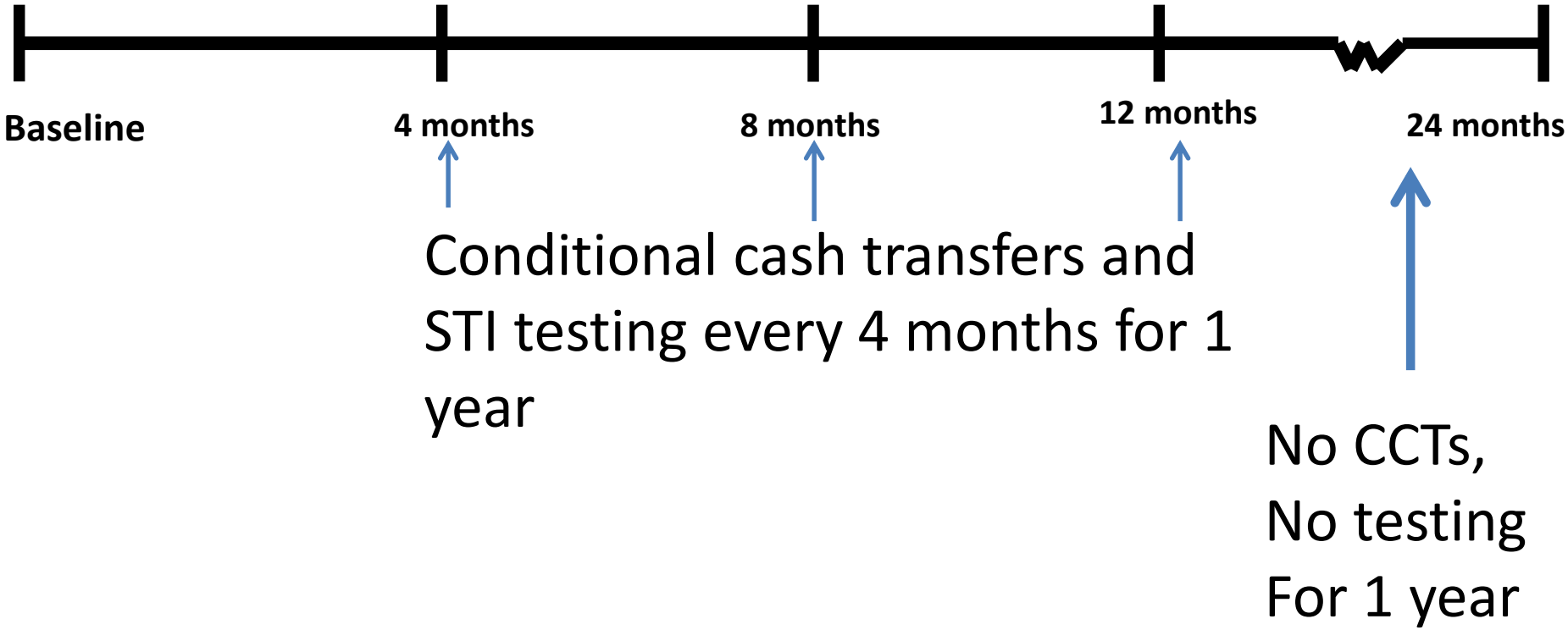
~~HIV~~


Study Population (N=2,409)
Control (N=1,124)
Treatment (N=1,285)
$10 if STI-free (N=660)
$20 if STI-free (N=615)


Study Population (N=2,409)
Control (N=1,124)
Treatment (N=1,285)
$10 if STI-free (N=660)
$20 if STI-free (N=615)
Relative risk (compared to control, adjusted) 4 STIs : 1.06
Relative risk (compared to control, adjusted) 4 STIs : 0.73 (p<0.05)
BMJ open

Should we pay people life-long in order for them to choose safe sex?

Sustained effects after the end of the intervention?



1-Year Post-intervention Follow-Up: Hypotheses

(1) Positive sustained risk reduction: Learning

(2) Zero long-run effect: Incentives must be continued for sustained effect

(3) Adverse long-run effect: The cash transfers destroyed the intrinsic motivation

Results of 1 year post-intervention follow-up

- There were no adverse effects 1-year later

(e.g. from destroyed intrinsic motivation).

- But gender differences:
    - Effect sustained among men.
    - Effect disappeared for women. .

What we really care about is an impact on HIV incidence, the rate of new infections:

