Polygyny and the spread of HIV in sub-Saharan Africa

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Abstract

Using Demographic and Health Survey data from 14 African countries, we study the relationship between polygyny and HIV infection. At the individual level, we find that polygyny positively correlates with HIV status, particularly in regions and countries with relatively high HIV prevalence. At the aggregate level, however, the correlation is negative, suggesting that the practice of polygyny contains the spread of HIV. With that insight we investigate two mechanisms that contribute to different individual and aggregate-level correlations: (1) HIV status-based adverse selection into polygynous unions, and (2) a reduction in the frequency of intercourse in conjugal units of polygynous unions. We find evidence for both, and together they support the proposition that polygynous marriage systems limit the spread of HIV in populations while increasing the risk of infection for seronegative individuals in polygynous unions. We relate these results to recent discussions of concurrency as one of the major factors explaining the differential spread of HIV.

Source: Libindo, F.G. (2004) Polygamy and AIDS. Zambia, Paris, UNESCO (Literacy, gender and HIV/AIDS series).

**** FIRST DRAFT ****

1. Polygyny and HIV: a review of prior evidence

Whereas polygyny frequently featured in early scientific and popular discourses around HIV (Gausset 2001; Oppong and Kalipeni 2003), the role of polygyny in HIV transmission has largely disappeared from the scientific debate on the epidemiology of HIV. The most plausible reason is the difficulty to reconcile claims about polygyny as a risk factor with the low prevalence rates in countries where polygyny is most common (Figure 1).

Figure 1 about here

Despite the thin layer of evidence, there are several plausible reasons for expecting a positive relationship between polygyny and HIV. First, polygynous households involve multiple partners, each of whom might introduce HIV and expose the other spouses. Second, the concurrency of sexual partnerships in polygynous unions has an independent effect on the spread of the virus (net of the quantum of partnerships): under serial monogamy earlier partners are not at risk of being infected by later partners; in concurrent relationships, the protective effect of the sequence is lost (Morris and Kretzschmar 1997).[1] Third, men in societies where polygyny is practiced tend to marry at a later age, and more often have casual sexual partnerships in early adulthood (Caldwell et al. 1993; Philipson and Posner 1995). Fourth, the institution of polygyny presumably endorses the belief that men require more than one woman for sexual satisfaction (Caldwell et al. 1993). Last, polygynous societies are often characterized by high rates of marital dissolution and the easy remarriage of widows and divorcees. This could lead to an increase in the total number of sexual partners over an individual's lifetime (Halton et al. 2003; Pison 1986; van de Walle 1990). On the other hand, it is sometimes argued that polygyny contains sexual networks because it reduces the incidence of casual or

[1] For epidemics such as HIV/AIDS that have an early peak in infectivity, concurrency of partnerships could be an important independent risk factor in the spread of the virus (Morris and Kretzschmar 1997; Wawer et al. 2005).

extra-marital sex and, therefore, that polygyny reduces the transmission of HIV (Caldwell et al. 1993; Carael, Ali, and Cleland 2001; Mitsunaga et al. 2005).[2]

Some of the associations discussed in the previous paragraph point at polygyny as an individual-level risk factor, others invoke polygyny as a cultural system with implications for the spread of HIV in populations. They move beyond the idea of polygyny status as an individual attribute, and that is an insight that demographers reached several years ago via the study of the relationship between polygyny and fertility (e.g., Ezeh 1997; Pebley and Mbugua 1989; Pison 1986). The analogy with the fertility literature does not stop there. HIV and fertility share several proximate determinants, and we will rely on some of the insights about the relationship between polygyny and fertility for developing hypotheses about its relationship with HIV.

We first present evidence that polygyny and HIV status correlate positively at the individual level and negatively at the aggregate level. Coincidentally, a different individual-level and ecological relationship (albeit reversed) also exists for polygyny and fertility. We subsequently investigate two mechanisms that can help explaining that discrepancy, and label these (1) *adverse selection*, and (2) *coital dilution*.

Adverse selection. In the fertility literature, levels of female subfecundity or infecundity are generally found to be higher in polygynous marriages, either because presumed infecundity is the motivation for adding another spouse, or, because it is a motivation for divorce (Pebley and Mbugua 1989; Timæus and Reynar 1998). In a previous study in rural Malawi, we found that women in their second or third marriage are disproportionately recruited into polygynous unions, and higher marriage order, in turn, is a good predictor of HIV positive status (Reniers and Tfaily 2008). The mixing pattern described above can explain the relative distribution of HIV positive women in monogamous and polygynous unions. However, for adverse selection to account for the lower prevalence at the population level, it should be accompanied by adverse male selection into polygynous unions as well. If both men and women who form polygynous unions have a higher than average likelihood of HIV infection at the time of marriage, polygyny as an institution promotes

[2] The empirical evidence for that is not conclusive. A few studies gathered evidence that men (sometimes also women) in polygynous unions have more extra-marital affairs than their counterparts in monogamous marriages (Carael, Ali, and Cleland 2001; Mitsunaga, Powell, Heard, and Larsen 2005; Reniers and Tfaily 2008). A study in Tanzania suggested that non-marital partnerships are less common in polygynous men, and more frequent among women in polygynous unions (Nnko et al. 2004).

assortative mating on HIV status and that would explain both the positive individual-level relationship as well as the negative aggregate-level relationship. Selection on HIV status of one sex only is likely to increase rather than inhibit the spread of HIV in a population (all other things being equal). The reason is that the concurrency of partnerships in polygynous unions increases HIV transmission rates.

Coital dilution. The hypothesis about a reduction in the coital frequency in polygynous unions is also derived from the literature on polygyny and fertility. Compared to a monogamous husband, a polygynous man divides his time between two or more women, and that is likely to reduce the frequency of sexual intercourse with each of his wives. Just as this is claimed to affect fertility (Musham 1956), it might affect HIV incidence in serodiscordant couples with a polygynous husband.[3] The evidence for a coital dilution effect on fertility is mixed; most likely because the relationship between coital frequency and fertility is not linear (Barrett 1971; Garenne and van de Walle 1989; Pebley and Mbugua 1989). The relationship between coital frequency and HIV transmission has yet to be established, but beyond the first few months following seroconversion when infectivity is disproportionately high, it is likely that the relation of coital frequency to HIV transmission is linear.

2. Data and methods

We use data from all African Demographic and Health Surveys (DHS) and HIV/AIDS Indicator Surveys (AIS) with individually linked survey and HIV serostatus data. At the time of writing these were Burkina Faso (2003), Cameroon (2004), Ethiopia (2005), Ghana (2003), Guinea (2005), Ivory Coast (2005), Kenya (2003), Lesotho (2004), Malawi (2004), Niger (2006), Rwanda (2005), Senegal (2005), Tanzania (2003), and Zimbabwe (2005/6) . Data, survey instruments, and documentation can be retrieved from the Measure DHS website (http://www.measuredhs.com).

