Multiple Partners, Marriage and Materialism: The Structural Drivers of HIV across sixteen African Countries

Ashley M. Fox[1§]

[1]Department of Health Evidence and Policy, Mount Sinai School of Medicine, New York, NY

[§]Corresponding author

Email addresses:

AMF: ashley.fox@mountsinai.org

Abstract

Research has identified sexual concurrency as a major underlying driver of high HIV infection levels in sub-Saharan Africa. Whereas some researchers argue that concurrency represents a culturally sanctioned continuation with historical polygamy, ethnographic research supports dynamic economic conditions in explanations for sexual partnering patterns over static cultural explanations. This paper empirically assesses the relationship between economic conditions and sexual concurrency/polygamy among men and women in sub-Saharan Africa using Demographic and Health Surveys from sixteen countries. Wealthier men and women had higher odds of being in an extramarital partnership and living in a wealthier area was associated with a higher odds of being in a concurrent partnership. By contrast, the odds of being in a polygamous union were higher among poorer individuals and in poorer areas. Across multiple African countries, extramarital concurrency is associated with higher wealth and economic development, whereas polygamy is associated with poverty and lower economic development.

Abstract Word Count: 149

Total Word Count: 2,652

Keywords: Concurrency, polygamy, HIV, structural drivers, wealth, economic development

Background

The startling and tragic progression of Africa's HIV "hyper-epidemics" has spurred renewed interest in sexuality research with mounting attention to the role that multiple concurrent sexual partnerships play in the spread of HIV [1-4]. Yet, the role of concurrency in the spread of HIV remains contested with some researchers questioning the sufficiency of the epidemiologic evidence base in support of this risk factor. Detractors of the concurrency thesis allege that the concurrency argument is grounded in "Western preconceptions about African sexuality," which depicts African culture as inherently hyper-sexual, a view shared by some African leaders (Sawers & Stillwaggon, 2010) [5]. As President Mbeki of South Africa said of Western AIDS researchers in 2001, "convinced that we are but natural-born, promiscuous carriers of germs, unique in the world, they proclaim that our continent is doomed to an inevitable mortal end because of our unconquerable devotion to the sin of lust" [6]. Thus, in spite of the large body of evidence that has accrued over the last decade supporting the role of sexual concurrency as an underlying driver of sub-Saharan Africa's hyper-epidemics, skeptics question both the empirical evidence and ideological motivation to support this theory and some have gone so far as to call for "…an end (or at least a moratorium) to research on sexual behaviour in Africa" [5].

Although a good deal of research has examined the relationship between HIV and concurrency, little is understood about why rates of sexual concurrency are high in certain parts of Africa, if indeed they are, nor the underlying drivers of these behavioral patterns. At the core of critics' skepticism towards concurrency has been the theory posed by some researchers that "culture" explains high rates of concurrency stemming from the common practice of polygamy in Africa normalizing concurrent relationships [7]. In this way, to critics concurrency is presented as an

immutable cultural norm that essentializes and stigmatizes African culture, playing into colonial portrayals of Africa as the archetypal "dark continent," home to conflicts, plagues, pestilence and "primitive" lifestyles (the cultural continuity argument) [8]. Others argue that, though concurrency is an underlying factor in the spread of HIV in Africa, the practice of informal concurrency should be understood not as stemming from cultural continuity with the "traditional" practice of polygamy, but rather as deriving from changing economic conditions, which has undermined the foundation of the family in Africa [8-11].

Recent evidence that wealthier rather than poorer individuals are more likely to be infected with HIV stemming, most likely, from wealthier individuals' greater access to multiple sexual partners has further clouded the debate over the causes of concurrency and its role in the spread of HIV in SSA. Concurrency detractors have suggested that non-sexual modes of transmission such as the prevalence of diseases of poverty in Africa that weaken the immune system account for African epidemic trends [12]. This argument has been undermined by the finding across multiple studies based on population data that wealthier individuals are more likely to be infected with HIV [13-20]. On the other hand, researchers found in South Africa that concurrency was not patterned along socioeconomic lines and was prevalent among Africans of all income categories [21]. They argue that the lack of an income gradient in HIV infection in South Africa demonstrates that culture and not structural economic factors drive differences in HIV trends between Africans and other groups [7]. Research that views changing economic conditions as the structural driver of HIV in Africa supports the notion that wealthier individuals may be more likely to have multiple partners. For instance, studies of transactional sex in Africa find that in light of growing consumerism in more developed areas in Africa, women with aspirations