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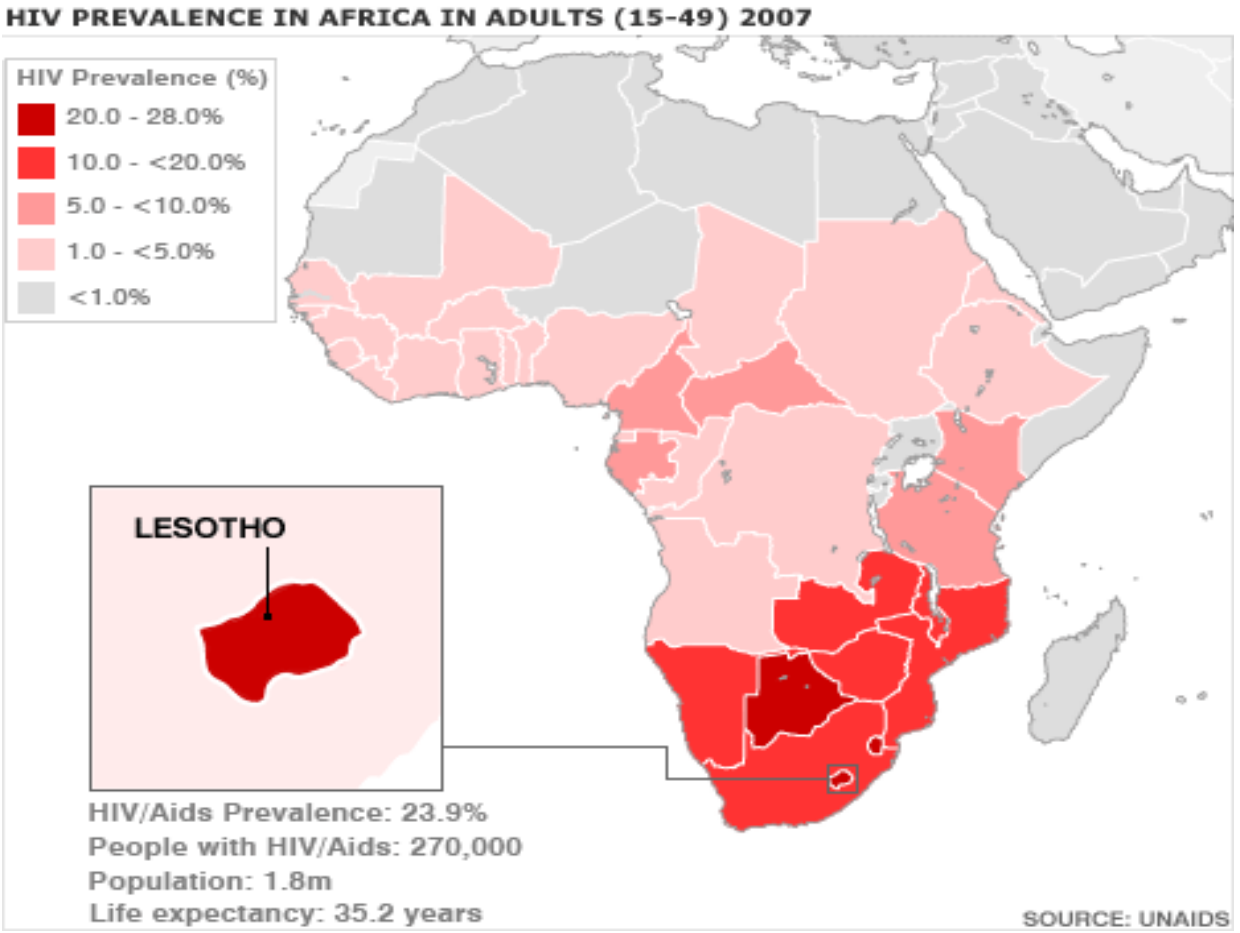


Nice idea, but how do you scale it up?

Nice idea, but how do you scale it up?

Lotteries as incentives for HIV prevention in Lesotho

Lottery Tickets for Staying HIV-Free Cut Infections 25%

Bloomberg
NEWS

→↓HIV?

STIs?
HIV?

~~STIs~~

~~HIV~~

STIs?
HIV?

