



**USAID**  
FROM THE AMERICAN PEOPLE

# DHS WORKING PAPERS

## **A study of the association of HIV infection with wealth in sub-Saharan Africa**

Vinod Mishra  
Simona Bignami  
Robert Greener  
Martin Vaessen  
Rathavuth Hong  
Peter Ghys  
Ties Boerma  
Ari Van Assche  
Shane Khan  
Shea Rutstein

2007 No. 31

January 2007

This document was produced for review by the United States Agency for International Development.

*DEMOGRAPHIC  
AND  
HEALTH  
RESEARCH*

The *DHS Working Papers* series is an unreviewed and unedited prepublication series of papers reporting on research in progress based on Demographic and Health Surveys (DHS) data. Funding for this research was provided by the Joint United Nations Programme on HIV/AIDS (UNAIDS) (# HQ/05/423963). Additional support was provided by the United States Agency for International Development (USAID) through the MEASURE DHS project (# GPO-C-00-03-00002-00). Views expressed are those of the authors and do not necessarily reflect the views of UNAIDS, USAID, the United States Government, or the organizations with which the authors are affiliated.

MEASURE DHS assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Additional information about the MEASURE DHS project can be obtained by contacting Macro International Inc., Demographic and Health Research Division, 11785 Beltsville Drive, Suite 300, Calverton, MD 20705 (telephone: 301-572-0200; fax: 301-572-0999; e-mail: [reports@orcmacro.com](mailto:reports@orcmacro.com); internet: [www.measuredhs.com](http://www.measuredhs.com)).



## **A study of the association of HIV infection with wealth in sub-Saharan Africa**

Vinod Mishra<sup>1</sup>  
Simona Bignami<sup>2</sup>  
Robert Greener<sup>3</sup>  
Martin Vaessen<sup>1</sup>  
Rathavuth Hong<sup>1</sup>  
Peter Ghys<sup>3</sup>  
Ties Boerma<sup>4</sup>  
Ari Van Assche<sup>5</sup>  
Shane Khan<sup>1</sup>  
Shea Rutstein<sup>1</sup>

January 2007

*Corresponding author:* Vinod Mishra, DHR Division, MACRO International Inc., 11785 Beltsville Drive, Calverton, MD 20705. Phone: 301-572-0220. Fax: 301-572-0999. Email: [vinod.mishra@orcmacro.com](mailto:vinod.mishra@orcmacro.com)

---

<sup>1</sup> Macro International Inc.

<sup>2</sup> University of Montreal

<sup>3</sup> Joint United Nations Programme on HIV/AIDS

<sup>4</sup> World Health Organization

<sup>5</sup> HEC Montreal

## **ACKNOWLEDGEMENTS**

The preliminary findings of this research were presented at the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) annual meeting in Durban, South Africa during June 12-15, 2006, and at the International AIDS Economic Network meeting in Toronto, Canada during August 11-12, 2006. The authors wish to thank numerous people who provided comments on the two presentations and on draft versions of this report.

## **ABSTRACT**

**Background:** Wealthier individuals do better than poorer ones on most measures of health status including malnutrition, morbidity, mortality, and health care utilization. It is reasonable to expect that poverty increases individual vulnerability to HIV/AIDS in the same manner.

**Objectives:** This study examines the association between wealth and HIV serostatus to identify what specific characteristics and behaviors of the wealthier are associated with HIV infection, and to what extent confounding factors such as place of residence and other risk factors mediate this association.

**Methods:** Data are from eight national Demographic and Health Surveys in sub-Saharan Africa—Kenya, Ghana, Burkina Faso, Cameroon, Tanzania, Lesotho, Malawi, and Uganda—conducted during 2003-2005. Dried blood spot samples were collected for HIV testing, following internationally accepted ethical standards and laboratory procedures. HIV test results were linked anonymously to the characteristics and risk behaviors of adult respondents. The association between household wealth and HIV serostatus is examined using both descriptive and multivariate statistical methods. Wealth is measured by an index based on household ownership of durable assets and other amenities.

**Results:** This study finds that, contrary to evidence for other infectious diseases and theoretical expectations, in sub-Saharan Africa HIV prevalence is not disproportionately higher among adults living in poorer households. In all eight countries included in this study, wealthier men and women tend to have higher prevalence of HIV than poorer ones. Accounting for various underlying factors and proximate determinants explains much of this positive association, but in most cases wealthier adults remain at least as likely as poorer adults to be infected with HIV.

**Conclusions:** The findings of this study question the basis for poverty-driven programs for HIV/AIDS prevention in developing countries. When planning and designing prevention, care, and treatment efforts, program planners and policymakers need to adjust to the reality that HIV prevalence is not necessarily higher among the poorer.



## INTRODUCTION

The relationship between socioeconomic status and health is well documented. There is ample evidence that wealthier individuals do better on most measures of health status including malnutrition, morbidity, mortality, and health care utilization (Kuate-Defo 1997; Adler and Newman 2002; Fotso and Kuate-Defo 2005). Consistent with these findings, there is evidence of an inverse relationship between socioeconomic status and risk of sexually transmitted infections, such as herpes, chlamydia, gonorrhea, syphilis, and bacterial vaginosis (Ellen et al. 1995; Fleming et al. 1997; Lacey et al. 1997; Holtgrave and Crosby 2003; Kyriakis et al. 2003; Miller et al. 2003; Wald 2004; Chawla et al. 2004; Uuskula et al. 2004; Bukusi et al. 2006). Although much of this evidence is from western countries, it is reasonable to expect that poverty increases individual vulnerability to HIV/AIDS in the same manner.

It is indeed often argued that poverty is the root cause of the spread of the HIV/AIDS pandemic (Fitzgerald et al. 2000). A recent article in the *Lancet* argued that “[s]ince poverty plays a role in creating an environment in which individuals are particularly susceptible and vulnerable to HIV/AIDS, poverty reduction will undoubtedly be at the core of a sustainable solution to HIV/AIDS” (Fenton 2004). Analogous views have been expressed in numerous public statements and publications, and guide HIV/AIDS prevention efforts in several countries.

At the global level, there is evidence of a positive correlation between countries’ HIV prevalence and poverty, as measured by per capita income, income inequality, or absolute poverty (Bloom et al. 2001). However, the HIV/AIDS epidemic in sub-Saharan Africa represents a notable exception to this general pattern. On the one hand, at the macro level African nations with high HIV prevalence, such as South Africa and Botswana, tend to be the wealthier countries in the region (Whiteside 2002; UNAIDS 2006). On the other hand, at the individual level wealth has been found to be positively associated with HIV serostatus (Menon et al. 1998; Kirunga and Ntozi 1997; Shelton et al. 2005).<sup>1</sup>

Several hypotheses have been put forward to account for this apparently anomalous finding. It has been argued that greater prevalence of risky sexual behaviors among the wealthier may increase their vulnerability to HIV infection, while better nutritional status, greater access to

---

<sup>1</sup> Reviews of the existing literature about the association between socioeconomic status and HIV infection indicate that only few studies have found a negative association, whereas most have found a positive or no association (e.g., Ainsworth et al. 1998; Wojcicki 2005).

health care, and greater use of antiretroviral drugs (ARVs) may improve their survival with HIV infection (Shelton et al. 2005).

Using data from eight recent population-based, nationally-representative surveys with HIV testing in sub-Saharan Africa, we conduct an in-depth analysis of the association between wealth status and HIV prevalence in the region. Our aim is to identify what specific characteristics and behaviors of the wealthier are associated with HIV infection, and to what extent confounding factors such as place of residence and other risk factors mediate this association. We also discuss possible reasons why the relationship between wealth and HIV status might differ between men and women.

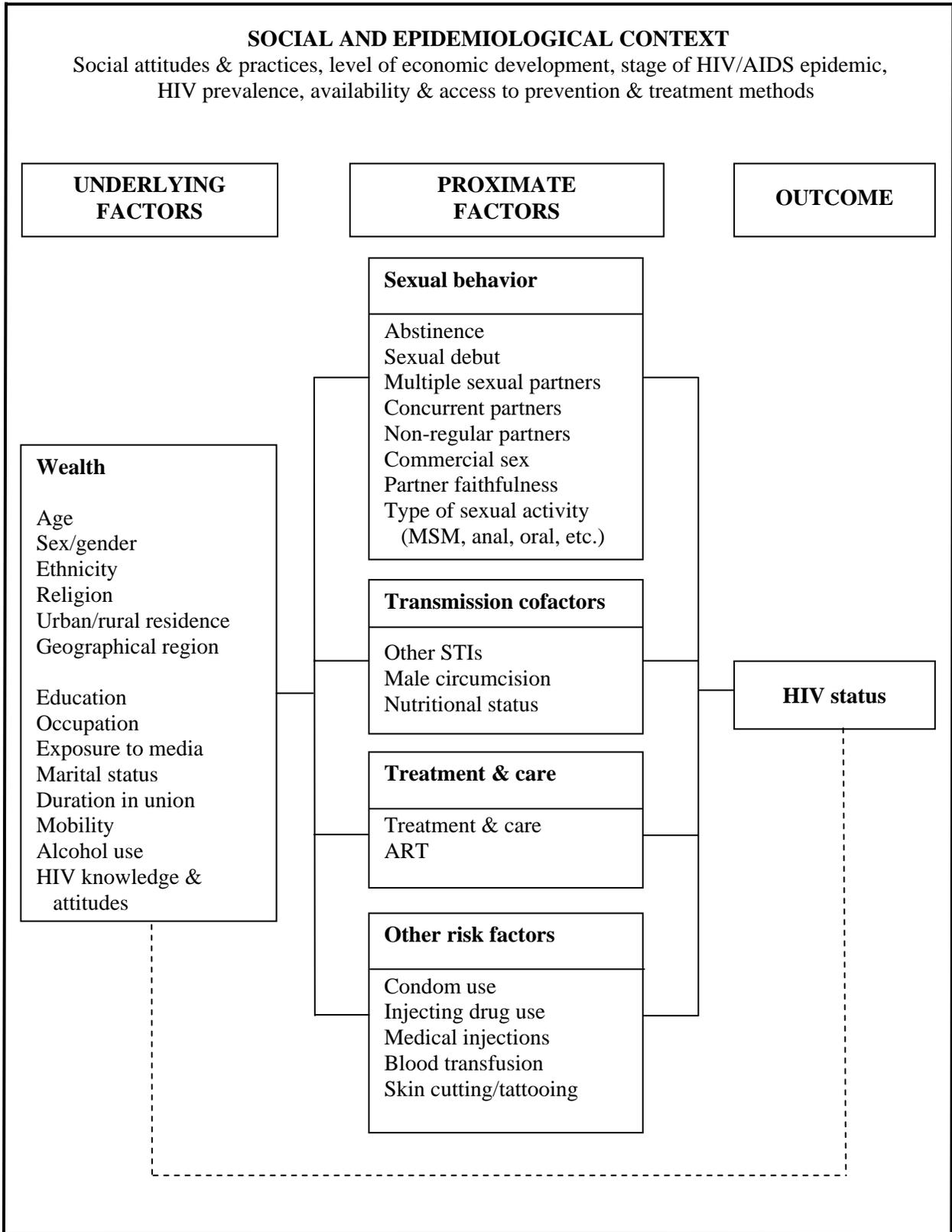
## **WEALTH AND HIV: A CONCEPTUAL FRAMEWORK**

The relationship between household wealth and HIV status operates within and depends on the social and epidemiological context, which includes social attitudes and practices, level of economic development, availability of prevention and treatment methods, as well as overall HIV prevalence and the stage of the epidemic in the population.

Figure 1 summarizes how we conceptualize the association between wealth and HIV and possible pathways. Building on a widely-used proximate determinants framework (Boerma and Weir 2005), the relationship between wealth and HIV is conceptualized as being influenced by a host of underlying factors and mediated by several proximate factors. To have an effect on HIV incidence and prevalence the underlying factors must affect one or more of the proximate factors, which in turn affect either the rate of infection or the duration of infectivity with HIV.

Wealth is associated with several other underlying factors that may influence the relationship between wealth and HIV status in African settings, such as gender, place of residence, education, and mobility. Gender inequities are important for HIV transmission because many women in sub-Saharan Africa face heavy economic, legal, cultural, and social disadvantages. Women's economic dependency on their male partners and lack of power in the relationship make it difficult for them to negotiate safe sex, and may force them into transactional sex (Kim and Watts 2005). At the same time, individuals with little or no education tend to have poor access to safe-sex information and are less likely to use condoms (Lagarde et al. 2001). Mobility significantly increases HIV-related risk because men and women with more education and higher incomes are more likely to travel and thus have more opportunities for casual sexual contacts. Indeed, early HIV studies from sub-Saharan Africa showed a significant relationship between risk of HIV infection and high socioeconomic status and a history of travel (Van de Perre et al. 1987; Barongo et al. 1992). In sub-Saharan Africa, household wealth tends to be associated with urban residence and HIV prevalence tends to be higher in urban areas. It has therefore been argued that the observed positive correlation between HIV infection and socioeconomic status might be a proxy for the concentration of HIV infection in cities or other advantaged regions (Shelton et al. 2005). Finally, wealth also tends to be associated with the knowledge of HIV infection risks and prevention methods, as well as attitudes toward HIV-infected people, which may affect sexual behavior and other proximate factors.

Figure 1. Association between wealth status and HIV prevalence: a conceptual framework



The primary mediating factor linking an individual's wealth and HIV status is sexual behavior. Sexual transmission accounts for most HIV infections worldwide even though the risk of transmission per sex act is small (UNAIDS 2006; Mastro et al. 1994; Gray et al. 2001). There is some evidence that the exposure to infection is higher among the better-off. Several studies have shown that, in sub-Saharan Africa, the probability of having a non-regular sexual partner rises with education and income, potentially raising the exposure to contracting STDs including HIV (Deheneffe et al. 1998; Kongnyuy et al. 2006). Studies have also suggested that men with higher incomes and greater access to resources tend to have a greater number of female sexual partners, are more likely to engage in commercial sex and to have non-regular sexual partners, and are less likely to be faithful to their marital partners—circumstances which all increase the risk of HIV infection (Gregson et al. 2006; Mishra et al. 2007). On the other hand, there is also evidence that women in lower socio-economic positions are more likely to engage in transactional sex and have higher HIV risk (Dunkle et al. 2004).

The efficiency of transmission is affected by a host of proximate determinants. The presence of other untreated STIs, and male circumcision are of particular interest. First, the risk of sexual transmission of HIV increases considerably in the presence of other untreated STIs. For example, there is ample evidence that individuals with herpes and other STIs are more likely to also have HIV infection (Mbizvo et al. 1996; Auvert et al. 2001; Msuya et al. 2002). However, wealthier individuals should have lower HIV infection rates to the extent they have lower prevalence of other untreated STIs than the poorer individuals. Male circumcision is another important transmission cofactor for HIV. Studies have found that uncircumcised men are more likely to be infected than circumcised men, but the evidence on the protective role of male circumcision is not conclusive (Bailey et al. 2001; Siegfried et al. 2005; Way et al. 2006). Three recent clinical trials in sub-Saharan Africa have shown that male circumcision can significantly reduce the risk of HIV infection (NIH 2006; Williams et al. 2006; Auvert et al. 2005). The relationship between wealth status and HIV status is mediated by prevalence of male circumcision to the extent this practice is associated with wealth status. However, in most sub-Saharan African countries, with the notable exception of Lesotho, wealthier men are more likely to be circumcised, which should reduce their risk of HIV infection. Finally, malnutrition may act as a transmission cofactor for HIV since it may lower immune function and increase susceptibility to infection and disease progression.

Access to treatment and care for HIV, and especially to ARVs, affect the duration of illness and play a key role in mediating the relationship between an individual's wealth and HIV status. This

is because HIV transmission is more likely to occur when an infected partner has a higher plasma viral load. Because ARVs lower viral load to undetectable levels in most patients that adhere to prescribed combination regimens, it is possible that ARVs significantly reduce their infectivity. To the extent wealthier individuals have better access to ARVs, and treatment and care in general, they may live longer with HIV infection than poorer individuals lacking such care and treatment. This may result in higher HIV prevalence rates among the wealthier even if their infection rates were not higher.

Wealth status also tends to be associated with various other risk or protective factors, such as condom use, IV drug use, and blood and injection safety, which may influence the risk of HIV infection.

Given a negative association between national wealth and HIV prevalence at the global level, and a concentration of HIV among the poorer in developed countries and among the wealthier in poorer countries (as in sub-Saharan Africa), one may argue that the relationship between wealth and HIV is transitional in nature. For example, individuals with HIV infection eventually tend to lose wealth due to job loss, relocation, or expenses related to illness. It is therefore possible that some wealthier persons may eventually become poorer due to their HIV infection. Moreover, for some poorer women, the sexual exploitation or compulsion to engage in risky behavior due to economic needs may both increase their risk of infection and lead to their economic advancement.

It may be hypothesized that the epidemic starts out among the wealthier people and certain higher-risk groups through their higher-risk behaviors and then as wealthier become aware of transmission risks and start taking precautions (reduce partners and start using condom, especially with higher-risk partners), the prevalence may start to decline among the wealthier, eventually shifting the distribution of the epidemic toward the poorer. If the infection rates decline first among the wealthier, as one would expect, it is possible that the direction of the correlation between wealth and HIV prevalence could eventually change even if the infection rates among the poor remain unchanged.

The pace of this transition in a particular setting may depend on several factors, such as educational campaigns about HIV/AIDS, availability and access to condoms, and availability, access, affordability, and adherence to ARVs.

We hypothesize that in a given country context some combination of many of the mechanisms discussed above occurs to define the nature of relationship between wealth status and HIV prevalence.

## DATA AND METHODS

### *Data*

In this study, we analyze data available from eight national surveys with linked HIV test results: Kenya, Tanzania, Uganda, Malawi, Lesotho, Cameroon, Ghana, and Burkina Faso. All surveys were conducted during the period 2003-2005. The target for HIV testing were nationally-representative samples of women aged 15-49 and men aged 15-59, with three main exceptions. In Uganda, the target sample were women aged 15-59; in Tanzania, the target sample were men aged 15-49; and in Kenya, the target sample were men aged 15-54. The total number of respondents eligible for HIV testing ranged from 3,305 men and 3,758 women in Lesotho to 9,905 men and 11,454 women in Uganda. For consistency, the analysis in this report is limited to men and women aged 15-49 in each of the eight countries. The sampling design and survey implementation procedures for each country are described in detail in the individual country survey reports (CBS, MOH, and ORC Macro 2004; GSS, NMIMR, and ORC Macro 2004; INSD et ORC Macro 2004; TACAIDS, NBS, and ORC Macro 2005; INS et ORC Macro 2005; NSO and ORC Macro 2005; MOHSW, BOS, and ORC Macro 2005; MOH and ORC Macro 2006).