The DHS constitute an important resource for studying this topic because they are the largest collection of comparable datasets from African countries with

[3] The coital dilution effect on fertility is usually reported to be stronger for first wives than for wives of higher rank (Lardoux and van de Walle 2003). This is explained in terms of the preferential treatment of the newest wife. We are, however, not aware of a study that investigates whether the preference for the newest spouse persists if the new spouse is, for example, an inherited wife.

individually linked HIV serostatus information. A disadvantage of the DHS and AIS is the lack of detail on marriage and partnerships, and, sometimes, the lack of standardization of questions. The definition of a marriage, for example, includes consensual union in most, but not all instances. Marriage duration for higher order marriages, and the outcome of the prior marriages is only reported in a few surveys. The wife's rank in a polygynous household is missing in a few surveys as well. Because of the cross-sectional nature of the DHS, we are also limited to a current status measure of polygyny. We are, in other words not capable of identifying men and women who have ever been in a polygynous union but were not so at the time of the interview. If polygynous marriage increases exposure to HIV, then this limitation will lead to conservative estimates of the effect of polygyny in individual-level analyses of HIV risk factors. Timaeus and Reynar (1998) provide a discussion of the quality of reporting on the polygyny variables in the DHS.

The empirical part of the paper consists of three parts. First, we analyze the individual-level relationship between polygyny and HIV status. We carry out country-specific analyses as well as analyses in which we pool data from different countries, but stratify by region-specific HIV prevalence. The reason for doing so is the expectation that the role of polygyny will become more explicit in settings where the HIV epidemic penetrated all layers of the population. We present results form conventional logit models whereby HIV status is the outcome of interest, and (survey) cluster-level fixed effects (FE) or conditional logit models. The fixed effects models only exploit within cluster variation, and therefore circumvent potential omitted variable bias. In the second analysis, we change the level of aggregation and carry out Ordinary Least Squares (OLS) regression models of HIV prevalence in each survey cluster on a number of predictors among which the prevalence of polygyny is of greatest interest. We complement that analysis with country level fixed effects models.[4]

In the third set of analyses, we address the mechanisms that may reconcile the findings from the individual and ecological analysis. These test the adverse selection and coital dilution hypotheses. We consider selection based on marriage order, outcome of the previous marriage (for higher order marriages), and, more directly, also selection based on HIV status at the time of marriage. As a measure of coital dilution we compare sexual activity levels of women in monogamous and polygynous unions. We usually present our analyses in terms of conventional logit

[4] [We are considering combining the individual and ecological analysis in a multilevel model].

models as well as survey-cluster fixed effects models. Where possible and appropriate, we present models that are stratified on HIV prevalence by *de facto* region of residence.

3. Results

3.1 Individual and aggregate-level associations between HIV and polygyny

The country-specific analyses of the individual-level relationship between HIV status and polygyny suggest that women in polygynous unions are more likely to be HIV positive than women in monogamous unions (Annex 1, summarized in Figure 2). This observation appears to hold for most countries, but the fixed effects parameter estimates are only significant for Ghana, Rwanda, Kenya, Malawi and Zimbabwe. For men, the pattern is not as clear: the parameter for Zimbabwe is the only one that reaches statistical significance. These estimates are adjusted for age, the type of place of residence, the age at first marriage, and the duration of premarital sexual activity (i.e., the difference between the age at first marriage and the age at first intercourse).[5] The age effect has the expected curvilinear pattern in all countries. Similarly, urban residence increases exposure to HIV in all settings, but its effect is stronger in countries with relatively low prevalence. In accordance with Bongaarts' (2007) ***gregson ?*** observation, a prolonged interval of pre-marital sexual activity increases exposure to HIV. Net of the duration of the pre-marital sexually active interval, delayed marriage reduces exposure to HIV, but it effect is not as important as that of pre-marital sexual activity.

Figure 2 about here

Table 1 about here

The analysis wherein data from all countries are pooled (Table 1) corroborates the pattern described above. It confirms that HIV infection is less

[5] One of the suggested mechanisms through which polygyny might affect the spread of HIV is that polygyny increases the age at marriage for men and thus prolongs the interval of pre-marital sex (cfr. supra). Excluding both from the regression models, however, does not change the parameter estimate for the effect of polygyny (not shown).

exclusively an urban phenomenon in settings with higher HIV prevalence. More important for the discussion in this paper, it indicates that the polygyny effect is positive and more explicit in populations with higher HIV prevalence levels. This is very clear in women, but the pattern for men is similar. The absence of a polygyny effect in low prevalence populations is probably due to the fact that HIV in these populations is largely confined to urban populations, or, higher risk groups of another type.

Contrary to the individual-level association between polygyny and HIV status, the ecological relationship is negative, suggesting that HIV prevalence is lower in clusters where the practice of polygyny is more common (Table 2). Fixed effects models lead to the same conclusions as OLS regressions. The association decreases, but remains significant, after adjusting for the level of male circumcision, the level of urbanization, and characteristics of the population with respect to the age at marriage and age at sexual debut.[6] The effects of all of these covariates all operate in the expected direction. Worth noting also is that the negative effect of polygyny is more explicit in regions with higher HIV prevalence (not shown).

Table 2 about here

These results are intriguing and suggest that some features of polygynous marriage systems curb the spread of HIV while sustaining higher prevalence rates in among women (to a lesser extent in men) who are in a polygynous union. We explore some of the mechanisms that may contribute to this pattern below.

3.2 Mechanisms

3.2.1 Adverse selection

Selection effects may operate through the probability of a marriage (e.g., Reniers 2008), as well the mixing patterns of those who do marry. In Tables 3, 4 and 5, we concentrate on the mixing patterns only. We compare characteristics of women who are recruited into polygynous unions with those who (re)marry a monogamous husband. The first two columns of Table 3, indicate that women at higher marriage

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[6] [In the analysis presented in Table 2, we currently control for the median age at 1st marriage and the median duration between 1st sex and 1st marriage for women only. We intend to include similar controls for men in a future version of the paper + include a control for % muslim]

orders are much more likely to become a spouse of a polygynous as opposed to a monogamous husband. The results in Annex 2 indicate that this observation holds for all countries with available data. When restricting the analysis to women at higher marriage orders, those whose previous marriage ended in widowhood are also more, albeit slightly, likely to marry a polygynous husband. To the extent that marriage order and widowhood correlate with HIV status, these results suggest that women with a higher than average likelihood of being infected are disproportionately recruited into polygynous unions. These results are in line with an analysis for rural Malawi (Reniers and Tfaily 2008), and concur with an earlier insight that polygynous systems are facilitated by the fast remarriage of divorcees and widows (Goldman, Pebley, and Lesthaeghe 1989; Pison 1986).

Table 3 about here

Table 4 about here

While interesting, a more direct comparison of the HIV status at the time of marriage in women that marry a polygynous versus monogamous husband is needed to draw firmer conclusions about the adverse selection hypothesis. HIV status at the time of marriage is, however, unobserved, and the HIV status at the time of the interview is confounded by the transmission between partners during marriage. We use two approaches to circumvent that problem. In the first approach, we restrict the analyses to marriages that were contracted just prior to the survey (two up to five months). [7] The assumption is that HIV infection, if detected, will probably predate the marriage. The rationale for that are the low transmission probabilities per coital act (Wawer et al. 2005), and a window period of at least one month during which HIV infection is not detectable. It should be clear, however, that this approach induces a reverse causality problem if sexual intercourse and infection precede the reported marriage date. The results in Table 4 suggest that women who marry a polygynous husband are more likely to be HIV positive at the time of marriage than women who marry a monogamous husband. While this appears true for all women who marry a polygynous husband, the effect is stronger for wives of higher rank. Because of the smaller sample, the analogue models for men do not converge.