for upward mobility are more likely to engage in sex with multiple partners for consumer goods [8, 22]. A study in Uganda found that economic development and migration patterns have led to increased stigma surrounding polygamy, which has contributed to greater secrecy surrounding extramarital relationships and a pattern of informal secondary households [10]. Likewise, in Nigeria, aspirations for "modern" lifestyles have been found to lead to an increase in monogamous "companionate," marriages, but simultaneously to greater in secrecy surrounding extramarital relationships [11]. This research has largely been qualitative, however, and therefore not generalizable across high and low prevalence settings. In spite of the importance of this question to understanding the role of concurrency in the spread of HIV in Africa, there has been little quantitative research examining the structural drivers of sexual concurrency.

Though polygamy, as a form of concurrency, also likely increases risk for HIV, the relationship between polygamy and HIV has been less well studied and has resulted in contradictory results. Whereas a number of studies have found that individuals in polygamous unions are at increased risk for HIV [23], at the ecologic level, places with more polygamous unions have been found to have lower HIV infection rates [24]. As suggested by the qualitative literature on this subject, one reason for this ecologic paradox may be that polygamous unions are more common in poorer settings, where traditional social mores concerning sex outside of marriage are more strictly enforced. By contrast, in wealthier settings, informal transactional sexual network structures may predominate, with more fluid and overlapping sexual network structures. Thus although both polygamy (henceforth "formal concurrency"-concurrency formalized in marriage) and informal concurrency should theoretically increase risk for individuals in these network structures compared with serial

monogamy, poorer places with more polygamy may have lower overall rates compared with wealthier places with more informal concurrent network structures due to differences in levels of economic development.

An understanding of the structural drivers of concurrency is important for policy and practice in HIV prevention. If concurrency (both formalized in marriage and informal) is driven by cultural norms sanctioning concurrent partnering, social marketing campaigns aimed at educating individuals about the risks associated with this practice may be a sufficient policy response. On the other hand, if economic conditions underlie this practice, education alone may be insufficient if there is a failure to address the economic conditions underlying concurrent partnering patterns.

To that end, this paper aimed to leverage available population data sources to assess the structural drivers of HIV "risk behavior" in SSA. The paper examines the degree to which extramarital concurrency and polygamy form social gradients according to individual wealth and vary in prevalence according to regional wealth. The study hypothesizes that extramarital concurrency should be higher among wealthier individuals and in wealthier regions, whereas polygamy should be higher among poorer individuals and in poorer regions.

Methods

In order to assess the degree to which both concurrency and polygamy are or are not associated with wealth/poverty, the study used Demographic and Health Survey data from 16 African countries with linked HIV biomarkers representing high, medium and low prevalence countries (see **Table 1**).

<<Insert **Table 1** about here>>

Measures and Instrumentation. First, sexual concurrency and polygamy were modelled as dependent variables. Sexual concurrency was measured using extramarital partners as a proxy for concurrency. Although the question was asked of all respondents regardless of marital status, the measure of concurrency was limited to currently married respondents. Male and female respondents were asked the number of partners other than their spouse that they had had sex with in the past twelve months. Using extramarital partners as a proxy for concurrency rests on the assumption that if an individual is married and reports having sex with someone other than his/her spouse, these sexual relationships are overlapping in time. While having the disadvantage of excluding non-married individuals, this measure is a closer proxy for concurrency than the measure typically employed in the Demographic and Health Survey that assesses the number of non-marital sexual partners in the past year regardless of marital status since there is no way to validate that these partnerships are overlapping in time. The question was recoded as a dichotomous variable- whether an individual reported having any extramarital partners in the past year. For regional measures of sexual concurrency, the percentage of individuals reporting an extramarital partnership was calculated and assigned to each region. The same process was undertaken to assess polygamy. Men and women were coded as being in a polygamous union if they reported having more than one wife/cowife and the percent reporting more than one wife/cowife was calculated for each region. Though there is no direct measure of serial concurrency on the DHS, lifetime partners were also assessed for the twelve countries where this question was available to determine whether concurrency had an effect beyond the total number of sexual partners ever reported.