HIV testing was done using dried blood spot (DBS) samples collected on a special filter paper using capillary blood from a finger prick.<sup>2</sup> Participation in HIV testing was voluntary and, before collecting blood samples for HIV testing, each selected participant was asked to provide informed consent to the testing (ORC Macro 2005a). Informed consent was obtained separately for the questionnaire interview. In each country, HIV testing was conducted in a central laboratory by following a standard testing algorithm designed to maximize the sensitivity and specificity of HIV test results, and an approved quality assurance and quality control plan (ORC Macro 2005b). The testing algorithm used two HIV enzyme immunosorbent assays (EIA), based on different antigens. All discordant samples that were positive on the first test and negative on the second test were retested with the same EIAs, and if still discordant, were resolved by Western blot testing. These steps were also repeated for 5–10 percent of randomly selected samples that tested negative on the first test. For external quality assessment, a subset of DBS samples (usually about 5 percent) was retested at an outside reference laboratory using the same algorithm.

In order to ensure confidentiality, the HIV test results were anonymously linked to individual and household questionnaire information through bar codes, after scrambling the household and

---

<sup>2</sup> The only exception was the 2004-05 Uganda Sero-Behavioural Survey, where venous blood was used.

cluster identifiers (ORC Macro 2005b). All HIV testing procedures were reviewed by the ethical review boards of ORC Macro (a U.S.-based company that provides technical assistance to DHS surveys around the world), the host country, and any other implementing partners.

Table 1 shows basic information about the eight surveys included in the present analysis. The number of eligible respondents who participated in the surveys was at least 90 percent, being slightly lower for females than for males. Participation in HIV testing was more heterogeneous across countries. The number of male respondents who were tested for HIV among all those eligible varied from 63 percent in Malawi to 90 percent in Cameroon. For females, response rates ranged from 70 percent in Malawi to 92 percent in Cameroon and Burkina Faso (Table 1).

### ***Methods***

DHS surveys do not include direct questions on income or expenditure, but collect information on several items that measure household ownership of consumer durables (such as television and bicycle; materials used for housing construction; and availability of amenities such as electricity, source of drinking water, and type of toilet facility), which tend to be correlated with household wealth status. Using these survey items, Filmer and Pritchett (2001) developed a standard procedure to construct a “wealth index” to quantify differences in household economic status. The wealth index is generated using the principal components analysis. It is a composite measure of the cumulative living standard of a household, which places individual households on a continuous scale of relative wealth. The wealth index is divided into population quintiles, with the lowest quintile representing the poorest 20 percent and the highest quintile representing the wealthiest 20 percent households within each country.

Table 1 Number of men and women interviewed and tested for HIV, DHS/AIS countries with linked HIV testing									
Country (year) Sex (age group)	# eligible for interview	# inter- viewed	Interview response rate	# ever had sex	# had sex in last 12 months	# currently in union	# eligible for HIV testing	# tested for HIV	HIV response rate
Kenya 2003									
Male (15-54)	4,183	3,578	86%	3,038	2,584	1,818	4,183	2,941	70%
Female (15-49)	8,717	8,195	94%	6,784	5,709	4,919	4,303	3,285	76%
Tanzania 2003/04									
Male (15-49)	6,194	5,659	91%	4,690	4,182	3,005	6,194	4,774	77%
Female (15-49)	7,154	6,863	96%	5,963	5,289	4,362	7,154	5,973	83%
Uganda 2004/05									
Male (15-59)	9,905	8,830	89%	7,390	6,330	4,932	9,905	8,298	84%
Female (15-59)	11,454	10,826	95%	9,483	7,748	6,855	11,454	10,227	89%
Malawi 2004									
Male (15-54)	3,797	3,261	86%	2,863	2,545	2,079	3,797	2,404	63%
Female (15-49)	12,229	11,698	96%	10,397	9,087	8,312	4,071	2,864	70%
Lesotho 2004/05									
Male (15-59)	3,305	2,797	85%	2,291	2,004	1,191	3,305	2,246	68%
Female (15-49)	7,522	7,095	94%	5,917	4,981	3,709	3,758	3,032	81%
Cameroon 2004									
Male (15-59)	5,676	5,280	93%	4,424	4,075	2,678	5,676	5,098	90%
Female (15-49)	11,304	10,656	94%	9,280	8,060	7,166	5,738	5,287	92%
Ghana 2003									
Male (15-59)	5,345	5,015	94%	3,861	3,338	2,671	5,345	4,274	80%
Female (15-49)	5,949	5,691	96%	4,807	3,863	3,549	5,949	5,311	89%
Burkina Faso 2003									
Male (15-59)	3,984	3,605	90%	2,769	2,336	2,016	3,984	3,418	86%
Female (15-49)	12,952	12,477	96%	10,911	8,168	9,655	4,575	4,223	92%

Table 2 presents associations of household wealth status (as measured by the wealth index) with eight key indicators of health and well-being of children under five years of age and of women aged 15-49. The household wealth status shows a strong monotonic relationship with each of these indicators in most countries. For example, in Kenya children in the lowest wealth quintile are two times more likely to be stunted and three times more likely to be underweight than those in the highest wealth quintile; and women in the highest wealth quintile are about four times more likely to use modern contraception and about five times more likely to give birth in a medical institution than those in the lowest wealth quintile. These examples illustrate that the wealth index captures well the relative economic status as it correlates strongly with the health and well-being of people within each country. A full discussion about the wealth index can be found in Rutstein and Johnson (2004). The household wealth index divided into quintiles is the main predictor variable in our analysis.

Using the conceptual framework discussed earlier we systematically examine the association between wealth and HIV infection. For each country, we first examine the distribution of women and men by wealth quintile and by selected background characteristics, including age, education, occupation, media exposure, marital status, ethnicity, religion, urban/rural residence, geographical region of residence, and duration in current place of residence.

Next, we evaluate if wealth status is associated with key risk behaviors and protective factors, including age at first sexual intercourse, age at first cohabitation, number of times married, duration of current union, polygamy, number of lifetime and recent sexual partners, sexual intercourse with a non-regular (non-marital, non-cohabiting) partner, consistent condom use and condom use with the last non-regular partner, circumcision (for men only), reported STI or STI symptoms, alcohol use at last sexual intercourse, knowledge of own HIV status, and knowledge of HIV/AIDS prevention methods. Further details and definitions of these variables are provided in the tables.

Table 2 Association between household wealth status and key indicators of health and well-being for children under 5 and women aged 15-49, DHS/AIS countries with linked HIV testing data								
Country Wealth status	Children				Women			
	Fully immunized	Stunting	Underweight	Under-five mortality	Secondary or higher education	Institutional delivery	Modern contraceptive use	BMI $\geq$ 25.0 kg/m <sup>2</sup>
Kenya (2003)	57	31	20	115	29	42	32	23
Lowest	40	38	30	149	6	16	12	9
Second	53	33	20	109	16	31	24	13
Middle	69	30	18	121	22	37	33	19
Fourth	64	27	17	77	36	53	41	27
Highest	65	19	9	91	53	74	45	40
Number	1,131	4,931	4,931	-	8,195	6,102	4,919	7,047
Tanzania (2004-05)	71	38	22	112	9	47	20	18
Lowest	58	45	25	137	1	32	11	8
Second	71	43	26	156	0	37	13	9
Middle	71	41	23	147	2	39	16	12
Fourth	81	38	20	117	6	54	24	17
Highest	81	16	12	93	27	86	36	36
Number	1,658	7,989	7,989	-	10,329	8,725	6,950	8,888
Uganda (2000-01)	37	39	23	157	18	37	18	14
Lowest	27	43	27	192	2	18	11	7
Second	38	40	26	173	5	26	9	6
Middle	40	43	25	164	9	30	12	8
Fourth	40	38	19	136	20	44	20	15
Highest	43	25	12	106	49	76	41	29
Number	1,504	5,604	5,604	-	7,245	7,672	4,881	5,601
Malawi (2004)	64	48	22	133	16	57	28	14
Lowest	52	54	28	193	4	47	22	8
Second	58	53	24	171	5	47	24	8
Middle	66	52	23	168	5	52	25	10
Fourth	74	44	20	146	14	64	31	14
Highest	78	32	13	111	44	85	38	25
Number	2,194	8,520	8,520	-	11,698	10,771	8,312	9,280

*Continued...*

Table 2-Continued								
Country Wealth status	Children				Women			
	Fully immunized	Stunting	Underweight	Under-five mortality	Secondary or higher education	Institutional delivery	Modern contraceptive use	BMI $\geq$ 25.0 kg/m <sup>2</sup>
Lesotho (2004)	68	38	20	113	39	52	35	42
Lowest	66	47	27	114	12	30	15	28
Second	68	46	24	106	19	39	24	32
Middle	69	36	19	106	36	55	35	36
Fourth	67	31	14	102	45	65	39	47
Highest	69	25	11	82	62	81	53	56
Number	660	1,620	1,620	-	7,095	3,572	3,709	3,144
Cameroon (2004)	48	32	18	144	39	59	13	29
Lowest	36	41	28	189	7	28	2	13
Second	47	36	24	162	14	43	5	16
Middle	51	37	17	150	30	68	11	27
Fourth	51	25	10	115	52	84	19	36
Highest	60	12	5	88	77	91	26	44
Number	1,546	3,705	3,705	-	10,656	8,097	7,166	4,491
Ghana (2003)	69	30	22	111	52	46	19	25
Lowest	54	42	31	128	17	19	9	8
Second	72	32	24	105	34	30	19	13
Middle	74	30	22	111	50	41	19	18
Fourth	74	24	16	108	61	73	21	30
Highest	79	13	11	88	80	89	26	45
Number	695	3,183	3,183	-	5,691	3,639	3,549	4,835
Burkina Faso (2003)	44	39	38	184	9	38	9	9
Lowest	34	46	42	206	1	20	2	2
Second	41	42	40	213	1	25	4	3
Middle	42	42	41	196	2	33	6	3
Fourth	46	39	39	193	3	46	7	6
Highest	61	21	22	144	32	86	27	27
Number	1,840	8,628	8,628	-	12,477	10,852	9,655	10,604

Third, we evaluate the association between HIV infection and having multiple sexual partners or having sex with a non-regular partner in the 12 months preceding the survey. We also examine the association between the number of lifetime sexual partners and HIV status for both women and men in Tanzania, Cameroon, and Uganda, and for men in Lesotho (information on number of lifetime sexual partners was not collected for women in Lesotho and for both men and women in the other surveys considered).

Finally, using multivariate statistical methods we investigate the association between household wealth and HIV prevalence among women and men in each country. We use logistic regression to measure the independent relationship between wealth and HIV status after controlling for several underlying and mediating proximate factors. For women and men aged 15-49 who reported ever having sex, we estimate five alternative regression models. Model 1 estimates unadjusted effects of household wealth status on HIV prevalence. Model 2 adds controls for several underlying background factors, including: age, ethnicity, religion, urban/rural residence, and geographical region of residence. Model 3 adds education, occupation, media exposure, marital status, duration in union, number of years in current place of residence, alcohol use at last sex in last 12 months, knowledge of prevention methods, and knowledge of own HIV status. Model 4 adds the proximate determinants (risk and protective factors) that are likely to mediate the relationship between the underlying factors and HIV prevalence (as discussed in Figure 1). These include: age at first sexual intercourse, number of lifetime sexual partners<sup>3</sup>, reported STI or STI symptoms in last 12 months, circumcision (for men only), and consistent condom use in last 12 months. Model 5 adds a control for a community-level wealth score, computed by averaging the individual household wealth scores in each cluster. Because not all variables are available for each country, the actual set of variables included in the models varies slightly from country to country.

We also carry out a similar set of models in each country for cohabiting couples to examine the association between household wealth status and the likelihood that one or both partners is HIV-positive. Model 1 estimates the unadjusted effect of household wealth status on the likelihood that one or both partners is HIV positive. Model 2 controls for wife's age, age gap between spouses, urban/rural residence, and geographical region. Model 3 adds controls for wife's education, education gap between spouses, union type, and duration in union. Model 4 adds controls for number of lifetime sexual partners for each spouse (replaced with whether the respondent had two

---

<sup>3</sup> Since the number of lifetime sex partners was not always available, we replaced this variable with whether the respondent had two or more partners in the previous 12 months in Kenya, Ghana, Burkina Faso, and Malawi for both women and men; and in Lesotho for women.

or more partners in the previous 12 months in Kenya, Ghana, Burkina Faso, and Malawi for both spouses; and in Lesotho for the female partner), circumcision status of the male partner, and consistent condom use in last 12 months. Model 5 additionally controls for community-level wealth score. Further details on the variables are provided in the tables.

For all models, our analysis accounts for complex DHS survey design to estimate efficient regression coefficients and robust standard errors adjusted for intra-cluster correlation, and sampling weights are applied in accordance with standard DHS procedures to ensure the representativeness of the samples. We use individual sampling weights for tabulations involving information gathered in the individual questionnaire, and HIV sampling weights for tabulations involving HIV status. We use men's individual sampling weights for couple-level tabulations using only questionnaire information, and men's HIV sampling weights for couple-level tabulations involving HIV status of either partner. Results of the multivariate analysis are presented as odds ratios (OR), with 95 percent confidence intervals (CI) and significance levels ( $p$ -values).

## RESULTS

### *Descriptive*

Data from the eight surveys (Table 3) indicate that the overall HIV prevalence is lowest in Burkina Faso (1.8 percent), and highest in Lesotho (23.5 percent). Women have a higher HIV prevalence than men in all countries except Burkina Faso, with a female-to-male ratio ranging from 1.9 in Kenya and Ghana to about 1.0 in Burkina Faso. Most importantly, in each country HIV prevalence tends to be much higher among adults belonging to the wealthiest 20 percent of households than among those from the poorest 20 percent. This pattern holds for men and women separately, with the exception of men in Ghana and Lesotho where HIV prevalence in the highest

Table 3 HIV prevalence among men and women aged 15-49 by household wealth status, DHS/AIS countries with linked HIV testing				
Country Wealth index	HIV prevalence			
	Men	Women	Total (men and women)	Cohabiting couples (either/both HIV+)
Kenya	4.6	8.7	6.7	11.1
Lowest	3.4	3.9	3.6	8.0
Second	4.2	8.5	6.5	11.0
Middle	2.2	7.1	4.8	9.7
Fourth	4.3	9.7	7.1	9.9
Highest	7.3	12.2	9.8	16.5
Number	2,851	3,151	6,001	1,116
Tanzania	6.3	7.7	7.0	10.7
Lowest	4.1	2.8	3.4	5.2
Second	4.3	4.7	4.5	7.7
Middle	4.3	6.8	5.6	9.9
Fourth	7.7	10.9	9.4	13.8
Highest	9.5	11.4	10.5	17.6
Number	4,994	5,753	10,747	2,219
Uganda	5.0	7.5	6.4	8.1
Lowest	4.0	4.8	4.5	4.9
Second	4.2	6.6	5.5	6.6
Middle	5.1	6.7	6.0	8.4
Fourth	5.9	7.0	6.5	9.4
Highest	5.5	11.0	8.6	11.0
Number	7,515	9,391	16,906	3,882
Malawi	10.2	13.3	11.8	16.7
Lowest	4.4	10.9	8.3	7.2
Second	4.6	10.3	7.6	10.2
Middle	12.1	12.7	12.4	19.7
Fourth	11.7	14.6	13.2	19.5
Highest	14.9	18.0	16.4	26.7
Number	2,465	2,686	5,150	1,324

*Continued...*

Table 3-Continued				
Country Wealth index	HIV prevalence			
	Men	Women	Total (men and women)	Cohabiting couples (either/both HIV+)
Lesotho	19.3	26.4	23.5	32.5
Lowest	18.3	19.6	19.1	27.3
Second	16.8	27.9	23.3	30.5
Middle	23.7	25.5	24.6	37.0
Fourth	21.6	27.3	25.0	34.8
Highest	14.8	28.9	24.3	33.6
Number	2,012	3,031	5,043	593
Cameroon	4.1	6.8	5.5	7.4
Lowest	1.4	3.1	2.4	2.7
Second	2.2	4.1	3.2	4.6
Middle	4.7	8.1	6.5	9.5
Fourth	5.3	9.4	7.4	11.4
Highest	5.3	8.0	6.6	12.3
Number	4,672	5,227	9,900	2,027
Ghana	1.5	2.7	2.2	4.2
Lowest	1.4	1.4	1.4	2.8
Second	1.5	2.7	2.2	3.4
Middle	2.0	4.0	3.1	5.4
Fourth	1.4	3.0	2.2	4.7
Highest	1.1	2.4	1.9	5.1
Number	4,045	5,097	9,142	1,790
Burkina Faso	1.9	1.8	1.8	3.1
Lowest	1.4	0.9	1.1	0.8
Second	2.9	1.1	1.9	4.7
Middle	1.3	1.5	1.4	2.6
Fourth	0.4	1.7	1.1	1.6
Highest	2.7	3.4	3.1	5.8
Number	3,065	4,086	7,151	2,230

wealth quintile is slightly lower than in the lowest quintile. In most cases, HIV prevalence increases monotonically with household wealth status, with the notable exception of Ghana where there is an inverted U-shaped relationship between the two.

Table 3 also shows the likelihood that one or both partners is HIV-infected for cohabiting couples, and its association with household wealth status in each country. The proportion of couples with one or both partners HIV-infected ranges from 3.1 percent in Burkina Faso to 32.5 percent in Lesotho. As noted earlier for all respondents, in each of the eight countries the likelihood that one or both partners is HIV-infected increases with household wealth status, with the wealthiest 20 percent of couples being 2-7 times more likely than the poorest 20 percent of couples in most countries to have HIV. The only exception is Lesotho, where this ratio is smaller (1.2) but in the same direction.

Wealthier men and women tend to be more educated, more mobile, and more likely to live urban areas, where HIV is more prevalent (Appendix Tables A1-A8). Wealthier men and women are also more likely to be older, regularly exposed to mass media, more likely to be working, and more likely to be working in professional/service jobs than poorer men and women.

