HIV-AIDS in Africa

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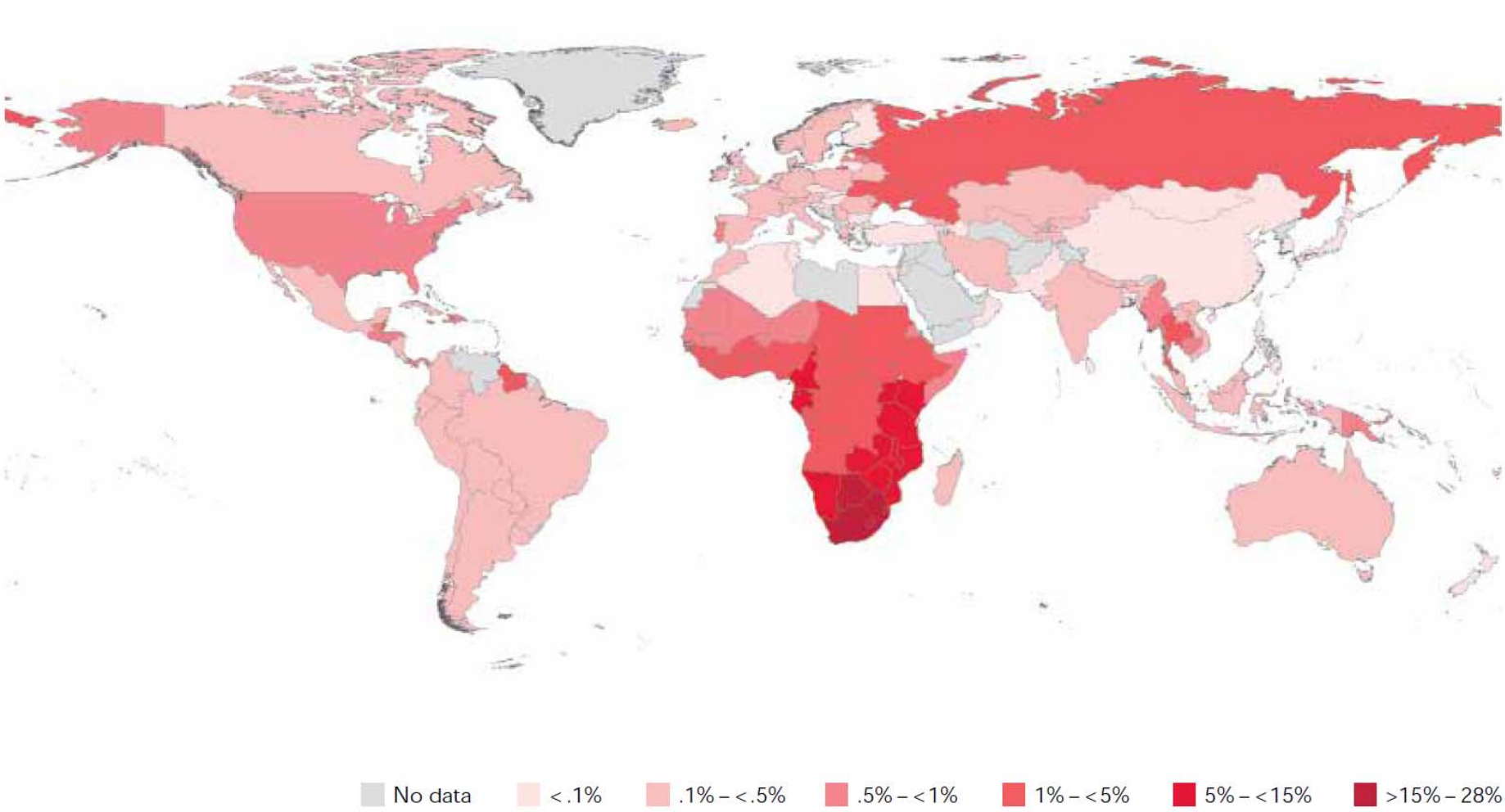
Introduction

- HIV-AIDS epidemics reached its peak in the late Nineties and then began to decline
- However, HIV-AIDS it is still a major health concern especially in Sub-Saharan Africa
- Let’s look at some data coming from the UNAIDS 2010 and 2014 Global Report

Global prevalence of HIV, 2009

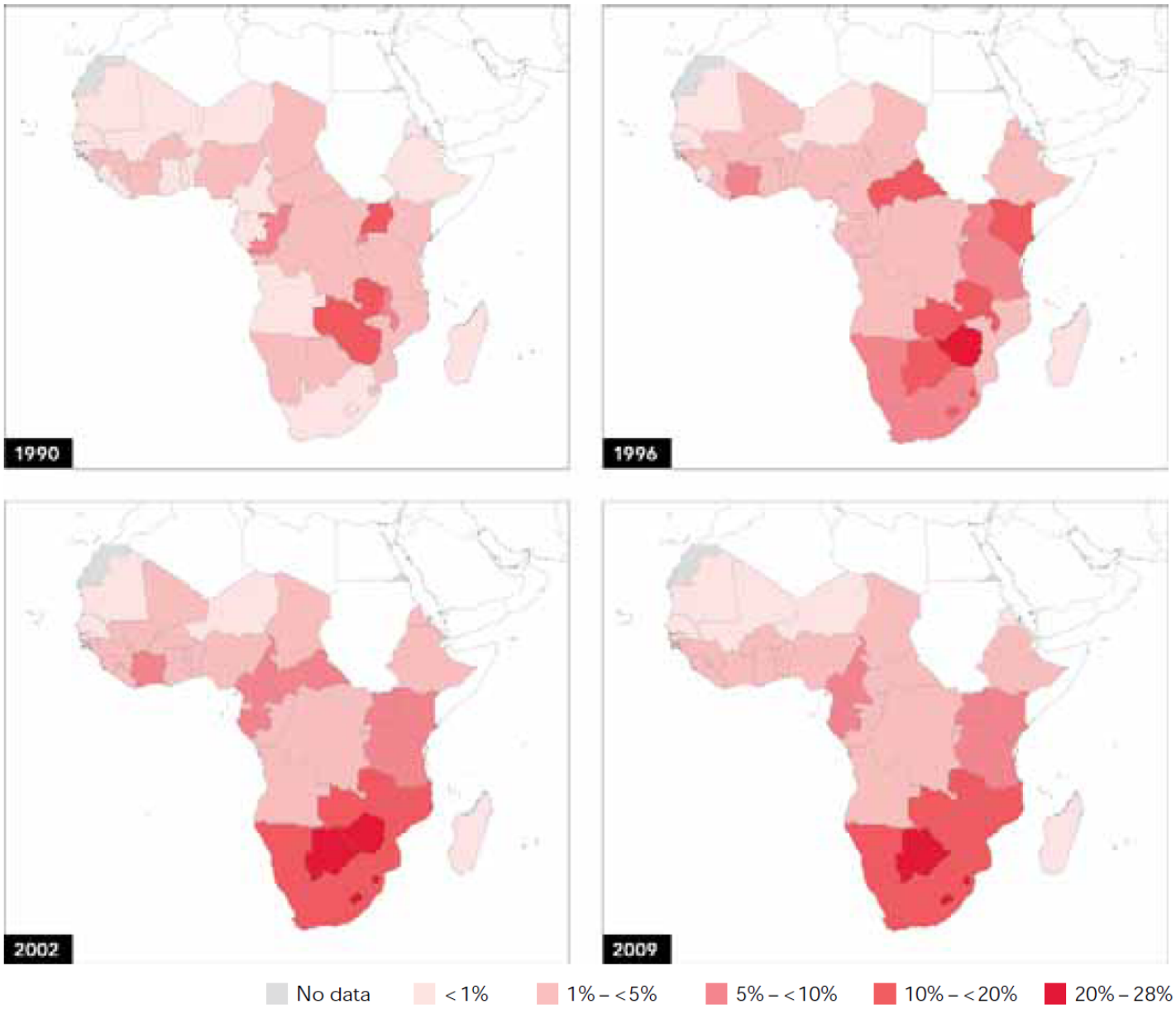
Source: UNAIDS.



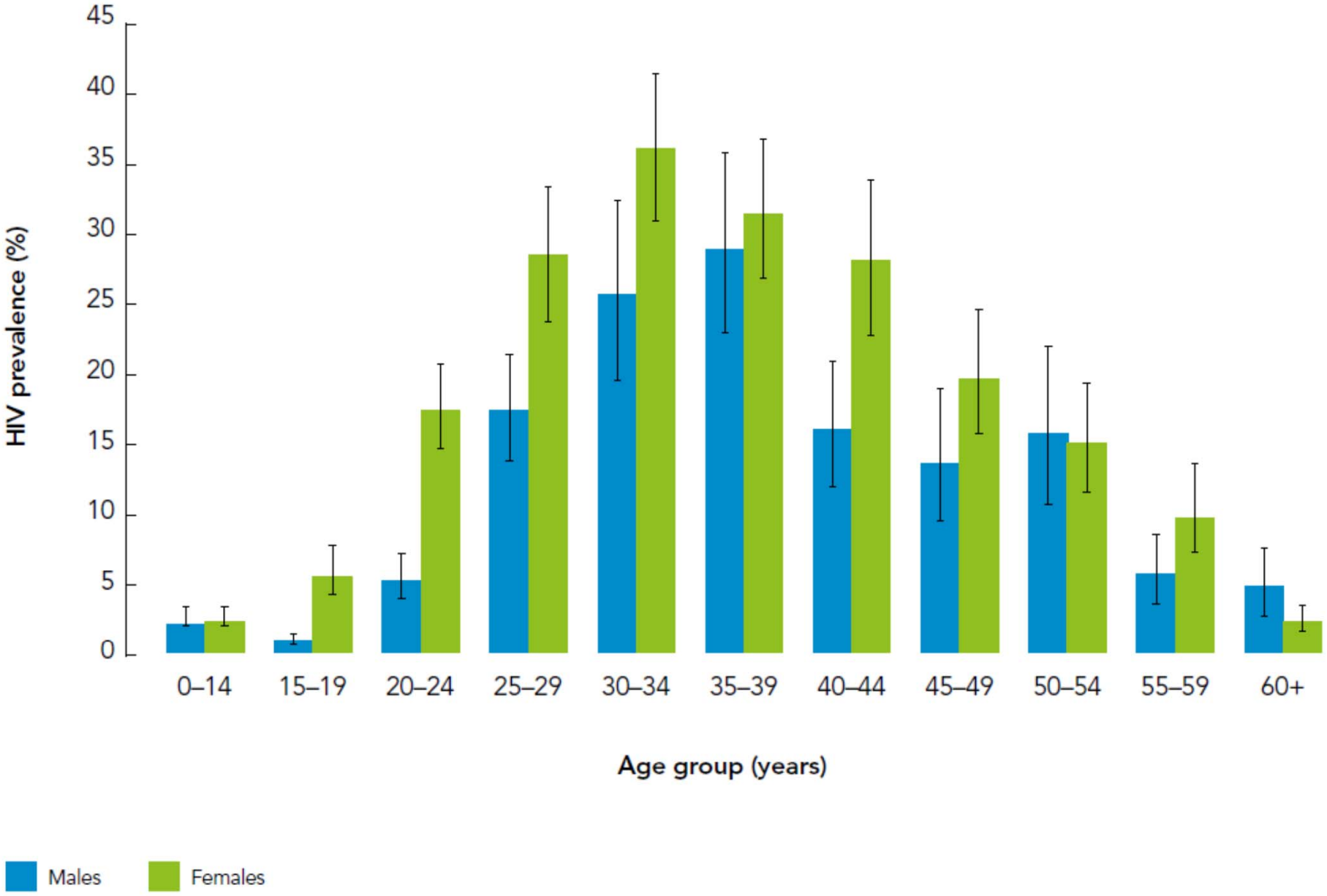
HIV prevalence in sub-Saharan Africa

HIV prevalence among adults aged 15–49 years old in sub-Saharan Africa, 1990 to 2009.