Wealth was measured using the DHS wealth score, the only available measure of economic well-being on DHS surveys. The exact assets that go into the wealth index vary from country to country depending on the presence or absence of various questions, but include at minimum the following: type of flooring (e.g., dirt, cement, parquet), water supply (e.g., surface, communal well, piped), sanitation facilities (e.g., bush, pit latrine, flush toilet), electricity, radio, television, telephone, refrigerator, transportation (e.g., bicycle, motorcycle, car) [25]. To calculate wealth index scores, each variable is recoded as a dichotomous variable and principal components analysis is used to produce standardized scores [25]. Both individual wealth scores and the mean wealth of a region calculated as mean household wealth were utilized in this study.

In the first stage of analysis HIV status was assessed by extramarital partnerships and polygamous unions (individual and ecologic) controlling for wealth, education, the regional prevalence of male circumcision, area of residence (urban, town, country), age, age of sexual debut and self-reported STD (sore) in the past twelve months. The number of lifetime partners (available for 12 countries) was then added to assess whether concurrency had an additional effect beyond the absolute number of partners an individual has been exposed to in his/her lifetime. In the second stage of analysis, the relationship between wealth and formal and informal concurrency was modelled controlling for age (continuous), education, area of residence (urban, town, country) and religion (Muslim, Christian, Other).

To capture the effect of living in a more or less economically developed area, regional measures of wealth were added to the model in addition to the individual level wealth measure. All multivariate models were run as three-level, hierarchical varying intercept and slope models adjusted for clustering at the regional level with

the national level treated as fixed effect. All data analysis was completed using Stata version 11.

Graphing the random slopes and intercepts generated from the multilevel analysis allows visual inspection of the data [26]. Graphs of random slopes and intercepts were drawn to examine the direction of the relationship between wealth and sexual behaviour variables within wealthier and poorer regions. In order to improve the readability of graphs, because of the different scales of the epidemic and wealth across countries, the graphs have been rescaled to maximize the visibility of within country variation.

Results

As **Figures 1 and 2** suggest, wealthier individuals were more likely to be engaged in informal concurrency whereas poorer individuals were more likely to be in a polygamous union. Controlling for age, area of residence and religion, wealthier individuals had a higher odds of being in an extramarital partnership and living in a wealthier region increased the odds of having an extramarital partner beyond the contribution of individual wealth (OR=1.07, $p<0.01$; OR=1.74, $p<0.01$) (**Table 2**). The odds of being in a polygamous union, on the other hand, were lower among wealthier individuals and in wealthier regions (OR=0.94, $p<0.01$; OR=0.72, $p<0.01$) (**Table 2**). Women in polygamous unions were wealthier but not men, though for both men and women, living in a wealthier region decreased the likelihood of being in a polygamous union (**Table 2**).

<< Insert **Figures 1 and 2** about here>>

<< Insert **Table 2** about here>>

Figures 3-4 show the variation at the regional and individual levels in the relationship between wealth and informal and formal concurrency. In wealthier regions, extramarital partnerships were more common and polygamy less common. Likewise, in extramarital partnerships were more common among wealthier individuals in most regions and polygamy less common, though this varied more (see **Figures 3 and 4**).

<< Insert **Figures 3 and 4** about here>>

Discussion

This research examined the structural drivers of concurrency and found support for the notion that greater economic development and individual wealth positively predict informal concurrency and negatively predict formal concurrency. Informal concurrency was more common in developed areas and among wealthier individuals whereas polygamy is more common among poorer individuals and in poorer areas. This finding supports qualitative research on this subject, which has found that economic development, increasing inequality and changing narratives on "modern" family structures has facilitated a transition from patterns of formal polygamy to informal concurrent unions.

This research adds additional nuance to the debate concerning whether concurrency represents continuity with the traditions of polygamy or signifies a break from the past driven by changing economic relations and material circumstances. Bringing to bear a broad set of nationally representative datasets and a consistent measure of concurrency, this study finds support for the heightened risk conferred by formal concurrency in the form of polygamous unions. By demonstrating that

polygamy is presently more common among poorer individuals and in poorer areas, while informal concurrency is more common among the wealthy in wealthier areas, the study finds support for a material explanation for the social patterning of sexual risk behaviours. If cultural belief systems determined sexual behaviour, we would not expect to see such an economic patterning in behaviour. Although one limitation of this paper is that it based on cross-sectional data, what this snapshot in time demonstrates is that where polygamy is currently high, informal concurrency is low and vice versa. This suggests that informal concurrency does not substitute directly for formal concurrency. On the other hand, there is no way to rule out the argument that past polygamy has legitimized present day informal concurrency in a manner different from parts of the world where polygamy has never (or not recently) been socially sanctioned. Future research could overcome the limitation of cross-sectional data examining the longitudinal relationship between different forms of sexual partnership structures and wealth/HIV infection. The addition of evidence from outside sub-Saharan Africa would further allow for relevant comparisons between Africa and other regions.