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[7] [In the current version, these analyses are restricted to first marriages. We still intend to include higher order marriages for countries that have incorporated the marriage calendar in the interview process.]

The second approach conditions on marrying an HIV negative spouse. This restriction is introduced to eliminate the possibility that HIV infection measured at the time of the survey is acquired from the current spouse. It does not, however, correct for the possible acquisition of HIV during marriage via other channels (e.g., an extra-marital partner or blood transfusion). On the other hand, this approach leads to conservative estimates of adverse selection into polygynous unions if there is any assortative mating on HIV status. In Table 5, we present the results that are further stratified by region-level HIV prevalence.

Table 5 about here

The top panel in Table 5 compares the odds that polygynous (by rank) and monogamously married women are HIV positive, provided that they are married to an HIV negative husband. It suggests that first wives of polygynous men are about equally likely to be HIV positive than women in a monogamous union. Wives of higher rank, however, are much more likely to be HIV positive, and that indicates that there is adverse selection of HIV positive women into polygynous unions. The difference between women of different ranks may be related to the practice of widow inheritance, or, more generally, that women at higher marriage orders are more likely to become a second or third spouse. Is also seems that adverse selection of women into polygynous unions (at any rank) is more explicit in populations with relatively high HIV prevalence levels, but the pattern is not very clear. The bottom panel of Table 5 compares the odds that polygynous and monogamous men are HIV positive provided that they are married with an HIV negative spouse. These results should be interpreted with caution, however, as a more appropriate approach would be to condition on HIV negative status of all wives, and not just the wife with whom the husband happens to be linked with in the data file. [8] The evidence in support of adverse selection is also weaker for men than it is for women: the parameter estimates for polygyny are smaller and not significant. Adverse selection, if any, however, seems to increase with HIV prevalence in the community.

3.2.2 Coital dilution

Whereas selection contributes to higher HIV prevalence rates among women in polygynous unions (the evidence is less conclusive for men), it is unlikely that it is

[8] [We wish to look into the feasibility of doing that in future versions of the paper].

sufficient to contain HIV prevalence rates at the population level. One of the possible contributing factors that we investigate in this section is a reduction in the frequency of intercourse in polygynous unions. The DHS do not provide a measure of coital frequency, and we use sexual activity as an alternative. Sexual activity is a self-reported measure of having had intercourse (both marital and non-marital) in the month prior to the survey. In Table 6, sexual activity is the outcome, and the type of union the predictor of interest.[9] The analysis is stratified by region-level HIV prevalence (see Annex 3 for country specific analyses). We exclude women from the analysis who are post-partum abstaining. If anything, this restriction will lead to conservative estimates of the effect of polygyny on sexual activity because the practice of polygyny is usually associated with longer durations of post-partum abstinence (Lesthaeghe, Meekers, and Kaufmann 1994).

Table 6 about here

Controlling for age, and compared to women in monogamous unions, the likelihood of being sexually active is up to 40% lower for first wives in a polygynous marriage, and up to 24% lower for women in polygynous unions of higher rank. The stronger reduction in sexual activity for first wives of polygynous husbands concurs with the findings in the fertility literature. This is usually considered the result of the husbands' favoritism for newer wives (Lardoux and van de Walle 2003). The reduction in sexual activity in wives of higher rank is, however, also noticeable. The coital dilution in polygynous unions is possibly an important factor in limiting the spread of HIV.

Reductions in sexual activity (at any rank) are also more pronounced in populations with higher HIV prevalence levels. Disproportionate levels of HIV infection in polygynous unions in populations with higher HIV prevalence, is possibly linked with levels of morbidity, and, therefore, the frequency of intercourse. Conscious behavioral decisions to reduce exposure to HIV may contribute to this pattern as well. If levirate marriage is practiced, for example, AIDS widows will account for a greater share of wives of higher rank in populations where HIV is more widespread. The reduction of sexual activity in polygynous unions, therefore, may

[9] Sexual activity levels possibly vary with marital duration. Because marriage duration is unknown for higher order marriages, it is not included as a control in the analyses. Marriage duration, however, can be both an outcome and a predictor of sexual activity level.

reflect a behavioral response to the awareness that widow inheritance implies a risk of transmitting HIV.

6. Discussion

We began with the observation that HIV prevalence rates tend to be higher among women (and men) in polygynous unions compared to those who are in monogamous marriages. That far, our findings concur with a popular belief that polygyny and HIV are somehow positively associated, and should be advocated against. However, our analyses, however, demonstrate that that conclusion is premature and deserves qualification in several respects.

First, the correlation between HIV and polygyny status is only clear in populations with relatively high HIV prevalence; probably because HIV infection in low prevalence areas is concentrated in urban areas and high-risk groups and has not breached the sexual networks in rural areas where polygyny is more common. Second, we find a negative ecological correlation, and that suggests that the relationship between polygyny and HIV requires a more refined explanation.

If genuine, the ecological relationship implies that some features of polygynous marriage systems account for the lower HIV prevalence rates in populations that are characterized by relatively high polygyny rates. We investigated two mechanisms that, in conjunction, contribute to that explanation. The first is adverse selection of HIV positive women into polygynous unions. Particularly women of higher rank are more likely to be HIV positive at the time of marriage than first wives of polygynous husbands and women who marry a monogamous spouse. Selection alone could account for both the individual and aggregate level correlations if selection on HIV status takes place for both sexes. Such a mixing pattern induces assortative mating on HIV status and will have an important inhibiting effect on the spread of HIV. However, we only identified strong adverse selection into polygynous unions of women and not of men. Admittedly, the data did not allow us to scrutinize male selection to the same extent as female selection, but if it were important, the cross sectional association is likely to have been more explicit than what we observed. The second mechanism, namely the coital dilution in conjugal units of polygynous households, is thus an important complement to adverse selection in explaining the negative ecological correlation between polygyny and HIV prevalence. In sum, polygynous households absorb a disproportionate share of

HIV positive women (perhaps men), and because the coital frequency in polygynous conjugal units is lower than in monogamous unions, the transmission of the HIV virus is decelerated in populations where polygyny is practiced.

Depending on the population, a significant share of women of higher rank in polygynous households may be acquired through the practice of levirate marriage, or, more generally, widow inheritance. Widow inheritance, just as polygyny, is sometimes considered an entrenched cultural practice that facilitates the spread of HIV (Nyindo 2005; Okeyo and Allen 1994; UNAIDS 2006b). Again, our results imply that statement of that nature require qualification. Whereas, the re-entry into the marriage or partnerships market implies a non-negligible risk of transmitting HIV, widow inheritance as a cultural practice is not necessarily responsible for accelerating the spread of HIV in a population. An important function of widow inheritance is to provide a social security safety net for surviving spouses (Palmore 1987). Women, in these populations, are embedded in the lineage of their husband and their livelihood is independent of their husband's survival. Because the remarriage with the former husband's relative is not necessarily founded on an emotional bond, this will also have implications for the frequency of sexual intercourse. In the absence of widow inheritance (and adult male children), a widow needs to seek an alliance with another man (or men) to secure her and possibly her children's livelihoods, and that process may induce even higher transmission rates. Some authors argue that the sexual cleansing rituals that are often associated with the practice of widow inheritance induce an increased risk of transmitting HIV, but there is evidence that these practices are changing, and do necessarily imply penetrative sex (Luke 2002; Malungo 2001).