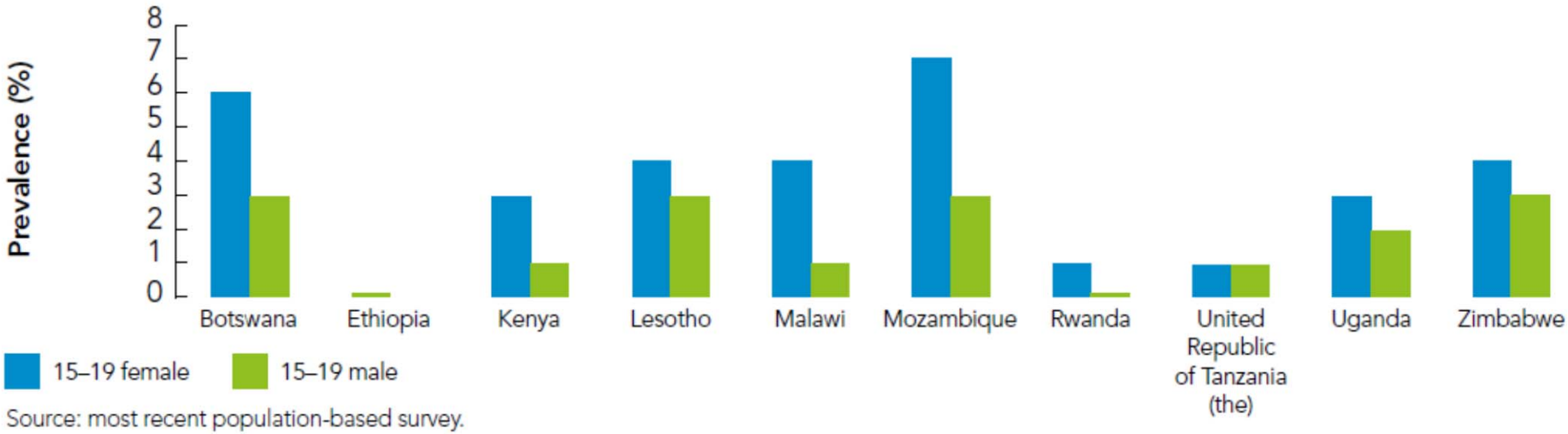
Source: UNAIDS.



HIV prevalence in South Africa by sex and age, 2012

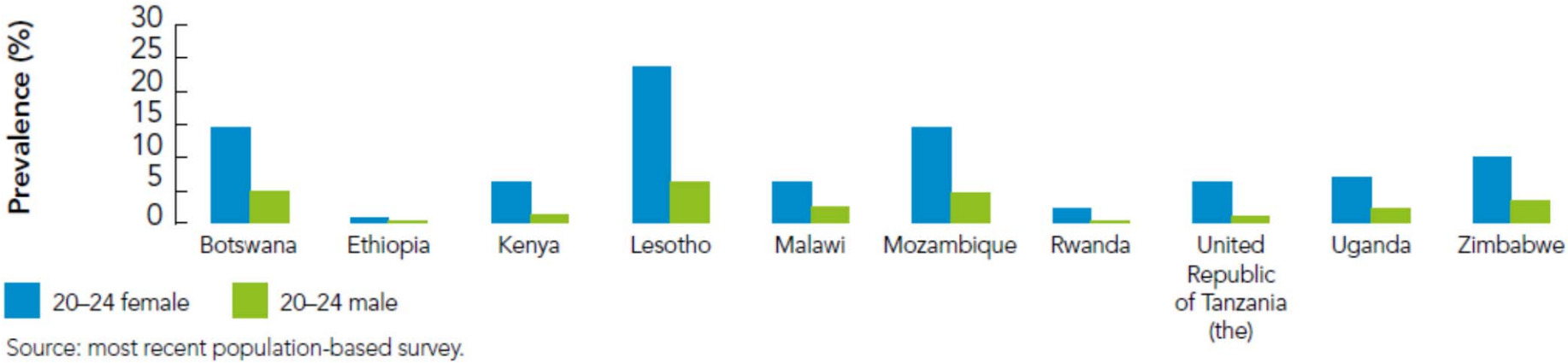


HIV prevalence among young people aged 15–19 in eastern and southern Africa



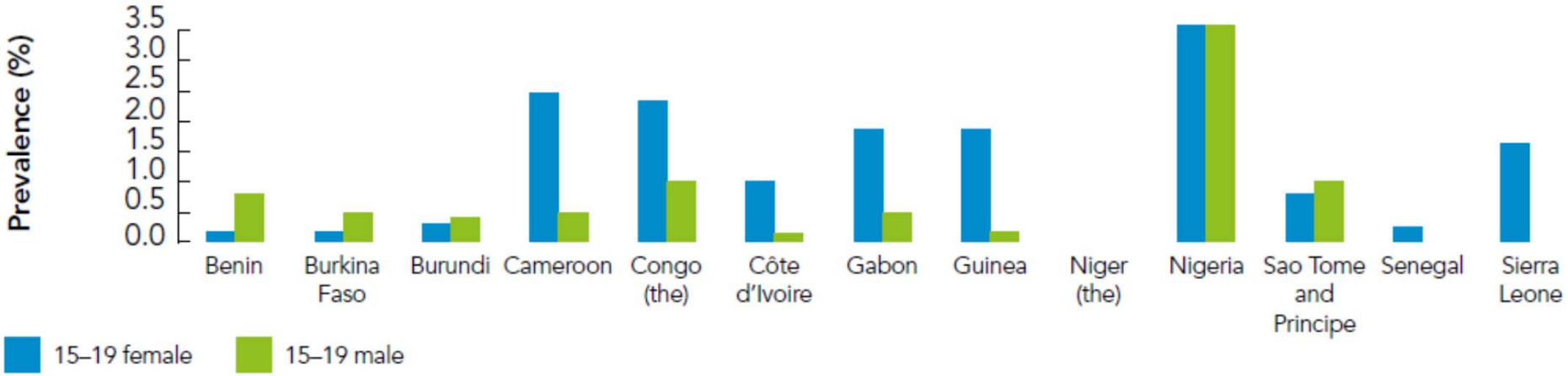
Source: most recent population-based survey.

HIV prevalence among young people aged 20–24 in eastern and southern Africa



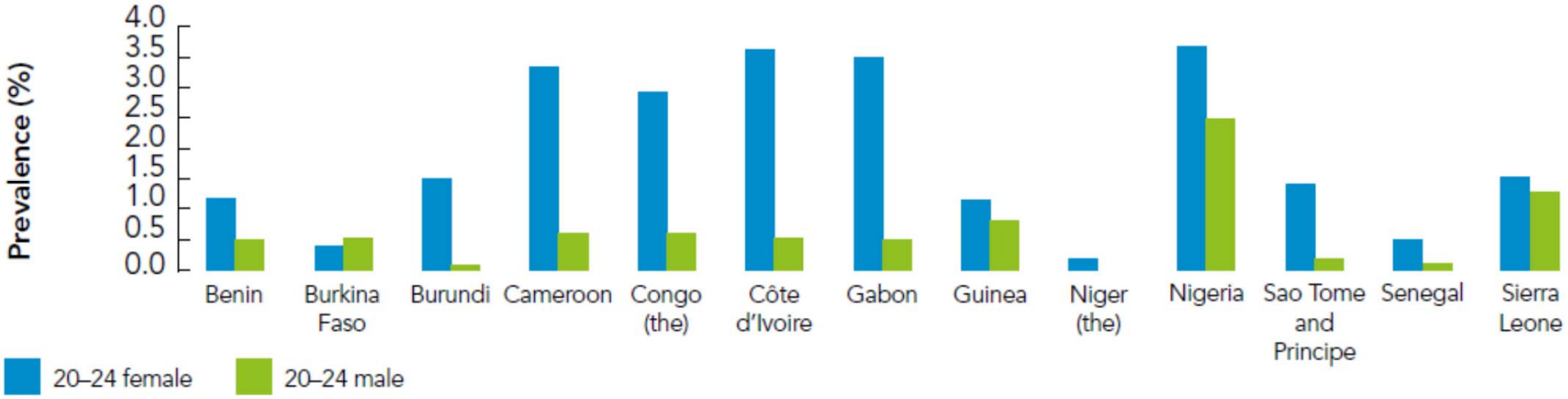
Source: most recent population-based survey.

HIV prevalence among young people aged 15–19 in west and central Africa



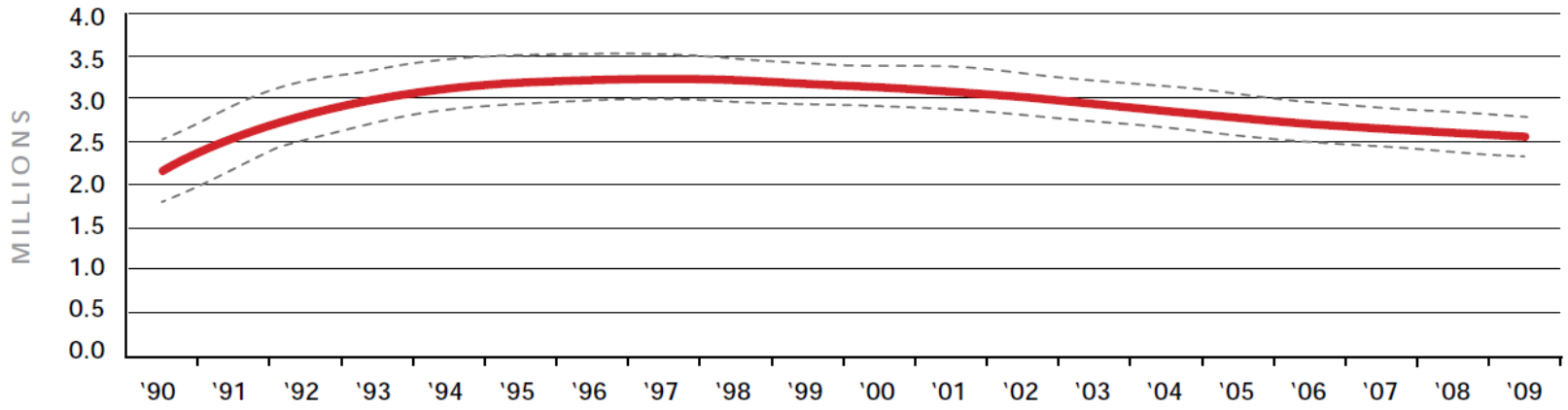
Source: most recent population-based survey.

HIV prevalence among young people aged 20–24 in west and central Africa

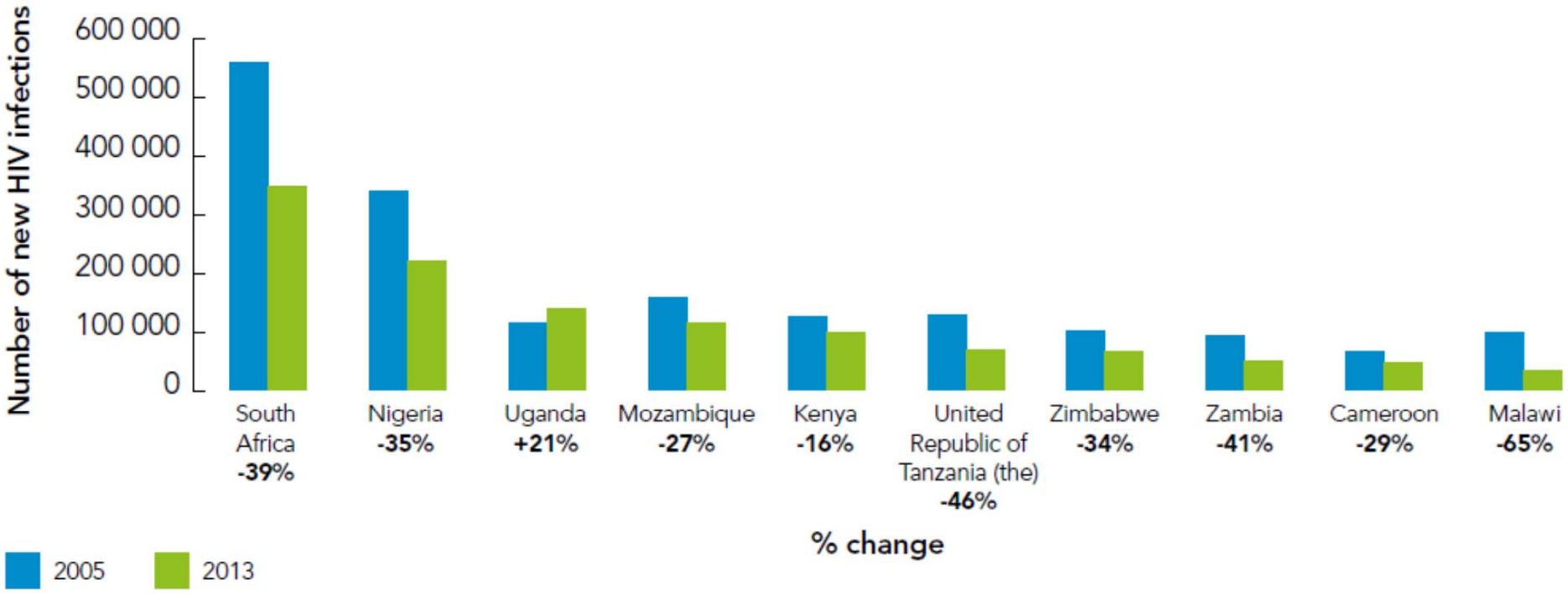


Source: most recent population-based survey.