~~STIs~~

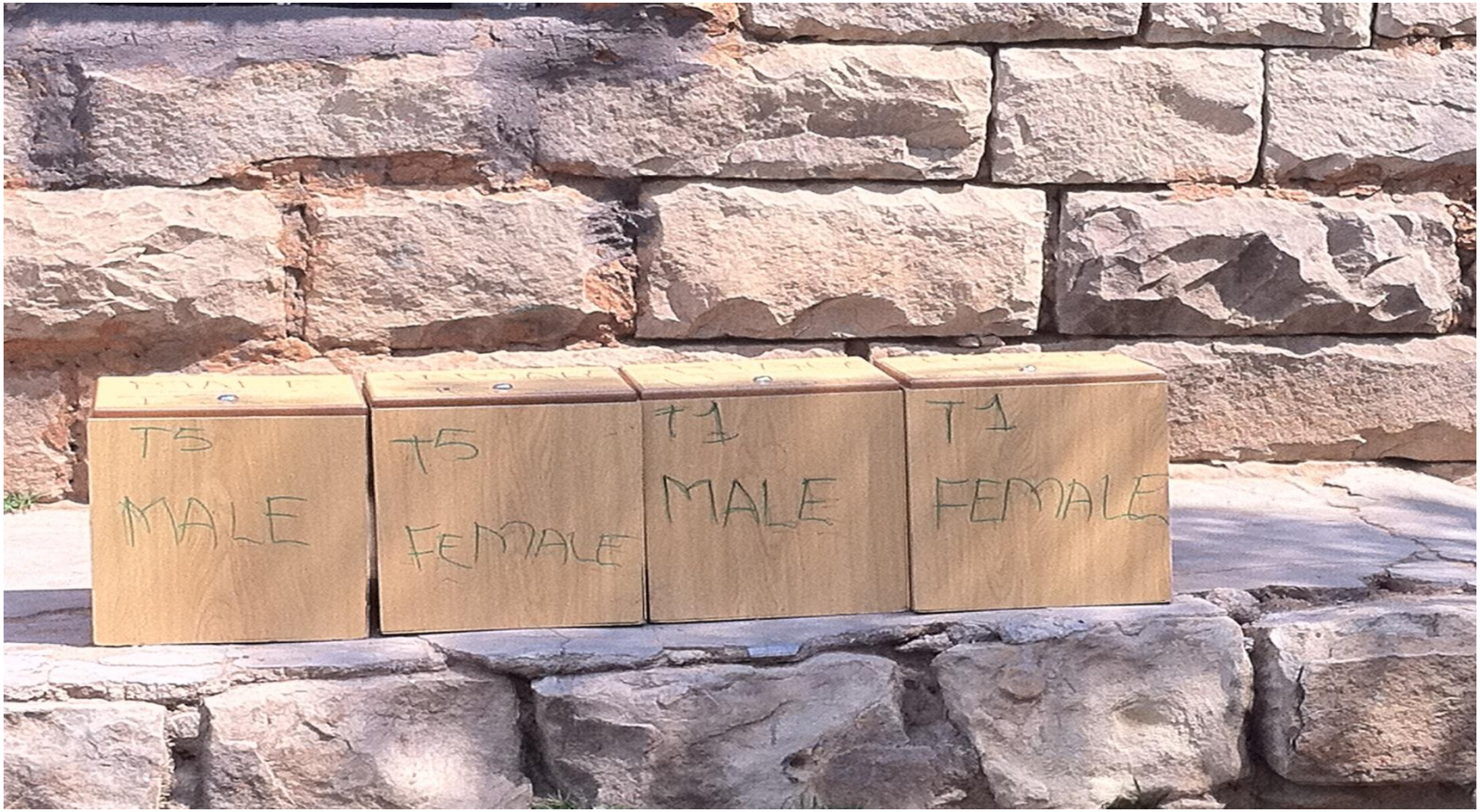
~~HIV~~

Björkman-Nyqvist, Corno, de Walque, Svensson, Under review

Study Population
Men and Women aged 18-32 (N=3,029)
Control (N=1,208)
Treatment (N=1,821)
Lottery ticket for $100 if STI-free (N=962)
Lottery ticket for $50 if STI-free (N=859)

Mobile clinic tested for syphilis and Trichomonas every four months over 2 years + HIV at baseline and months 16, 20 and 24

If in lottery intervention groups (T1 and T5) and STI negative, name entered in lottery boxes.



Size of the incentives

- The lottery rewards (US$50 or US$100) were perceived as significant amounts among respondents.
- From the Labor Force Survey (2008), the monthly salary for an agriculture worker is approximately 300 Maloti (about US$30).
- Last month income as reported in the baseline survey was 276 Maloti (approximately US$28) for males and 79 Maloti (approximately US$8) for females.
- The average expected values of the lotteries were approximately US$6.6 and US$3.3, respectively.

Winners announced and received lottery prizes at public village level ceremonies

After 2 years, HIV incidence is 22% lower in the 2 lotteries groups, effect strongest for women

Prevalence of curable STIs decreased and safe sexual behavior increased.

For high-risk individuals, number of risky sexual encounters reduced by as much as 62 percent.

HIV incidence can be reduced using financial incentives for remaining STI free
A lottery design is easier and cheaper to scale-up
Risk takers love lotteries

Future work: Swaziland

- Evaluate a combination of conditional cash transfers for education and lottery incentives for HIV prevention for young women aged 14-22.
- Test “scaled-up” version of the lottery: no STI test for everybody, but only for the lottery winners, who will win their prize if they are STI negative.

Incentives for safe sex for female sex workers in Dar-es-Salaam

Postscript on responding to Ebola

- Snapshot of state of the Ebola epidemic
- Look at similarities and differences between the epidemics and their implications
- Can we learn from the HIV/AIDS response to inform Ebola response?