Conclusions

This analysis offers empirical support for the idea that sexual concurrency is related to processes of economic development and increasing wealth rather than constituting a static cultural byproduct. Sexual concurrency should therefore be understood as a mutable response to changing economic conditions and not a continuation of "traditional" practices. This observed social patterning in concurrency can help to explain why wealthier individuals are more at risk of HIV infection and why wealthier areas have higher HIV prevalence rates. As Chanock explains, "we should ask what narratives are being replaced by the focus on 'culture'.

Post-everythingism has not changed everything. In the post-communist world material explanations have dropped suddenly from social analysis … (p. 32, 2000)."

Constructing concurrency as an underlying social driver of HIV infection poses both challenges and opportunities for HIV prevention in sub-Saharan Africa. On the one hand, the fact that concurrency may not constitute an immutable cultural norm offers the possibility that interventions to reduce HIV do not require Western researchers or policymakers to work to change African cultural norms in ways that might be objectionable or subject to accusations of neo-colonialism. On the other hand, addressing the underlying economic drivers of informal concurrency is complicated and may seem beyond the immediate control of HIV prevention initiatives. In contrast with biomedical prevention strategies such as increasing male circumcision, addressing the structural drivers of HIV requires social change at the highest levels.

Competing interests

None.

Acknowledgements

Support for this research was provided by the Horowitz Foundation for Social Policy, Robert K. Merton Award for Studies in the Relation between Social Theory and Public Policy; the American Psychological Association, Graduate Student Research Awards Program; and the Agency for Healthcare Research and Quality (AHRQ).

References

1. Halperin DT, Epstein H. **Concurrent sexual partnerships help to explain Africa's high HIV prevalence: implications for prevention**. *Lancet* 2004, 364(9428):4-6.
2. Mah TL, Halperin DT. **Concurrent sexual partnerships and the HIV epidemics in Africa: evidence to move forward**. *AIDS Behav* 2010,14(1):25-28.
3. Mah TL, Shelton JD. **Concurrency revisited: increasing and compelling epidemiological evidence**. *JIAS* 2011, 14:33-41.
4. Eaton JW, Hallett TB, Garnett GP. **Concurrent sexual partnerships and primary HIV infection: a critical interaction**. *AIDS Behav* 2011, 15(4):687-92.
5. Sawers L, Stillwaggon E. **Concurrent sexual partnerships do not explain the HIV epidemics in Africa: a systematic review of the evidence**. *JIAS* 2010, 13:34-57.
6. Mail & Guardian (Johannesburg). *Mbeki in Bizarre Aids Outburst*. October 26, 2001.
7. Kenyon C, Zondo S. ***Riding HIV's superhighway***. Nov 20 2009 Mail & Guardian Online. http://www.mg.co.za/article/2009-11-20.
8. Hunter M. *Love in the Time of AIDS: Inequality, Gender, and Rights in South Africa*. Indiana University Press, Bloomington, IN, 2009.
9. Hunter M. **The materiality of everyday sex: thinking beyond "prostitution."** *Afr Stud* 2002, 61: 99-120.
10. Parikh SA. **The political economy of marriage and HIV: the ABC approach, "safe" infidelity, and managing moral risk in Uganda**. *American Journal of Public Health* 2007, 97(7), 1198-1208.
11. Smith DJ. **Modern marriage, men's extramarital sex, and HIV risk in Southeastern Nigeria**. *Am J Public Health* 2007, 97(6), 997-1005.
12. Sawers L, Stillwaggon E. **Understanding the Southern African 'anomaly': poverty, endemic disease and HIV**. *Development and Change* 2010, 41(2), 195–224.
13. Shelton JD, Cassell MM, Adetunji J. **Is poverty or wealth at the root of HIV?** *Lancet* 2005, 366(9491): 157.
14. Lachaud J-P. **HIV prevalence and poverty in Africa: Micro- and macro-econometric evidences applied to Burkina Faso**. *J Health Econ* 2007, 26, 483-504.
15. Mishra VK, Assche SB, Greener R, Vaessen M, Hong R, Ghys PD, et al. (2007a). **HIV infection does not disproportionately affect the poorer in sub-Saharan Africa**. *AIDS* 21(suppl 7): S17–S28.
16. Msisha WM, Kapiga SH, Earls F, Subramanian SV. **Socioeconomic status and HIV seroprevalence in Tanzania: a counterintuitive relationship**. *International Journal of Epidemiology* 2008, 37: 1297–1303.
17. Msisha WM, Kapiga SH, Earls F, Subramanian SV. **Place matters: multilevel investigation of HIV distribution in Tanzania.** *AIDS* 2008, 22,741–748.