Number of people newly infected with HIV



Trends in new HIV infections for top 10 countries in sub-Saharan Africa, 2005 and 2013



Source: UNAIDS 2013 estimates.

Country scorecard: Adult access to antiretroviral therapy, 2013

≥40%

Botswana
Burundi
Burkina Faso
Cabo Verde
Eritrea
Ethiopia
Gabon
Kenya
Malawi
Namibia
Rwanda
South Africa
Swaziland
Uganda
United Republic of Tanzania (the)
Zambia
Zimbabwe

25–39%

Angola
Benin
Cameroon
Congo (the)
Côte d'Ivoire
Gambia
Ghana
Lesotho
Mali
Mozambique
Niger (the)
Senegal
Togo

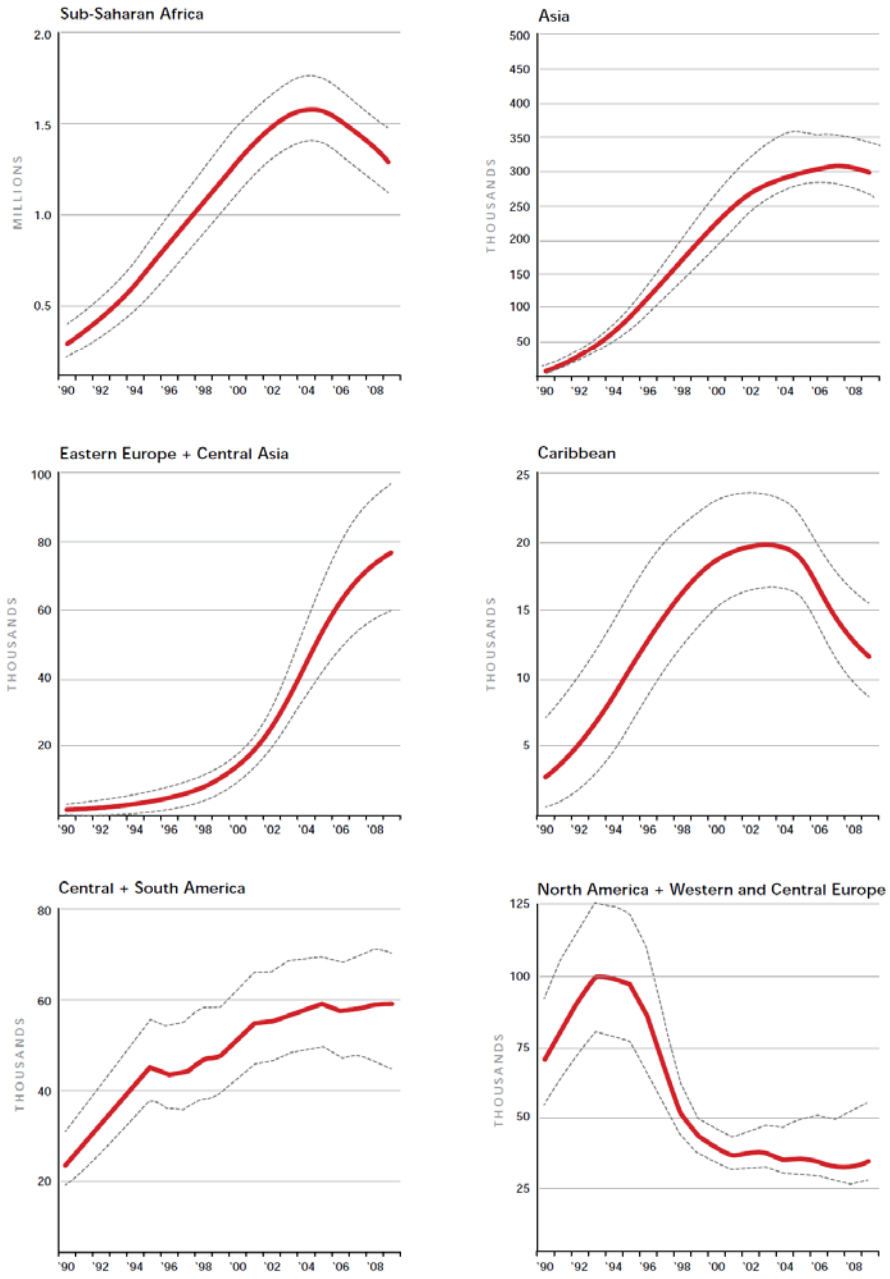
<25%

Central African Republic (the)
Chad
Democratic Republic of the Congo (the)
Guinea
Guinea-Bissau
Liberia
Madagascar
Mauritius
Nigeria
Sao Tome and Principe
Sierra Leone
South Sudan

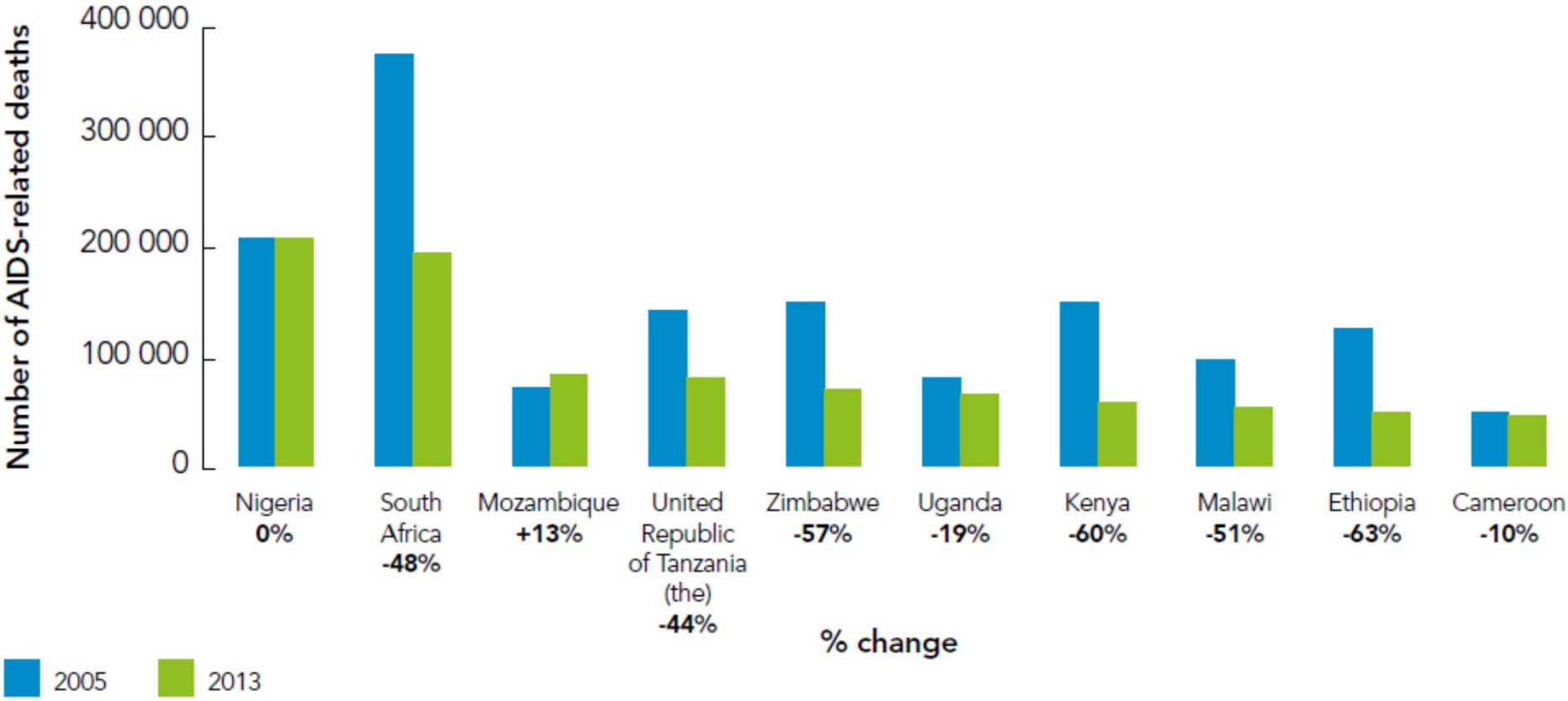
Source: UNAIDS 2013 estimates.

Annual AIDS-related deaths by region, 1990-2009

Source: UNAIDS.



Trends in AIDS-related deaths in sub-Saharan Africa, 2005 and 2013



Source: UNAIDS 2013 estimates.

Regional HIV and AIDS statistics, 2001 and 2009

Regional figures on adults and children newly infected and living with HIV and AIDS-related deaths

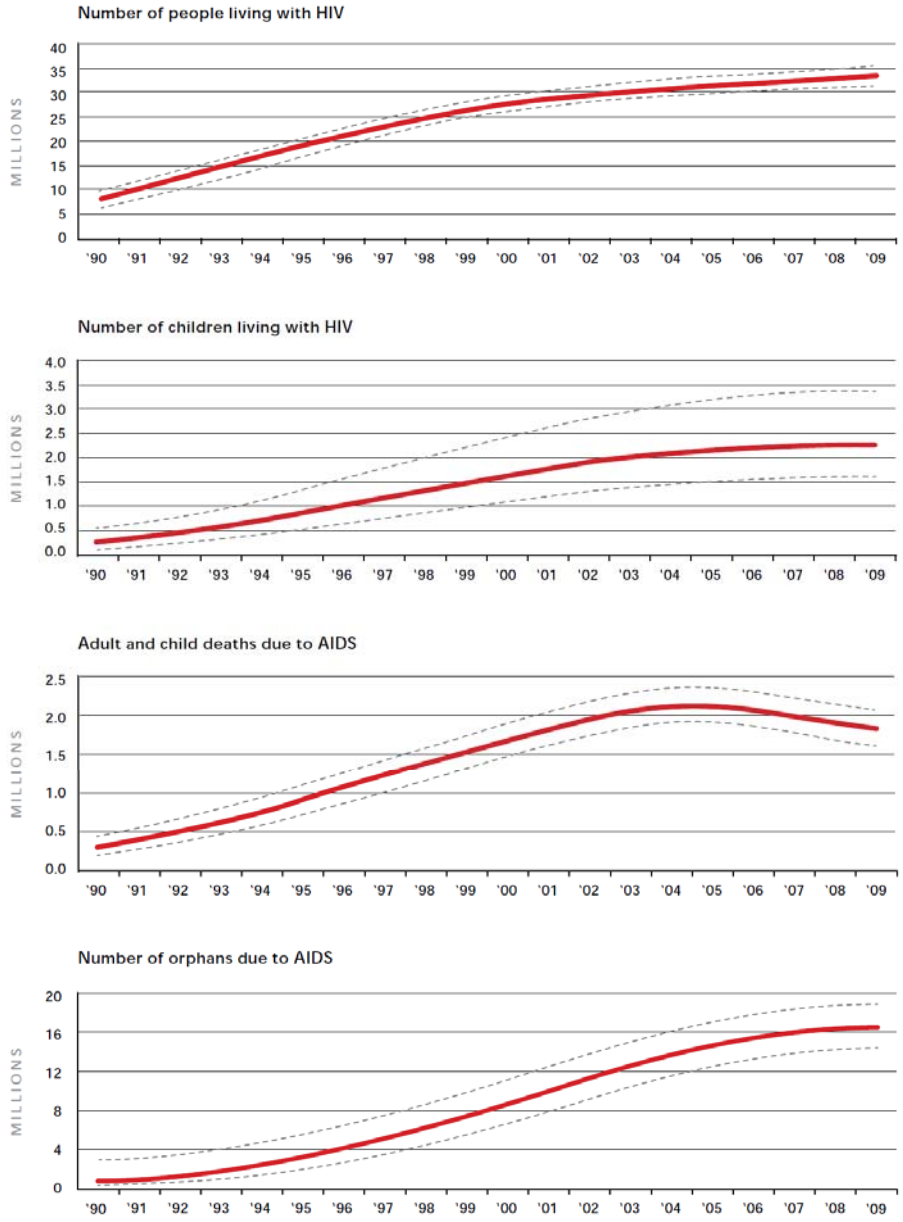
Source: UNAIDS.