We have not exhausted all possible mechanisms through which the practice of polygyny may affect the transmission of HIV. These may include the longer periods of post-partum abstinence among women in polygynous unions (Pebley and Mbugua 1989), and the rapid (perhaps also more frequent) remarriage following marriage dissolution in populations where polygyny is common (Pison 1986). Features of polygynous nuptial systems that we only address via control variables are the age at first marriage and the duration of pre-marital sexual activity. The pattern that we describe, however, exists net of these effects. Similarly, we have only indirectly addressed possible difference in the practice of extra-marital sex in monogamous and polygynous unions. A few studies have suggested that extra-marital sex is more common in polygynous unions (see footnote 2). These leaks in the system imply a greater variety in (concurrent) sexually partners, and may promote the spread of HIV. The overall sexual activity levels, however, appear to be lower among women in polygynous unions and these reports account for both marital and extra-marital sex.

Distilling policy implications from these results is not straightforward, and may depend on the overarching moral principles that informs those decisions (e.g., whether or not the public good takes precedent of the individual right). Whatever the position one may take on this issue, this study suggests that polygyny, and other traditional cultural practices such as widow inheritance have attracted much misdirected blame for the spread of HIV in some parts of Africa.

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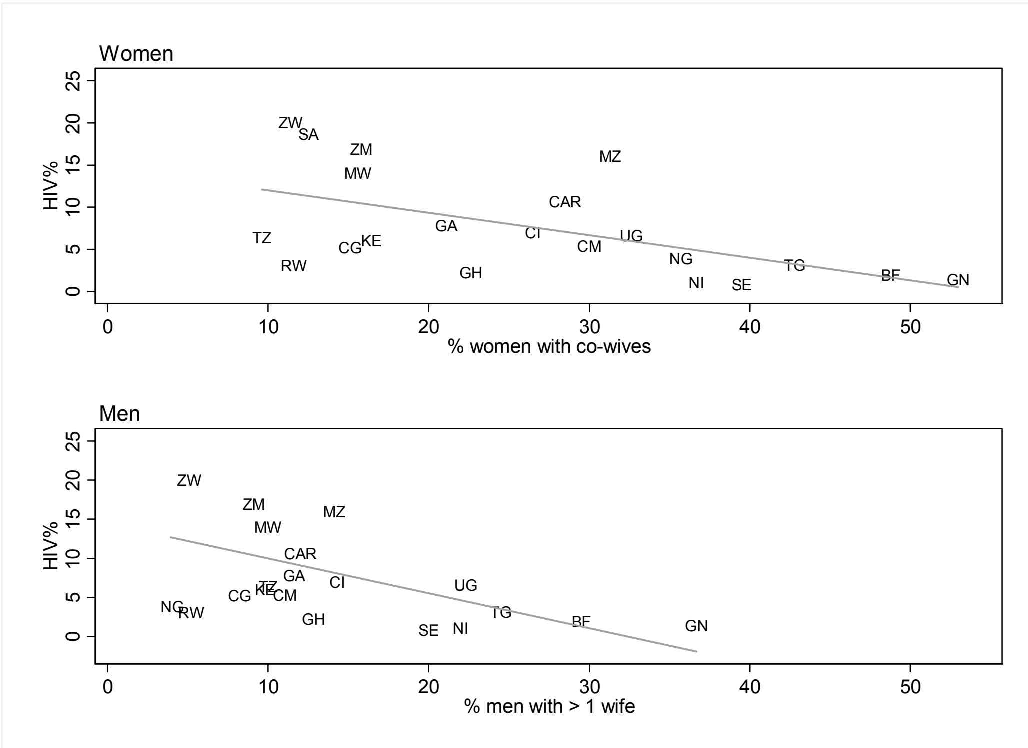
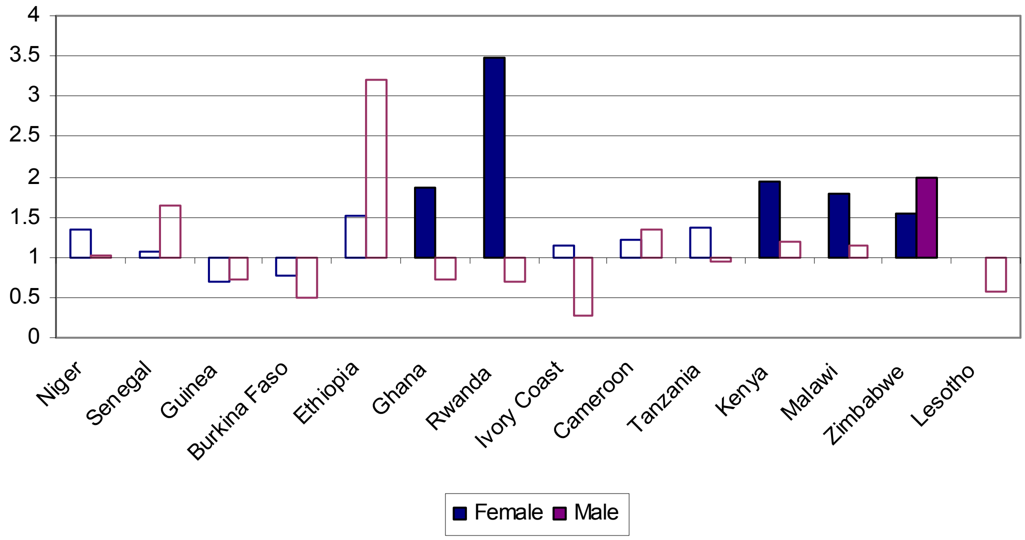
Figure 1: Prevalence of HIV (age 15-49, both sexes) and polygyny (by sex), Sub-Saharan Africa



Sources: UNAIDS (2006a) and DHS surveys (http://www.measuredhs.com). Countries included: Burkina Faso (BF), Cameroon (CM), Central African Republic (CAR), Congo (CG), Ivory Coast (CI), Gabon (GA), Ghana (GH), Guinea (GN), Kenya (KE), Malawi (Nnko et al.), Mozambique (MZ), Niger (NI), Nigeria (NG), Rwanda (Wawer et al.), Senegal (SE), South Africa (SA), Togo (TG), Uganda (UG), Tanzania (Morris and Kretzschmar), Zambia (ZM), Zimbabwe (ZW).

Figure 2: Individual-level relationship between polygyny and HIV status (odds ratios)



Notes: Survey cluster-level fixed effects estimates of odd ratios for polygyny from the analyses in Annex 1. Odds ratios are adjusted for age, age at first marriage, and the interval between age at first marriage and age at first sex. The parameter estimates for the solid bars are significant at the 5% level. The others are insignificant. Countries are organized along the X-axis from low to high HIV prevalence. The polygyny question in the Lesotho DHS was only asked for men.

Table 1: Individual-level predictors of HIV status by sex and regional HIV prevalence (odds ratios).