18. Forston JG. **The gradient in sub-Saharan Africa: socioeconomic status and HIV/AIDS**. *Demography* 2008, 45(2): 303–322.
19. Fox AM. **The social determinants of serostatus in sub-Saharan Africa: an inverse relationship between poverty and HIV?** *Public Health Rep* 2010, 125(S4): 16-24.
20. Parkhurst JO. **Understanding the correlations between wealth, poverty and human immunodeficiency virus infection in African countries**. *B World Health Org* 2010, 88(7): 519-526.
21. Kenyon C, Zondo S, Motasim B. **Determinants of self-perceived HIV risk in young South Africans engaged in concurrent sexual relationships**. *African Journal of Reproductive Health* 2010, 14(3): 171-182.
22. Leclerc-Madlala S. **Transactional sex and the pursuit of modernity**. *Soc Dynamics* 2004, 29(2), 1-21.
23. Epstein H, Stanton D. **Is polygamy really benign?** *AIDS* 2010, 24(11):1791-1792.
24. Reniers G, Watkins S. **Polygyny and the spread of HIV in sub-Saharan Africa: a case of benign concurrency**. *AIDS* 2010, 24(2):299-307.
25. Rutstein SO, Johnson K. ***The DHS wealth index***. DHS Comparative Reports 2004, 6, Calverton, Maryland: ORC Macro.
26. Gelman, A. & Hill, J. *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press, 2007.
27. Chanock M. 'Culture' and human rights: orientalising, occidentilising and authenticity. In Mamdani, M., ed. *Beyond rights talk and culture talk: comparative essays on the politics of rights and culture*. St Martin's Press: New York, NY: 2000.

Figures and Tables

Table 1 - Country Sample

Country[1]	*% Extra-marital Partner, past yr*	*% polygamous Union*	*HIV Prevalence (C.I.)*	*GNI Per Capita (2007)*[2]	**Mean GDP Growth Rate**[3]
Senegal, 2005	13.4	33.6	0.7 (0.4, 1.0)	1250	4.4
Niger, 2006	3.4	30.5	0.7 (0.5, 0.9)	630	3.4
Ethiopia, 2005	3.4	10.2	1.4 (1.2- 1.6)	780	7.8
Guinea, 2005	21.6	70.5	1.6 (1.2-1.9)	1120	2.8
Mali, 2006	11.1	41.2	1.7 (1.5- 1.9)	1040	5.3
Burkina Faso,	14.1	42.1	1.8 (1.6- 2.2)	1120	2.8
Ghana, 2003	18.0	18.2	2.2 (1.8-2.4)	1320	5.1
Rwanda, 2005	6.3	19.6	3.0 (2.9-3.5)	860	6.3
Ivory Coast,	44.1	8.8	4.7 (4.5- 5.4)	1620	-0.1
Cameroon,	33.7	31.4	5.5 (5.0- 6.0)	2120	3.8
Kenya, 2003	19.9	54.7	6.8 (6.0-6.9)	1550	4.1
Tanzania,	26.1	10.0	7.0 (5.9-7.2)	1200	6.5
Malawi, 2004	12.7	15.0	11.7 (10.7-12.7)	760	3.0
Zimbabwe,	15.3	8.6	18.1 (16.9-19.3)	missing	-5.7
Lesotho, 2004	25.9	5.8	23.2 (21.7-24.5)	1940	3.6
Swaziland,	32.3	15.9	25.9 (25.2-27.1)	4890	3.6

Table 1: Country Sample.
[1]Countries ordered from lowest to highest HIV prevalence. All figures weighted for probability of selection into the sample.
[2]GNI per capita, PPP (current international $), 2007. Zimbabwe's data is missing due to the ongoing political and economic crisis- data from World Bank, World Development Indicators Database.
[3]Average annual GDP growth rate since 2000. Data from World Bank, World Development Indicators Database.
[4]Gini data from Deininger & Squire Measuring Income Inequality Database, most recent year available.