		Adults and children living with HIV	Adults and children newly infected with HIV	% Adult prevalence (15–49 years)	AIDS-related deaths among adults and children
SUB-SAHARAN AFRICA	2009	22.5 million [20.9–24.2 million]	1.8 million [1.6–2.0 million]	5.0 [4.7–5.2]	1.3 million [1.1–1.5 million]
	2001	20.3 million [18.9–21.7 million]	2.2 million [1.9–2.4 million]	5.9 [5.6–6.1]	1.4 million [1.2–1.6 million]
MIDDLE EAST AND NORTH AFRICA	2009	460 000 [400 000–530 000]	75 000 [61 000–92 000]	0.2 [0.2–0.3]	24 000 [20 000–27 000]
	2001	180 000 [150 000–210 000]	36 000 [32 000–42 000]	0.1 [0.1–0.1]	8300 [6300–11 000]
SOUTH AND SOUTH-EAST ASIA	2009	4.1 million [3.7–4.6 million]	270 000 [240 000–320 000]	0.3 [0.3–0.3]	260 000 [230 000–300 000]
	2001	3.8 million [3.5–4.2 million]	380 000 [350 000–430 000]	0.4 [0.3–0.4]	230 000 [210 000–280 000]
EAST ASIA	2009	770 000 [560 000–1.0 million]	82 000 [48 000–140 000]	0.1 [0.1–0.1]	36 000 [25 000–50 000]
	2001	350 000 [250 000–480 000]	64 000 [47 000–88 000]	<0.1 [<0.1–<0.1]	15 000 [9400–28 000]
OCEANIA	2009	57 000 [50 000–64 000]	4500 [3400–6000]	0.3 [0.2–0.3]	1400 [<1000–2400]
	2001	29 000 [23 000–35 000]	4700 [3800–5600]	0.2 [0.1–0.2]	<1000 [<500–1100]
CENTRAL AND SOUTH AMERICA	2009	1.4 million [1.2–1.6 million]	92 000 [70 000–120 000]	0.5 [0.4–0.6]	58 000 [43 000–70 000]
	2001	1.1 million [1.0–1.3 million]	99 000 [85 000–120 000]	0.5 [0.4–0.5]	53 000 [44 000–65 000]

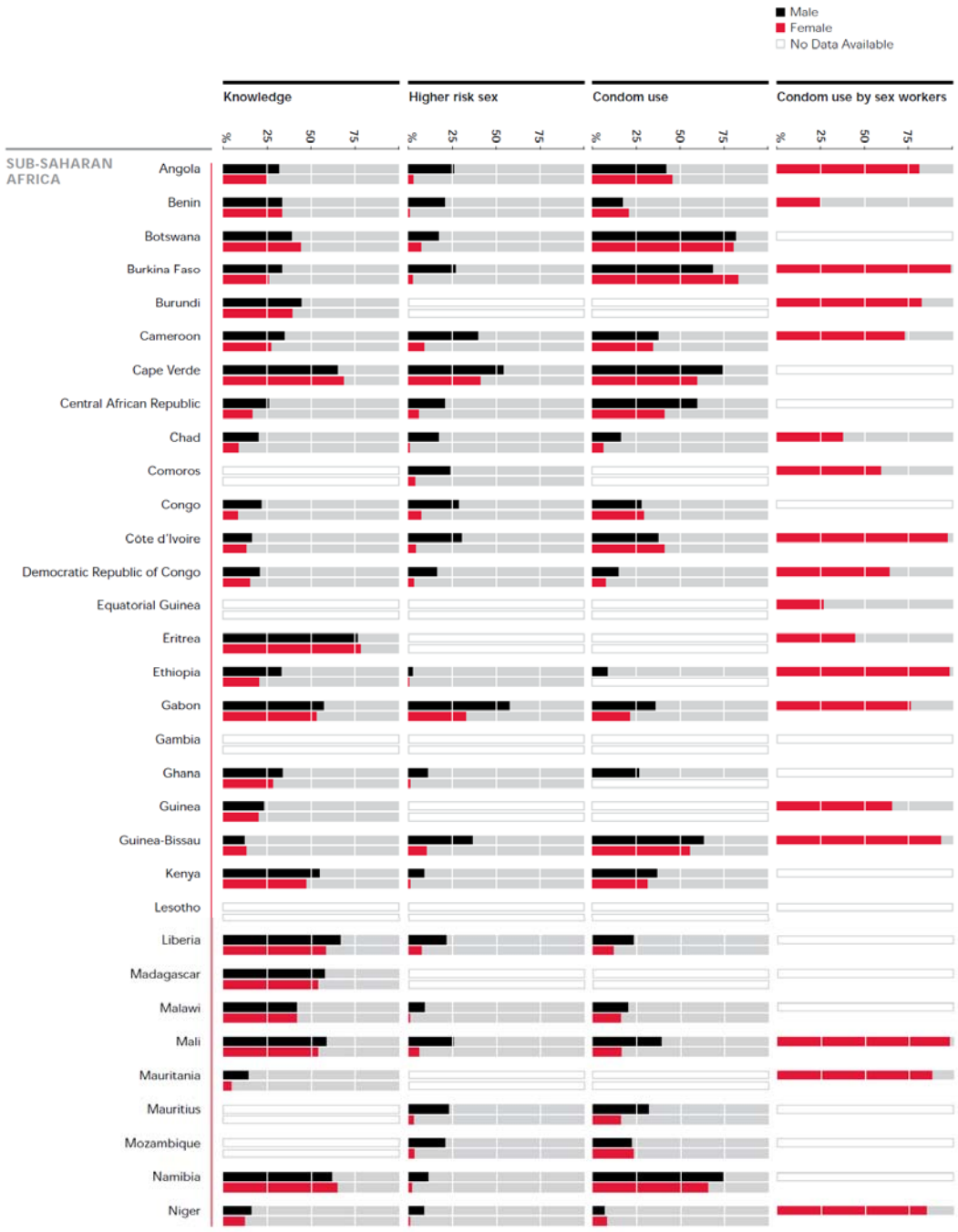
		Adults and children living with HIV	Adults and children newly infected with HIV	% Adult prevalence (15–49 years)	AIDS-related deaths among adults and children
CARIBBEAN	2009	240 000 [220 000–270 000]	17 000 [13 000–21 000]	1.0 [0.9–1.1]	12 000 [8500–15 000]
	2001	240 000 [210 000–270 000]	20 000 [17 000–23 000]	1.1 [1.0–1.2]	19 000 [16 000–23 000]
EASTERN EUROPE AND CENTRAL ASIA	2009	1.4 million [1.3–1.6 million]	130 000 [110 000–160 000]	0.8 [0.7–0.9]	76 000 [60 000–95 000]
	2001	760 000 [670 000–890 000]	240 000 [210 000–300 000]	0.4 [0.4–0.5]	18 000 [14 000–23 000]
WESTERN AND CENTRAL EUROPE	2009	820 000 [720 000–910 000]	31 000 [23 000–40 000]	0.2 [0.2–0.2]	8500 [6800–19 000]
	2001	630 000 [570 000–700 000]	31 000 [27 000–35 000]	0.2 [0.2–0.2]	7300 [5700–11 000]
NORTH AMERICA	2009	1.5 million [1.2–2.0 million]	70 000 [44 000–130 000]	0.5 [0.4–0.7]	26 000 [22 000–44 000]
	2001	1.2 million [960 000–1.4 million]	66 000 [54 000–81 000]	0.4 [0.4–0.5]	30 000 [26 000–35 000]
TOTAL	2009	33.3 million [31.4–35.3 million]	2.6 million [2.3–2.8 million]	0.8 [0.7–0.8]	1.8 million [1.6–2.1 million]
	2001	28.6 million [27.1–30.3 million]	3.1 million [2.9–3.4 million]	0.8 [0.7–0.8]	1.8 million [1.6–2.0 million]

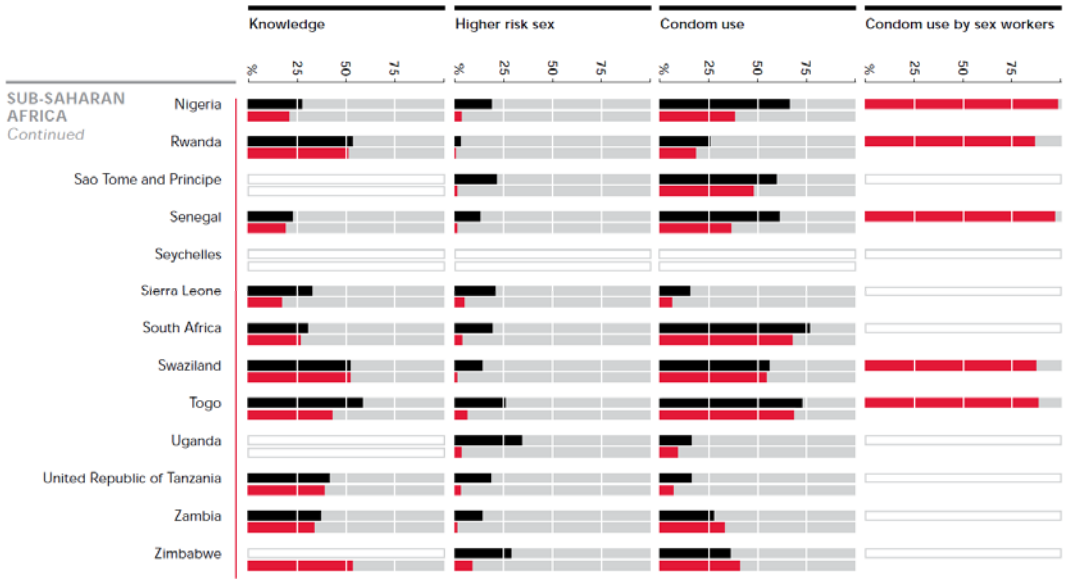
Global HIV trends, 1990 to 2009

Source: UNAIDS.



SCORECARD: HIV PREVENTION




Knowledge
Higher risk sex
Condom use
Condom use by sex workers
%
25
50
75
SUB-SAHARAN AFRICA
Continued
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
South Africa
Swaziland
Togo
Uganda
United Republic of Tanzania
Zambia
Zimbabwe

Oster, 2007

- Oster, E. (2007) “HIV and Sexual Behavior Change: Why not Africa?”, NBER WP 13049

- In the late Nineties, standard epidemiological model predicted a continuous rise in the rate of prevalence of HIV. Forecasts were very grim
- But people react to the diffusion of the virus...
  - the higher the prevalence rate, the less risky sexual behaviors should be observed

- This paper estimates the responsiveness of sexual behavior to the HIV epidemic in Africa

- Results: limited changes in sexual behavior in response to the HIV rate:
  - For women, there seems to be a small decrease in risky behavior.
  - For men, however, there is no change and, in fact, the point estimate on behavior change is positive.

- The result for men, in particular, is in stark contrast to a significant degree of behavior change among gay men in the United States.
- Why is Africa different?

Method

- There are significant reverse causality issues
  - is a higher HIV rate which makes behavior to change
  - or is changing behavior which reduces HIV rate

- Reverse causality is avoided by instrumenting the HIV rate with distance to the origin of the virus in the Democratic Republic of the Congo
  - highly correlated
  - exogenous

Table 1. ***First Stage Estimates – HIV and Distance to Virus Origin***

	Dependent Variable: HIV Rate in Region			
	(1)	(2)	(3)	(4)
Explanatory Variables:				
Log Distance	−12.2981***	−4.9113***	−4.5928***	−4.2361
	(−9.84)	(−3.69)	(−3.2)	(−1.49)
East Region		−2.4152	−2.5926	
		(−1.08)	(−1.11)	
South Region		10.5868***	7.7056***	
		(4.52)	(2.89)	
Center Region		−.856	.7418	
		(−.44)	(.31)	
Longitude		.1986***	.2668***	
		(3.32)	(4.1)	
Latitude		−.1853***	−.1666***	
		(−3.31)	(−2.85)	
Log GDP			2.5449**	
			(1.98)	
Sec. School. Enroll.			−.0536	
			(−.86)	
Fertility Rate			−.2101	
			(−.2)	
Year=1999		2.3395*	1.203	
		(1.95)	(.9)	
Year=2000		2.7027**	1.7105	
		(2.32)	(1.36)	
Year=2001		4.3006***	1.8835	
		(3.15)	(1.27)	
Year=2002		.2304	−1.3452	
		(.08)	(−.48)	
constant	106.71***	42.546***	24.851	45.78**
	(11.2)	(4.03)	(1.25)	(2.11)
Country FE	NO	NO	NO	YES
Number of Observations	473	473	459	418
R^2	.17	.60	.61	.67

t-statistics in parenthesis

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: HIV rates are estimated from the U.S. Census HIV/AIDS Surveillance Database. Distance is calculated from the center of the region to roughly the center of the Democratic Republic of the Congo. Column 3 is limited to countries with at least 10 regions observed. This eliminates 14 of the 31 countries, although a much smaller share of regions.