Consistently across countries, wealthier individuals tend to start cohabiting at an older age than poorer individuals, with an average age difference between the highest and lowest wealth quintile of 2-4 years in most cases (Table 4). The proportion of individuals who married more than once and the proportion who have been in union for 10 or more years exhibit small differences by wealth status, and there are no clear patterns across countries. However, in most countries wealthier women tend to be somewhat less likely to have been married more than once and less likely to have been in union for 10 or more years than poorer women. Wealthier men and women are also less likely to be in a polygamous union than poorer men and women. The proportion of women reporting that their spouse lives elsewhere ranges from 8 percent in Burkina Faso to 45 percent in Malawi and Lesotho.

Knowledge of HIV prevention (being faithful to one's regular partner and using condom) increases with wealth status for both men and women in all countries, except for men in Tanzania, Malawi, and Cameroon and for women in Lesotho, where there is little difference in such knowledge by wealth status (Table 5). Knowledge of one's own status (measured by having ever been tested for HIV and having received the test result) also increases with wealth status in all countries for both men and women.

In Lesotho, Cameroon, and Burkina Faso, wealthier men tend to have their first sexual intercourse more than one year earlier than poorer men, whereas in other countries men's median age at first sex varies little by wealth status. On the contrary, wealthier women in most countries tend to have their first sexual intercourse later in life than poorer women (Table 5). In most countries, wealthier youth (15-24) are less likely to have abstained from sex (never had sex) than poorer youth. Yet, among youth who have ever had sex there is no systematic pattern in the proportion who did not have sex in the previous 12 months (i.e., secondary abstinence) by wealth status.

Table 4 Median age at cohabitation, proportion married more than once (among ever in union), proportion with 10+ years in union (among currently in union), proportion in a polygamous union, and proportion in union whose partner lives elsewhere (women only), by household wealth status, men and women aged 15-49, DHS/AIS countries with linked HIV testing

Country Wealth status	Male				Female				
	Median age at cohabitation	% married > once	% with 10+ years in union	% in polygamous union	Median age at cohabitation	% married > once	% with 10+ years in union	% in polygamous union	% partner living elsewhere <sup>e</sup>
Kenya	25.1	14	51	4	20	7	54	10	22
Lowest	23.5	14	56	10	17.8	11	60	18	20
Second	24.7	18	55	4	19.0	8	55	12	25
Middle	24.5	13	54	3	19.3	6	57	9	27
Fourth	25.8	11	53	4	20.2	6	57	8	24
Highest	25.9	15	45	3	22.0	7	43	6	15
Number	1,825	1,752	1,615	3,363	4,648	5,752	4,919	8,195	4,914
Tanzania	24.1	30	51	5	18.7	19	54	6	n/a
Lowest	22.9	32	49	5	17.9	24	55	8	n/a
Second	23.3	33	51	7	18.2	22	55	6	n/a
Middle	23.1	38	57	8	18.2	21	56	9	n/a
Fourth	24.8	28	54	4	18.8	18	58	6	n/a
Highest	26.1	23	44	3	20.4	12	48	3	n/a
Number	3,291	3,313	3,000	5,656	3,993	5,176	4,354	6,863	n/a
Uganda	21.9	27	62	11	17.7	23	61	21	n/a
Lowest	21.3	27	66	14	17.5	23	65	22	n/a
Second	21.3	28	64	10	17.4	24	65	20	n/a
Middle	21.7	30	66	13	17.4	25	63	22	n/a
Fourth	21.7	28	60	12	17.8	23	60	22	n/a
Highest	23.7	22	54	9	18.6	18	52	18	n/a
Number	4,678	4,870	4,223	8,010	5,22	7,720	6,290	9,941	n/a
Malawi	22.9	23	49	6	17.9	23	50	11	45
Lowest	22.5	20	45	5	17.7	31	50	13	31
Second	22.1	25	48	7	17.8	25	49	13	38
Middle	22.6	22	43	7	17.6	25	49	11	46
Fourth	22.2	26	60	7	17.8	21	52	12	54
Highest	25.3	21	45	4	18.8	12	48	6	52
Number	1,877	2,030	1,936	3,114	6,436	9,728	8,312	11,698	8,305
Lesotho	25.5	6	49	n/a	19.1	3	54	n/a	45
Lowest	24.3	6	49	n/a	18.1	4	45	n/a	31
Second	24.5	4	46	n/a	18.4	3	51	n/a	38

Continued...

Table 4-Continued									
Country Wealth status	Male				Female				
	Median age at cohabitation	% married > once	% with 10+ years in union	% in polygamous union	Median age at cohabitation	% married > once	% with 10+ years in union	% in polygamous union	% partner living elsewhere <sup>c</sup>
Middle	25.5	4	47	n/a	18.8	3	52	n/a	46
Fourth	26.7	6	47	n/a	19.2	3	56	n/a	54
Highest	25.9	7	55	n/a	20.3	4	64	n/a	52
Number	1,246	1,083	952	n/a	3,922	4,722	3,709	n/a	3,694
Cameroon	24.9	39	49	5	17.6	23	54	20	22
Lowest	22.2	45	56	14	15.8	24	64	35	11
Second	23.9	40	48	7	16.5	26	56	24	18
Middle	24.5	40	51	6	17.6	26	54	21	25
Fourth	25.7	37	49	3	18.1	22	50	15	28
Highest	27.1	37	44	2	20.7	16	45	9	28
Number	2,638	2,703	2,271	4,815	5,720	8,096	7,166	10,656	7,139
Ghana	24.6	28	58	6	19.4	27	63	14	30
Lowest	24.3	20	57	12	18.7	22	63	29	19
Second	23.8	30	62	6	18.7	29	65	18	28
Middle	23.7	29	62	6	18.9	31	66	16	33
Fourth	24.4	31	55	3	19.3	28	59	9	39
Highest	27.2	29	55	3	21.7	23	62	5	31
Number	2,738	2,489	2,228	4,529	3,531	4,075	3,549	5,691	3,531
Burkina Faso	25.5	32	54	12	17.7	12	61	37	8
Lowest	24.8	27	49	11	17.4	14	63	33	8
Second	25.2	34	56	15	17.5	14	61	43	5
Middle	24.2	36	55	16	17.7	11	62	46	7
Fourth	24.8	40	61	18	17.7	12	61	49	10
Highest	27.8	27	48	5	18.7	9	57	19	11
Number	1,769	1,689	1,636	3,209	7,427	10,140	9,655	12,477	9,626

In most countries with available data, wealthier men and women tend to have more lifetime sexual partners than poorer men and women (Table 6). Also, wealthier men are more likely to report having had two or more sexual partners and sex with a non-regular partner in the last 12 months than poorer men, with the notable exception of Tanzania (where the pattern is reversed) and Lesotho (where differences are small). Wealthier men and women are somewhat less likely to report having used alcohol at their last sexual encounter in the previous 12 months. There is no clear pattern of relationship between wealth status and reported STI/STI symptoms in last 12 months, except in Uganda, Cameroon, and Burkina Faso where wealthier men and women are somewhat more likely to report STI/STI symptoms.

In all countries, ever use of condom, condom use with a non-regular partner in last 12 months, and consistent condom use (with all partners) in last 12 months increase consistently with an increase in wealth status for both men and women (Table 7). Also, wealthier men are more likely to be circumcised, except in Lesotho where poorer men are more likely to be circumcised.

Table 8 shows associations of risky sexual behavior with HIV prevalence. In all countries with available data, the number of lifetime sexual partners is strongly positively associated with HIV prevalence. For example, in Uganda HIV prevalence increases from 1.0 percent among men with one lifetime sexual partner to 3.0 percent among those with two lifetime partners, and 7.8 percent among those with three or more lifetime partners; among women, it correspondingly increases from 3.9 percent among those with one lifetime partner to 14.5 percent among those with three or more lifetime partners. Having two or more partners in the previous 12 months and having had sex with a non-regular partner during the same period are also strongly positively associated with HIV prevalence, with the exception of Tanzania, Ghana, and Burkina Faso where these patterns are not observed or slightly reversed for men.

Table 5 Proportion with knowledge of HIV prevention methods (both about being faithful and using condom), proportion with knowledge of own HIV status, median age at 1st sex, proportion with primary abstinence (never had sex; youth aged 15-24 only) and proportion with secondary abstinence (ever had sex, but not in last 12 months; youth aged 15-24 only), by household wealth status, men and women aged 15-49, DHS/AIS countries with linked HIV testing

Country Wealth status	Male					Female				
	Knows about HIV prevention	Knows own HIV status	Median age at 1st sex	Primary abstinence	Secondary abstinence	Knows about HIV prevention	Knows own HIV status	Median age at 1st sex	Primary abstinence	Secondary abstinence
Kenya	75	14	17.0	37	35	67	13	17.8	63	41
Lowest	71	10	17.0	43	36	59	5	16.5	72	36
Second	74	11	16.4	36	39	63	9	17.0	61	43
Middle	72	11	16.7	47	41	66	12	17.3	64	43
Fourth	74	12	17.3	33	38	68	13	18.2	65	41
Highest	82	23	17.4	30	26	74	23	18.8	59	41
Number	3,113	3,343	2,507	1,379	865	7,056	8,070	6,339	2,090	764
Tanzania	69	13	18.7	46	27	63	13	17.6	59	20
Lowest	68	6	18.3	48	16	56	5	16.7	58	26
Second	69	9	18.6	47	18	61	6	16.9	64	12
Middle	68	11	18.9	50	32	64	7	17.4	60	19
Fourth	70	15	18.6	49	29	66	14	17.7	56	21
Highest	70	22	18.8	41	30	67	27	18.6	59	20
Number	5,646	5,656	4,304	1,988	1,068	6,801	6,863	5,373	1,486	612
Uganda	73	11	18.4	50	40	64	13	16.8	64	32
Lowest	65	5	18.5	58	38	49	6	16.9	73	30
Second	70	7	18.4	54	41	57	9	16.6	78	29
Middle	72	6	18.3	50	42	62	8	16.7	69	29
Fourth	73	10	18.3	48	36	67	11	16.7	67	26
Highest	80	21	18.3	45	40	77	25	16.8	50	35
Number	7,939	8,010	5,940	2,776	1,385	9,801	9,941	7,755	2,049	731
Malawi	65	15	18.5	40	35	76	13	17.2	57	32
Lowest	64	10	18.6	38	32	66	8	16.7	64	37
Second	67	8	18.4	42	29	71	11	16.9	57	33
Middle	64	14	18.5	39	36	76	12	17.0	58	34
Fourth	64	14	18.3	38	42	78	13	17.4	57	31
Highest	64	25	18.6	41	33	80	16	18.1	55	30
Number	3,057	3,098	2,464	937	561	10,960	11,513	9,306	1,869	599

*Continued...*

Country Wealth status	Male					Female				
	Knows about HIV prevention	Knows own HIV status	Median age at 1st sex	Primary abstinence	Secondary abstinence	Knows about HIV prevention	Knows own HIV status	Median age at 1st sex	Primary abstinence	Secondary abstinence
Lesotho	65	10	19.0	42	18	50	13	18.6	68	34
Lowest	53	5	20.0	42	26	47	9	17.9	66	31
Second	57	7	19.2	38	9	50	10	18.3	77	27
Middle	62	9	18.7	42	18	50	10	18.5	75	32
Fourth	68	13	18.9	45	23	52	12	18.7	70	41
Highest	76	12	18.8	40	15	49	22	19.2	61	34
Number	2,325	2,325	1,753	1,137	662	6,640	6,638	5,385	1,990	851
Cameroon	75	14	18.3	47	15	63	12	16.4	58	19
Lowest	73	5	19.3	65	14	45	2	15.7	79	21
Second	75	6	18.9	60	13	56	4	15.6	61	23
Middle	77	10	18.3	50	16	62	8	16.2	60	20
Fourth	74	15	18.3	39	18	70	15	16.8	53	19
Highest	76	24	17.8	38	14	77	24	17.7	54	16
Number	4,776	4,777	3,591	1,756	934	10,422	10,352	7,972	2,318	972
Ghana	78	8	20.0	67	27	70	7	18.1	61	24
Lowest	69	3	20.1	77	24	64	3	17.5	66	28
Second	77	3	20.0	72	27	67	5	17.6	52	20
Middle	79	6	19.6	67	19	72	6	17.8	54	21
Fourth	80	9	20.1	63	31	71	9	18.1	58	19
Highest	83	14	20.1	62	31	74	11	19.1	67	30
Number	4,497	4,497	3,422	1,615	528	5,597	5,590	4,543	1,417	559
Burkina Faso	71	n/a	20.5	61	18	64	n/a	17.4	69	15
Lowest	63	n/a	21.0	70	9	52	n/a	17.2	79	16
Second	74	n/a	20.8	74	23	60	n/a	17.4	79	11
Middle	72	n/a	20.6	68	15	61	n/a	17.4	81	14
Fourth	66	n/a	20.5	68	12	68	n/a	17.4	71	9
Highest	76	n/a	19.6	41	21	74	n/a	17.9	58	17
Number	2,696	n/a	2,332	1,272	494	8,747	n/a	9,701	2,246	695

Table 6 Proportion with 3+ lifetime sex partners among those who ever had sex, proportion with 2+ sex partners in last 12 months, proportion who had sex with a non-regular (non-marital, non-cohabiting) partner in last 12 months, proportion (one or both partners) who used alcohol at last sex in last 12 months, and proportion who reported an STI or STI symptoms in last 12 months, by household wealth status, men and women age 15-49, DHS/AIS countries with linked HIV testing

Country Wealth status	Male					Female				
	3+ lifetime sex partners	2+ sex partners in last 12 months	Sex with a non-regular partner	Alcohol use at last sex	STI/STI symptoms	3+ lifetime sex partners	2+ sex partners in last 12 months	Sex with a non-regular partner	Alcohol use at last sex	STI/STI symptoms
Kenya	n/a	17	11	n/a	3	n/a	3	2	n/a	4
Lowest	n/a	15	9	n/a	5	n/a	3	3	n/a	4
Second	n/a	17	11	n/a	3	n/a	2	3	n/a	5
Middle	n/a	14	8	n/a	2	n/a	2	2	n/a	4
Fourth	n/a	15	11	n/a	2	n/a	2	1	n/a	5
Highest	n/a	19	13	n/a	3	n/a	3	2	n/a	4
Number	n/a	2,380	1,613	n/a	2,822	n/a	5,709	4,906	n/a	6,778
Tanzania	66	27	23	12	6	32	6	5	16	5
Lowest	68	30	26	13	7	35	7	7	19	7
Second	66	28	24	10	6	35	7	6	15	5
Middle	63	27	24	14	6	34	7	5	18	6
Fourth	66	27	25	14	7	28	5	4	16	4
Highest	68	24	19	11	5	31	5	3	15	5
Number	4,556	4,181	2,999	4,181	4,682	5,949	5,289	4,362	5,286	6,853
Uganda	67	29	18	28	21	31	4	3	32	33
Lowest	61	23	11	41	16	23	4	2	47	23
Second	65	25	15	30	18	27	3	3	36	30
Middle	68	28	16	31	20	28	3	3	36	34
Fourth	70	31	20	25	25	33	4	3	28	36
Highest	71	36	26	16	23	40	5	4	20	38
Number	6,393	5,642	4,228	5,634	6,567	8,549	7,387	6,349	7,368	8,596
Malawi	n/a	12	7	n/a	6	n/a	1	1	n/a	8
Lowest	n/a	10	5	n/a	3	n/a	2	1	n/a	10
Second	n/a	11	6	n/a	7	n/a	1	1	n/a	9
Middle	n/a	13	9	n/a	7	n/a	1	1	n/a	8
Fourth	n/a	13	8	n/a	6	n/a	1	1	n/a	8
Highest	n/a	11	6	n/a	5	n/a	1	1	n/a	8
Number	n/a	2,402	1,894	n/a	2,713	n/a	9,087	8,004	n/a	10,354

*Continued...*

Table 6-Continued

Country Wealth status	Male					Female				
	3+ lifetime sex partners	2+ sex partners in last 12 months	Sex with a non-regular partner	Alcohol use at last sex	STI/STI symptoms	3+ lifetime sex partners	2+ sex partners in last 12 months	Sex with a non-regular partner	Alcohol use at last sex	STI/STI symptoms
Lesotho	66	30	31	13	12	n/a	11	12	12	15
Lowest	63	31	32	18	13	n/a	14	15	14	16
Second	61	27	30	9	16	n/a	13	14	15	18
Middle	65	30	36	10	14	n/a	10	10	12	16
Fourth	66	30	31	12	9	n/a	10	10	11	16
Highest	71	33	29	14	10	n/a	10	10	10	12
Number	1,916	1,742	903	1,742	1,987	n/a	4,981	3,704	4,981	1,990
Cameroon	80	40	39	25	9	43	8	14	19	12
Lowest	70	35	19	34	6	21	2	4	24	5
Second	76	38	31	27	6	35	6	9	19	9
Middle	79	41	44	23	8	46	7	15	19	13
Fourth	81	38	45	24	11	52	10	21	18	14
Highest	85	46	51	22	12	59	12	23	17	17
Number	3,949	3,660	2,214	3,658	3,957	9,252	8,060	6,570	8,047	9,278
Ghana	n/a	15	14	16	4	n/a	2	3	10	8
Lowest	n/a	14	10	14	5	n/a	0	2	9	7
Second	n/a	11	11	16	5	n/a	2	3	11	8
Middle	n/a	16	15	16	4	n/a	1	3	9	7
Fourth	n/a	16	18	15	5	n/a	1	4	8	8
Highest	n/a	19	17	16	3	n/a	3	5	11	11
Number	n/a	2,905	2,227	2,904	3,373	n/a	3,863	3,545	3,862	4,805
Burkina Faso	n/a	24	12	n/a	4	n/a	1	1	n/a	5
Lowest	n/a	13	8	n/a	3	n/a	1	0	n/a	1
Second	n/a	23	10	n/a	2	n/a	1	0	n/a	2
Middle	n/a	22	9	n/a	3	n/a	1	1	n/a	2
Fourth	n/a	22	8	n/a	6	n/a	2	1	n/a	3
Highest	n/a	31	22	n/a	5	n/a	3	2	n/a	14
Number	n/a	2,014	1,631	n/a	2,373	n/a	8,168	9,635	n/a	10,910