Number of cases and deaths as of 2/15/15

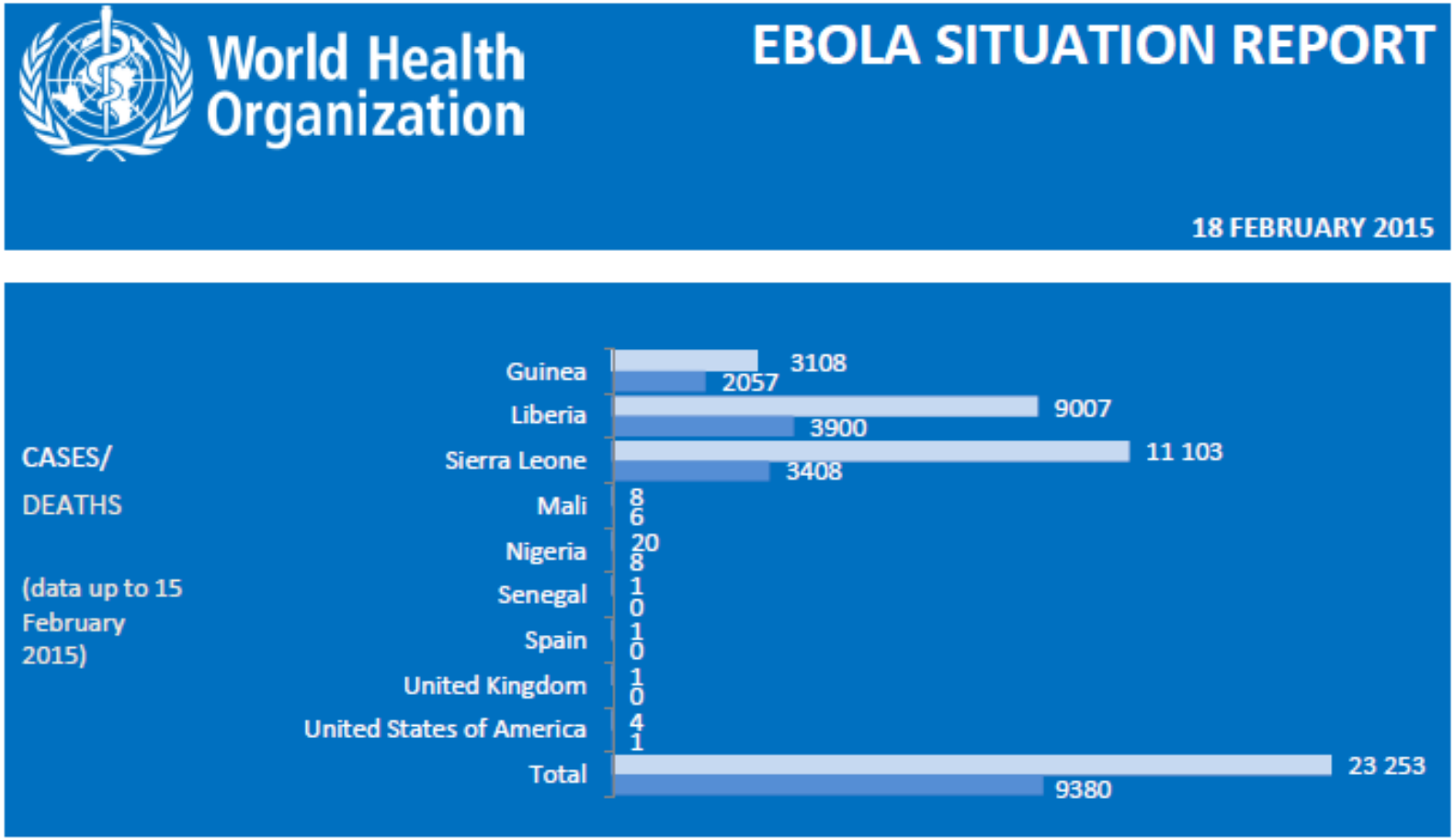
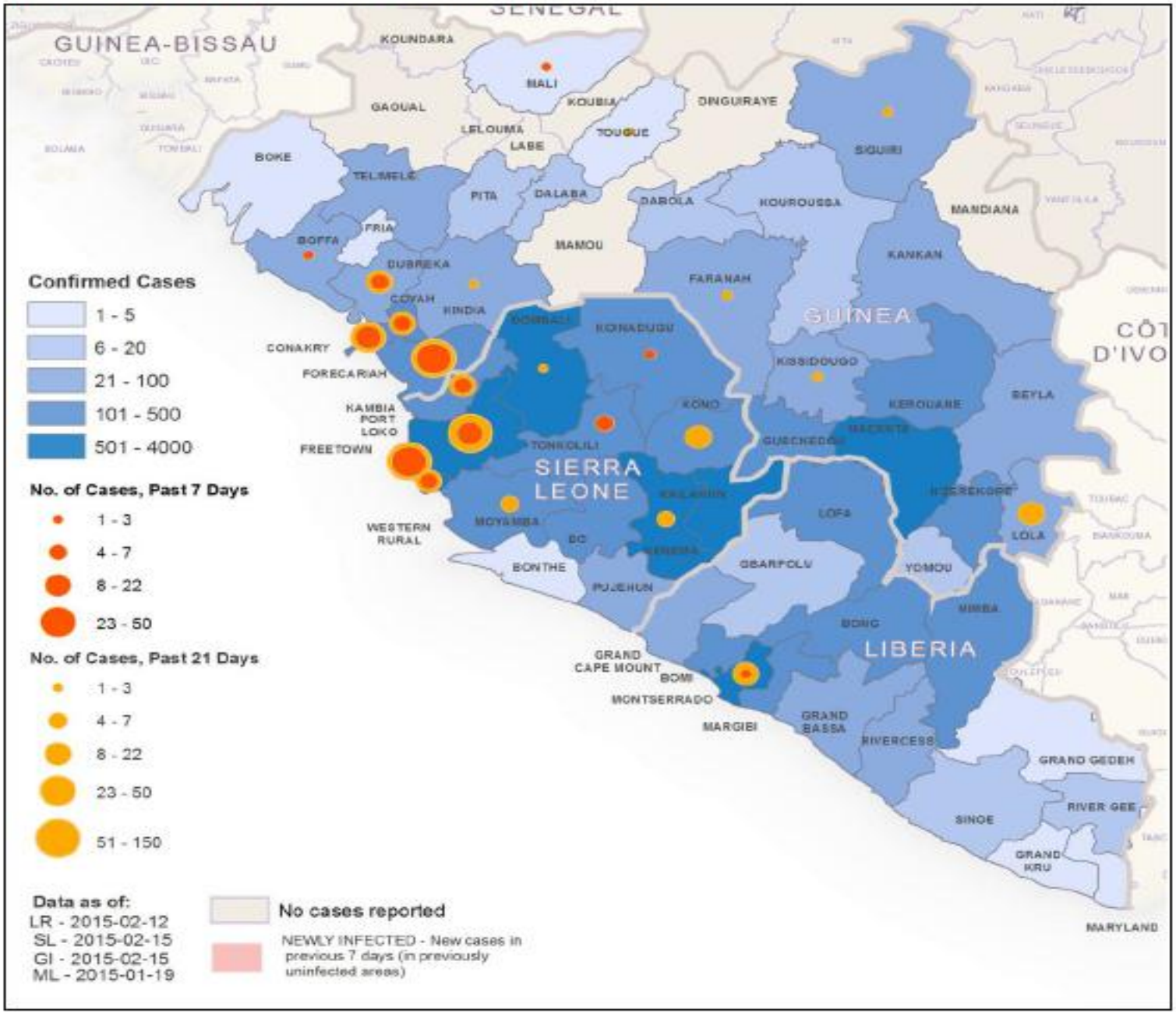


Figure 4: Geographical distribution of new and total confirmed cases



HIV/AIDS and Ebola
Comparing some facts

HIV/AIDS

- Infectious/Communicable disease
- Currently, no vaccine
- Transmission: unsafe sex, unsafe blood, in utero
- Prevention can target specific channels/behaviors: sex, blood (needle sharing, blood transfusion), prevention of mother to child transmission

Ebola

- Infectious/Communicable disease
- Currently, no vaccine
- Transmission: direct contact with blood, secretions, other bodily fluids or organs of infected people and with surface or materials contaminated by those fluids.
- Prevention needs to target a broader set of channels: health care, family based care, traditional burial practices (embalming), etc…

HIV/AIDS and Ebola
Comparing some facts (2)

HIV/AIDS

- Infectious even if no symptoms
- Time between infection and illness (AIDS) is 8-10 years in the absence of antiretroviral treatment.
- Initially very high mortality, but reduced with anti-retroviral
- No cure, but people under anti-retrovirals are less infectious