Figure 1 - % reporting at least one extramarital partner in the past year by wealth quintile

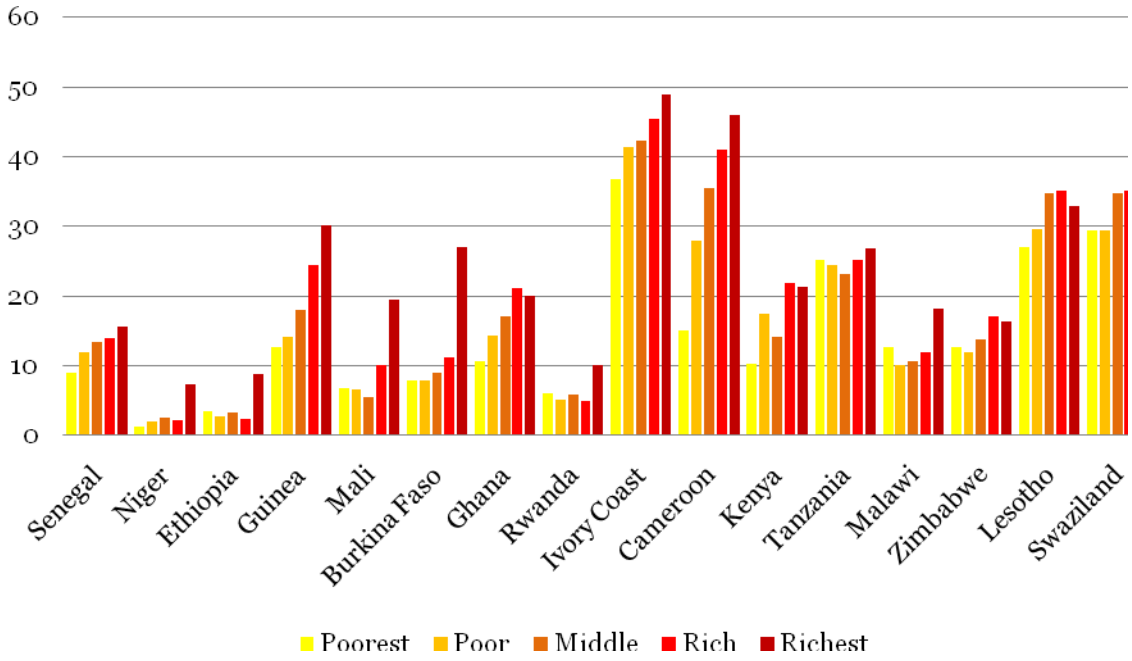