First stage: distance is a relevant instrument

Second stage: behaviors regressed on "predicted" HIV rate

Table 6. ***Effect of HIV on Sexual Behavior – IV Estimates***

Dependent Variable: More than One Partner (0/1)			
	Women, Africa	Men, Africa	Gay Men, U.S.
HIV Rate (0-100)	−0.0042**	0.0040	−.0805***
	(−2.04)	(.68)	(−6.62)
Number of Observations	86,422	29,435	24406

t-statistics in parenthesis

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: First stage regressions appear in Table 1. The second stage reduced form regressions are in Appendix Table 1. The overall estimates and standard errors are produced as outlined in section 2. Single individuals are defined as having more than one partner if they report two or more partners in the last year. Married individuals are defined as having more than one partner if they report any extramarital sex in the last year.

Why is Africa different?

- What is the implicit “price” of a sexual partner?
  - those with higher income and more future years of life should respond more to the epidemic.
  - estimate the costs of sexual partners for each individual = a dollarized value of future utility losses from early death.
- Results: risky behavior for both men and women decrease with the price of a sexual partner in Africa
- The response to the price of a sexual partner for gay men in the United States and men in Africa are of similar magnitudes

Implications

- Implications for HIV/AIDS prevention in Africa.
- The results here suggest that poverty remains one of the fundamental barriers to change.
- It is not the lack of female empowerment, but simply that the value of life is lower.
- Increases in education and decreases in other mortality risks could have significant effects on behavior change.
- The results also indicate that increases in knowledge could have large effects on behavior.

HIV and education

- Are education and other socio-economic characteristics related to the likelihood of infection?
  - more awareness
  - better understanding of information
  - more income and more opportunities of risky behavior
- de Walque (2009):
  - no impact on prob. of being infected
  - more protection, but more nonmarital sex

TABLE 3. Determinants of HIV Prevalence in Five Demographic and Health Surveys: Analysis by Country

	Burkina Faso (2003)		Cameroon (2004)		Ghana (2003)		Kenya (2003)		Tanzania 2004	
Variable	Men (1)	Women (2)	Men (3)	Women (4)	Men (5)	Women (6)	Men (7)	Women (8)	Men (9)	Women (10)
Linear regression model with earth floor, as proxy for poverty, instrumented by the other durable assets[a]										
Years of education	0.0006	−0.0023	−0.0004	−0.0009	0.0001	0.0004	−0.0002	−0.0021	−0.0006	0.0009
	(0.0014)	(0.0014)	(0.0010)	(0.0018)	(0.0006)	(0.0008)	(0.0015)	(0.0020)	(0.0017)	(0.0017)
Earth floor	0.0065	−0.0112	−0.0186	−0.009	0.0072	0.043	0.0223	−0.0472	0.015	0.0192
	(0.0171)	(0.0249)	(0.0125)	(0.0291)	(0.0272)	(0.0491)	(0.0169)	(0.0387)	(0.0431)	(0.0360)
Urban	0.016	0.0156	0.0141	0.0332**	0.0021	0.0104	0.0326*	0.018	0.0603**	0.0592***
	(0.0131)	(0.0157)	(0.0086)	(0.0152)	(0.0048)	(0.0082)	(0.0193)	(0.0225)	(0.0259)	(0.0228)
Currently married	0.0276***	−0.0154	−0.0076	0.0094	0.002	−0.0059	0.0013	0.0033	0.0156	−0.0082
	(0.0096)	(0.0109)	(0.0109)	(0.0133)	(0.0064)	(0.0089)	(0.0150)	(0.0172)	(0.0136)	(0.0129)
Formerly married	0.025	−0.0009	0.0109	0.0919***	0.0109	0.0310*	0.0067	0.1028***	0.0900***	0.1228***
	(0.0229)	(0.0279)	(0.0140)	(0.0248)	(0.0118)	(0.0159)	(0.0275)	(0.0388)	(0.0295)	(0.0205)
Widowed	0.0867	0.0296	0.0	0.1302***	−0.0224	0.0056	0.3070**	0.1396**	n.a.	n.a.
	(0.1024)	(0.0402)	(0.0000)	(0.0451)	(0.0271)	(0.0290)	(0.1287)	(0.0556)		
More than one marriage	0.0088	0.0155	−0.0004	0.0405***	0.0137	0.0288***	0.0122	0.0563	0.0346**	0.0600***
	(0.0138)	(0.0104)	(0.0094)	(0.0111)	(0.0085)	(0.0090)	(0.0216)	(0.0346)	(0.0174)	(0.0168)
Polygamous	−0.0214*	−0.0091	−0.0023	0.0045	−0.0175	0.0137	0.0127	0.0364*	−0.0033	0.0216
	(0.0130)	(0.0059)	(0.0129)	(0.0109)	(0.0136)	(0.0101)	(0.0352)	(0.0195)	(0.0254)	(0.0162)
Protestant	0.0278	−0.0002	−0.0011	−0.0068	0.0075	−0.0097	0.0028	−0.0009	−0.0146	−0.0144
	(0.0235)	(0.0111)	(0.0074)	(0.0096)	(0.0055)	(0.0079)	(0.0097)	(0.0115)	(0.0108)	(0.0120)
Muslim	0.0119	−0.0006	0.0114	−0.005	0.0008	−0.0006	−0.0072	−0.0521*	−0.0136	0.001
	(0.0079)	(0.0076)	(0.0119)	(0.0169)	(0.0074)	(0.0098)	(0.0228)	(0.0289)	(0.0119)	(0.0140)
Other religion	0.005	−0.0102	−0.0109	−0.0256**	0.0102	−0.0204	0.0204	0.0106	−0.0323**	−0.0369*
	(0.0106)	(0.0069)	(0.0084)	(0.0116)	(0.0134)	(0.0124)	(0.0175)	(0.0514)	(0.0149)	(0.0196)
Observations	3339	4164	4997	5085	3959	4919	2914	3240	4772	5665
R-square	0.06	0.04	0.06	0.1	0.04	0.03	0.11	0.12	0.05	0.08
Marginal effects of probit estimations, with durable asset dummies controlling for wealth (not shown)[b]										
Years of education	0	−0.0006*	−0.0003	−0.0012	0	0.0002	0	−0.0008	−0.0009	0
	(0.0002)	(0.0003)	(0.0008)	(0.0010)	(0.0002)	(0.0005)	(0.0009)	(0.0013)	(0.0012)	(0.0011)
Assets χ^2 (10)-Test	28.07	18.92	17.29	14.67	21.29	11.92	11.79	9.63	26.15	42.88
Prob > χ^2	0.0018	0.0413	0.0681	0.1447	0.0191	0.2904	0.2255	0.4739	0.0035	0.0000
Mean HIV prevalence										
Mean HIV	0.0194	0.0182	0.0391	0.0662	0.0162	0.0270	0.0463	0.0868	0.0626	0.0769
	(0.0031)	(0.0027)	(0.0030)	(0.0043)	(0.0022)	(0.0024)	(0.0051)	(0.0064)	(0.0047)	(0.0052)

Significant at the *10 percent level.

**Significant at the 5 percent level.

***Significant at the 1 percent level.

n.a. is not applicable because data were unavailable and so the variable was not included.

Note: Numbers in parentheses are robust and clustered standard errors. HIV prevalence is the dependent variable. Controls for age, region, and ethnicity are also included; ethnicity and widowhood are not controlled for in Tanzania 2004 as the variable were not available. The omitted dummy variables are rural, never married, and Muslim (see note in table 1). The data are weighted with the sample weights given by the data provider.

[a]To control for wealth/poverty, earth floor is included in the linear regression specifications and instrumented by the other durable assets: type of latrine, type of floor (earth floor or not), electricity, refrigerator, radio, television, bicycle, motorcycle, or car.

[b]All asset dummy variables are included (coefficients not shown, but the results of an *F*-test of joint significance are reported).

Source: Author's analysis based on data from Demographic and Health Surveys (Burkina Faso and ORC Macro 2004; Cameroon and ORC Macro 2004; Ghana and ORC Macro 2004; Kenya and ORC Macro 2004; and Tanzania and ORC Macro 2005).

De Walque (2009), "Does Education Affect HIV Status? Evidence from five African Countries", THE WORLD BANK ECONOMIC REVIEW, VOL. 23, NO. 2, pp. 209–233

TABLE 4. Condom Use and Extramarital Sex: Pooled Regressions

	All with Tanzania		All without Tanzania		Age 15–29 with Tanzania	
Variable	Men (1)	Women (2)	Men (3)	Women (4)	Men (5)	Women (6)
Determinants of using a condom at the last intercourse with spouse (married sample)						
Years of education	0.0026***	0.0034***	0.0027***	0.0039***	0.0076***	0.0041***
Linear	(0.0009)	(0.0006)	(0.0009)	(0.0007)	(0.0020)	(0.0010)
Observations	10440	23883	7671	19895	2474	11524
R-square	0.04	0.04	0.05	0.05	0.08	0.06
Years of education	0.0031***	0.0026***	0.0028***	0.0026***	0.0071***	0.0029***
Probit, marginal effects	(0.0006)	(0.0003)	(0.0006)	(0.0003)	(0.0017)	(0.0006)
Determinants of using a condom at the last intercourse if not with spouse (if nonmarital sex)						
Years of education	0.0188***	0.0149***	0.0170***	0.0131***	0.0176***	0.0182***
Linear	(0.0029)	(0.0029)	(0.0033)	(0.0030)	(0.0037)	(0.0036)
Observations	5530	5454	4177	4485	4303	4219
R-square	0.14	0.13	0.14	0.1	0.14	0.12
Years of education	0.0215***	0.0224***	0.0202***	0.0212***	0.0236***	0.0278***
Probit, marginal. effects	(0.0033)	(0.0028)	(0.0040)	(0.0029)	(0.0035)	(0.0034)
Determinants of having nonmarital sex in the last 12 months (currently married)						
Years of education	0.0008	0.0028***	0.0001	0.0033***	−0.0059	0.0052***
Linear	(0.0013)	(0.0005)	(0.0013)	(0.0005)	(0.0037)	(0.0009)
Observations	11980	28736	8959	24518	3021	13839
R-square	0.12	0.11	0.15	0.13	0.13	0.15
Years of education	0.0036***	0.0012***	0.0024**	0.0013***	−0.0019	0.0023***
Probit, marginal effects	(0.0012)	(0.0002)	(0.0012)	(0.0002)	(0.0035)	(0.0004)

Significant at the *10 percent level.

**Significant at the 5 percent level.

***Significant at the 1 percent level.

Note: Numbers in parentheses are robust and clustered standard errors. Controls for age (dummy variables), urban location, marital status, religion, region, and ethnicity are also included (ethnicity and widowhood are not controlled for in Tanzania 2004 as the variable were not available). To control for wealth/poverty, earth floor (coefficient not shown) is included and instrumented by the other during assets: type of latrine, type of floor (earth floor or not), electricity, refrigerator, radio, television, bicycle, motorcycle, or car. In the probit specification, all asset dummy variables are included (coefficients not shown). The data are weighted with the sample weights given by the data provider, multiplied by the country population divided by the sample size.

Do Teenagers Respond to HIV Risk Information? Evidence from a Field Experiment in Kenya

P. Dupas

American Economic Journal: Applied Economics 3 (January 2011): 1–34

Prevention at school

- Most children in Africa attend primary school
- this offers a unique opportunity to make early HIV-AIDS prevention

- In many countries HIV-AIDS education is included in the official curriculum

What kind of information matters?