	Women					
	HIV < 2.5%		HIV: 2.5-5%		HIV > 5%	
	Logit[a]	FE[b]	Logit[a]	FE[b]	Logit[a]	FE[b]
Polygynous	0.919	1.087	1.557***	1.606***	1.292***	1.472***
	(0.47)	(0.37)	(2.83)	(2.66)	(3.59)	(4.65)
Age	1.455***	1.421***	1.170**	1.219***	1.362***	1.396***
	(4.95)	(4.27)	(2.39)	(2.75)	(11.55)	(11.12)
AgeSQ	0.994***	0.995***	0.998**	0.997***	0.995***	0.995***
	(4.97)	(4.27)	(2.38)	(2.75)	(11.66)	(11.18)
Urban	4.357***		2.213***		1.495***	
	(8.59)		(5.44)		(6.14)	
Age 1st Mar	0.975	0.995	0.972	0.984	0.971***	0.978*
	(0.86)	(0.16)	(1.18)	(0.64)	(2.79)	(1.83)
Interval 1st Mar – 1st sex	1.023	1.000	1.093***	1.079***	1.102***	1.078***
	(0.49)	(0.00)	(3.55)	(2.60)	(8.25)	(5.57)
Observations	16555	1431	7406	1860	14818	8410
LL	-933.92	-349.78	-1094.42	-485.09	-5037.29	-2728.21
df	14.00	5.00	14.00	5.00	14.00	5.00

	Men					
	HIV < 2.5%		HIV: 2.5-5%		HIV > 5%	
	Logit[a]	FE[b]	Logit[a]	FE[b]	Logit[a]	FE[b]
Polygynous	0.851	0.787	1.242	1.368	1.021	1.321*
	(0.76)	(1.00)	(0.91)	(1.09)	(0.15)	(1.67)
Age	1.213***	1.135*	1.478***	1.472***	1.422***	1.423***
	(2.91)	(1.76)	(4.92)	(4.55)	(10.46)	(8.96)
AgeSQ	0.998***	0.999	0.995***	0.995***	0.995***	0.995***
	(2.71)	(1.45)	(4.99)	(4.61)	(10.18)	(8.70)
Urban	2.373***		1.765***		1.318***	
	(5.54)		(3.20)		(3.19)	
Age 1st Mar	1.011	1.010	0.965*	0.950*	0.955***	0.958***
	(0.58)	(0.46)	(1.79)	(1.91)	(3.90)	(2.98)
Interval 1st Mar – 1st sex	1.041**	1.033*	1.046**	1.060**	1.051***	1.054***
	(2.43)	(1.69)	(2.56)	(2.35)	(4.93)	(4.21)
Observations	13580	1129	4007	958	6079	3453
LL	-1019.81	-321.43	-748.09	-282.81	-2760.20	-1249.87
df	14.00	5.00	11.00	5.00	12.00	5.00

Notes:
Robust z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%
[a] Logit models include a control for country (not shown).
[b] Survey cluster-level fixed effects model. Because the survey clusters are homogeneous on the type of place of residence, its effect is omitted because of the lack of within-group variance.

Table 2: Aggregate level predictors of HIV prevalence

	Men				Women			
	OLS		Fixed effects		OLS		Fixed effects	
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
% polygynous	-0.076**	-0.045***	-0.018***	-0.014**	-0.103**	-0.040**	-0.036***	-0.014*
	(2.41)	(3.10)	(3.28)	(2.25)	(2.33)	(2.82)	(5.00)	(1.80)
% circumcised		-0.088***		-0.021***		-0.117**		-0.009
		(3.03)		(2.68)		(2.51)		(0.95)
% Urban		0.029**		0.023***		0.046***		0.028***
		(2.50)		(6.39)		(3.68)		(7.67)
Median age 1st Mar (women)		0.002		0.000		0.007***		0.006***
		(1.31)		(0.38)		(3.64)		(6.49)
Interval median age 1st Mar – median age 1st sex (women)		0.008**		0.003***		0.016***		0.010***
		(2.33)		(2.80)		(3.97)		(7.52)
Constant	0.057***	0.205***	0.050***	0.103***	0.087**	0.291***	0.072***	0.129***
	(3.24)	(3.51)	(35.61)	(6.64)	(2.99)	(3.49)	(34.36)	(7.31)
Observations	5514	4701	5514	4701	5170	4424	5170	4424
R-squared	0.02	0.14	0.30	0.32	0.04	0.24	0.39	0.43
LL	5324.76	4834.96	6260.80	5385.21	4654.86	4494.34	5823.69	5107.36
df	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00

Notes:
SE's of OLS regressions are adjusted for clustering on country. Robust t statistics in parentheses. Weights, inversely proportional to the variance of each observation are used in the regressions. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Predictors of marrying a polygynous husband (women, odds ratios)

	Marriage Order[c]		Widowhood[b c]	
	Logit[a]	FE	Logit[a]	FE
Urban	0.550***		0.915	
	(16.06)		(0.86)	
>1st Marriage	2.167***	2.529***		
	(29.04)	(37.46)		
Widow			1.285**	1.273*
			(2.36)	(1.79)
Observations	83634	71410	2477	1668
LL	-43931.64	-32059.32	-1637.04	-696.57
df	14.00	1.00	4.00	1.00

Notes:
Robust z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%
[a] Logit models include a statistical control for country (effects not shown).
[b] Analysis is based on data for Ivory Coast, Niger, and Zimbabwe; the only countries that included a question about the outcome of the previous marriage in the survey.
[C] Age is not included as a control variable because the age at marriage for higher order marriages is not known.

Table 4: Individual-level HIV risk factors conditional on marriage duration (women, 1st marriage, odds ratios)

	<2months		<3 months		<4 months		<5 months	
	Logit[a]	FE[b]	Logit[a]	FE[b]	Logit[a]	FE[b]	Logit[a]	FE[b]
Polygynous (1st wife)	1.935	1.838*	2.031	1.951	2.751	2.651**	2.392	2.351
	(0.42)	(1.73)	(0.55)	(0.90)	(1.01)	(2.16)	(0.91)	(1.01)
Polygynous (>1st wife)	3.798	3.641***	2.979	2.895**	3.389	3.246**	3.482**	3.375***
	(1.28)	(3.28)	(1.35)	(2.21)	(1.54)	(2.47)	(2.21)	(3.81)
Age	4.110	3.525	8.652	7.810	1.955	1.949	0.960	0.985
	(0.96)	(0.75)	(1.63)	(1.53)	(1.46)	(1.23)	(0.11)	(0.04)
AgeSQ	0.975	0.978	0.958	0.960	0.990	0.990	1.005	1.004
	(0.80)	(0.63)	(1.55)	(1.47)	(1.11)	(0.96)	(0.59)	(0.51)
Urban	0.342	0.374	0.412	0.433	0.520	0.528	0.887	0.884
	(1.44)	(1.44)	(1.22)	(1.57)	(1.16)	(1.08)	(0.29)	(0.30)
Observations	109	91	206	173	305	259	417	362
LL	-27.92	-22.42	-39.33	-32.44	-58.50	-51.06	-93.01	-83.37
df	9.00	4.00	11.00	5.00	11.00	5.00	12.00	5.00

Notes:
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
[a] Logit models include a statistical control for country (effects not shown).
[b] Survey cluster-level fixed effects model. Because the survey clusters are homogeneous on the type of place of residence, its effect is omitted because of the lack of within-group variance.