Table 7 Proportion who reported ever using condom, proportion who reported using condom consistently (with all sexual partners in last 12 months; checked for up to 3 partners), proportion who reported using condom with their last non-regular partner in last 12 months (among those who had a non-regular partner), and proportion circumcised (men only), by household wealth status, men and women age 15-49, DHS/AIS countries with linked HIV testing

Country Wealth status	Male				Female		
	Ever used condom	Used condom consistently	Used condom with non-regular partner	Circumcised	Ever used condom <sup>a</sup>	Used condom consistently	Used condom with non-regular partner
Kenya	50	16	46	84	12	5	20
Lowest	29	9	25	76	5	2	6
Second	42	15	37	83	9	4	18
Middle	46	11	25	89	11	3	14
Fourth	56	18	46	87	15	5	38
Highest	63	21	67	84	19	11	34
Number	2,805	2,379	171	3,355	6,806	5,705	110
Tanzania	n/a	19	53	70	n/a	11	38
Lowest	n/a	11	33	59	n/a	5	27
Second	n/a	12	46	55	n/a	7	35
Middle	n/a	15	56	58	n/a	8	35
Fourth	n/a	21	66	75	n/a	13	58
Highest	n/a	30	65	92	n/a	22	49
Number	n/a	4,171	694	5,649	n/a	5,284	204
Uganda	34	14	54	25	18	9	49
Lowest	19	7	44	19	7	5	36
Second	24	10	38	19	9	6	28
Middle	30	9	45	25	13	5	40
Fourth	37	13	46	25	18	8	55
Highest	59	28	80	33	41	19	70
Number	4,882	5,635	760	8,003	7,264	7,376	183
Malawi	49	15	46	21	11	5	26
Lowest	40	14	31	18	7	3	33
Second	42	12	45	23	7	3	14
Middle	46	10	39	21	10	4	30
Fourth	47	12	45	23	12	5	12
Highest	64	24	67	20	15	10	54
Number	2,674	2,402	133	3,032	9,552	9,081	67
Lesotho	57	27	39	47	43	19	33
Lowest	30	10	18	70	22	6	18
Second	48	18	19	55	30	9	28
Middle	53	25	30	49	37	15	30
Fourth	63	31	56	40	47	20	39
Highest	81	44	65	28	61	34	50
Number	1,954	1,742	282	2,489	5,630	4,980	437

*Continued...*

Table 7-Continued							
Country Wealth status	Male				Female		
	Ever used condom	Used condom consistently	Used condom with non-regular partner	Circumcised	Ever used condom <sup>a</sup>	Used condom consistently	Used condom with non-regular partner
Cameroon	n/a	28	55	93	43	15	39
Lowest	n/a	8	40	75	11	3	15
Second	n/a	11	37	87	23	6	20
Middle	n/a	23	46	97	37	11	29
Fourth	n/a	35	62	98	52	22	43
Highest	n/a	45	69	98	68	28	50
Number	n/a	3,638	857	4,811	7,984	7,923	929
Ghana	55	19	44	95	23	8	17
Lowest	31	8	27	83	11	3	18
Second	41	12	38	96	16	5	0
Middle	53	17	42	98	16	5	7
Fourth	61	26	37	98	28	12	12
Highest	76	28	66	99	37	15	34
Number	3,340	2,906	318	4,529	4,596	3,863	115
Burkina Faso	n/a	29	72	90	14	9	38
Lowest	n/a	10	48	88	4	3	26
Second	n/a	16	33	83	5	3	40
Middle	n/a	23	77	90	7	4	40
Fourth	n/a	23	72	91	9	6	43
Highest	n/a	52	93	97	36	23	37
Number	n/a	2,014	194	3,209	9,323	8,167	87

Table 8 HIV prevalence among men and women aged 15-49 by multiple sexual partners and sex with a non-regular partner in last 12 months, DHS/AIS countries with linked HIV testing		
Country Risk behavior	HIV prevalence	
	Male	Female
Kenya		
Had 2+ partners in last 12 months		
No	5.4	9.6
Yes	8.5	21.2
Had sex with a non-regular partner in last 12 months		
No	6.3	7.9
Yes	12.9	11.9
Tanzania		
Number of lifetime sex partners		
1	3.5	3.8
2	4.8	10.1
3+	8.0	12.9
Had 2+ partners in last 12 months		
No	7.2	7.4
Yes	6.9	10.1
Had sex with a non-regular partner in last 12 months		
No	7.8	7.0
Yes	7.9	6.2
Uganda		
Number of lifetime sex partners		
1	1.0	3.9
2	3.0	8.5
3+	7.8	14.5
Had 2+ partners in last 12 months		
No	5.5	7.3
Yes	8.1	13.5
Had sex with a non-regular partner in last 12 months		
No	6.2	5.8
Yes	9.3	9.1
Malawi		
Had 2+ partners in last 12 months		
No	11.0	13.9
Yes	16.2	42.5
Had sex with a non-regular partner in last 12 months		
No	12.7	12.4
Yes	30.2	22.0
Number of lifetime sex partners		
1	13.3	n/a
2	19.1	n/a
3+	26.5	n/a
Lesotho		
Had 2+ partners in last 12 months		
No	23.8	29.5
Yes	25.2	39.6

*Continued...*

Table 8-Continued		
Country Risk behavior	HIV prevalence	
	Male	Female
Had sex with a non-regular partner in last 12 months		
No	28.7	25.2
Yes	42.7	39.3
Cameroon		
Number of lifetime sex partners		
1	0.6	2.6
2	2.4	8.0
3+	5.6	11.0
Had 2+ partners in last 12 months		
No	3.7	6.9
Yes	7.1	10.1
Had sex with a non-regular partner in last 12 months		
No	4.1	5.7
Yes	7.6	10.4
Ghana		
Had 2+ partners in last 12 months		
No	2.0	3.1
Yes	1.7	8.4
Had sex with a non-regular partner in last 12 months		
No	2.4	2.9
Yes	2.1	3.7
Burkina Faso		
Had 2+ partners in last 12 months		
No	2.4	2.0
Yes	1.3	5.0
Had sex with a non-regular partner in last 12 months		
No	2.9	1.6
Yes	2.1	n/a*
* There are 32 married women who reported having sex with a non-regular partner in last 12 months, none if they were HIV +		

### ***Multivariate***

Unadjusted odds of HIV infection by wealth quintile (Table 9a, Model 1) indicate that in all countries except Lesotho and Ghana, men belonging to the highest wealth quintile are more likely to be HIV-infected than those belonging to the lowest wealth quintile. In Lesotho and Ghana, there is an inverted U-shaped relationship between wealth status and HIV prevalence among men; in other terms, the odds of HIV infection peak in the middle wealth quintile. Higher HIV prevalence by wealth status is also observed for women (Table 9b, Model 1). For women, the odds of HIV infection are 2-5-times greater in the highest wealth quintile than in the lowest wealth quintile (statistically significant in all countries), suggesting a stronger positive effect of wealth status on HIV infection among women than among men.

Table 9a. Odds ratio estimates of effects of wealth status on the likelihood of being HIV-infected among men aged 15-49 who ever had sex, DHS/AIS countries with linked HIV testing

Country Wealth status	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	(95% CI; <i>p</i> -value)								
Kenya										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.28	(0.60, 2.73; 0.516)	1.50	(0.70, 3.21; 0.301)	1.43	(0.65, 3.13; 0.374)	1.72	(0.81, 3.69; 0.160)	1.73	(0.81, 3.70; 0.158)
Middle	0.70	(0.24, 2.03; 0.505)	1.02	(0.34, 3.03; 0.969)	0.98	(0.31, 3.07; 0.966)	1.02	(0.34, 3.07; 0.973)	1.02	(0.34, 3.09; 0.967)
Fourth	1.20	(0.59, 2.46; 0.611)	1.91	(0.90, 4.09; 0.093)	1.43	(0.57, 3.56; 0.443)	1.61	(0.64, 4.10; 0.313)	1.64	(0.65, 4.13; 0.295)
Highest	2.07	(1.07, 4.04; 0.032)	1.54	(0.55, 4.27; 0.411)	1.87	(0.66, 5.34; 0.239)	2.25	(0.79, 6.42; 0.129)	2.35	(0.81, 6.87; 0.117)
Number		2,266		2,180		2,053		2,048		2,048
Tanzania										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.01	(0.59, 1.75; 0.963)	0.87	(0.50, 1.54; 0.638)	0.85	(0.49, 1.47; 0.558)	0.84	(0.48; 1.49; 0.557)	0.85	(0.48, 1.50; 0.576)
Middle	1.09	(0.66, 1.78; 0.738)	0.87	(0.52, 1.44; 0.580)	0.78	(0.47, 1.30; 0.347)	0.83	(0.49; 1.39; 0.470)	0.85	(0.50, 1.43; 0.533)
Fourth	2.00	(1.21, 3.30; 0.007)	1.53	(0.89, 2.61; 0.121)	1.34	(0.76, 2.35; 0.305)	1.33	(0.76; 2.33; 0.320)	1.41	(0.81, 2.48; 0.227)
Highest	2.35	(1.48, 3.74; 0.000)	1.55	(0.80, 2.97; 0.191)	1.31	(0.64, 2.68; 0.452)	1.31	(0.64; 2.68; 0.456)	1.56	(0.74, 3.29; 0.247)
Number		3,948		3,946		3,941		3,847		3,847
Uganda										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.08	(0.70, 1.68; 0.717)	0.97	(0.61, 1.54; 0.899)	0.96	(0.60, 1.52; 0.853)	0.98	(0.61, 1.60; 0.948)	0.99	(0.61, 1.60; 0.954)
Middle	1.24	(0.82, 1.90; 0.309)	1.00	(0.65, 1.55; 0.987)	0.97	(0.62, 1.52; 0.898)	0.96	(0.60, 1.54; 0.874)	0.97	(0.61, 1.54; 0.893)
Fourth	1.50	(1.02, 2.19; 0.037)	1.24	(0.82, 1.87; 0.305)	1.14	(0.74, 1.75; 0.553)	1.07	(0.69, 1.64; 0.767)	1.06	(0.69, 1.62; 0.805)
Highest	1.43	(0.93, 2.20; 0.104)	1.00	(0.58, 1.72; 0.998)	1.05	(0.59, 1.85; 0.880)	1.01	(0.57, 1.79; 0.983)	0.89	(0.50, 1.60; 0.706)
Number		6,141		6,114		5,923		5,755		5,755
Malawi										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.08	(0.47, 2.48; 0.864)	0.84	(0.34, 2.07; 0.703)	0.91	(0.36, 2.32; 0.841)	0.84	(0.33, 2.15; 0.715)	0.85	(0.33, 2.19; 0.742)
Middle	2.93	(1.37, 6.25; 0.006)	2.43	(1.06, 5.57; 0.035)	2.65	(1.09, 6.43; 0.031)	2.41	(0.98, 5.91; 0.055)	2.44	(0.99, 6.02; 0.052)
Fourth	2.98	(1.39, 6.37; 0.005)	2.24	(0.97, 5.15; 0.059)	2.52	(1.00, 6.35; 0.050)	2.45	(0.97, 6.23; 0.059)	2.49	(0.98, 6.34; 0.056)
Highest	4.12	(1.89, 8.94; 0.000)	2.57	(1.05, 6.29; 0.039)	2.51	(0.90, 7.01; 0.080)	2.63	(0.97, 7.15; 0.057)	2.82	(1.02, 7.76; 0.045)
Number		2,031		2,030		2,006		1,948		1,948

*Continued...*

Table 9a-Continued										
Country	Model 1		Model 2		Model 3		Model 4		Model 5	
Wealth status	OR (95% CI; <i>p</i> -value)		OR (95% CI; <i>p</i> -value)		OR (95% CI; <i>p</i> -value)		OR (95% CI; <i>p</i> -value)		OR (95% CI; <i>p</i> -value)	
Lesotho										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	0.91	(0.59, 1.41; 0.678)	0.93	(0.59, 1.47; 0.765)	0.97	(0.59, 1.58; 0.898)	1.09	(0.66, 1.80; 0.743)	1.07	(0.64, 1.78; 0.790)
Middle	1.47	(0.96, 2.24; 0.077)	1.62	(1.01, 2.60; 0.047)	1.80	(1.04, 3.13; 0.037)	1.71	(0.95, 3.07; 0.074)	1.65	(0.90, 3.02; 0.103)
Fourth	1.43	(0.93, 2.18; 0.100)	1.53	(0.95, 2.47; 0.084)	1.68	(0.93, 3.04; 0.088)	1.94	(1.03, 3.63; 0.039)	1.84	(0.93, 3.65; 0.081)
Highest	0.80	(0.49, 1.30; 0.363)	0.82	(0.45, 1.51; 0.532)	0.85	(0.40, 1.77; 0.656)	0.88	(0.42, 1.83; 0.729)	0.82	(0.36, 1.86; 0.628)
Number	1,593		1,593		1,481		1,420		1,420	
Cameroon										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.42	(0.59, 3.41; 0.432)	1.25	(0.50, 3.12; 0.626)	1.19	(0.48, 2.97; 0.702)	1.23	(0.49, 3.11; 0.664)	1.24	(0.49, 3.11; 0.654)
Middle	2.86	(1.34, 6.13; 0.007)	2.66	(1.24, 5.69; 0.012)	2.37	(1.06, 5.31; 0.036)	2.44	(1.06, 5.60; 0.035)	2.48	(1.08, 5.67; 0.031)
Fourth	3.65	(1.84, 7.27; 0.000)	3.63	(1.65, 7.99; 0.001)	3.19	(1.34, 7.57; 0.008)	3.16	(1.31, 7.62; 0.011)	3.29	(1.33, 8.09; 0.010)
Highest	3.61	(1.76, 7.40; 0.000)	3.54	(1.49, 8.43; 0.004)	3.08	(1.15, 8.25; 0.025)	3.03	(1.11, 8.26; 0.030)	3.22	(1.12, 9.31; 0.030)
Number	3,802		3,800		3,776		3,743		3,743	
Ghana										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.10	(0.41, 2.95; 0.845)	1.13	(0.39, 3.24; 0.825)	0.99	(0.38, 2.60; 0.987)	1.11	(0.40, 3.06; 0.839)	1.11	(0.40, 3.07; 0.845)
Middle	1.36	(0.58, 3.18; 0.483)	1.23	(0.45, 3.38; 0.691)	0.99	(0.36, 2.75; 0.984)	1.12	(0.39, 3.24; 0.838)	1.07	(0.36, 3.21; 0.904)
Fourth	1.00	(0.41, 2.44; 0.992)	0.73	(0.20, 2.64; 0.635)	0.62	(0.16, 2.41; 0.490)	0.65	(0.16, 2.61; 0.540)	0.59	(0.14, 2.44; 0.462)
Highest	0.79	(0.28, 2.27; 0.664)	0.50	(0.12, 2.16; 0.354)	0.47	(0.09, 2.36; 0.359)	0.53	(0.11, 2.59; 0.431)	0.42	(0.07, 2.66; 0.356)
Number	2,825		2,823		2,743		2,739		2,739	
Burkina Faso										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	2.66	(1.03, 6.82; 0.042)	2.40	(0.83, 6.93; 0.107)	2.77	(0.73, 10.51; 0.134)	2.82	(0.78, 10.16; 0.114)	2.84	(0.79, 10.23; 0.111)
Middle	1.24	(0.38, 4.01; 0.720)	1.02	(0.27, 3.81; 0.978)	1.21	(0.25, 5.83; 0.817)	1.18	(0.24, 5.78; 0.842)	1.23	(0.25, 6.00; 0.799)
Fourth	0.26	(0.03, 2.28; 0.225)	0.14	(0.01, 1.88; 0.139)	0.18	(0.01, 2.54; 0.204)	0.19	(0.01, 2.86; 0.231)	0.21	(0.01, 3.10; 0.259)
Highest	2.14	(0.73, 6.29; 0.167)	0.24	(0.05, 1.22; 0.086)	0.24	(0.03, 1.61; 0.140)	0.28	(0.04, 2.00; 0.206)	0.40	(0.06, 2.82; 0.360)
Number	2,157		2,157		2,130		2,129		2,129	
†Reference category										
Note: Model 1 estimates unadjusted effects of household wealth status on HIV prevalence. Model 2 adds controls for age, ethnicity, religion, urban/rural residence, and geographical region of residence. Model 3 adds education, occupation, media exposure, marital status, duration in union, number of years in current place of residence, alcohol use at last sex in last 12 months, knowledge of prevention methods, and knowledge of own HIV status. Model 4 adds age at first sexual intercourse, number of lifetime sexual partners, reported STI or STI symptoms in last 12 months, circumcision, and consistent condom use in last 12 months. Model 5 adds a control for a community-level wealth score, computed by averaging the individual household wealth scores in each cluster.										