- What type of information African teenagers are most responsive at?
  - risk avoidance (extensive margin)
  - risk reduction (intensive margin)

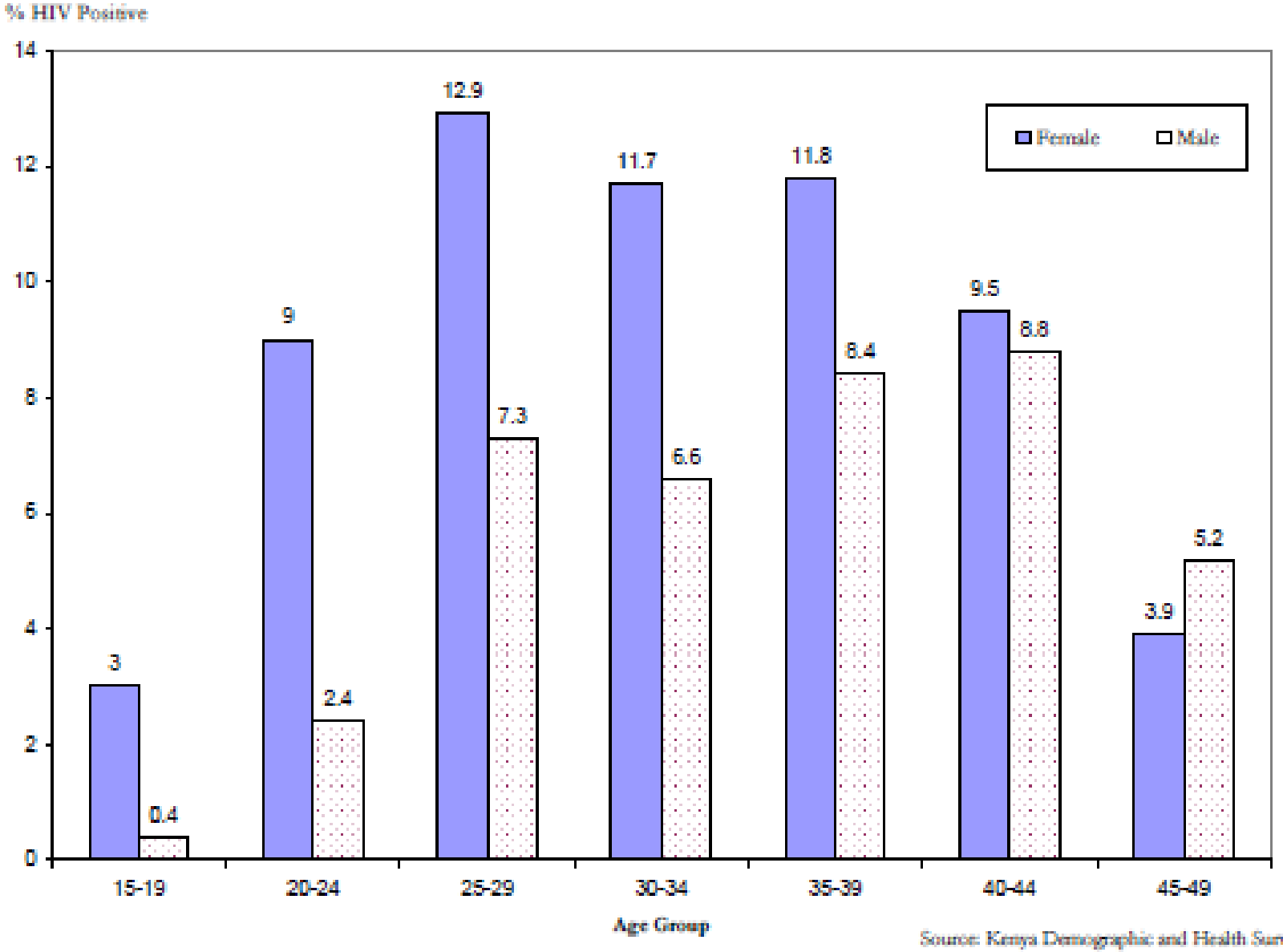
Risk Avoidance

- The Kenya Ministry of Education, Science and Technology (MoEST) integrated HIV/AIDS education into the primary school curriculum in 2001.
  - "The national HIV/AIDS curriculum includes [...] a prevention section which emphasizes moral values, refusal skills, and abstinence until marriage. The curriculum does not mention condoms and provides only limited scope for teachers to discuss protected sex in response to students questions. It does not cover partner selection [...]. The proposed strategies to avoid infection are to Avoid Sex and to Say NO to sex before marriage. All sexual activity outside of marriage, irrespective of the age of the partner, is thus considered equally risky".

Risk reduction

- A way of reducing the risk of been infected is throughout partners' selection
- Not all partners are equally "risky"
  - older males are riskier than teenage boys
  - but they are more attractive

HIV Prevalence by Gender and Age Groups, Kenya



Source: Kenya Demographic and Health Survey, 2003

Sugar daddies

- high prevalence of cross-generation unprotected sex:
  - teenage girls (15yo) with older males (more than five years older)
- bargaining power
  - sugar daddies are typically richer than teenage boys
    - they can take care of the girl and of the child in case of pregnancy
    - they can marry the girl
    - they provide cash and gifts before pregancy

Sugar daddies

Panel B. Partnership Survey (girls who started childbearing within a year of starting eighth grade)*	
Share reporting that the pregnancy was wanted	0.13
Share reporting age difference with male partner > 5 years	0.49
Share reporting age difference with male partner > 10 years	0.16
Share reporting that the partnership was consensual	0.99
Share reporting that the male partner made regular cash payments to the teenage girl prior to the pregnancy	0.70
Share reporting that the male partner is currently providing financial support to the teenage girl	0.79
Share married if age difference < 5 years	0.45
Share married if 5 years < age difference < 10 years	0.77
Share married if age difference > 10 years	0.82
Observations	184

Sugar daddies

- If all group were thought to be equally risky, then sugar daddies would have an advantage over teenage boys in negotiating unprotected sex

Empirical Strategy

- School randomization

- Two treatments:
  - Teacher training (TT)
  - Relative risk information campaign (RR)

Treatment TT

- While the HIV/AIDS curriculum was introduced in 2001, HIV/AIDS education was absent until early 2003.
- Schools and their teachers claimed to be not familiar with the HIV/AIDS curriculum and did not know how to teach the topic.
- In response, the Kenya Institute of Education (KIE) and the MoEST trained a number of trainers to provide in-service training for teachers on HIV/AIDS education methodology.
- The training was being phased-in over a long period (starting in 2003)

- This fact allowed for **randomly selecting** the schools which were initially visited by the trainers

Treatment TT

- In 2003, 328 primary schools in two districts of Western Kenya were sampled to test the effectiveness of TT treatment in primary schools.
  - Seven divisions were randomly sampled from those two districts
  - All public primary schools in these seven divisions were sampled

- Half of the schools were randomly chosen to receive Teacher Training (TT) on the HIV/AIDS curriculum
  - all grades affected: trained teachers did talk about HIV in their classes. Evidence of effectiveness in terms of students' knowledge

Treatment RR

- in 2004 the "Relative Risk Information Campaign (RR) was conducted
- The 71 schools randomly selected after stratifying by participation in the TT program of 2003.
  - Thus, the RR program was implemented both in schools treated and not treated by TT
  - This design generated four groups of schools:
    - TT and RR programs,
    - schools with TT only,
    - schools with RR only,
    - schools with neither of the two programs
- only to 8^{th} graders in 2004 (i.e. 7th graders in 2003)

Treatment RR

- A trained project officer visited each of those 71 schools and spoke to Grade 8 students for a 40-minute period.
  - "At the start of the period, the students were asked to complete [...] a survey. After the survey, students were shown a 10-minute educational video on sugar daddies. The video screening was followed by an open discussion about cross-generational sex. During the discussion, the project officer shared the results of studies conducted in Kenya and Zambia (Glynn et al. 2001) and Zimbabwe (Gregson et al. 2002) on the role of cross-generational sex in the spread of HIV. In particular, the project officer wrote on the blackboard the detailed prevalence rates of HIV, disaggregated by gender and age group, in the nearby city of Kisumu, a place familiar to the students".

[13]The HIV prevalence rates provided to the students were as follows:

Age	15–19	20–24	25–29	30–39
Female	22 percent	36 percent	35 percent	32 percent
Male	4 percent	13 percent	28 percent	32 percent.

Final samples

- 8th graders of the 328 schools in 2004

- TT treated: 8th graders who received TT only or TT and RR
- controls for TT
  - no treatment
  - RR only

- RR treated: 8th graders who received RR only or TT and RR
- controls for RR
  - no treatment
  - TT only

Outcomes

- childbearing within 1 year from the treatment
  - and, conditional of childbearing, age of the partner

- this is an imperfect measure for the incidence of unprotected sex
  - with teenage boys
  - with sugar daddies

Outcomes - Details

- Childbearing data was collected in two steps.
- First, information on schooling status, marital status, and childbearing status was obtained during two primary school visits conducted in March and July 2005. At each visit, the list of all students on the grade 8 registers of 2004 was read aloud to an assembly of pupils in grades 6, 7, and 8 (often the siblings, neighbors, or friends of students on the list). For each of the students on the list, the following questions were asked:
  - *Is X still in school? If yes, in what grade? In what school? Does she still live in the area? Is she married? Does she have any children? If so, how many? How old is her first born? Is she pregnant*?
- Second, enumerators conducted a home follow-up visit with girls who had been reported to have started childbearing by July 2005. This follow-up took place in August/September 2005, and included a question on the age of the child's father, in order to identify pregnancies that resulted from a cross-generational relationship.
  - When the teenage girl herself could not be found (for example, because she had moved with her husband to another district), a relative (typically, the mother) was interviewed

- Overall rather precise information!

Outcomes

- self-reported behavior of the students tracked in secondary schools in 2005
  - self-selected sample: used only for reinforcing interpretation

Study timeline

2003	Feb. – May	• PROGRAM 1 – Rollout of TT Program in 164 primary schools (all grades affected).
2004	July – Oct.	• BASELINE DATA – Anonymous "Priors" Survey conducted in 71 primary schools (grade 8 students only). • PROGRAM 2 – Rollout of RR Program in same 71 primary schools (grade 8 students only).
	December	• School year ends. Most grade 8 students graduate from primary school.
2005	January	• School year starts. Former grade 8 students enroll in secondary school if they qualify (academically) and can pay tuition fees.
	March	• FOLLOW-UP DATA – Schooling, marital and childbearing status update via visits at all 328 primary schools of origin.
	May – July	• FOLLOW-UP DATA – Anonymous follow-up survey administered at Secondary Schools in study area. Students filling-in survey asked to record primary school of origin so that their "treatment" status can be identified.
	July	• FOLLOW-UP DATA – Schooling, marital and childbearing status update via visits at all 328 primary schools of origin.
	Aug. – Sep.	• FOLLOW-UP DATA – Follow-up survey conducted through home visits for girls reported as having started childbearing.

FIGURE 2. STUDY TIMELINE

Empirical analysis

- two models
  - simple differences
  - DID (cohort receiveng RR vs cohort already out of school in 2004 + treated/non treated schools)

Simple differences

$$Y_{is1} = \alpha_1 + \beta_1 \times RR_s + \chi_1 \times TT_s + I_i'\gamma_1 + \varepsilon_{is}$$

Preliminary comment

- What is indentified??
- in the text: "The average effect of coming from a RR treatment school ($RR_s = 1$) versus a RR comparison school ($RR_s = 0$) is captured by β_1"
  - for instance, if we want to assess TT impact, we are going to compare
    - people who received TT or TT+RR with (164 schools, 129 TT only, 35 TT+RR)
    - people who received nothing or RR (164 school, 129 nothing, 35 RR)
  - ➔The interaction among treatments matters...

With interaction

TABLE A3—TESTING FOR AN INTERACTION EFFECT BETWEEN RR AND TT INFORMATION SETS

Sample		All	Girls who started childbearing		Secondary school girls	
Corresponding specification in main tables:		Table 3, col. 1	Table 4, col. 1	Table 4, col. 3	Table 6, col. 5	Table 6, col. 9
		Has started childbearing	Age difference between teenage girl and her partner	Age gap >5 years	Age gap >5 years	Ever had sex
		(1)	(2)	(3)	(4)	(5)
α	RR only	−0.007	−2.33	−0.158	−0.061	0.109
		(0.010)	(1.183)*	(0.131)	(0.061)	(0.045)**
	TT only	0.009	-0.904	0.093	0.008	−0.025
		(0.007)	(0.855)	(0.092)	(0.044)	(0.025)
γ	Both RR and TT	−0.016	−2.251	−0.166	−0.068	0.069
		(0.014)	(0.960)**	(0.161)	(0.038)*	(0.039)*
	Observations	5,988	120	134	260	2,173
	p-value, test ($\alpha = \gamma$)	0.55	0.94	0.96	0.874	0.442

Note: Robust standard errors are in parentheses
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Treatment and Control groups

TABLE 2—VERIFYING BALANCE BETWEEN GROUPS IN TERMS OF SCHOOL CHARACTERISTICS AND OUTCOMES FOR PRE-PROGRAM COHORT

	RR information			TT on HIV/AIDS curriculum		
	Comparison group (C) (1)	Treatment group (T) (2)	Difference T–C (3)	Comparison group (C) (4)	Treatment group (T) (5)	Difference T–C (6)
Panel A. School characteristics at baseline						
Class size	38.2 [15.9]	34.4 [17.4]	−3.8 (1.540)**	37.4 [16.9]	37.3 [15.7]	−0.06 (1.281)
Pupils' sex ratio (girls/boys)	1.07 [0.489]	1.12 [0.668]	0.049 (0.072)	1.06 [0.476]	1.10 [0.586]	0.040 (0.059)
Teacher-pupil ratio	0.026 [0.026]	0.026 [0.022]	0.000 (0.003)	0.025 [0.021]	0.027 [0.028]	0.003 (0.003)
Teachers' sex ratio (females/males)	1.033 [0.914]	0.921 [0.777]	−0.112 (0.119)	1.003 [0.92]	1.014 [0.852]	0.011 (0.099)
KCPE results (2003)	251.0 [29.0]	249.4 [27.4]	−1.6 (3.9)	252.2 [28.6]	249.0 [28.5]	−3.2 (3.2)
Sampled for TT on HIV/AIDS curriculum	0.50	0.49	−0.003 (0.067)	0.00	1.00	
Sampled for RR information	0.00	1.00		0.22	0.22	−0.002 (0.046)

Difference in differences

$$Y_{isc} = \alpha_2 + \beta_2 \times RR_s \times StudyCohort_c + \delta \times RR_s + \theta \times RR_s + \chi_2 \times TT_s + I_i'\gamma_2 + \omega_{isc}$$

- DID:
  - Recall that the study cohort is made of students enrolled in grade 8 in 2004.
  - Two control cohorts: the older cohort (grade 8 of 2003) and the younger cohort (grade 7 of 2004).
    - For the older cohort no data on partner's age
    - For the younger cohort all data available

Why DID?