Ebola

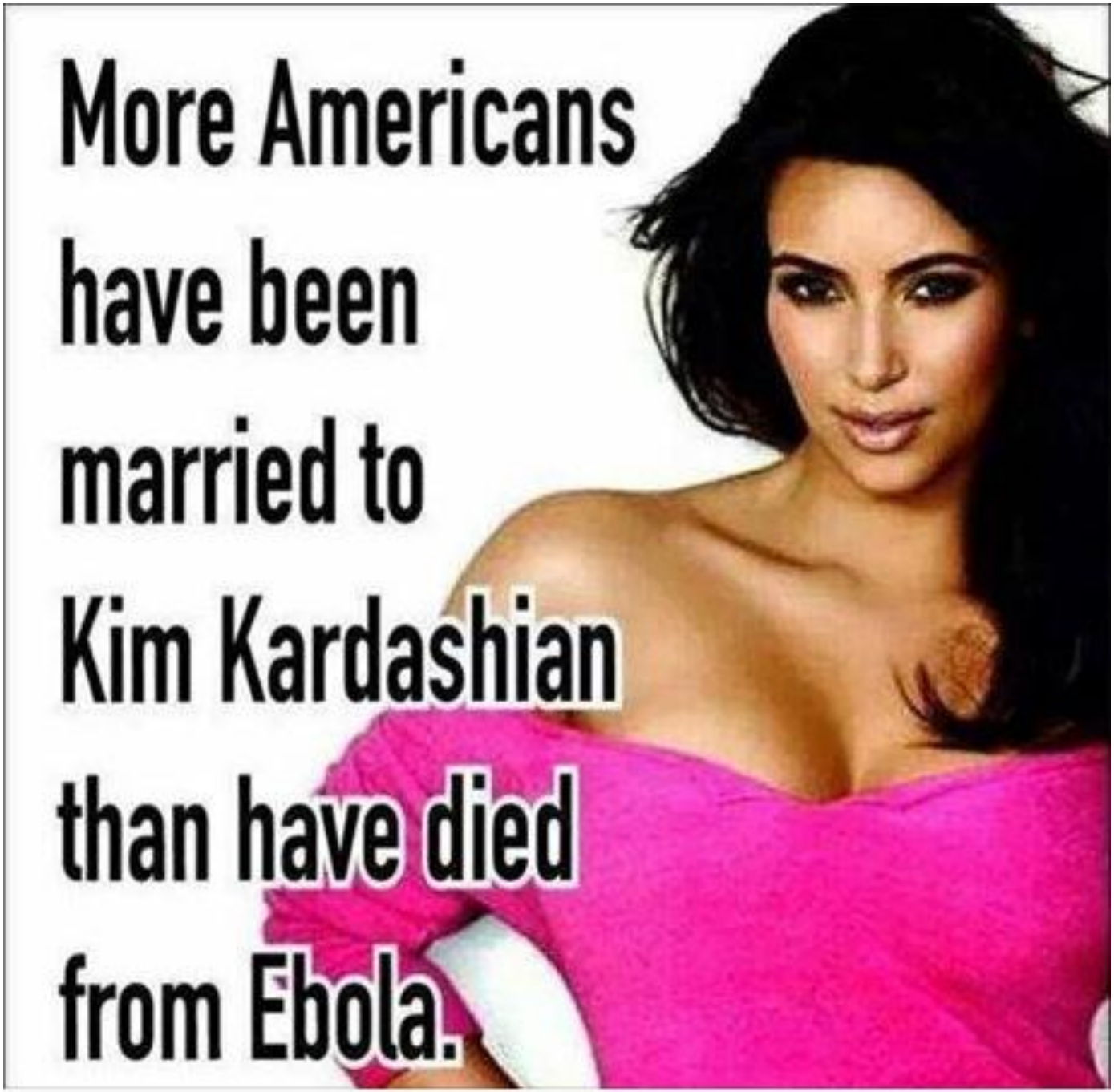
- Not infectious until develop symptoms
- Time between infection and illness (incubation) is 2-21 days
- After that, patient either dead or recovered and immune (People who recover from Ebola develop antibodies that last for at least 10 years)
- Very high mortality (average death rate 40%)

Implications of differences

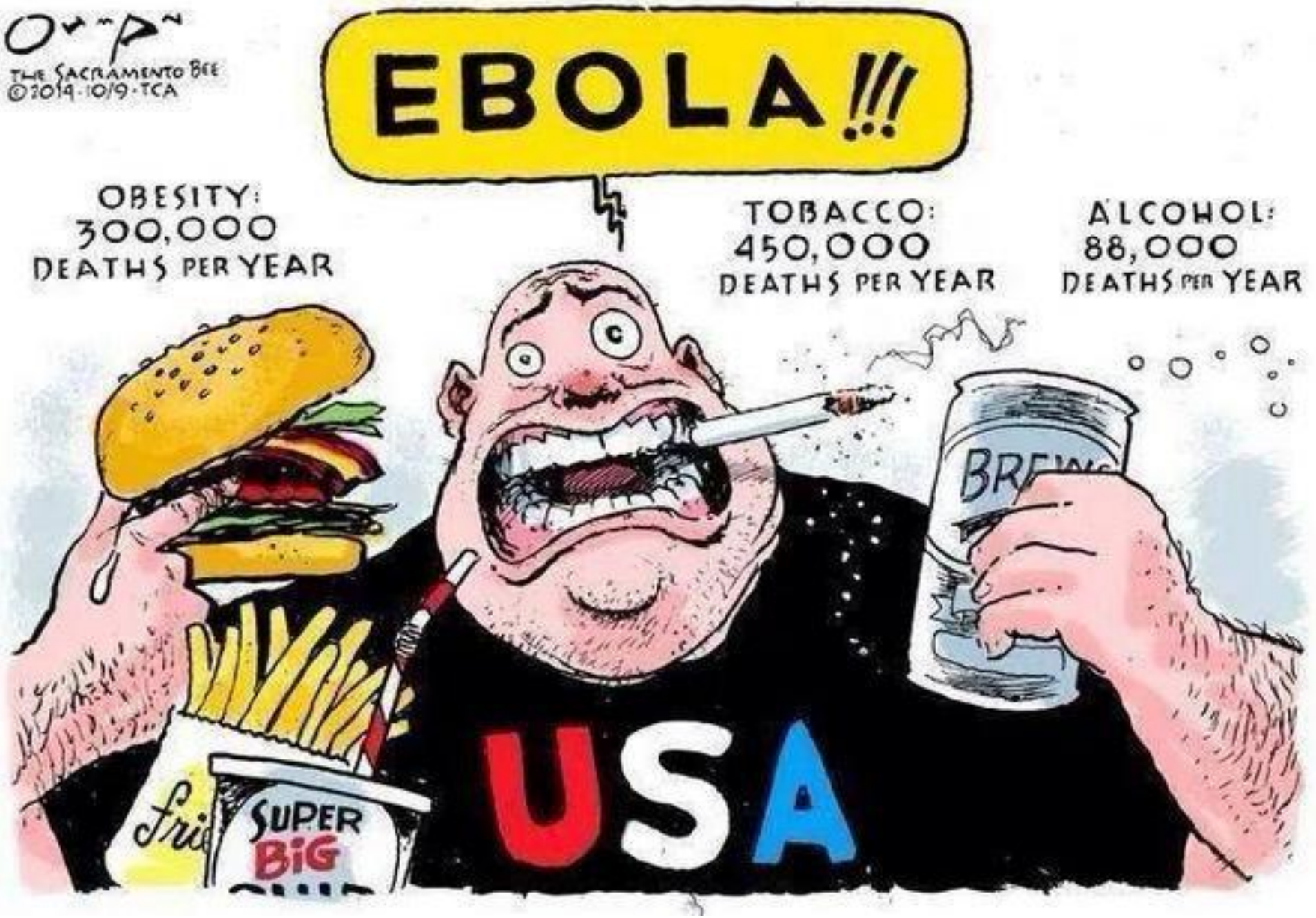
- Pool of (asymptomatic) infectious people much larger for HIV/AIDS
- Normally, HIV/AIDS more difficult to contain than Ebola
- But recent outbreak in West Africa more difficult to contain than earlier. First outbreak affecting large cities.
- And very fast and high mortality of Ebola creates fear, panic : “aversion” behavior
- Prevention for Ebola must target a broader set of behaviors: isolation and contact tracing play a more important role