Table 5: Individual-level HIV risk factors conditional on having an HIV negative spouse, by sex and regional HIV prevalence (odds ratios)

	women					
	HIV < 2.5%		HIV: 2.5-5%		HIV > 5%	
	Logit[a]	FE[b]	Logit[a]	FE[b]	Logit[a]	FE[b]
Polygynous (1st wife)	0.671	0.661	0.943	0.845	1.142	1.457
	(0.95)	(0.91)	(0.14)	(0.34)	(0.65)	(1.40)
Polygynous (>1st wife)	2.127**	1.787	2.615**	3.694**	2.041***	2.513***
	(2.41)	(1.37)	(2.07)	(2.14)	(3.39)	(3.17)
Age	1.284*	1.282*	1.200*	1.167	1.292***	1.309***
	(1.84)	(1.79)	(1.74)	(1.26)	(4.44)	(3.98)
AgeSQ	0.996*	0.996*	0.997*	0.997	0.996***	0.996***
	(1.78)	(1.68)	(1.77)	(1.32)	(4.53)	(4.09)
Urban	4.950***		1.859**		1.523***	
	(6.47)		(2.41)		(3.26)	
Observations	11924	460	4319	439	5795	1356
LL	-430.32	-121.36	-399.42	-125.53	-1211.26	-409.48
Df	14.00	4.00	15.00	4.00	14.00	4.00

	Men					
	HIV < 2.5%		HIV: 2.5-5%		HIV > 5%	
	Logit[a]	FE[b]	Logit[a]	FE[b]	Logit[a]	FE[b]
Polygynous	0.737	0.748	0.690	0.620	1.273	1.388
	(1.02)	(0.81)	(1.02)	(1.12)	(1.39)	(1.42)
Age	0.998	0.999	0.997**	0.998	0.997***	0.997***
	(1.14)	(0.45)	(2.02)	(1.11)	(4.02)	(3.37)
AgeSQ	1.161	1.079	1.281**	1.206	1.252***	1.264***
	(1.23)	(0.58)	(2.22)	(1.45)	(4.26)	(3.72)
Urban	1.965**		2.047***		1.539***	
	(2.28)		(2.83)		(3.41)	
Observations	11000	497	5016	514	6374	1500
LL	-474.39	-139.33	-496.32	-149.14	-1473.36	-482.27
Df	12.00	3.00	13.00	3.00	14.00	3.00

Notes:
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
[a] Logit models include a statistical control for country (effects not shown).
[b] Survey cluster-level fixed effects model. Because the survey clusters are homogeneous on the type of place of residence, its effect is omitted because of the lack of within-group variance.

Table 6: Predictors of sexual activity in the month prior to the survey by HIV prevalence level (odds ratios, women[a])

	HIV < 2.5%		HIV: 2.5-5%		HIV > 5%	
	Logit[b]	FE[c]	Logit[b]	FE[c]	Logit[b]	FE[c]
Polygynous (1st wife)[d]	0.866***	0.820***	0.720***	0.707***	0.601***	0.629***
	(3.13)	(4.53)	(3.29)	(3.70)	(6.20)	(5.80)
Polygynous (> 1st wife)[d]	0.927*	0.932*	0.800***	0.841**	0.756***	0.812***
	(1.85)	(1.84)	(2.85)	(2.17)	(3.52)	(3.19)
Age	1.121***	1.133***	1.095***	1.130***	1.073***	1.080***
	(9.12)	(10.71)	(3.72)	(4.89)	(3.24)	(3.92)
AgeSQ	0.998***	0.998***	0.998***	0.998***	0.999***	0.999***
	(9.89)	(11.41)	(4.47)	(5.62)	(4.14)	(4.74)
Urban	1.095*		0.842**		1.322***	
	(1.87)		(2.28)		(4.09)	
Observations	29748	27709	10047	8587	17004	14819
LL	-16342.64	-12248.70	-4803.53	-3509.45	-7793.01	-5474.39
df	12.00	4.00	11.00	4.00	10.00	4.00

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Notes:
[a] The sample is restricted to women who are not postpartum abstaining, Ivory Coast, Kenya, Tanzania and Lesotho are not included in the analysis (see Annex 3).
[b] Logit models include a statistical control for country (effects not shown).
[c] Survey cluster-level fixed effects model. Because the survey clusters are homogeneous on the type of place of residence, its effect is omitted because of the lack of within-group variance.
[d] The difference in the parameter estimate for women of first rank in polygynous unions between regions with lowest and highest HIV prevalence (fixed effects models) has a z-score of $z=(b_1-b_2)/\text{sqrt}(\text{se}(b_1)^{\wedge 2} + \text{se}(b_2)^{\wedge 2})=2.91$, and is significant at the 1% level. The z-score for the parameter estimates for wives of higher rank is 1.81, and significant the 10% level.

Annex 1a: Individual-level relationship between polygyny and HIV status, by country (Women, odds ratios)

	Niger		Senegal		Guinea		Burkina Faso		Ethiopia		Ghana		Rwanda	
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE
Polygynous	0.747	1.336	1.030	1.072	0.683	0.706	0.606	0.772	1.450	1.527	1.219	1.867**	2.072**	3.483***
	(0.54)	(0.43)	(0.07)	(0.15)	(1.01)	(0.81)	(1.36)	(0.70)	(0.62)	(0.71)	(0.69)	(2.05)	(2.52)	(3.44)
Age	2.512***	1.928**	1.270*	1.261	1.086	1.209	1.763***	1.797***	1.291	1.312*	1.314*	1.354*	1.055	1.199
	(3.11)	(2.24)	(1.66)	(1.44)	(0.49)	(1.18)	(3.53)	(2.94)	(1.43)	(1.88)	(1.89)	(1.91)	(0.35)	(1.23)
AgeSQ	0.986***	0.990**	0.996*	0.996	0.999	0.997	0.991***	0.991***	0.996	0.995**	0.996*	0.995**	0.999	0.997
	(3.19)	(2.07)	(1.74)	(1.47)	(0.44)	(1.20)	(3.58)	(2.79)	(1.56)	(1.99)	(1.90)	(1.96)	(0.38)	(1.22)
Urban	5.374***		1.025		4.737***		3.563***		13.903***		1.418		4.024***	
	(3.62)		(0.06)		(4.48)		(3.35)		(6.87)		(1.47)		(5.86)	
Age 1st Mar	0.799**	0.846*	0.966	0.969	0.948	0.931	0.930	0.926	0.959	0.988	0.927	0.992	1.019	1.049
	(2.09)	(1.84)	(0.44)	(0.41)	(0.70)	(0.68)	(1.37)	(1.11)	(0.88)	(0.29)	(1.59)	(0.15)	(0.44)	(1.22)
1st Mar - 1st Int	1.305	1.665**	1.080	1.053	1.110	1.067	1.069	1.097	1.054	1.015	1.116**	1.033	1.062	1.080
	(1.33)	(2.56)	(0.96)	(0.96)	(1.25)	(0.61)	(1.04)	(1.02)	(0.37)	(0.19)	(2.43)	(0.59)	(1.52)	(1.44)
Observations	3389	175	2743	231	2749	317	3013	407	3474	320	3170	665	2623	418
LL	-96.18	-36.41	-149.17	-59.31	-197.98	-76.43	-238.26	-96.55	-232.99	-100.82	-426.12	-167.95	-316.15	-123.90
df	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00