Comparing the single-difference to the difference-in-differences estimates is useful for two reasons.

1. if the randomization of the RR program assignment was not perfect, the difference-in-differences will adjust for potential pre-existing random differences between RR treatment and RR comparison schools.
2. Second, the difference-in-differences allows the inclusion of school fixed effects, which allows to control for unobservable school characteristics.

TABLE 3—PROBABILITY THAT GIRLS HAVE STARTED CHILDBEARING

	Has started childbearing				Has started childbearing, unmarried		Has started childbearing, married	
Specification model	SD OLS (1)	SD PROBIT (ME) (2)	DD OLS (3)	DD-FE OLS (4)	SD OLS (5)	DD OLS (6)	SD OLS (7)	DD OLS (8)
RR information	−0.015 (0.008)*	−0.013 (0.008)*	0.006 (0.013)		−0.009 (0.004)**	0.015 (0.010)	−0.005 (0.006)	0.011 (0.012)
RR information × 2004 cohort			−0.024 (0.016)	−0.020 (0.016)		−0.027 (0.011)**		−0.017 (0.013)
TT on HIV/AIDS curriculum	0.006 (0.007)	0.007 (0.006)	0.008 (0.006)		0.006 (0.004)	0.006 (0.004)	0.000 (0.005)	0.002 (0.005)
Sample								
Control cohort included (2003 cohort)			Yes	Yes		Yes		Yes
Controls								
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Primary school characteristics	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Primary school fixed effects				Yes				
Observations	5,988	5,988	10,968	10,968	5,988	10,968	5,988	10,968
Mean of dependent variable (2004 cohort, RR = 0)	0.054	0.054	0.054	0.054	0.021	0.021	0.033	0.033

Notes: Data collected by asking whereabouts of students at their 2004 primary school. Specifications: SD = simple difference; DD = difference-in-difference; FE = school fixed effects. Only the 2004 cohort was affected by the RR information program. The dependent variables are individual-level dummies. Robust standard errors in parentheses, clustered at the school level. Columns 2, 6, and 10 report mean marginal effects. "2004 Cohort" = Cohort of students enrolled in grade 8 in 2004. "2003 Cohort" = Cohort of students enrolled in grade 8 in 2003. Individual controls include: age, whether student is repeating grade 8 at baseline, and cohort when applicable. School controls include: gender ratio among pupils, teacher-pupil ratio, average school performance on the national KCPE exam, location, and timing of school visit. School visits were conducted between July and December 2005 for the 2004 cohort, and between July and December 2004 for the 2003 cohort. The timing of visits was balanced across groups.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

childbearing X married

No effect of the TT program on childbearing.

Significant negative effect of the RR program

(results from the published paper)

(Results from the NBER Working Paper)

Table 3 *Probability that Girls have started Childbearing*

	Has started childbearing				Has started childbearing, Unmarried				Has started childbearing, Married			
SPECIFICATION MODEL	SD OLS (1)	SD PROBIT (ME) (2)	DD OLS (3)	DD-FE OLS (4)	SD OLS (5)	SD PROBIT (ME) (6)	DD OLS (7)	DD-FE OLS (8)	SD OLS (9)	SD PROBIT (ME) (10)	DD OLS (11)	DD-FE OLS (12)
RR Information	-0.015	-0.014	0.004		-0.011	-0.009	0.006		-0.004	-0.002	-0.002	
	(0.008)**	(0.007)**	(0.011)		(0.005)**	(0.004)**	(0.008)		(0.006)	(0.005)	(0.009)	
RR Information x 2004 Cohort			-0.024	-0.024			-0.017	-0.019			-0.006	-0.004
			(0.013)*	(0.013)*			(0.009)*	(0.008)**			(0.010)	(0.010)
TT on HIV/AIDS Curriculum	0.006	0.008	0.000		0.006	0.006	0.002		0.000	0.002	-0.002	
	(0.006)	(0.006)	(0.005)		(0.004)	(0.003)*	(0.003)		(0.005)	(0.004)	(0.004)	
Sample												
Control Cohort Included (2003 cohort)			Yes	Yes			Yes	Yes			Yes	Yes
Controls												
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Primary School Characteristics	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	
Primary School Fixed Effects				Yes				Yes				Yes
Observations	5989	5989	10970	10970	5989	5989	10970	10970	5989	5989	10970	10970
Mean of Dep Var (RR=0)	0.054	0.054	0.054	0.054	0.021	0.021	0.021	0.021	0.033	0.033	0.033	0.033

Notes: Specifications: SD = simple difference; DD = difference-in-difference; FE= school fixed effects. Only the 2004 cohort was affected by the RR Information program. The dependent variables are at individual-level dummies. Robust standard errors in parentheses, clustered at the school level. Significantly different than zero at 1(***), 5(**) and 10(*) percent. Columns 2, 6 and 10 report mean marginal effects. Individual controls include: schooling status, age, and cohort when applicable. School controls include: gender ratio among pupils, average school performance on the national KCPE exam, location, timing of follow-up visit. Follow-up visits were conducted after 15 to 21 months for the 2003 Cohort, and after 12 to 17 months for the 2004 Cohort. The timing of visits was balanced across treatment and control schools, with an average gap of 16 months between baseline and follow-up in both groups (in both groups: 17.6 months for the 2003 Cohort and 14.5 months for the 2004 Cohort).

TABLE 4—AGE GAP BETWEEN GIRLS WHO HAVE STARTED CHILDBEARING AND THEIR PARTNER

	Age difference between teenage girl and her partner		Age gap > 5 years			Age gap > 10 years		
Specification model	SD OLS (1)	DD OLS (2)	SD OLS (3)	SD PROBIT (ME) (4)	DD OLS (5)	SD OLS (6)	SD PROBIT (ME) (7)	DD OLS (8)
RR information	−1.685 (0.609)***	1.07 (0.817)	−0.224 (0.116)*	−0.226 (0.097)**	0.157 (0.121)	−0.064 (0.061)	−0.081 (0.052)	0.166 (0.084)**
RR information × 2004 cohort		−2.576 (1.048)**			−0.351 (0.190)*			−0.229 (0.109)**
TT on HIV/AIDS curriculum	−0.708 (0.720)	−0.331 (0.451)	0.074 (0.081)	0.101 (0.074)	0.026 (0.060)	−0.076 (0.058)	−0.066 (0.055)	−0.03 (0.037)
Sample								
Control cohort included (2005 cohort)		Yes			Yes			Yes
Controls								
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Primary school characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	120	250	134	134	278	134	134	278
Mean of dependent variable (RR = 0)	5.91	5.91	0.49	0.49	0.49	0.16	0.16	0.16
Standard deviation	(4.16)	(4.16)						

Notes: Data source: follow-up survey conducted through home visits for subsample of girls who had started childbearing by July 2005. Specifications: SD = simple difference; DD = difference-in-difference. Data collected through home visits. Only the 2004 cohort was affected by the RR Information program. The dependent variables are at the individual level. Robust standard errors in parentheses, clustered at the primary school level. Columns 4 and 7 report mean marginal effects. Individual controls include: age, and cohort when applicable. School controls include: gender ratio among pupils, average school performance at national KCPE exam, location.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

No effect of TT on age difference

Significant negative effect of RR on age difference

Summary

TABLE 5—OVERALL TREATMENT EFFECTS ON INCIDENCE OF CHILDBEARING BY MALE PARTNER'S AGE

	Comparison group	RR treatment group				RR treatment effect		
	Base = 100	Point estimate	Std. error	90% CI		Point estimate (%)	90% CI	
Panel A. Effect of relative risks information								
# Teen pregnancies (A)	100.0	72.3	14.8	[47.5	97.0]	−27.7	[−52.5	−3.0]
Share of pregnancies by men > 5 years older (B)	47.6	25.2	11.6	[5.8	44.6]	−47.1	[−87.8	−6.4]
# Pregnancies by men > 5 years older (C = A × B)	47.6	18.2	9.3	[3.66	33.8]	−61.7	[−92.3	−29.0]
# Pregnancies by men ≤ 5 years older (D = A − C)	52.4	54.1	13.9	[30.9	76.2]	3.2	[−41.0	45.4]
		TT treatment group				TT treatment effect		
	Base = 100	Point estimate	Std. error	90% CI		Point estimate (%)	90% CI	
Panel B. Effect of teacher training on HIV curriculum								
# Teen pregnancies	100.0	111.1	13.0	[89.4	132.7]	11.1	[−10.6	32.7]
Share of pregnancies by men > 5 years older	47.6	55	8.1	[41.5	68.5]	15.5	[−12.9	44.0]
# Pregnancies by men > 5 years older	47.6	61.1	12.9	[44.3	82.6]	28.4	[−6.9	73.5]
# Pregnancies by men ≤ 5 years older	52.4	50.0	11.9	[30.1	65.3]	−4.6	[−42.6	24.6]

Notes: In each panel, the first row shows the effect on number of teen pregnancies reported from Table 3, column 1. The second row shows the effect on share of pregnancies by older men reported from Table 4, column 3.

Summary

- Teenagers do not comply with a recommendation of the kind “absolute abstinence”
- They positively respond when they are fully informed of the risk level they will bear with different partner

Mechanisms

TABLE 6—SELF-REPORTED SEXUAL BEHAVIOR FOR STUDENTS WHO JOINED SECONDARY SCHOOL

	Has had sex with multiple partners (1)	Currently has a regular partner[a] (2)	Partner > 5 years older[b] (3)	Ever received money from current partner (4)	Ever had sex (5)	Ever had sex but never used a condom (6)	Used a condom at last sexual intercourse (7)
Panel A. Girls							
RR information	0.007	0.096	−0.069	0.055	0.101	0.034	0.118
	(0.015)	(0.025)***	(0.038)*	(0.089)	(0.031)***	(0.027)	(0.073)
TT on HIV/AIDS curriculum	−0.010	0.009	0.004	0.092	−0.028	−0.021	0.012
	(0.011)	(0.023)	(0.035)	(0.075)	(0.023)	(0.016)	(0.067)
Observations	2,170	2,157	260	246	2,173	2,173	307
Mean of dependent variable (RR = 0)	0.033	0.122	0.074	0.684	0.191	0.107	0.360
Controls							
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Secondary school characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Boys							
RR information	0.106	0.027	−0.041	0.228	0.125	0.052	0.024
	(0.032)***	(0.027)	(0.015)***	(0.102)**	(0.036)***	(0.039)	(0.042)
TT on HIV/AIDS curriculum	−0.011	0.002	0.017	−0.036	−0.025	0.005	−0.012
	(0.023)	(0.021)	(0.018)	(0.070)	(0.026)	(0.023)	(0.029)
Observations	2,668	2,641	312	350	2,678	2,678	1,116
Mean of dependent variable (RR = 0)	0.217	0.138	0.036	0.453	0.521	0.333	0.296
Controls							
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Secondary school characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Data source: anonymous follow-up survey conducted among secondary school students. All columns correspond to Linear Probability Model regressions (probit estimates are shown in Appendix Table A3). The dependent variables are individual-level dummies. Robust standard errors in parentheses, clustered at the secondary school level. Individual controls include: age and a dummy indicator for students not coming from a study primary school. Controls at the secondary school level include: location and gender ratio among pupils. Results are robust to the addition of all other available school controls (school size, average performance, school type (day or boarding), tuition costs). Columns 3 and 4: sample restricted to those who declare having a regular partner. Column 7: sample restricted to those who declare ever having had sex.