Ebola is a major threat in Guinea, Liberia and Sierra Leone, but, at this stage, not elsewhere

	Guinea, Liberia, Sierra Leone	Rest of the world
Ebola new cases (last 12 months)	23,218	35
Ebola deaths (last 12 months)	9,365	15
HIV new cases (2012)	13,300	2,100,000
AIDS deaths (2012)	10,100	1,500,000
Deaths due to malaria yearly	-	627,000
Deaths due to diarrhea yearly	-	801,175


More Americans
have been
married to
Kim Kardashian
than have died
from Ebola.

Nevertheless, fear and panic, even in the US

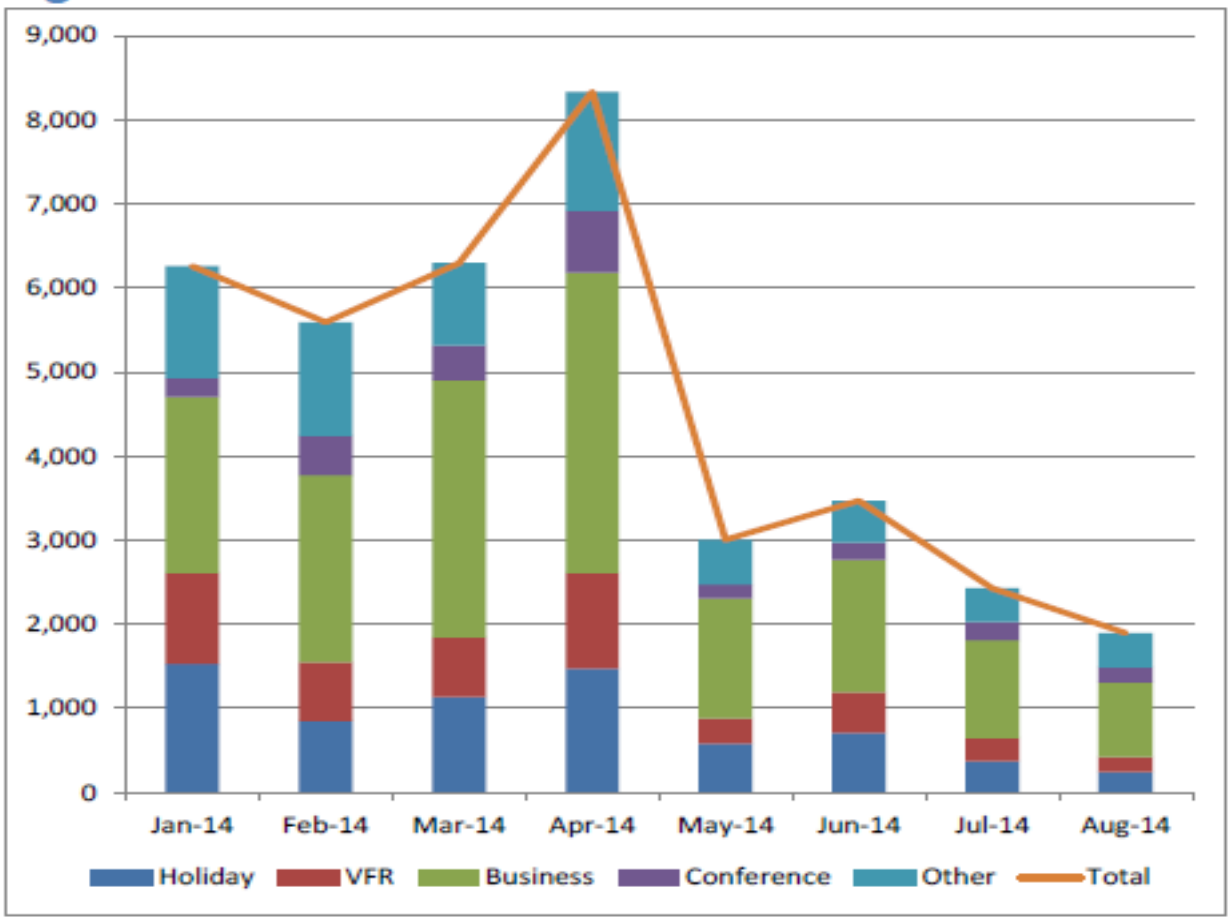

O'P'
THE SACRAMENTO BEE
©2014-10/9-TCA
EBOLA!!!
OBESITY:
300,000
DEATHS PER YEAR
TOBACCO:
450,000
DEATHS PER YEAR
ALCOHOL:
88,000
DEATHS PER YEAR
SUPER
BIG
USA