Table 9b Odds ratio estimates of effects of wealth status on the likelihood of being HIV-infected among women aged 15-49 who ever had sex, DHS/AIS countries with linked HIV testing

Country Wealth status	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	(95% CI; <i>p</i> -value)								
<b>Kenya</b>										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	2.26	(1.21, 4.23; 0.011)	2.11	(1.08, 4.11; 0.029)	1.85	(0.89, 3.84; 0.097)	1.82	(0.89, 3.74; 0.101)	1.82	(0.88, 3.73; 0.105)
Middle	1.98	(1.11, 3.55; 0.022)	2.21	(1.16, 4.19; 0.015)	2.18	(1.06, 4.47; 0.034)	2.15	(1.06, 4.35; 0.033)	2.13	(1.05, 4.33; 0.036)
Fourth	2.76	(1.58, 4.81; 0.000)	2.80	(1.51, 5.20; 0.001)	2.01	(0.93, 4.32; 0.075)	1.92	(0.88, 4.15; 0.099)	1.86	(0.86, 4.03; 0.114)
Highest	3.36	(1.90, 5.95; 0.000)	2.84	(1.32, 6.11; 0.007)	2.06	(0.81, 5.24; 0.128)	1.92	(0.75, 4.90; 0.173)	1.76	(0.63, 4.89; 0.280)
Number	2,734		2,593		2,222		2,217		2,217	
<b>Tanzania</b>										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.65	(1.02, 2.69; 0.042)	1.52	(0.93, 2.48; 0.096)	1.53	(0.93, 2.50; 0.091)	1.54	(0.93, 2.55; 0.092)	1.55	(0.94, 2.56; 0.089)
Middle	2.61	(1.54, 4.41; 0.000)	2.33	(1.39, 3.92; 0.001)	2.19	(1.26, 3.82; 0.005)	2.26	(1.30, 3.92; 0.004)	2.29	(1.31, 4.00; 0.004)
Fourth	4.40	(2.87, 6.75; 0.000)	3.46	(2.23, 5.37; 0.000)	3.20	(1.98, 5.18; 0.000)	3.37	(2.06, 5.52; 0.000)	3.51	(2.12, 5.80; 0.000)
Highest	5.07	(3.32, 7.75; 0.000)	3.17	(1.90, 5.30; 0.000)	2.83	(1.54, 5.22; 0.001)	3.11	(1.68, 5.73; 0.000)	3.39	(1.73, 6.64; 0.000)
Number	5,214		5,210		5,165		5,149		5,149	
<b>Uganda</b>										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.36	(0.98, 1.89; 0.063)	1.13	(0.81, 1.57; 0.463)	1.02	(0.71, 1.45; 0.923)	0.98	(0.69, 1.41; 0.930)	0.98	(0.68, 1.41; 0.928)
Middle	1.35	(0.97, 1.88; 0.078)	1.03	(0.72, 1.47; 0.880)	1.00	(0.68, 1.46; 0.989)	0.96	(0.65, 1.41; 0.828)	0.96	(0.65, 1.41; 0.835)
Fourth	1.46	(1.02, 2.07; 0.037)	1.09	(0.76, 1.58; 0.642)	1.05	(0.72, 1.53; 0.813)	0.97	(0.66, 1.43; 0.874)	0.98	(0.66, 1.44; 0.902)
Highest	2.44	(1.80, 3.31; 0.000)	1.36	(0.93, 1.99; 0.118)	1.40	(0.90, 2.19; 0.136)	1.36	(0.87, 2.14; 0.176)	1.41	(0.90, 2.20; 0.133)
Number	8,094		8,065		7,581		7,538		7,538	
<b>Malawi</b>										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	0.89	(0.56, 1.42; 0.626)	0.92	(0.57, 1.49; 0.735)	1.13	(0.66, 1.91; 0.661)	1.07	(0.63, 1.80; 0.809)	1.00	(0.59, 1.69; 0.998)
Middle	1.15	(0.77, 1.73; 0.498)	1.14	(0.74, 1.74; 0.551)	1.35	(0.81, 2.24; 0.244)	1.23	(0.74, 2.04; 0.434)	1.14	(0.69, 1.91; 0.604)
Fourth	1.41	(0.95, 2.08; 0.090)	1.39	(0.93, 2.07; 0.106)	1.69	(1.04, 2.77; 0.035)	1.59	(0.97, 2.62; 0.068)	1.51	(0.92, 2.49; 0.104)
Highest	1.96	(1.28, 3.00; 0.002)	1.81	(1.14, 2.87; 0.012)	1.86	(1.02, 3.39; 0.043)	1.61	(0.89, 2.90; 0.113)	1.19	(0.63, 2.25; 0.586)
Number	2,609		2,604		2,463		2,458		2,458	

*Continued...*

Table 9b-Continued										
Country	Model 1		Model 2		Model 3		Model 4		Model 5	
Wealth status	OR	(95% CI; <i>p</i> -value)								
Lesotho										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.49	(1.07, 2.07; 0.017)	1.43	(1.02, 2.01; 0.038)	1.43	(0.98, 2.07; 0.062)	1.44	(0.99, 2.09; 0.060)	1.42	(0.97, 2.07; 0.069)
Middle	1.42	(1.01, 1.98; 0.041)	1.29	(0.90, 1.84; 0.161)	1.35	(0.90, 2.01; 0.145)	1.40	(0.93, 2.11; 0.103)	1.38	(0.92, 2.07; 0.122)
Fourth	1.56	(1.12, 2.19; 0.009)	1.32	(0.89, 1.94; 0.170)	1.58	(1.00, 2.51; 0.050)	1.64	(1.03, 2.62; 0.038)	1.59	(1.00, 2.54; 0.050)
Highest	1.82	(1.31, 2.52; 0.000)	1.14	(0.75, 1.74; 0.536)	1.58	(0.94, 2.64; 0.084)	1.58	(0.93, 2.68; 0.087)	1.52	(0.89, 2.62; 0.126)
Number	2,541		2,536		2,309		2,308		2,308	
Cameroon										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.32	(0.72, 2.42; 0.376)	0.99	(0.53, 1.85; 0.983)	0.82	(0.43, 1.59; 0.561)	0.82	(0.42, 1.62; 0.573)	0.79	(0.41, 1.55; 0.496)
Middle	2.82	(1.71, 4.66; 0.000)	1.99	(1.16, 3.41; 0.012)	1.55	(0.88, 2.72; 0.132)	1.62	(0.90, 2.92; 0.109)	1.46	(0.81, 2.63; 0.208)
Fourth	3.34	(2.01, 5.55; 0.000)	1.96	(1.02, 3.77; 0.045)	1.48	(0.74, 2.98; 0.269)	1.50	(0.74, 3.06; 0.264)	1.23	(0.59, 2.56; 0.574)
Highest	2.97	(1.81, 4.87; 0.000)	1.56	(0.82, 2.96; 0.173)	1.22	(0.60, 2.50; 0.587)	1.28	(0.61, 2.70; 0.516)	0.94	(0.42, 2.08; 0.871)
Number	4,556		4,553		4,392		4,320		4,320	
Ghana										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.98	(1.02, 3.82; 0.042)	1.31	(0.67, 2.59; 0.429)	1.42	(0.72, 2.80; 0.318)	1.43	(0.73, 2.79; 0.300)	1.43	(0.73, 2.79; 0.302)
Middle	3.03	(1.67, 5.47; 0.000)	1.96	(1.04, 3.68; 0.037)	1.98	(1.03, 3.78; 0.040)	2.04	(1.08, 3.83; 0.027)	1.96	(1.04, 3.69; 0.037)
Fourth	2.37	(1.23, 4.56; 0.010)	1.27	(0.56, 2.89; 0.565)	1.23	(0.53, 2.85; 0.621)	1.27	(0.56, 2.87; 0.566)	1.10	(0.47, 2.57; 0.817)
Highest	2.12	(1.12, 4.03; 0.021)	1.00	(0.40, 2.51; 1.000)	1.22	(0.45, 3.26; 0.697)	1.26	(0.47, 3.34; 0.642)	0.95	(0.32, 2.83; 0.929)
Number	4,505		4,499		4,303		4,301		4,301	
Burkina Faso										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.09	(0.38, 3.09; 0.878)	0.86	(0.29, 2.54; 0.783)	0.95	(0.30, 3.03; 0.926)	0.96	(0.29, 3.12; 0.942)	0.97	(0.30, 3.17; 0.959)
Middle	1.52	(0.59, 3.89; 0.387)	1.00	(0.38, 2.60; 0.998)	1.19	(0.40, 3.49; 0.753)	1.29	(0.43, 3.84; 0.647)	1.35	(0.45, 4.02; 0.595)
Fourth	1.93	(0.68, 5.54; 0.219)	0.88	(0.31, 2.45; 0.805)	1.00	(0.34, 2.96; 0.996)	1.05	(0.35, 3.16; 0.934)	1.11	(0.36, 3.43; 0.851)
Highest	4.32	(1.66, 11.24; 0.003)	0.66	(0.16, 2.75; 0.567)	0.61	(0.12, 3.04; 0.549)	0.61	(0.13, 2.83; 0.530)	0.72	(0.14, 3.57; 0.685)
Number	3,624		3,617		3,573		3,565		3,565	
†Reference category										
Note: Model 1 estimates unadjusted effects of household wealth status on HIV prevalence. Model 2 adds controls for age, ethnicity, religion, urban/rural residence, and geographical region of residence. Model 3 adds education, occupation, media exposure, marital status, duration in union, number of years in current place of residence, alcohol use at last sex in last 12 months, knowledge of prevention methods, and knowledge of own HIV status. Model 4 adds age at first sexual intercourse, number of lifetime sexual partners, reported STI or STI symptoms in last 12 months, and consistent condom use in last 12 months. Model 5 adds a control for a community-level wealth score, computed by averaging the individual household wealth scores in each cluster.										

The strong, positive unadjusted association between wealth status and HIV infection observed in Model 1 for both men and women is diminished considerably when a number of underlying factors are controlled for (Models 2 & 3 in Tables 9a and 9b). In Model 4, when selected proximate factors are also added, the effect of wealth status on HIV infection is further diminished in most cases. Even with all underlying and proximate factors controlled statistically, the odds of HIV infection remain greater than one in the highest wealth quintile in four out of the eight countries for men and in seven out of the eight countries for women, while losing statistical significance in most cases. The association between wealth status and HIV infection remains mostly unchanged (slightly reduced in some cases, and slightly increased in other cases) when an additional control for community-level wealth is introduced in Model 5.

Table 10 presents similar models for cohabiting couples. The table presents unadjusted and adjusted effects of household wealth status on the likelihood that one or both partners is HIV-infected. The unadjusted effects in Model 1 show that in all but one country the odds of one or both partners being HIV-infected are 2-6-times greater among couples in the highest wealth quintile than among those in the lowest wealth quintile. As in Tables 9a and 9b, adding controls for selected underlying factors, proximate factors, and community-level wealth in Models 2-5 progressively diminishes the strength of this association. Even with all factors controlled for in Model 5, the odds of one or both partners being HIV-infected remain greater than one in six out of the eight countries considered, but statistically significant at the 5 percent level in only one country (Tanzania).

Table 10 Odds ratio estimates of effects of wealth status on the likelihood of either or both partners being HIV-infected among cohabiting couples, DHS/AIS countries with linked HIV testing										
Country wealth status	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	(95% CI; <i>p</i> -value)								
Kenya										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.42	(0.66, 3.02; 0.367)	1.32	(0.57, 3.04; 0.520)	1.32	(0.58, 2.99; 0.507)	1.60	(0.66, 3.86; 0.294)	1.57	(0.65, 3.80; 0.318)
Middle	1.23	(0.60, 2.54; 0.575)	1.54	(0.69, 3.44; 0.297)	1.55	(0.70, 3.44; 0.281)	1.94	(0.82, 4.60; 0.133)	1.86	(0.77, 4.45; 0.166)
Fourth	1.26	(0.57, 2.76; 0.564)	1.98	(0.84, 4.66; 0.116)	2.25	(0.95, 5.33; 0.065)	2.55	(1.02, 6.36; 0.045)	2.20	(0.88, 5.52; 0.093)
Highest	2.28	(1.14, 4.54; 0.019)	2.98	(1.02, 8.72; 0.046)	2.75	(0.96, 7.90; 0.060)	2.49	(0.78, 7.98; 0.124)	1.65	(0.40, 6.86; 0.491)
Number	1,083		1,017		1,017		1,015		1,015	
Tanzania										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.52	(0.74, 3.15; 0.255)	1.36	(0.65, 2.84; 0.416)	1.40	(0.65, 3.00; 0.388)	1.43	(0.67, 3.03; 0.352)	1.42	(0.67, 3.02; 0.361)
Middle	2.00	(0.99, 4.04; 0.053)	1.71	(0.83, 3.50; 0.143)	1.82	(0.85, 3.90; 0.122)	1.94	(0.92, 4.08; 0.082)	1.91	(0.90, 4.04; 0.090)
Fourth	2.93	(1.44, 5.95; 0.003)	2.42	(1.17, 4.98; 0.017)	2.80	(1.29, 6.10; 0.009)	2.94	(1.36, 6.36; 0.006)	2.83	(1.27, 6.30; 0.011)
Highest	3.90	(1.99, 7.62; 0.000)	2.88	(1.39, 5.99; 0.004)	4.03	(1.77, 9.19; 0.001)	4.35	(1.90, 9.95; 0.000)	3.96	(1.59, 9.89; 0.003)
Number	2,220		2,220		2,219		2,174		2,174	
Uganda										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.37	(0.86, 2.18; 0.186)	1.23	(0.76, 2.00; 0.405)	1.24	(0.76, 2.01; 0.392)	1.14	(0.69, 1.87; 0.617)	1.14	(0.69, 1.87; 0.617)
Middle	1.76	(1.12, 2.75; 0.014)	1.46	(0.91, 2.32; 0.116)	1.40	(0.87, 2.25; 0.165)	1.14	(0.70, 1.87; 0.596)	1.14	(0.70, 1.87; 0.596)
Fourth	2.01	(1.34, 3.01; 0.001)	1.64	(1.07, 2.52; 0.024)	1.63	(1.05, 2.53; 0.029)	1.42	(0.91, 2.22; 0.119)	1.42	(0.91, 2.22; 0.118)
Highest	2.37	(1.51, 3.72; 0.000)	1.45	(0.82, 2.54; 0.198)	1.46	(0.80, 2.69; 0.220)	1.31	(0.70, 2.43; 0.399)	1.30	(0.70, 2.40; 0.412)
Number	3,949		3,949		3,933		3,672		3,672	
Malawi										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.46	(0.65, 3.28; 0.363)	1.32	(0.55, 3.16; 0.537)	1.38	(0.56, 3.35; 0.483)	1.36	(0.55, 3.39; 0.503)	1.29	(0.52, 3.17; 0.582)
Middle	3.17	(1.44, 6.96; 0.004)	3.13	(1.35, 7.28; 0.008)	3.15	(1.33, 7.46; 0.009)	3.27	(1.37, 7.81; 0.008)	3.06	(1.29, 7.25; 0.011)
Fourth	3.11	(1.40, 6.92; 0.005)	2.89	(1.24, 6.71; 0.014)	2.93	(1.21, 7.12; 0.018)	3.01	(1.22, 7.42; 0.016)	2.84	(1.17, 6.92; 0.022)
Highest	4.68	(2.07, 10.61; 0.000)	2.94	(1.23, 7.04; 0.016)	3.08	(1.23, 7.70; 0.016)	3.14	(1.24, 7.99; 0.016)	2.43	(0.94, 6.26; 0.066)
Number	1,297		1,297		1,297		1,268		1,268	

*Continued...*

Table 10-Continued										
Country/ wealth status	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	(95% CI; <i>p</i> -value)								
Lesotho										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.17	(0.69, 1.97; 0.564)	1.29	(0.74, 2.26; 0.368)	1.44	(0.80, 2.58; 0.223)	1.48	(0.79, 2.79; 0.221)	1.42	(0.74, 2.74; 0.294)
Middle	1.56	(0.89, 2.75; 0.123)	1.70	(0.88, 3.31; 0.115)	1.98	(0.98, 4.00; 0.056)	2.26	(1.06, 4.83; 0.036)	2.07	(0.91, 4.75; 0.084)
Fourth	1.42	(0.76, 2.64; 0.270)	1.36	(0.68, 2.71; 0.387)	1.57	(0.76, 3.23; 0.221)	1.64	(0.76, 3.56; 0.207)	1.42	(0.53, 3.78; 0.482)
Highest	1.35	(0.68, 2.65; 0.390)	1.18	(0.47, 2.94; 0.723)	1.62	(0.60, 4.35; 0.340)	1.83	(0.70, 4.80; 0.216)	1.46	(0.43, 5.00; 0.543)
Number		586		586		586		554		554
Cameroon										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.74	(0.66, 4.57; 0.260)	1.51	(0.58, 3.91; 0.398)	1.37	(0.53, 3.55; 0.521)	1.14	(0.38, 3.37; 0.817)	1.11	(0.37, 3.28; 0.853)
Middle	3.80	(1.65, 8.75; 0.002)	3.11	(1.37, 7.05; 0.007)	2.70	(1.19, 6.08; 0.017)	2.33	(0.94, 5.76; 0.066)	2.16	(0.85, 5.49; 0.105)
Fourth	4.65	(2.00, 10.82; 0.000)	3.44	(1.37, 8.62; 0.008)	3.37	(1.35, 8.41; 0.009)	2.86	(1.07, 7.60; 0.036)	2.40	(0.84, 6.82; 0.100)
Highest	5.10	(2.21, 11.76; 0.000)	4.43	(1.72, 11.42; 0.002)	4.97	(1.83, 13.52; 0.002)	4.08	(1.39, 11.96; 0.010)	3.04	(0.88, 10.48; 0.079)
Number		2,014		2,014		2,014		1,959		1,959
Ghana										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	1.20	(0.51, 2.84; 0.673)	0.89	(0.35, 2.28; 0.809)	0.92	(0.37, 2.28; 0.865)	0.88	(0.36, 2.15; 0.773)	0.86	(0.35, 2.14; 0.750)
Middle	1.98	(0.90, 4.38; 0.092)	1.43	(0.56, 3.66; 0.453)	1.53	(0.63, 3.72; 0.346)	1.44	(0.59, 3.48; 0.423)	1.31	(0.53, 3.24; 0.555)
Fourth	1.69	(0.68, 4.17; 0.257)	1.05	(0.35, 3.17; 0.935)	1.04	(0.37, 2.95; 0.940)	0.95	(0.33, 2.73; 0.926)	0.71	(0.21, 2.44; 0.590)
Highest	1.87	(0.76, 4.61; 0.175)	1.05	(0.29, 3.86; 0.941)	1.17	(0.33, 4.09; 0.807)	1.07	(0.31, 3.70; 0.914)	0.59	(0.11, 3.24; 0.543)
Number		1,814		1,814		1,814		1,811		1,811
Burkina Faso										
Lowest <sup>†</sup>	1.00		1.00		1.00		1.00		1.00	
Second	5.94	(1.96, 17.97; 0.002)	5.66	(1.78, 17.96; 0.003)	5.86	(1.85, 18.59; 0.003)	5.87	(1.89, 18.26; 0.002)	5.86	(1.89, 18.16; 0.002)
Middle	3.14	(0.93, 10.60; 0.065)	2.60	(0.85, 8.00; 0.095)	2.75	(0.93, 8.17; 0.068)	2.80	(0.91, 8.61; 0.073)	2.79	(0.91, 8.53; 0.072)
Fourth	1.88	(0.40, 8.73; 0.420)	1.13	(0.19, 6.65; 0.892)	1.16	(0.19, 7.10; 0.875)	1.19	(0.20, 6.98; 0.847)	1.18	(0.21, 6.74; 0.851)
Highest	7.37	(1.94, 28.07; 0.003)	0.72	(0.07, 7.25; 0.777)	0.76	(0.07, 8.43; 0.823)	0.88	(0.09, 8.84; 0.912)	0.86	(0.08, 8.93; 0.898)
Number		2,157		2,157		2,157		2,145		2,145
<sup>†</sup> Reference category Note: Model 1 estimates the unadjusted effect of household wealth status on the likelihood that one or both partners is HIV positive. Model 2 adds controls for wife's age, age gap between spouses, urban/rural residence, and geographical region. Model 3 adds controls for wife's education, education gap between spouses, union type, and duration in union. Model 4 adds controls for number of lifetime sexual partners for each spouse (replaced with whether the respondent had two or more partners in the previous 12 months in Kenya, Ghana, Burkina Faso, and Malawi for both spouses; and in Lesotho for the female partner), circumcision status of the male partner, and consistent condom use in last 12 months. Model 5 additionally controls for community-level wealth score.										