Based on self-reported information. Sample = students who enroll to secondary school

Issues?

- Is it the type of information important or is it something else?
  - TT is provided by teachers
  - RR is provided by young girls of an NGO: more effective communication?
  - TT data are national averages
  - RR data are much higher and coming from the nearby city
- However, if RR just increased undifferentiated perceived risk, we would not observe any change in partners' selection

Comments

- spillovers across schools: could this account for the null effect of TT?
- spillover across cohorts of the same school
- How do programs interact?
  - is it the kind of information that matters or simply... repetita juvant?
- Could it really be that 40min long information event change consolidated behaviors?

Kohler & Thornton (2011)

- Are conditional cash transfers effective in inducing people to avoid risky sexual behaviors?
  - conditional cash transfers (if you behave in a given manner, I'll give you some money) have been proven to be very effective in several domains (e.g. smoking, conditional aid)
  - much confidence has been attached to CCT in the battle against HIV
  - in Malawi 1300 males and females have been randomly assigned a CCT: they would have received a transfer if their HIV status remained constant during the program (1 year long).
- However
  - one thing is promising cash…
  - another thing is actually receiving this money…

The program

- The Malawi Incentives Project is part of the larger Malawi Diffusion and Ideational Change Project (MDICP)
  - a longitudinal study of men and women in three districts of rural Malawi,
  - started in 1998 and continued until 2008
- The incentives project involved a subsample of those who accepted a HIV test in 2006.
  - During the 2006 testing, 92 percent of the respondents who were offered an HIV test accepted the test.
  - Of those tested for HIV in 2006, 1408 individuals were invited to participate in the incentives project.
  - A total of 1,312 (or 93%) were enrolled into the incentives program.

The program

- Each individual **randomly** drew a token out of a bag to determine their incentive amount. The incentive amounts included
  - zero,
  - 500 Kwacha (approximately 4 dollars),
  - 2000 Kwacha (approximately 16 dollars) for an individual.
- Each individual was **immediately** given a voucher of the financial amount they randomly drew, and was told that they must maintain their HIV status in order to receive the money approximately one year later
- The realized (ex-post) distribution of the incentives resulted in 35 percent receiving zero, 32 percent receiving a medium level incentive, and 33 percent receiving a high-level incentive
- Is the financial incentive large?
  - Whiteside (1998) reports piecework daily rates (ganyu) of 20 Kwacha for men and 5–10 Kwacha for women.

The program

- Three to six months after the incentives were offered and vouchers given out, respondents were interviewed in their homes and asked about their recent sexual behavior.
  - asked about the previous nine days, asking sexual activities and condom use each day.
- These diaries were collected three times over the period of the study, Round 1, Round 2, and Round 3, respectively.
  - unannounced visits that occurred approximately every three months
  - the same questionnaire was administered each time.
- At the end of the third round, respondents were offered another HIV test.
  - This HIV test was required in order to be eligible to receive any of the financial incentives.
- At the end of the study, 89 percent of all enrolled respondents obtained a follow-up HIV test after Round 3
  - although those who were assigned a zero transfer had less incentive to submit to the HIV test and thus they turn out to be under-represented.

Balancing

Table 2: Baseline Characteristics by Incentives Offered

	Zero Incentive (N=458) (1)	Medium Incentive (N=420) (2)	High Incentive (N=434) (3)	p-value of joint test (4)
Male	0.44	0.47	0.43	0.60
Age	34.75	35.52	37.04	0.02
Married	0.84	0.83	0.84	0.89
Subjective Health	2.03	2.00	2.17	0.02
Number of lifetime sexual partners	2.95	3.35	3.06	0.35
Acceptable to use condom	0.40	0.39	0.43	0.58
Used condom with current partner	0.26	0.26	0.27	0.87
HIV positive	0.11	0.09	0.07	0.11
Fear about HIV	1.61	1.58	1.61	0.81
Number friends died of HIV	7.79	8.58	8.27	0.37
Some likelihood of HIV infection (current)	0.30	0.29	0.28	0.93
Some likelihood of HIV infection (future)	0.60	0.56	0.55	0.35

Standard errors in parenthesis *signifcant at 10%; **signifcant at 5%; ***signifcant at 1%

Notes: This table presents baseline demographic statistics by incentives amounts among 1,312 respondents who participated in the incentives program. Subjective health represents self-reported health and was asked: "In general, would you say your health is: Excellent (1), Very Good (2), Good (3), Fair (4), Poor(5)". Fear about HIV was asked as: "How worried are you that you might catch HIV/AIDS? Not worried at all (1), Worried a little (2), Worried a lot (3)". Some likelihood of infection was coded one if the respondent answered low, medium, high, or don't know and zero otherwise. Each variable was measured before incentives were offered. Column 4 shows the p value for
the joint test of significance of each of the treatment dummies.

The model

$$Y_{ij} = \alpha + \beta(any\ incentive_i) + \gamma X_i + \varepsilon_{ij}$$

where

- Y_{ij} is a given sexual beahvior or the HIV status of individual i in round j
- $any\ incentive_i$ is a dummy which takes 1 if individual i is **assigned** any positive transfer
- X are individual controls

Results

Table 4: Impact of Incentive Offer on Reported Sexual Behavior, All Rounds

	Pregnant (Women)	Any Vaginal Sex	Days of Vaginal Sex	Used Condom	Condoms at Home	Safe/No Sex
	(1)	(2)	(3)	(4)	(5)	(6)
Any Incentive	0.001	0.007	0.026	-0.021	0	-0.007
	[0.014]	[0.019]	[0.074]	[0.019]	[0.013]	[0.018]
Male		0.138***	0.439***	0.097***	0.093***	-0.093***
		[0.021]	[0.083]	[0.017]	[0.014]	[0.021]
Married	0.025	0.333***	0.922***	-0.057	0.075***	-0.292***
	[0.020]	[0.035]	[0.116]	[0.043]	[0.020]	[0.029]
HIV Positive at baseline	-0.028	-0.072**	-0.391***	0.141**	0.128***	0.129***
	[0.018]	[0.034]	[0.121]	[0.054]	[0.030]	[0.038]
Age	-0.006	0.004	0.045**	-0.011**	-0.005	-0.006
	[0.003]	[0.004]	[0.019]	[0.005]	[0.003]	[0.004]
Age-squared	0.000	-0.000*	-0.001***	0.000	0.000	0.000*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Some school	-0.023*	0.018	0.070	0.008	0.030**	-0.014
	[0.014]	[0.022]	[0.094]	[0.019]	[0.012]	[0.024]
Number of children	-0.003	0.011***	0.050**	-0.001	-0.000	-0.012***
	[0.002]	[0.004]	[0.019]	[0.003]	[0.002]	[0.004]
Rumphi	0.001	-0.082***	0.009	0.123***	0.050**	0.156***
	[0.016]	[0.027]	[0.107]	[0.027]	[0.022]	[0.027]
Balaka	0.006	-0.124***	-0.271***	0.006	0.006	0.099***
	[0.018]	[0.026]	[0.102]	[0.038]	[0.023]	[0.027]
Round 2	-0.003	-0.021	-0.093	-0.005	0.001	-0.040*
	[0.011]	[0.020]	[0.070]	[0.016]	[0.011]	[0.022]
Round 3	-0.005	-0.044**	-0.016	-0.010	-0.005	-0.017
	[0.015]	[0.019]	[0.091]	[0.020]	[0.013]	[0.018]
Constant	0.263***	0.238***	0.015	0.371***	0.120**	0.882***
	[0.075]	[0.083]	[0.348]	[0.108]	[0.059]	[0.087]
Observations	1987	3552	3552	1873	3552	3552
R-squared	0.037	0.104	0.070	0.084	0.053	0.091
Mean of dependent variable	0.086	0.531	1.510	0.126	0.121	0.556

* significant at 10%; ** significant at 5%; *** significant at 1%

Results

Table 5: Impact of Incentive Offer on Reported Sexual Behavior, Separate Rounds

Dependent Variable:		HIV Positive (Round 3)	Pregnant (Women)	Any Vaginal Sex	Days Vaginal Sex	Used Condom	Condoms at Home	Safe/No Sex
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Round 1	"Any Incentive" Coefficient	--	0.023	0.04	0.155	-0.028	0.001	-0.025
		--	[0.025]	[0.031]	[0.108]	[0.026]	[0.022]	[0.032]
	Observations		673	1203	1203	665	1203	1203
	R-squared		0.047	0.098	0.077	0.124	0.068	0.083
	Mean of dep var	--	0.089	0.553	1.548	0.133	0.123	0.575
Round 2	"Any Incentive" Coefficient	--	-0.003	-0.011	-0.034	-0.029	-0.014	-0.007
		--	[0.021]	[0.026]	[0.107]	[0.030]	[0.019]	[0.030]
	Observations		646	1158	1158	614	1158	1158
	R-squared		0.036	0.114	0.085	0.107	0.06	0.107
	Mean of dep var	--	0.085	0.532	1.457	0.128	0.122	0.534
Round 3	"Any Incentive" Coefficient	0.001	-0.019	-0.008	-0.043	0.000	0.014	0.012
		[0.005]	[0.019]	[0.027]	[0.114]	[0.030]	[0.016]	[0.026]
	Observations	1149	668	1189	1189	593	1189	1189
	R-squared	0.912	0.048	0.119	0.063	0.081	0.057	0.104
	Mean of dep var	0.074	0.083	0.505	1.518	0.116	0.115	0.561

* significant at 10%; ** significant at 5%; *** significant at 1%

Additional results

- the impact is not changing
  - with education
  - with inndividual wealth
  - by gender
  - by woman enpowerment

The effect of cash in your pocket

- At the end of the program, the CCT was paid and a further Round of interviews about sexual behaviors was carried out (Round 4)
- The same model is estimated (now assigned incentive turns into actual cash)
- Additional cash induces
  - more risky behaviors among men (more partners but also more condoms)
  - less risky behaviors among women

Results

Table 6: Effect of Receiving Incentive on Reported Sexual Behavior, Round 4

Panel A: Attrition to Round 4 Survey

	All	Zero Incentive	Medium Incentive	High Incentive	p-value of joint test
	(1)	(2)	(3)	(4)	(5)
Completed Round 4	0.839	0.808	0.838	0.873	0.03

Panel B: Effects of Receiving an Incentive on Sexual Behavior

	Men				**Women**			
	Any Vaginal Sex	Days Vaginal Sex	Used Condom	Safe/No Sex	Any Vaginal Sex	Days Vaginal Sex	Used Condom	Safe/No Sex
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any Incentive	0.129***	0.531**	0.069**	-0.085*	-0.085**	-0.216	0.002	0.075*
	[0.047]	[0.208]	[0.032]	[0.044]	[0.040]	[0.174]	[0.032]	[0.038]
Observations	469	469	295	469	628	628	356	628
R-squared	0.136	0.088	0.166	0.179	0.067	0.038	0.128	0.081

Results

Panel C: Effects of Receiving an Incentive on Sexual Behavior

	Men				Women			
	Any Vaginal Sex	Days Vaginal Sex	Used Condom	Safe/No Sex	Any Vaginal Sex	Days Vaginal Sex	Used Condom	Safe/No Sex
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High Incentive	0.122**	0.690**	0.079*	-0.080*	-0.113***	-0.303	-0.019	0.095**
	[0.052]	[0.268]	[0.040]	[0.047]	[0.042]	[0.191]	[0.037]	[0.046]
Lo Incentive	0.136**	0.367	0.058	-0.090	-0.055	-0.124	0.022	0.053
	[0.055]	[0.225]	[0.039]	[0.055]	[0.049]	[0.210]	[0.038]	[0.044]
Observations	469	469	295	469	628	628	356	628
R-squared	0.136	0.092	0.167	0.179	0.070	0.039	0.132	0.082

Notes: All coefficients are from OLS regressions. Control variables not shown. "Vaginal Sex" is a dummy variable equal to one if the respondent reported having had vaginal sex. "Used a Condom" is a dummy variable equal to one if the respondent reported using a condom. "Safe Sex or No Sex" is a dummy variable equal to one if the respondent either reported using a condom or reported not having sex. Each regression includes controls for whether the respondent is male, married, has some schooling, HIV status at baseline, number of living children, and distric fixed effects. Robust standard errors clustered by village, in brackets.

Comments

- Cash could have been directly used by men to purchase risky sex, and could have been used by the women to substitute away from “selling” risky sex.
- Another possible mechanism for men is that the incentive may have been a signal that the individual was HIV-negative.
  - If everyone in the village knew about the incentives program, a man could use the earning of the incentive as an indication that he was not infected.
- Ironically, this could have resulted in an increase in risky sex.