Fear creates aversion behavior (Mead Over)

- Schools closure in Guinea, Liberia, Sierra Leone
- Rwandan immigrants refused access to school in New Jersey!
- Soccer Africa Cup of Nations moved from Morocco to Equatorial Guinea
- Travel restrictions, quarantines
- (To some extent similar issues at the beginning of HIV/AIDS. Restrictions on US visas for HIV positive individuals until 2008).

Fear creates aversion behavior and exacerbates economic cost

Figure 7: Sierra Leone - Visitor arrivals



Source: Sierra Leone Immigration Department.

In some villages, health workers have been attacked

- Health workers leaving their posts because they are the first exposed and not protected: mortality among health workers very high (Liberia 300 cases, 179 deaths among health staff).

To confront fear, build trust

Building trust

- Honest communication by government
- Work with community to explain isolation of patients, tracing of contacts
- US establishing treatment centers for affected health workers
- It is only after working with religious leaders that progress has been made to stop unsafe burial practices: develop “safe and dignified” burials.
- Same approach was gradually developed for HIV/AIDS (but not easy, still a lot of stigma).

In the long term, build more resilient health systems

- Continue surveillance for early detection of new cases – population need to trust the health system
- Improve motivation of health workers (for example through results-based financing).
- HIV/AIDS similar story: initially an increased burden on fragile health system. But now, in retrospect, in most contexts, the HIV/AIDS response contributed to strengthening health systems.

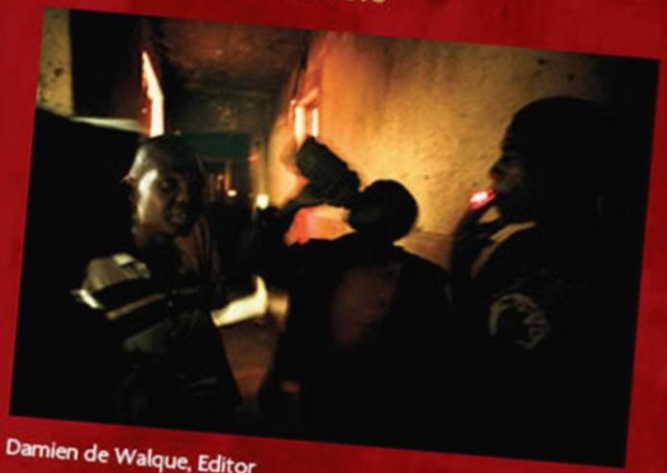
Thank you !

Additional slides

HUMAN DEVELOPMENT PERSPECTIVES

Risking Your Health

Causes, Consequences, and Interventions to Prevent Risky Behaviors



Damien de Walque, Editor

THE WORLD BANK

Risking Your Health

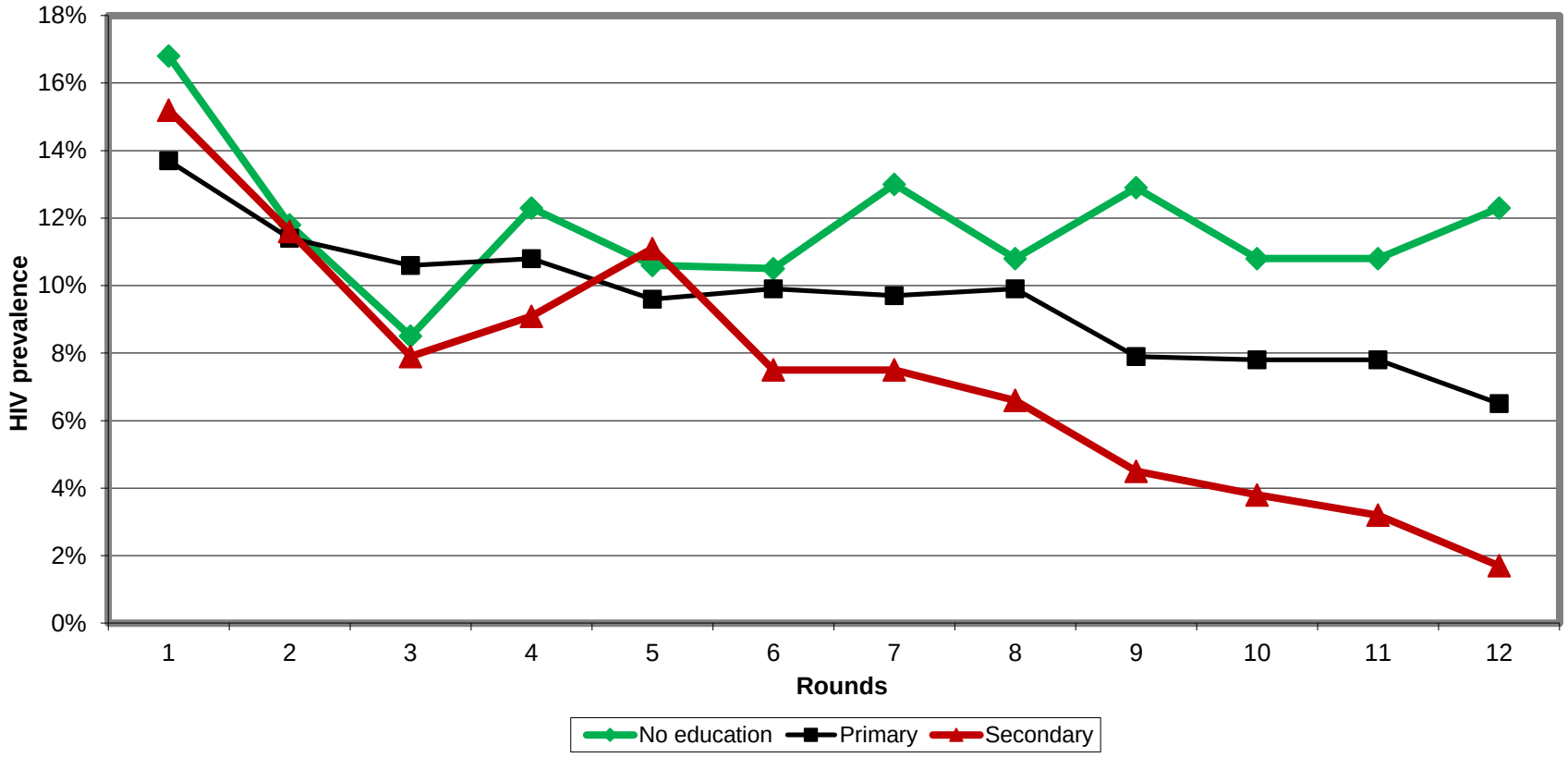
- Risky behaviors for health
  - Drug use
  - Tobacco smoking
  - Alcohol abuse
  - Unhealthy food and lack of exercise
  - Risky sex