## DISCUSSION

### *Summary*

This study finds that, contrary to evidence for other infectious diseases and theoretical expectations, HIV prevalence is *not* disproportionately higher among adults living in poorer households in sub-Saharan Africa. In all eight countries included in this study, wealthier men and women tend to have higher prevalence of HIV than poorer ones. The positive association between wealth status and HIV is considerably diminished in most cases when a number of underlying factors (such as education, urban/rural residence, and community wealth) and mediating proximate factors (such as sexual risk taking, condom use, and male circumcision) are taken into account. This is also the case when the analysis focuses on cohabiting couples. These results indicate that much of the positive association between wealth and HIV is due to these underlying or mediating factors, yet even after accounting for these various factors, in most countries wealthier adults remain at least as likely as the poorer to be HIV-infected, if not more.

Our analysis indicates that several factors may be responsible for the observed higher HIV prevalence among wealthier individuals in these countries. First, the wealthier are more likely to live in urban areas and to live in wealthier communities, where HIV is more prevalent. Also, wealthier adults may live longer with HIV than the poorer due to their better nutritional status, as reflected in higher BMI levels among wealthier women. Wealthier adults, especially men, tend to be more mobile, more likely to have multiple partners, and more likely to engage in sex with non-regular partners – behaviors that tend to be associated with higher HIV prevalence. However, polygamy is not more prevalent among the wealthier than among the poorer.

On the other hand, there are factors that would reduce HIV prevalence among the wealthier. Wealthier men and women tend to be more educated and have higher knowledge of HIV/AIDS prevention methods. As such they may be more likely to receive health care, to use condoms (both with non-regular partners and consistently with all partners), and less likely to use alcohol when having sex. Also, wealthier men are more likely to be circumcised in all countries, except in Lesotho, which may reduce their risk of HIV infection.

We find some important sex differences in the association between wealth status and HIV infection and associated behaviors. Women are less likely than men to report having multiple partners and non-regular partners. In some countries, wealthier men report to have started having sex at an earlier age than poorer men, but wealthier women report to have started at an older age

than poorer women. We also find that the positive association between wealth status and HIV prevalence tends to be stronger for women than for men in most countries, suggesting disproportionately greater vulnerability of women in the wealthier groups.

### ***Limitations***

There are several limitations of this study that should be kept in mind when interpreting our findings.

One important limitation is that DHS surveys do not collect data on household income or expenditure, the traditional indicators used to measure wealth. The assets-based wealth index used here is only a proxy indicator for household economic status, and it does not always produce results similar to those obtained from direct measurements of income and expenditure where such data are available or can be collected reliably (Montgomery et al. 2000; Filmer and Pritchett 2001). A second issue is that the choice of assets included in the construction of the index varies somewhat from country to country, which makes difficult comparing wealth index scores across countries. Moreover, because the level and distribution of wealth differs from one country to another, wealth index scores cannot be compared across countries. The wealthiest 20 percent of households in one country do *not* necessarily correspond to the wealthiest 20 percent of households in another country.

In spite of these limitations, the wealth index quintiles provide a reasonable gradient from the poorest 20 percent to the wealthiest 20 percent of households within countries. As shown in this study, the wealth quintiles correlate strongly with most important health and well-being indicators for women and children. Elsewhere, the wealth index has been shown to produce superior results and equal or greater distinctions in health outcomes than household expenditure-based measures (Rutstein and Johnson 2004). In many developing-country settings, such as in sub-Saharan Africa, it is difficult to collect reliable data on income and expenditure from household surveys, whereas it is relatively easy to collect data on household ownership of certain assets and amenities, which makes an assets-based indicator of household economic status particularly valuable. Moreover, income and expenditure are flow variables that we might expect to correlate with HIV incidence – also a flow variable. Wealth status reflects the accumulation of many years of income and expenditure, in the same way that HIV prevalence is the accumulation of many years of incidence and mortality. Therefore, wealth status is a preferred measure to compare with prevalence.

Another limitation of the present analysis is the differential non-response in the surveys considered. Non-response rates for HIV testing tend to be higher among the wealthier, urban, and more educated adults, who also tend to have higher HIV prevalence. However, previous research has indicated that in these surveys differential non-response has small and insignificant effects on the observed HIV prevalence, so any bias due to differential non-response by wealth status should be small (Mishra et al. 2006). In any case, if there were no differential non-response by wealth status, the positive association between wealth status and HIV prevalence would be even stronger.

A third limitation is that the surveys considered exclude population groups that are difficult to locate or interview, most notably the homeless. The observed positive association between wealth status and HIV prevalence may be overestimated to the extent the homeless are poorer and have higher HIV prevalence than those included in the survey. However, given that the proportion of the homeless in the total population tends to be small, any effect of excluding this group on the observed associations is likely to be small.

Another limitation is that our analysis is based on self-reported sexual and other behaviors. There is evidence that women tend to underreport and men tend to exaggerate their premarital and extramarital sexual activity (Zaba et al. 2002). Epidemiological studies in Africa have also observed weak associations between self-reported risky sexual behavior and HIV status. For example, a large multi-site study of factors determining HIV prevalence in four African cities revealed large numbers of HIV positive women who reported themselves to be virgins or having had only one sexual partner and few episodes of sexual intercourse (Buve et al. 2001). The findings of our study may be biased to the extent men and women misreport their number of sexual partners, sex with non-regular partners, condom use, and other related behaviors, or to the extent that the degree of misreporting is different across the wealth quintiles.

A fifth limitation is that the surveys included in the analysis did not collect data on concurrent partnerships and sexual networks. We are thus unable to examine the extent to which wealthier individuals are more likely to engage in such complex patterns of sexual relations, which may increase the risk of HIV infection in Africa by allowing the virus of spread rapidly to others (Hudson 1996; Morris and Kretzschmar 1997; Lagarde et al. 2001; Halperin and Epstein 2004; HELLERINGER and Kohler 2005).

Because of the cross-sectional nature of the data used in this study, endogeneity might also bias the results at several levels. First, when considering the effect of wealth status on HIV prevalence we do not allow for the opposite, detrimental effect of HIV infection on wealth status. This effect is well-established in the literature on the economic impact of AIDS (Piot et al. 2001; UNAIDS 2000). However, excluding HIV-positive individuals who reported being seriously ill for three or more months in the previous 12 months (in Tanzania, Uganda, Cameroon, and Malawi, where such information was collected) had virtually no effect on the observed associations between wealth and HIV status (data not shown). The negative effect of HIV infection on wealth status would also bias, for instance, the measurement of individual mobility, since individuals and families who have been affected and impoverished by the epidemic are likely to relocate to poorer communities. Second, if HIV-positive adults were aware of their serostatus, they might have adjusted their sexual and reproductive behavior. We think it is unlikely this would significantly bias the associations identified in this study, since most respondents who were tested for HIV in the surveys had never been tested before. We tested this by excluding HIV-positive individuals who may have known their status (those who were previously tested and received result), which made little difference to the observed associations between wealth and HIV status in most cases (data not shown). Third, when infected with HIV, wealthier individuals are likely to survive longer than poorer individuals because of better nutrition and access to health care. Cross-sectional data used in this study do not allow taking into account such selective survival of wealthier respondents. A lack of information on the availability and access to treatment and care (ARVs in particular) further limits the possibility of disentangling this effect.

Finally, cross-sectional data only allow looking at associations; it is not possible to identify any causal linkages between wealth status and HIV infection. For many HIV-positive adults, the infection may have preceded their sexual and other behaviors recorded in the survey, which may have biased some of the associations. Moreover, as discussed earlier, we expect the relationship between wealth status and HIV prevalence to be transitional in nature. The strength and direction of the relationship between wealth status and HIV prevalence and the roles of risk behaviors and protective factors are likely to change over time, depending on the stage and spread of the epidemic. Consistent with this viewpoint, a recent study has suggested that the relationship between women's education and HIV changes as the epidemic matures (Hargreaves and Boler 2006). However, cross-sectional data used in our study do not allow examining trends and these transitional phenomena.

## *Conclusions*

This study finds a positive association between household economic status and HIV prevalence among adult men and women in sub-Saharan Africa. Accounting for various underlying factors and proximate determinants explains much of this positive association, but in most cases wealthier adults remain at least as likely as poorer to be HIV infected. These findings question the basis for poverty-driven programs for HIV/AIDS prevention in developing countries. When planning and designing prevention, care, and treatment efforts, program planners and policymakers need to adjust to the reality that HIV prevalence is not necessarily higher among the poorer. Poverty-driven programs are likely to have limited impact on such efforts when the prevalence of HIV is higher among the wealthier than among the poorer. Focusing on the most important modes of exposure will likely be more effective than focusing broadly on poverty reduction (Pisani et al. 2003; Gouws et al. 2006). It will also be important to extend programs to the rural areas where a majority of the population in sub-Saharan Africa resides.

It is important to note that our findings do *not* imply that the poor are not disproportionately affected by HIV when they do get infected. Poverty reduction is an extremely important goal in itself for many reasons, and it will certainly help combat the HIV/AIDS epidemic in the long run and deal with its many adverse consequences.

## REFERENCES

1. Adler NE, Newman K. Socioeconomic disparities in health: pathways and policies. *Health Aff (Millwood)* 2002;21:60-76.
2. Ainsworth M, Semali I. Who is most likely to Die of AIDS? Socioeconomic correlates of Adult Deaths in Kagera Region, Tanzania. In: Ainsworth M, Fransen L, Over M, editors. *Confronting AIDS: Evidence for Developing World*, European Commission, and Brussels: European Commission; 1998.
3. Auvert B, Ballard R, Campbell C, Carael M, Carton M, Fehler G, et al. HIV infection among youth in a South African mining town is associated with herpes simplex virus-2 seropositivity and sexual behavior. *AIDS* 2001;15:931-4.
4. Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, Puren A. Randomized controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLoS Med* 2005;2:e298.
5. Bailey RC, Plummer FA, Moses S. Male circumcision and HIV prevention: current knowledge and future research directions. *Lancet Infect Dis* 2001;1:223-31.
6. Barongo LR, Borgdorff MW, Moshia FF, Nicoll A, Grosskurth H, Senkoro KP, et al. The epidemiology of HIV-1 infection in urban areas, roadside settlements and rural villages in Mwanza Region, Tanzania. *AIDS* 1992;6:1521-8.
7. Bloom DE, River Path Associates, Sevilla J. *Health, Wealth, AIDS, and Poverty*. Report of the Asia-Pacific Ministerial Meeting, 9-10 October, 2001. Melbourne, Australia: The Australian Government' Overseas Aid Programme.
8. Boerma JT, Weir SS. Integrating demographic and epidemiological approaches to research on HIV/AIDS: the proximate-determinants framework. *J Infect Dis*. 2005 Feb 1;191 Suppl 1:S61-7.
9. Bukusi EA, Cohen CR, Meier AS, Waiyaki PG, Nguti R, Njeri JN, Holmes KK. Bacterial vaginosis: risk factors among Kenyan women and their male partners. *Sex Transm Dis* 2006;33:361-7.
10. Buve A, Lagarde E, Carael M, Rutenberg N, Ferry B, Glynn JR, et al. Study Group on Heterogeneity of HIV Epidemics in African Cities. Interpreting sexual behaviour data: validity issues in the multicentre study on factors determining the differential spread of HIV in four African cities. *AIDS* 2001;15 Suppl 4:S117-26.
11. Central Bureau of Statistics (CBS), Ministry of Health (MOH), and ORC Macro. *Kenya Demographic and Health Survey 2003*. Calverton, Maryland: CBS, MOH, and ORC Macro; 2004.

12. Chawla R, Bhalla P, Garg S, Meghachandra Singh M, Bhalla K, Sodhani P, et al. Community based study on sero-prevalence of syphilis in New Delhi (India). *J Commun Dis* 2004;36:205-11.
13. Deheneffe JC, Caraël M, Noubissi A. Socioeconomic determinants of sexual behaviour and condom use. In: Ainsworth M, Fransen L, Over M, editors. *Confronting AIDS: Evidence from the Developing World*. Brussels: European Commission; and Washington, DC: The World Bank; 1998:131-46.
14. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntryre JA, Harlow SD. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Soc Sci Med*. 2004 Oct;59(8):1581-92.
15. Ellen JM, Kohn RP, Bolan GA, Shiboski S, Krieger N. Socioeconomic differences in sexually transmitted disease rates among black and white adolescents, San Francisco, 1990 to 1992. *Am J Public Health* 1995;85:1546-8.
16. Fenton L. Preventing HIV/AIDS through poverty reduction: the only sustainable solution? *Lancet* 2004;364:1186-7.
17. Filmer D, Pritchett L. Estimating wealth effects without expenditure data—or tears: An application to educational enrollments in states of India. *Demography* 2001;38:115-132.
18. Fitzgerald DW, Behets F, Caliendo A, Roberfroid D, Lucet C, Fitzgerald JW, Kuykens L. Economic hardship and sexually transmitted diseases in Haiti's rural Artibonite Valley. *Am J Trop Med Hyg*. 2000 Apr;62(4):496-501.
19. Fleming DT, McQuillan GM, Johnson RE, Nahmias AJ, Aral SO, Lee FK, et al. Herpes simplex virus type 2 in the United States, 1976 to 1994. *N Engl J Med* 1997;337:1105-11.
20. Fotso JC, Kuate-Defo B. Socioeconomic inequalities in early childhood malnutrition and morbidity: modification of the household-level effects by the community SES. *Health Place* 2005;11:205-25.
21. Ghana Statistical Service (GSS), Noguchi Memorial Institute for Medical Research (NMIMR), and ORC Macro. *Ghana Demographic and Health Survey 2003*. Calverton, Maryland: GSS, NMIMR, and ORC Macro; 2004.
22. Gouws E, White PJ, Stover J, Brown T. Short term estimates of adult HIV incidence by mode of transmission: Kenya and Thailand as examples. *Sex Transm Infect*. 2006 Jun;82 Suppl 3:iii51-55.
23. Gray RH, Wawer MJ, Brookmeyer R, Sewankambo NK, Serwadda D, Wabwire-Mangen F, Lutalo T, Li X, vanCott T, Quinn TC; Rakai Project Team. Probability of HIV-1 transmission

- per coital act in monogamous, heterosexual, HIV-1-discordant couples in Rakai, Uganda. *Lancet*. 2001 Apr 14;357(9263):1149-53.
24. Gregson S, Garnett GP, Nyamukapa CA, Hallett TB, Lewis JJ, Mason PR, et al. HIV decline associated with behavior change in eastern Zimbabwe. *Science*. 2006 Feb 3;311(5761):664-6.
  25. Halperin DT, Epstein H. Concurrent sexual partnerships help to explain Africa's high HIV prevalence: implications for prevention. *Lancet* 2004;364:4-6.
  26. Hargreaves J, Boler T. Girl power: the impact of girls' education on HIV and sexual behaviour. ActionAid International; 2006.
  27. Holtgrave DR, Crosby RA. Social capital, poverty, and income inequality as predictors of gonorrhoea, syphilis, chlamydia and AIDS cases rates in the United States. *Sex Transm Infect* 2003;79:62-4.
  28. Hudson CP. AIDS in rural Africa: a paradigm for HIV-1 prevention. *Int J STD AIDS* 1996;7:236-43.
  29. Institut National de la Statistique et de la Démographie (INSD) et ORC Macro. Enquête Démographique et de Santé du Burkina Faso 2003. Calverton, Maryland, USA: INSD et ORC Macro; 2004.
  30. Institut National de la Statistique (INS) et ORC Macro. Enquête Démographique et de Santé du Cameroun 2004. Calverton, Maryland, USA: INS et ORC Macro; 2005.
  31. Kim JC, Watts CH. Gaining a foothold: tackling poverty, gender inequality, and HIV in Africa. *BMJ* 2005;331:769-72.
  32. Kirunga CT, Ntozi JP. Socio-economic determinants of HIV serostatus: a study of Rakai District, Uganda. *Health Transit Rev* 1997;7 Suppl:175-88.
  33. Hellingranger S, Kohler HP. Social networks, perceptions of risk, and changing attitudes towards HIV/AIDS: new evidence from a longitudinal study using fixed-effects analysis. *Popul Stud*. 2005 Nov;59(3):265-82.
  34. Kongnyuy EJ, Wiysonge CS, Mbu RE, Nana P, Kouam L. Wealth and sexual behaviour among men in Cameroon. *BMC Int Health Hum Rights*. 2006 Sep 11;6:11.
  35. Kuate-Defo B. Effects of socioeconomic disadvantage and women's status on women's health in Cameroon. *Soc Sci Med* 1997;44:1023-1042.
  36. Kyriakis KP, Hadjivassiliou M, Pappazios VA, Flemetakakis A, Stavrianeas N, Katsambas A. Incidence determinants of gonorrhoea, chlamydial genital infection, syphilis and chancroid in attendees at a sexually transmitted disease clinic in Athens, Greece. *Int J Dermatology* 2003;42:876-81.