Figure 2 - % in a polygamous union by wealth quintile

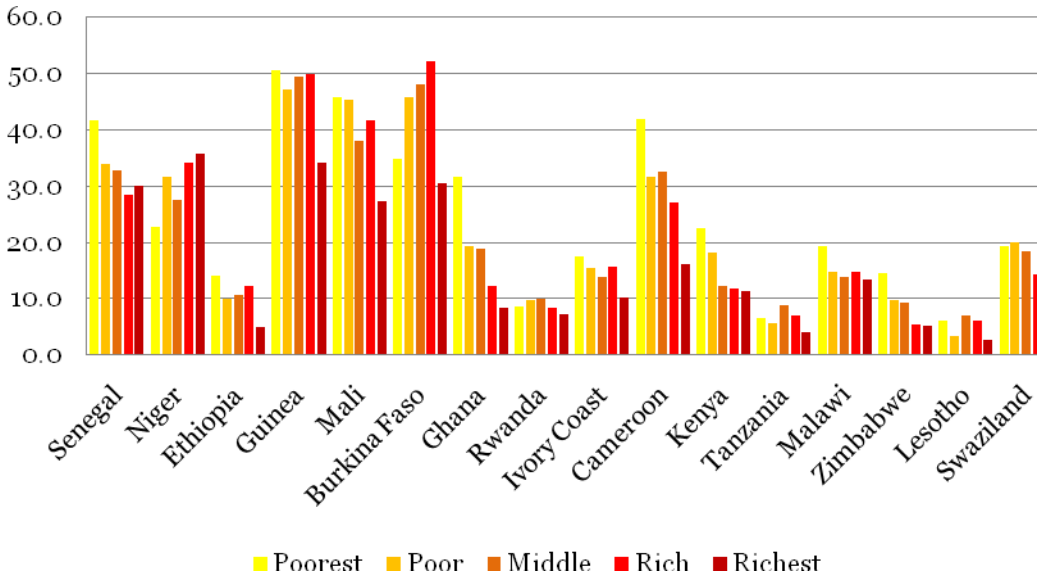
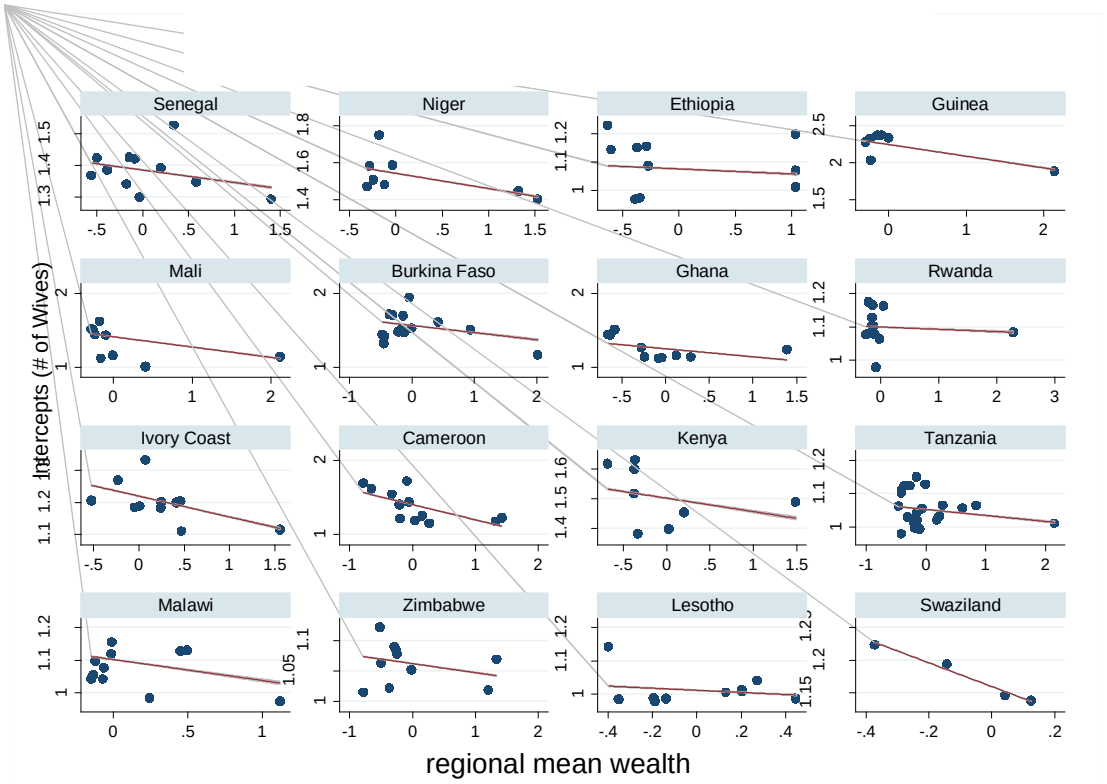