	Ivory Coast		Cameroon		Tanzania		Kenya		Malawi		Zimbabwe		Lesotho
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	
Polygynous	1.280	1.152	1.027	1.216	1.534**	1.367	1.858***	1.944**	1.452*	1.791**	1.396**	1.530***	
	(0.87)	(0.67)	(0.13)	(0.87)	(2.29)	(1.40)	(2.62)	(2.31)	(1.88)	(2.56)	(2.48)	(3.30)	
Age	1.495***	1.401***	1.309***	1.326***	1.481***	1.428***	1.263***	1.205*	1.197***	1.288***	1.535***	1.513***	
	(2.99)	(3.54)	(3.11)	(3.18)	(4.76)	(4.69)	(2.68)	(1.71)	(2.65)	(3.19)	(8.65)	(9.28)	
AgeSQ	0.994***	0.995***	0.995***	0.995***	0.994***	0.995***	0.996***	0.996**	0.997**	0.996***	0.993***	0.993***	
	(2.65)	(3.11)	(3.42)	(3.39)	(4.70)	(4.58)	(3.16)	(2.17)	(2.51)	(3.09)	(8.54)	(9.38)	
Urban	1.347		1.871***		2.854***		1.651**		1.957***		1.130		
	(1.05)		(3.33)		(6.56)		(2.06)		(3.15)		(1.19)		
Age 1st Mar	1.017	1.004	0.994	0.968	0.945**	0.932***	0.962	1.044	0.953	0.993	0.982	0.980	
	(0.18)	(0.08)	(0.16)	(0.83)	(2.28)	(2.63)	(1.06)	(0.97)	(1.49)	(0.20)	(1.14)	(1.19)	
1st Mar - 1st Int	1.034	1.031	1.107**	1.089**	1.079***	1.082***	1.158***	1.074*	1.131***	1.057	1.127***	1.108***	
	(0.37)	(0.64)	(2.54)	(2.07)	(2.58)	(2.69)	(4.63)	(1.65)	(3.53)	(1.32)	(5.19)	(4.71)	
Observations	2670	1205	3352	1246	3865	1727	1862	612	1898	831	4090	3547	
LL	-582.23	-280.33	-743.95	-354.76	-905.49	-468.76	-489.67	-188.82	-726.60	-290.00	-1957.37	-1275.81	
df	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	

Notes:
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Annex 1b: Individual-level relationship between polygyny and HIV status, by country (Men, odds ratios)

	Niger		Senegal		Guinea		Burkina Faso		Ethiopia		Ghana		Rwanda	
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE
Polygynous	1.112	1.008	1.177	1.631	0.839	0.722	0.397*	0.501	0.994	3.206	0.754	0.724	0.650	0.700
	(0.17)	(0.01)	(0.27)	(0.50)	(0.37)	(0.66)	(1.94)	(1.37)	(0.01)	(1.42)	(0.57)	(0.59)	(0.72)	(0.43)
Age	2.194**	1.314	1.652*	1.400	0.963	0.963	1.087	1.039	1.634**	1.183	1.343**	1.119	1.725***	1.815***
	(2.23)	(0.97)	(1.83)	(1.34)	(0.23)	(0.23)	(0.74)	(0.33)	(2.33)	(1.24)	(2.32)	(0.81)	(3.28)	(3.69)
AgeSQ	0.990**	0.997	0.994*	0.996	1.001	1.001	0.999	1.000	0.993**	0.997	0.997**	0.999	0.993***	0.993***
	(2.16)	(0.83)	(1.76)	(1.18)	(0.35)	(0.35)	(0.69)	(0.22)	(2.50)	(1.59)	(2.03)	(0.50)	(3.45)	(3.75)
Urban	3.702**		1.295		2.638**		2.923***		5.705***		1.073		3.211***	
	(2.02)		(0.45)		(2.38)		(2.78)		(3.76)		(0.22)		(4.43)	
Age 1st Mar	1.040	0.993	0.984	0.975	1.012	1.014	0.958	0.959	1.059	1.080	0.984	0.988	0.994	0.973
	(0.50)	(0.10)	(0.23)	(0.37)	(0.23)	(0.25)	(1.19)	(1.15)	(1.34)	(1.34)	(0.39)	(0.26)	(0.21)	(0.81)
1st Mar - 1st Int	1.016	0.995	1.075	0.999	1.001	1.008	0.990	1.090**	1.041	1.004	1.046	1.030	1.072***	1.051*
	(0.23)	(0.07)	(1.15)	(0.01)	(0.02)	(0.16)	(0.27)	(2.04)	(0.67)	(0.07)	(1.21)	(0.79)	(2.78)	(1.73)
Observations	1944	129	1611	69	1752	181	1831	217	2872	251	2293	314	2380	379
LL	-76.15	-37.27	-70.56	-19.97	-130.36	-49.16	-215.13	-66.51	-165.14	-68.12	-262.27	-87.00	-296.73	-108.15
df	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00

	Ivory Coast		Cameroon		Tanzania		Kenya		Malawi		Zimbabwe		Lesotho	
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE
Polygynous	0.293	0.270*	0.835	1.338	1.063	0.942	1.547	1.197	0.734	1.150	1.269	1.998***	1.124	0.564
	(1.45)	(1.77)	(0.55)	(0.80)	(0.22)	(0.23)	(1.19)	(0.42)	(1.04)	(0.44)	(1.08)	(3.11)	(0.34)	(1.16)
Age	1.718**	1.778**	1.555***	1.582***	1.339***	1.391***	1.280**	1.276*	1.463***	1.436***	1.529***	1.497***	1.262***	1.259***
	(2.11)	(2.33)	(5.02)	(4.51)	(2.62)	(2.84)	(2.32)	(1.70)	(3.74)	(3.32)	(7.14)	(6.91)	(3.29)	(2.94)
AgeSQ	0.993*	0.993**	0.994***	0.994***	0.996**	0.996***	0.997**	0.997*	0.995***	0.995***	0.995***	0.995***	0.997***	0.997***
	(1.86)	(2.07)	(4.99)	(4.51)	(2.41)	(2.61)	(2.25)	(1.68)	(3.54)	(3.11)	(6.93)	(6.54)	(3.44)	(3.12)
Urban	1.767		1.796***		2.097***		1.793**		2.345***		1.119		1.139	
	(1.52)		(2.66)		(3.53)		(2.17)		(4.02)		(0.79)		(0.47)	
Age 1st Mar	0.860	0.934	0.977	0.990	0.936*	0.924**	0.933**	0.970	0.947*	0.979	0.945***	0.947***	0.958	0.949
	(1.60)	(0.94)	(0.69)	(0.26)	(1.94)	(2.20)	(2.11)	(0.70)	(1.71)	(0.60)	(3.07)	(2.70)	(1.40)	(1.50)
1st Mar - 1st Int	1.177*	1.092*	1.027	1.020	1.042	1.065**	1.056*	1.023	1.048*	1.029	1.080***	1.071***	1.045	1.061*
	(1.79)	(1.74)	(1.01)	(0.63)	(1.46)	(2.20)	(1.82)	(0.55)	(1.68)	(0.90)	(4.62)	(3.87)	(1.55)	(1.93)
Observations	1775	413	2532	668	2573	1000	1497	316	1550	577	2486	1903	918	536
LL	-251.11	-98.55	-462.91	-187.53	-672.31	-293.85	-374.81	-109.65	-601.50	-205.06	-1278.56	-704.27	-534.91	-192.43
df	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00	6.00	5.00