37. Lacey CJN, Merrick DW, Bensley DC, Fairley I. Analysis of the Sociodemography of Gonorrhoea in Leeds, 1989–93. *British Medical Journal* 1997;314:1,715–18.
38. Lagarde E, Auvert B, Chege J, Sukwa T, Glynn JR, Weiss HA, et al. Condom use and its association with HIV/sexually transmitted diseases in four urban communities of sub-Saharan Africa. *AIDS* 2001;15 Suppl 4:S71-8.
39. Mastro TD, Satten GA, Nopkesorn T, Sangkharomya S, Longini IM Jr. Probability of female-to-male transmission of HIV-1 in Thailand. *Lancet*. 1994 Jan 22;343(8891):204-7.
40. Mbizvo MT, Machekano R, McFarland W, Ray S, Bassett M, Latif A, et al. HIV seroincidence and correlates of seroconversion in a cohort of male factory workers in Harare, Zimbabwe. *AIDS* 1996;10:895-901.
41. Menon R, Wawer MJ, Konde-Lule JK, Sewankambo NK, Li C. The economic impact of adult mortality on households in Rakai district, Uganda. In: Ainsworth M, Fransen L, Over M, editors. *Confronting AIDS: Evidence from the Developing World*. Brussels: European Commission; and Washington, DC: The World Bank; 1998:321-35.
42. Miller GC, McDermott R, McCulloch B, Fairley CK, Muller R. Predictors of the prevalence of bacterial STI among young disadvantaged Indigenous people in north Queensland, Australia. *Sex Transm Infect* 2003;79:332-5.
43. Ministry of Health (MOH) and ORC Macro. *Uganda HIV/AIDS Sero-behavioural Survey 2004-2005*. Calverton, Maryland, USA: MOH and ORC Macro; 2006.
44. Ministry of Health and Social Welfare (MOHSW), Bureau of Statistics (BOS), and ORC Macro. *Lesotho Demographic and Health Survey 2004*. Calverton, Maryland: MOHSW, BOS, and ORC Macro; 2005.
45. Mishra V, Thaddeus S, Kafuko J, Opio A, Hong R, Kirungi W, et al. Partner faithfulness reduces the risk of HIV infection: evidence from a national sero-survey in Uganda. 2007: Draft manuscript.
46. Mishra V, Vaessen M, Boerma JT, Arnold F, Way A, Barrere B, et al. HIV testing in national population-based survey experience from the Demographic and Health Surveys. *Bull World Health Organ* 2006;84:537-545.
47. Montgomery M, Gragnolati M, Burke K, Paredes E. Measuring living standards with proxy variables. *Demography* 2000;37:155-174
48. Morris M, Kretzschmar M. Concurrent partnerships and the spread of HIV. *AIDS* 1997;11(5):641-8.
49. Msuya SE, Mbizvo E, Stray-Pedersen B, Sundby J, Sam NE, Hussain A. Reproductive tract infections among women attending primary health care facilities in Moshi, Tanzania. *East*

- Afr Med J 2002;79:16-21.
50. National Institutes of Health (NIH). Adult male circumcision significantly reduces risk of acquiring HIV. NIH News, Dec. 13, 2006.
  51. National Statistical Office (NSO), and ORC Macro. Malawi Demographic and Health Survey 2004. Calverton, Maryland, USA: NSO and ORC Macro; 2005.
  52. ORC Macro. Anemia and HIV Testing Field Manual: Demographic and Health Surveys. Calverton, Maryland: ORC Macro; 2005a.
  53. ORC Macro. HIV Testing Laboratory Manual: Demographic and Health Surveys. Calverton, Maryland: ORC Macro; 2005b.
  54. Piot P, Bartos M, Ghys PD, Walker N, Schwartlander B. The global impact of HIV/AIDS. *Nature*. 2001 Apr 19;410(6831):968-73.
  55. Pisani E, Garnett GP, Grassly NC, Brown T, Stover J, Hankins C, Walker N, Ghys PD. Back to basics in HIV prevention: focus on exposure. *BMJ*. 2003 Jun 21;326(7403):1384-7.
  56. Rutstein, S. O., and K. Johnson. The DHS Wealth Asset Index. DHS Comparative Report no. 6. ORC Macro: Calverton, Maryland; 2004.
  57. Siegfried N, Clarke M, Volmink J. Randomised controlled trials in Africa of HIV and AIDS: descriptive study and spatial distribution. *BMJ* 2005;331:742.
  58. Shelton JD, Cassell MM, Adetunji J. Is poverty or wealth at the root of HIV? *Lancet* 2005;366:1057-8.
  59. Tanzania Commission for AIDS (TACAIDS), National Bureau of Statistics (NBS), and ORC Macro. Tanzania HIV/AIDS Indicator Survey 2003-04. Calverton, Maryland, USA: TACAIDS, NBS, and ORC Macro; 2005.
  60. UNAIDS. Report on the Global AIDS epidemic. Geneva: UNAIDS. 2006.
  61. UNAIDS. Report on the Global HIV/AIDS epidemic .Geneva: UNAIDS. 2000.
  62. Uuskula A, Nygard JF, Kibur-Nygaard M. Syphilis as a social disease: experience from the post-communist transition period in Estonia. *Int J STD AIDS* 2004;15:662-8.
  63. Van de Perre P, Le Polain B, Carael M, Nzaramba D, Zissis G, Butzler JP. HIV antibodies in a remote rural area in Rwanda, Central Africa: an analysis of potential risk factors for HIV seropositivity. *AIDS* 1987;1:213-5.
  64. Wald A. Synergistic interactions between herpes simplex virus type-2 and human immunodeficiency virus epidemics. *Herpes* 2004;11:70-6.
  65. Way A, Mishra V, Hong R, Johnson K. Is male circumcision protective of HIV infection? Presentation at the 16<sup>th</sup> International AIDS Conference; 2006 August 13-18; Toronto, Canada.

66. Whiteside A. Poverty and HIV/AIDS in Africa. *Third World Q* 2002;23:313-32.
67. Williams BG, Lloyd-Smith JO, Gouws E, Hankins C, Getz WM, Hargrove J, et al. The potential impact of male circumcision on HIV in Sub-Saharan Africa. *Plos Med* 2006;3:e262
68. Wojciki JM. Socioeconomic status as a risk factor for HIV infection in women in East, Central and Southern Africa: a systematic review. *J Biosoc Sci* 2005;37:1-36.
69. Zaba B, Boerma JT, Pisani E, Baptiste N. Estimation of levels and trends in age at first sex from African demographic surveys using survival analysis. Paper presented at the Annual Meeting of the Population Association of America, 2002 May 9-11; Atlanta, Georgia.

## APPENDIX

Appendix Table A1 Background characteristics by household wealth status, men and women aged 15-49, Kenya 2003												
Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Age group												
15-19	31	31	32	26	14	25	23	24	25	23	19	23
20-24	15	19	18	21	25	20	16	18	20	21	26	21
25-29	14	14	13	14	19	15	17	17	15	14	20	17
30-34	10	10	13	13	14	12	14	11	14	13	14	13
35-39	12	9	12	12	13	12	12	11	9	11	10	11
40-44	11	10	7	8	10	9	11	10	10	11	7	10
45-49	8	7	5	6	5	6	7	8	7	7	5	6
Education												
No education	16	5	4	3	4	6	34	14	10	6	5	13
Primary incomplete	52	47	41	31	14	34	44	45	41	28	16	33
Primary complete	17	25	27	26	19	23	15	25	27	30	27	25
Secondary or higher	14	23	28	40	63	37	6	16	22	36	53	29
Occupation												
Not working	32	29	28	22	17	25	42	38	37	40	35	38
Professional/service	9	11	13	19	42	21	12	14	15	21	38	22
Agriculture/domestic	47	44	42	39	10	34	43	45	43	35	20	35
Manual	12	16	16	20	31	20	2	4	5	4	7	5
Regular media exposure												
None	26	8	7	4	2	8	54	27	21	12	6	22
One source	50	57	46	30	15	36	40	61	59	43	22	43
Two sources	17	26	30	36	30	29	6	10	16	32	36	22
All three sources	8	10	17	30	53	27	1	2	4	13	36	13
Marital status												
Never in union	43	52	52	51	43	48	21	26	29	32	36	30
Monogamous	44	39	43	41	49	44	51	53	52	49	48	50
Polygynous	10	4	3	4	3	4	18	12	9	8	6	10
Divorced/separated	1	1	0	0	1	1	7	4	5	4	3	4
Widowed	2	4	2	4	4	3	3	5	5	7	8	6
Years in place of residence												
<3	7	7	10	16	28	15	13	13	13	21	38	21
3-9	13	14	10	16	37	20	22	24	23	23	30	25
10+	80	79	80	68	35	65	65	62	64	57	33	54
Ethnicity												
Kalenjin	29	12	11	13	3	12	21	12	9	9	4	10
Kamba	10	15	14	10	11	12	10	12	13	12	10	11

*Continued...*

Appendix Table A1-Continued												
Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Kinkuyu	2	14	23	34	30	23	1	12	24	36	34	23
Luhya	11	22	19	11	13	15	14	20	17	12	14	15
Luo	13	10	6	7	19	12	15	12	10	8	15	12
Other	34	28	27	26	23	27	39	32	29	24	23	28
Religion												
Roman Catholic	24	25	28	26	27	26	24	25	30	25	23	25
Protestant/Other Christian	56	65	60	62	61	61	55	69	63	69	67	65
Muslim	11	3	5	5	8	6	16	5	5	4	9	8
Other	9	8	8	7	5	7	5	2	1	2	1	2
Residence												
Urban	1	3	3	16	76	25	2	3	4	14	79	25
Rural	99	97	97	84	24	75	98	97	96	86	21	75
Region												
Nairobi	0	0	0	1	40	11	0	0	0	1	38	10
Central	2	12	19	26	14	15	1	11	19	25	13	14
Coast	7	4	6	6	11	7	12	5	6	6	11	8
Eastern	11	20	24	21	7	16	12	18	22	24	6	16
Nyanza	19	22	14	9	7	13	21	26	16	9	7	15
Rift valley	39	21	16	29	19	24	30	21	18	26	20	23
Western	14	20	20	7	2	11	15	18	17	8	3	11
North Eastern	8	1	1	0	0	2	9	1	1	1	0	2
Number	510	572	616	741	924	3,363	1,364	1,475	1,503	1,711	2,141	8,195

Appendix Table A2 Background characteristics by household wealth status, men and women aged 15-49, Tanzania 2003-2004

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Age group												
15-19	22	22	27	27	21	24	21	18	22	20	25	22
20-24	19	16	16	17	21	18	20	21	19	19	22	20
25-29	16	19	15	14	19	17	19	19	18	20	19	19
30-34	13	16	15	14	14	14	13	14	14	14	15	14
35-39	14	11	11	11	12	12	11	11	11	13	10	11
40-44	9	9	8	9	8	8	9	8	10	8	6	8
45-49	7	8	7	7	6	7	7	9	7	6	4	6
Education												
No education	22	17	13	7	3	11	41	32	26	13	6	22
Primary incomplete	28	24	24	18	9	20	20	19	19	17	8	16
Primary complete	48	59	59	65	58	58	39	48	53	63	60	53
Secondary or higher	2	1	3	11	30	11	0	0	2	7	26	8
Occupation												
Not working	10	10	16	17	19	15	7	9	12	19	35	18
Professional/service	3	5	7	19	42	17	5	5	10	24	47	21
Agriculture/domestic	84	81	72	48	11	55	87	85	77	53	11	58
Manual	3	4	6	16	28	13	1	1	1	4	7	3
Regular media exposure												
None	49	27	20	12	3	20	76	55	47	26	9	40
One source	37	55	55	47	16	41	21	40	44	52	26	36
Two sources	11	14	19	26	30	21	3	4	8	18	31	14
All three sources	2	4	5	16	51	19	0	1	1	5	34	10
Marital status												
Never in union	34	34	42	46	47	41	18	16	21	25	37	25
Monogamous	55	54	44	44	45	48	62	67	56	56	50	57
Polygynous	5	7	8	4	3	5	8	6	9	6	3	6
Divorced/separated/widowed	5	5	6	5	6	5	12	10	14	13	10	12
Years in place of residence												
<3	13	10	11	20	35	19	17	18	18	24	42	25
3-9	16	17	13	19	30	20	23	25	21	21	27	24
10+	71	73	76	61	35	61	59	57	61	55	31	51
Religion												
Moslem	27	24	24	29	41	30	26	25	26	31	41	31
Catholic	29	34	34	37	30	33	31	32	32	36	26	31
Protestant	24	24	27	29	28	26	25	29	32	29	31	29
None/Other	21	19	15	5	1	11	19	15	10	5	2	9

*Continued...*

Appendix Table A2-Continued													
Characteristic	Male						Female						
	Wealth status						Wealth status						
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total	
Residence													
Urban	3	6	10	26	84	30	2	5	10	30	84	31	
Rural	97	94	90	74	16	70	98	95	90	70	16	69	
Region													
Region I	27	11	16	26	20	20	26	13	19	28	22	22	
Region II	13	14	8	12	44	20	12	13	9	12	43	20	
Region III	10	19	27	27	16	20	12	20	26	27	17	20	
Region IV	21	22	13	13	5	14	21	23	12	12	5	14	
Region V	30	34	35	23	15	26	30	32	33	22	14	25	
Number	880	1,082	1,075	1,163	1,456	5,656	1,231	1,239	1,262	1,361	1,770	6,863	

Appendix Table A3 Background characteristics by household wealth status, men and women aged 15-49, Uganda 2004-2005

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Age group												
15-19	24	27	25	25	27	26	21	21	19	22	26	22
20-24	12	14	14	17	20	16	17	18	19	20	21	19
25-29	14	15	13	15	17	15	16	18	19	16	19	18
30-34	16	14	16	14	15	15	17	15	15	14	13	15
35-39	14	11	13	11	9	11	12	12	12	10	9	11
40-44	11	10	11	10	8	10	10	10	8	10	7	9
45-49	9	8	7	7	4	7	7	7	7	7	5	7
Education												
No education	17	10	9	6	3	8	38	30	26	20	7	23
Primary incomplete	56	54	54	49	27	47	51	53	54	49	30	46
Primary complete	13	16	16	15	11	14	6	9	10	13	15	11
Secondary or higher	14	20	21	29	59	31	5	8	10	19	47	20
Occupation												
Not working	21	23	20	22	26	23	27	27	25	29	41	31
Professional/service	6	8	9	13	34	16	8	7	8	13	34	15
Agriculture/domestic	61	55	57	45	14	44	48	54	58	48	18	44
Manual	12	15	14	20	25	18	17	12	9	10	7	10
Regular media exposure												
None	29	19	12	7	2	13	61	38	28	18	7	28
One source	59	66	70	66	29	56	36	57	66	72	43	55
Two sources	10	13	15	23	34	20	3	5	6	9	32	12
All three sources	1	2	2	4	36	11	0	0	0	1	18	5
Marital status												
Never in union	33	37	35	37	49	39	19	20	16	21	32	22
Monogamous	46	45	45	41	34	42	44	47	48	44	36	43
Polygynous	14	10	13	12	9	11	22	20	22	22	18	21
Divorced/separated	1	2	1	2	1	1	7	7	6	5	5	6
Widowed	6	6	6	8	7	7	7	7	7	8	9	8
Years in place of residence												
<3	11	13	13	15	31	18	19	21	22	21	39	25
3-9	18	20	20	21	28	22	26	29	32	30	28	29
10+	72	67	67	65	41	61	56	51	46	48	33	46

Continued...

Appendix Table A3-Continued

Characteristic	Male						Female					
	Wealth status					Total	Wealth status					Total
	Lowest	Second	Third	Fourth	Highest		Lowest	Second	Third	Fourth	Highest	
<b>Ethnicity</b>												
Baganda	5	11	11	15	37	17	7	10	10	16	39	18
Banyankore	4	8	12	16	10	10	3	9	14	15	9	10
Iteso	14	7	4	5	5	7	14	6	5	5	4	6
Lugbara/Madi	17	10	6	4	5	8	17	9	6	5	5	8
Basoga	9	9	9	10	10	9	8	10	9	11	11	10
Langi	7	9	8	4	3	6	5	8	8	4	3	5
Bakiga	5	8	11	8	5	7	7	8	9	9	3	7
Karimojong	10	5	0	0	0	3	12	5	0	1	0	3
Acholi	5	6	5	4	3	4	5	7	6	4	4	5
Bagisu/Sabiny	3	6	9	8	3	6	2	4	7	6	3	4
Alur/Jopadhola	7	6	5	7	3	6	5	6	5	7	3	5
Banyara	1	4	4	4	3	3	2	3	3	5	3	3
Batoro	1	3	3	3	4	3	1	2	2	2	4	2
Other	13	10	14	12	9	11	12	13	16	13	9	12
<b>Religion</b>												
Catholic	52	47	42	39	35	42	56	47	40	39	33	42
Anglican/protestant	31	35	41	41	35	37	27	34	40	38	32	34
Other Christian	6	8	6	8	6	7	6	8	9	9	11	9
Moslem	10	10	10	11	23	13	9	10	10	14	24	14
Other	2	1	1	1	1	1	2	1	1	1	1	1
<b>Residence</b>												
Urban	1	2	4	7	49	15	1	2	4	8	51	15
Rural	99	98	96	93	51	85	99	98	96	93	49	85
<b>Region</b>												
Central	9	14	14	19	29	18	10	14	14	18	25	17
Kampala	0	0	0	2	25	7	0	0	0	2	26	7
East Central	11	11	14	19	15	14	10	13	12	21	20	16
Eastern	8	10	13	13	5	10	7	9	12	11	5	9
Northeastern	24	11	4	3	2	8	26	10	5	4	2	8
North Central	11	15	13	7	5	10	10	14	14	7	5	10
West Nile	20	13	8	6	3	9	20	12	9	7	4	10
Western	10	13	15	13	8	12	9	14	15	13	7	11
Southwest	7	12	20	17	7	13	8	14	20	19	7	13
Number	1,209	1,628	1,506	1,669	1,998	8,010	1,610	2,038	1,849	2,000	2,443	9,941

Appendix Table A4 Background characteristics by household wealth status, men and women aged 15-49, Malawi 2004

Characteristic	Male						Female					
	Wealth status					Total	Wealth status					Total
	Lowest	Second	Third	Fourth	Highest		Lowest	Second	Third	Fourth	Highest	
Age group												
15-19	21	23	15	22	23	21	19	18	19	22	24	20
20-24	22	17	19	16	21	19	23	26	26	23	24	25
25-29	21	20	25	17	19	20	18	19	18	18	19	18
30-34	14	15	16	15	16	16	13	13	14	12	11	13
35-39	11	9	9	11	9	9	10	10	9	9	9	10
40-44	7	10	10	11	7	9	8	8	8	8	7	8
45-49	4	6	6	8	5	6	9	5	7	7	5	6
Education												
No education	18	17	16	7	3	11	37	33	27	17	7	23
Primary 1-4	38	35	26	23	8	24	33	32	30	25	10	26
Primary 5-8	39	45	50	60	47	49	25	30	39	45	39	36
Secondary or higher	5	3	8	10	42	16	4	4	5	13	44	15
Occupation												
Not working	22	21	18	23	35	25	33	38	40	42	53	42
Professional/service	4	4	5	4	12	6	8	10	11	14	26	14
Agriculture/domestic	68	64	66	60	39	58	57	50	47	42	19	42
Manual	7	11	11	13	14	11	2	2	2	2	3	2
Regular media exposure												
None	40	16	10	8	4	13	71	36	28	20	10	31
One source	51	68	68	62	30	55	26	59	67	70	44	54
Two sources	8	15	18	24	29	20	3	4	5	9	27	10
All three sources	2	1	3	6	38	12	0	0	0	1	19	5
Marital status												
Never in union	32	31	25	33	49	35	13	10	13	18	29	17
Monogamous	58	60	65	57	45	56	48	65	66	63	56	60
Polygynous	5	7	7	7	4	6	13	13	11	12	6	11
Divorced/separated	1	0	0	1	1	0	6	3	3	3	4	4
Widowed	4	2	3	2	2	3	19	8	7	4	6	8
Years in place of residence												
<3	15	14	17	16	41	22	14	17	15	19	39	21
3-9	18	21	21	22	27	22	17	20	24	23	28	23
10+	67	65	62	62	32	55	69	63	61	58	33	56
Ethnicity												
Chewa	39	41	34	31	23	33	41	40	33	31	27	34
Tumbuka	10	6	11	10	11	10	6	4	10	13	14	10

Continued...