Disclaimer

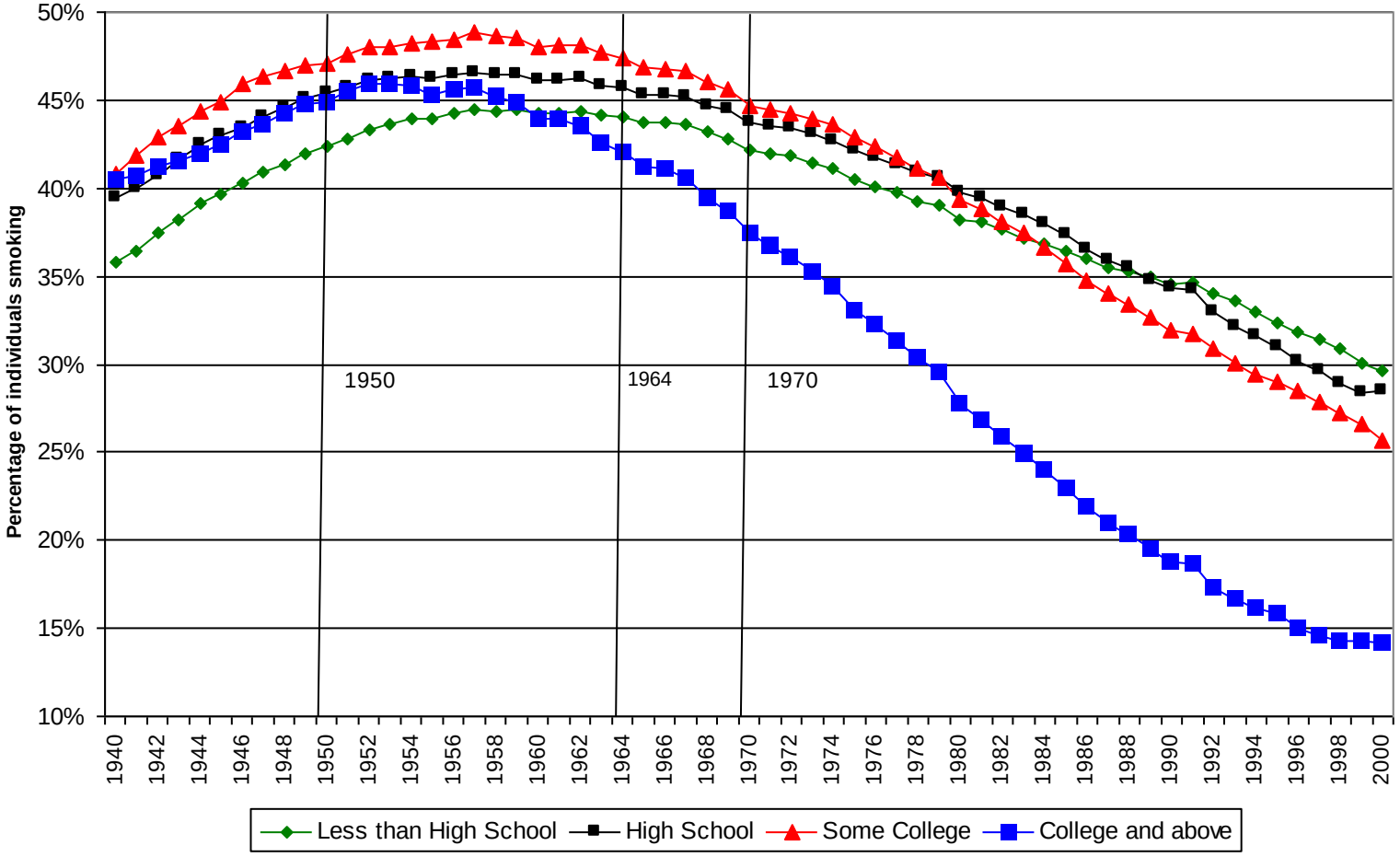
Not my autobiography!

Determinants of behavior: Example: education

Figure 2: HIV prevalence by education category, MRC General Population Cohort, Rural Uganda, 1990-2001. Individuals aged 18-29



An aside: compare with education and smoking in the US



Prevalence of smoking by education category in the United States, adults aged 25 and above: 1940-2000
Source: de Walque, JHR, 2010.