Notes:
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Annex 2a: Predictors of marrying a polygynous husband, by country (odds ratios)

	Niger		Senegal		Guinea		Burkina Faso		Ethiopia		Ghana		Rwanda	
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE
>1st Marriage	2.263***	2.764***	2.880***	2.872***	1.584***	1.852***	2.161***	2.278***	1.127	2.760***	1.305**	1.883***	3.494***	3.867***
	(10.69)	(14.27)	(15.67)	(16.54)	(6.07)	(8.33)	(9.71)	(10.56)	(1.02)	(9.71)	(2.31)	(5.95)	(11.70)	(11.70)
Urban	1.037		0.534***		0.559***		0.362***		0.430**		0.554***		0.710**	
	(0.36)		(7.64)		(6.63)		(7.09)		(2.55)		(3.69)		(2.49)	
Observations	7355	7131	9968	9934	6195	6184	9485	9379	8551	5233	3673	2919	5414	3717
LL	-4697.25	-3663.89	-6366.02	-5386.00	-4215.98	-3362.00	-6355.76	-4926.60	-3050.93	-1849.05	-1943.11	-1236.24	-1811.86	-1106.48
df	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00

	Ivory Coast		Cameroon		Tanzania		Kenya		Malawi		Zimbabwe	
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE
>1st Marriage	1.503***	1.455***	2.298***	2.315***	2.078***	2.480***	2.832***	2.508***	3.435***	3.660***	1.949***	2.184***
	(2.73)	(3.27)	(12.50)	(12.11)	(5.63)	(6.79)	(7.48)	(6.61)	(17.63)	(18.33)	(4.86)	(6.83)
Urban	0.657**		0.499***		0.573***		0.745***		0.328***		0.550***	
	(2.50)		(7.35)		(2.75)		(2.63)		(6.75)		(5.23)	
Observations	3152	2942	7106	6423	4395	2234	4869	4020	8370	7257	5101	4037
LL	-1897.42	-1350.33	-4182.77	-2955.88	-1373.96	-752.77	-2305.76	-1508.71	-3387.46	-2455.00	-2182.76	-1454.74
df	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00

Notes:
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Annex 3: Predictors of sexual activity in the month prior to the survey, by country (odds ratios, women[a])

	Niger		Senegal		Guinea		Burkina Faso		Ethiopia		Ghana		Rwanda	
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE
Polygynous (any rank) [a]														
Polygynous (1st wife) [a]	1.069	0.933	0.913	0.890	0.812**	0.823*	0.722***	0.691***	0.521***	0.608**	0.643***	0.612***	0.457***	0.334***
	(0.70)	(0.71)	(1.11)	(1.53)	(2.01)	(1.89)	(3.64)	(4.63)	(2.99)	(2.42)	(2.98)	(3.03)	(4.25)	(5.11)
Polygynous (> 1st wife) [a]	1.398***	1.309***	0.892	0.922	0.778***	0.861*	0.759***	0.809***	0.678*	0.578***	0.742**	0.765*	0.623***	0.499***
	(3.53)	(2.96)	(1.54)	(1.21)	(2.68)	(1.65)	(3.96)	(3.08)	(1.92)	(3.00)	(2.55)	(1.95)	(3.09)	(4.34)
Age	1.064**	1.119***	1.141***	1.135***	1.097***	1.076**	1.023	1.055**	1.229***	1.195***	1.151***	1.173***	0.858***	0.883**
	(2.41)	(4.65)	(6.33)	(6.05)	(3.08)	(2.51)	(0.89)	(2.25)	(4.13)	(4.34)	(3.39)	(3.61)	(2.61)	(2.09)
AgeSQ	0.999*	0.998***	0.998***	0.998***	0.998***	0.998***	0.999**	0.999***	0.996***	0.997***	0.998***	0.997***	1.002*	1.001
	(1.75)	(4.01)	(5.52)	(5.12)	(3.95)	(3.47)	(2.07)	(3.69)	(4.83)	(5.06)	(3.76)	(4.02)	(1.82)	(1.30)
Urban	1.492***		1.032		0.821**		1.272**		0.672**		0.773**		0.767**	
	(3.76)		(0.45)		(2.08)		(2.29)		(2.46)		(2.39)		(2.13)	
Observations	6920	6590	8798	8638	4043	3948	6768	6676	3850	2864	2937	2511	5312	3755
LL	-3899.94	-2855.80	-4863.04	-4087.82	-2366.84	-1766.78	-4257.62	-3227.16	-1725.72	-1046.37	-1691.04	-1035.07	-1740.81	-1072.70
df	5.00	4.00	5.00	4.00	5.00	4.00	5.00	4.00	5.00	4.00	5.00	4.00	5.00	4.00

	Ivory Coast		Cameroon		Tanzania		Kenya		Malawi		Zimbabwe		Lesotho
	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	Logit	FE	
Polygynous (any rank) [a]	1.131	0.998			0.772**	0.772**	0.495***	0.582***					
	(0.83)	(0.02)			(2.00)	(2.02)	(6.86)	(5.19)					
Polygynous (1st wife) [a]			0.865	0.712***					0.600***	0.648***	0.559***	0.599***	
			(1.26)	(2.99)					(4.13)	(3.73)	(3.64)	(3.20)	
Polygynous (> 1st wife) [a]			0.839**	0.810**					0.727**	0.808*	0.825	0.874	
			(2.18)	(2.50)					(2.52)	(1.73)	(1.00)	(1.11)	
Age	1.029	1.008	1.169***	1.194***	1.005	1.029	1.140***	1.151***	1.024	1.015	1.074	1.067*	
	(0.62)	(0.26)	(5.29)	(6.03)	(0.13)	(0.84)	(3.48)	(3.69)	(0.75)	(0.47)	(1.58)	(1.76)	
AgeSQ	1.000	1.000	0.997***	0.997***	1.000	1.000	0.998***	0.997***	0.999	1.000	0.999**	0.999**	
	(0.57)	(0.27)	(5.89)	(6.54)	(0.07)	(0.80)	(4.36)	(4.60)	(1.39)	(1.02)	(2.00)	(2.08)	
Urban	0.979		0.685***		1.095		1.404***		1.363*		2.055***		
	(0.16)		(4.39)		(0.87)		(3.05)		(1.86)		(6.03)		
Observations	3154	3106	6041	5664	4395	4136	4500	3914	7263	6185	4867	4284	
LL	-2031.17	-1498.32	-3097.82	-2231.24	-2452.88	-1750.20	-2202.22	-1498.79	-2973.87	-2154.86	-2232.44	-1561.90	
df	4.00	3.00	5.00	4.00	4.00	3.00	4.00	3.00	5.00	4.00	5.00	4.00	

Notes:
Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%
[a] Depending on the availability of data, some models include a polygyny variable that accounts for the wife's rank. For Ivory Coast, Tanzania, and Kenya, information on the wife's rank is not available and a dichotomous indicator variable is used.