Appendix Table A4 <i>Continued</i>												
Characteristic	Male						Female					
	Wealth status					Total	Wealth status					Total
	Lowest	Second	Third	Fourth	Highest		Lowest	Second	Third	Fourth	Highest	
Lomwe	12	18	20	18	16	17	16	17	19	17	15	17
Tonga	1	0	2	3	3	2	1	1	2	3	4	2
Yao	9	14	11	13	17	13	11	14	14	13	12	13
Sena	9	5	5	3	5	5	6	5	4	3	4	4
Nkonde	3	0	1	2	2	2	1	1	1	2	1	1
Ngoni	9	9	9	13	17	12	11	11	11	9	16	12
Other	8	6	8	8	7	7	7	7	7	8	7	7
Religion												
Catholic	20	21	21	22	22	21	22	21	24	23	25	23
CCAP	14	12	19	18	27	19	12	13	16	21	28	19
Christian	52	50	47	46	36	45	54	50	46	42	37	45
Muslim/Other	15	17	14	14	15	15	12	15	14	14	11	13
Residence												
Urban	6	3	7	15	60	21	4	4	5	12	57	18
Rural	94	97	93	85	40	79	96	96	95	88	43	82
Region												
Northern	13	8	14	17	12	13	8	8	13	20	17	13
Central	46	47	43	36	40	42	47	45	38	35	38	40
Southern	41	45	43	47	48	45	46	47	48	45	45	46
Number	383	614	666	666	785	3,114	2,037	2,277	2,383	2,361	2,639	11,698

Appendix Table A5 Background characteristics by household wealth status, men and women aged 15-49, Lesotho 2004

Characteristic	Male						Female					
	Wealth status					Total	Wealth status					Total
	Lowest	Second	Third	Fourth	Highest		Lowest	Second	Third	Fourth	Highest	
<b>Age group</b>												
15-19	24	28	33	31	31	30	24	25	29	23	22	24
20-24	17	21	22	22	19	20	24	20	21	23	17	21
25-29	16	16	14	16	13	15	14	15	13	14	17	15
30-34	16	13	12	12	10	12	12	11	11	10	14	12
35-39	10	8	10	6	12	9	7	10	10	10	13	10
40-44	8	7	5	7	7	7	10	11	9	12	10	10
45-49	9	7	4	6	8	7	9	8	8	9	7	8
<b>Education</b>												
No education	41	20	12	8	3	15	6	4	1	1	0	2
Primary incomplete	48	57	50	37	26	43	56	45	33	22	12	30
Primary complete	7	10	16	19	12	13	26	33	30	31	21	28
Secondary or higher	4	12	22	36	58	29	12	19	36	46	67	40
<b>Occupation</b>												
Not working	53	60	54	56	49	54	62	62	61	57	42	55
Professional/service	3	6	5	9	25	10	5	6	9	12	23	12
Agriculture/domestic	30	21	23	11	6	17	28	24	21	16	12	19
Manual	14	14	18	23	20	18	6	7	10	15	23	13
<b>Regular media exposure</b>												
None	82	55	40	29	9	40	86	65	49	29	10	42
One source	15	34	45	44	30	34	12	29	42	54	42	38
Two sources	3	10	11	23	33	17	2	5	8	15	35	16
All three sources	1	1	5	4	27	8	0	0	1	2	13	4
<b>Marital status</b>												
Never in union	46	53	64	62	55	57	23	28	35	33	41	33
Currently in union	45	41	32	35	40	38	58	55	51	54	47	52
Divorced/separated	3	2	1	2	1	2	11	10	9	8	7	9
Widowed	6	4	3	2	4	4	7	7	5	5	5	6
<b>Years in place of residence</b>												
<3	3	4	5	13	15	9	8	8	9	12	15	11
3-9	5	6	7	9	17	9	14	12	11	13	18	14
10+	92	90	89	78	68	82	78	81	80	75	67	75
<b>Religion</b>												
Roman Catholic	47	48	50	40	47	46	49	46	45	44	43	45
Lesotho Evangelical	15	22	24	26	25	23	12	18	21	22	24	20
Other/None	38	30	27	34	28	31	39	36	34	34	32	35

Continued...

Appendix Table A5 Background characteristics by household wealth status, men and women aged 15-49, Lesotho 2004

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Residence												
Urban	1	2	8	29	59	22	0	2	8	24	60	24
Rural	99	98	92	71	42	78	100	98	92	76	40	76
Region												
Butha-Buthe	3	6	9	7	5	6	3	7	10	7	5	6
Leribe	11	10	16	17	11	14	9	13	19	18	14	15
Berea	10	14	17	15	9	13	5	10	16	15	8	11
Maseru	12	18	21	28	51	27	12	15	16	27	47	26
Mafeteng	2	9	13	16	11	11	3	7	12	16	12	11
Mohale's Hoek	13	10	11	11	6	10	14	11	10	9	7	10
Quthing	11	10	4	3	2	6	10	12	8	4	3	7
Qasha's Nek	7	6	3	1	1	4	8	5	3	2	1	3
Mokhotlong	13	9	2	1	1	5	15	9	2	2	1	5
Thaba-Tseka	18	9	4	0	1	6	20	11	4	1	1	6
Number	410	448	505	560	573	2,496	987	1,294	1,258	1,595	1,962	7,095

Appendix Table A6 Background characteristics by household wealth status, men and women aged 15-49, Cameroon 2004

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Age group												
15-19	24	24	29	28	22	25	19	26	26	27	27	25
20-24	15	15	18	23	24	20	19	19	20	22	24	21
25-29	16	18	17	15	18	17	17	17	16	16	17	16
30-34	13	16	12	12	12	13	15	12	13	12	12	13
35-39	11	11	8	8	10	10	11	10	10	11	9	10
40-44	11	9	10	7	6	8	9	8	8	7	7	8
45-49	10	7	6	7	7	7	9	8	7	6	4	7
Education												
No education	28	19	8	4	1	10	57	35	19	9	2	22
Primary incomplete	38	32	25	16	5	20	27	34	28	18	7	22
Primary complete	14	18	21	18	10	16	9	17	22	21	14	17
Secondary or higher	19	31	46	62	84	54	7	14	30	52	77	39
Occupation												
Not working	17	18	26	32	38	28	12	32	41	45	55	38
Professional/service	3	7	12	20	29	17	0	1	2	4	13	4
Agriculture/domestic	72	60	39	12	3	30	79	48	31	12	3	32
Manual	9	15	23	37	31	25	9	20	26	39	29	25
Regular media exposure												
None	51	28	19	9	3	18	86	69	54	26	7	45
One source	33	49	42	29	11	30	12	25	29	33	22	24
Two sources	14	18	31	43	45	33	2	5	14	32	46	22
All three sources	2	6	7	19	41	19	0	1	3	9	25	9
Marital status												
Never in union	33	36	45	50	48	44	12	16	22	28	37	24
Monogamous	51	47	41	39	39	42	47	51	46	47	46	47
Polygynous	14	7	6	3	2	5	35	24	21	15	9	20
Divorced/separated	-	-	-	-	-	-	3	3	4	3	2	3
Widowed <sup>1</sup>	3	10	9	8	12	9	4	6	7	7	6	6
Years in place of residence												
<3	12	12	23	26	26	21	11	15	16	19	21	17
3-9	13	17	22	25	32	24	20	19	23	24	27	23
10+	75	71	55	48	42	55	70	65	61	56	52	60
Ethnicity												
Group1	8	11	9	7	2	7	8	14	10	8	4	8
Group2	30	21	10	7	3	12	31	16	7	4	1	11

Continued...

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Group3	27	17	9	7	3	11	28	14	8	5	3	11
Group4	5	4	4	4	3	4	3	4	3	3	3	3
Group5	11	11	15	14	8	12	9	11	13	12	8	11
Group6	8	10	20	28	36	23	9	13	25	36	34	25
Group7	2	3	6	5	6	5	1	4	4	5	6	4
Group8	4	14	21	22	31	21	4	16	22	23	33	20
Group9	3	5	3	2	2	3	3	4	3	2	2	3
Group10	4	4	3	5	5	4	4	4	4	3	4	4
Religion												
Catholic	36	33	37	40	48	40	27	31	35	41	50	38
Protestant	25	29	31	31	33	30	29	31	34	35	34	33
Muslim	21	24	21	18	8	17	20	27	22	16	9	18
Other/None	19	14	11	11	11	13	25	11	9	8	7	12
Residence												
Urban	13	21	40	80	96	58	10	19	44	84	97	55
Rural	87	79	60	20	4	42	90	81	56	16	3	45
Region												
Adamaoua	5	4	6	5	3	4	4	4	6	3	3	4
Central	2	11	14	8	4	8	2	11	15	9	4	8
Douala	0	0	4	17	27	12	0	0	5	17	27	11
East	5	9	6	4	4	5	5	7	5	4	4	5
Extreme North	38	30	8	5	1	13	41	30	10	5	2	16
Littoral	1	3	8	6	3	4	1	3	7	7	4	5
North	22	12	10	6	3	9	24	11	8	4	2	9
Northwest	14	14	11	12	5	11	12	15	13	10	4	10
West	8	9	12	9	6	9	8	10	15	13	8	11
South	1	4	8	7	3	5	1	4	7	6	3	4
Southwest	3	4	11	12	10	9	2	6	8	10	9	7
Yaounde	0	0	1	11	32	12	0	0	2	12	29	10
Number	650	792	906	1,110	1,357	4,815	2,007	1,756	2,046	2,283	2,566	10,656

<sup>1</sup> Widowed, divorced, and separated combined for men.

Appendix Table A7 Background characteristics by household wealth status, men and women aged 15-49, Ghana 2003

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Age group												
15-19	25	27	26	26	20	24	17	18	21	21	23	20
20-24	14	12	16	16	16	15	14	17	18	20	19	18
25-29	15	15	13	18	20	17	18	17	13	19	16	17
30-34	14	13	11	15	16	14	16	15	14	13	14	14
35-39	13	11	12	9	10	11	15	14	12	11	12	13
40-44	9	9	10	8	9	9	11	11	12	9	10	10
45-49	9	12	11	8	9	10	9	9	11	7	7	8
Education												
No education	46	21	14	8	2	16	64	38	26	19	8	28
Primary incomplete	23	27	19	12	7	17	19	28	24	21	12	20
Primary complete	24	44	55	50	43	44	16	32	44	50	50	40
Secondary or higher	8	8	12	30	49	24	2	2	6	11	30	12
Occupation												
Not working	13	20	26	29	27	24	15	16	22	24	30	22
Professional/service	4	4	9	23	39	18	13	21	31	50	55	37
Agriculture/domestic	78	67	48	14	3	38	61	54	35	8	1	28
Manual	5	9	17	34	31	21	11	9	13	17	14	13
Regular media exposure												
None	25	10	5	4	1	8	47	29	22	14	4	21
One source	63	64	46	22	6	37	46	56	47	35	14	37
Two sources	12	22	39	45	35	32	7	14	29	44	52	32
All three sources	1	4	10	29	58	23	0	1	3	7	30	10
Marital status												
Never in union	41	41	43	48	50	45	15	19	23	34	42	28
Monogamous	42	48	44	42	41	44	49	55	49	47	45	48
Polygynous	12	6	6	3	3	6	29	18	16	9	5	14
Divorced/separated	0	1	0	0	0	0	3	2	3	2	1	2
Widowed	4	4	6	7	6	5	5	6	9	9	7	7
Years in place of residence												
<3	8	11	11	17	18	13	11	15	12	18	22	16
3-9	18	22	23	28	32	25	23	23	22	26	32	26
10+	74	66	66	55	51	61	67	61	66	55	46	58
Ethnicity												
Akan	18	46	55	53	57	47	24	48	63	57	56	51
Ga/Dangme	3	7	7	8	10	7	3	10	5	9	12	8

Continued...

Appendix Table A7-Continued

Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
Ewe	8	19	14	12	12	13	11	18	13	12	13	13
Mole-Dagbani	46	17	11	13	8	18	35	12	9	9	6	13
Other	26	10	13	13	14	15	28	12	11	13	14	15
Religion												
Roman Catholic	15	17	14	13	13	14	16	15	18	13	9	14
Anglican/Methodist/Presbyterian	6	14	15	18	21	15	8	15	20	19	24	18
Other Christian	27	41	43	44	45	41	30	47	44	49	53	46
Moslem	28	15	19	20	16	19	24	14	13	16	13	16
Other	24	12	10	6	4	11	22	9	5	3	1	7
Residence												
Urban	3	7	29	74	91	45	3	8	34	76	92	48
Rural	97	93	71	26	9	55	97	92	66	24	8	52
Region												
North	63	14	14	12	5	20	55	14	12	9	3	17
Southeast	13	30	30	37	52	34	16	31	29	37	56	36
Southwest	8	23	24	18	12	17	11	22	25	18	12	17
Central	16	34	32	34	30	30	17	32	34	36	29	30
Number	777	802	879	971	1,100	4,529	970	949	1,071	1,245	1,457	5,691

Appendix Table A8 Background characteristics by household wealth status, men and women aged 15-49, Burkina Faso 2003

Characteristic	Male						Female					
	Wealth status					Total	Wealth status					Total
	Lowest	Second	Third	Fourth	Highest		Lowest	Second	Third	Fourth	Highest	
<b>Age group</b>												
15-19	26	25	30	34	24	27	22	20	21	20	28	22
20-24	18	17	15	16	20	18	17	18	17	18	21	18
25-29	14	13	12	11	16	14	15	17	17	18	16	17
30-34	11	11	13	9	16	13	12	14	15	13	10	13
35-39	11	11	10	13	13	12	13	13	13	12	11	12
40-44	9	12	12	8	6	9	11	10	10	10	8	10
45-49	11	10	8	9	6	8	10	9	8	9	6	8
<b>Education</b>												
No education	87	82	77	65	24	63	95	94	91	87	44	80
Primary incomplete	7	10	11	14	12	11	3	4	4	6	12	6
Primary complete	4	5	7	10	12	8	2	2	3	3	12	5
Secondary or higher	2	4	5	10	52	18	1	1	1	3	32	9
<b>Occupation</b>												
Not working	17	12	12	19	25	18	4	3	6	9	34	12
Professional/service	5	3	8	11	46	18	9	8	10	16	43	18
Agriculture/domestic	77	85	79	67	23	62	84	87	84	74	21	68
Manual	0	0	1	3	6	3	3	2	1	1	1	1
<b>Regular media exposure</b>												
None	60	29	24	20	4	24	77	50	51	40	12	44
One source	36	63	60	56	22	46	21	47	44	49	29	38
Two sources	4	7	15	21	47	22	2	3	4	9	42	14
All three sources	0	1	1	3	28	9	0	0	0	1	17	4
<b>Marital status</b>												
Never in union	38	42	44	51	57	47	13	12	14	14	36	19
Monogamous	50	42	39	31	35	39	50	43	37	34	38	40
Polygynous	11	15	16	18	5	12	33	43	46	49	19	37
Divorced/separated	0	0	0	0	0	0	3	2	1	2	3	2
Widowed	1	1	1	1	2	1	1	1	1	2	4	2
<b>Years in place of residence</b>												
<3	8	7	6	10	13	9	10	10	8	11	14	11
3-9	10	9	9	10	22	13	20	21	22	20	21	21
10+	82	84	85	80	65	78	71	69	70	70	64	68
<b>Ethnicity</b>												
Mossi	36	50	56	62	61	55	45	52	63	64	57	57
Other	64	50	44	38	39	45	55	48	37	36	43	43

*Continued...*

Appendix Table A8-Continued												
Characteristic	Male						Female					
	Wealth status						Wealth status					
	Lowest	Second	Third	Fourth	Highest	Total	Lowest	Second	Third	Fourth	Highest	Total
<b>Religion</b>												
Catholic/Protestant	24	27	26	25	40	30	25	29	25	21	38	28
Muslim	49	50	62	70	58	58	51	50	64	74	61	60
Other	27	22	12	6	2	12	24	21	11	5	1	12
<b>Residence</b>												
Urban	0	0	1	10	82	25	1	1	1	11	81	22
Rural	100	100	99	90	18	75	99	99	99	89	19	78
<b>Region</b>												
Ouagadougou	0	0	0	3	47	14	0	0	0	4	45	11
West	17	27	29	33	32	28	20	27	23	31	32	27
North	29	24	16	15	6	17	27	23	16	13	6	16
Central/south	14	24	23	23	10	18	17	24	28	24	10	20
East	40	25	32	25	6	23	36	26	32	27	8	25
Number	478	616	701	506	907	3,209	2,190	2,290	2,972	2,058	2,967	12,477