Table 2 - Sexual Concurrency and Polygamous Unions by Wealth

	Extramarital Partners OR(SE)			Polygamous Union OR(SE)		
	Pooled	Male	Female	Pooled	Male	Female
Wealthiest regions	1.74***	1.34*	2.44***	0.72**	0.61***	0.75*
	.350	.311	.660	.115	.155	.123
Poorest Regions	0.74*	0.80	0.78***	1.04*	0.99	1.02
	.145	.167	.209	.141	.181	.138
Individual Wealth	1.07***	1.09***	0.87***	0.94***	0.98	1.03*
	.017	.033	.030	.020	.037	.020
Location						
Country	ref	ref	ref	ref	ref	ref
Town	1.42***	1.26***	1.63***	0.74***	0.68***	0.74***
	.066	.084	.113	.025	.055	.028
Large City	1.11	1.01	1.24*	0.67***	0.73*	0.63***
	.116	.140	.196	.062	.153	.067
Education						
No education	ref	ref	ref	ref	ref	ref
Primary	2.04***	1.72***	1.50***	0.62***	0.91*	0.71***
	.089	.105	.102	.017	.056	.024
Secondary+	3.10***	1.95***	2.29***	0.42***	0.72***	0.54***
	.160	.136	.193	.016	.056	.027
Religion						
Other/None	ref	ref	ref	ref	ref	ref
Muslim	0.54***	0.66***	0.57***	1.27***	1.24**	1.12**
	.033	.055	.057	.057	.124	.059
Christian	0.74***	0.78***	1.20**	0.68***	0.58***	0.53***
	.040	.055	.112	.028	.052	.027
Age	0.97***	0.94***	0.95***	1.04***	1.07***	1.05***
	.001	.002	.002	.001	.002	.001
sd_cons, country	0.93	0.97	1.28	0.64	1.05	0.57
	.184	.201	.254	.126	.223	.115
sd_cons, region	0.62	0.61	.77	0.46	0.50	0.45
	.045	.051	.066	.032	.053	.033

Figure 3 - Extramarital Partners and Wives by Regional Wealth



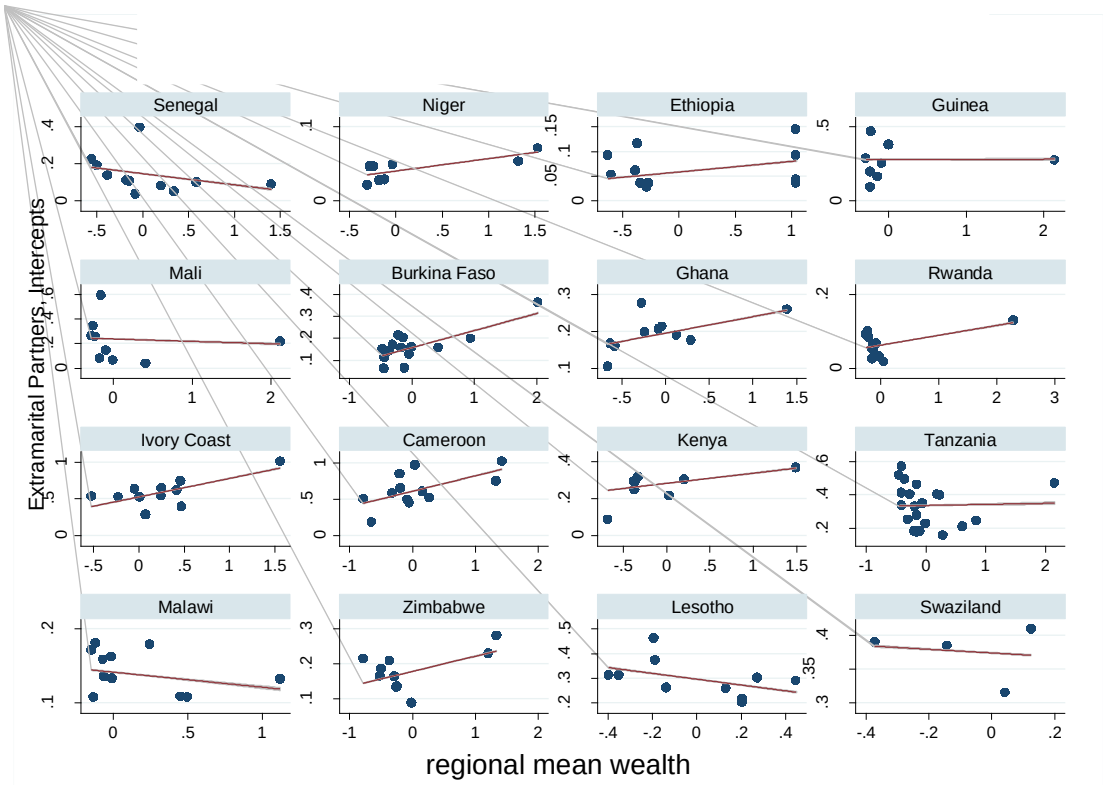


Figure 4 - Extramarital Partners and Wives by Individual Wealth