The Developing Economies, XXXV-3 (September 1997): 293–327

FACTORS ON POLYGAMY IN SUB-SAHARAN AFRICA: FINDINGS BASED ON THE DEMOGRAPHIC AND HEALTH SURVEYS

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I. INTRODUCTION

POLYGAMY in sub-Saharan Africa is not only a type of marriage but also a value system. Its prevalence as a type of marriage has declined substantially in the southern part of the region where the adoptions of plow cultivation and commercial livestock raising, as the basic economic activity, have reduced the importance of the participation of female laborers and hence have reduced the incentive to have multiple wives (Boserup 1970; Kuper 1985; Timaeus and Graham 1989). As a value system, it has been highly resistant to the competition of the imported ideology of monogamy and to the impacts of various structural changes (e.g., the transition from subsistence to a money economy and urbanization). As a reflection of the persistency of this value system, the decline in polygamous unions in the urban areas of sub-Saharan Africa has been accompanied by the growth of various forms of multiple and/or serial informal marriages which involve rather irregular "girl friends" and somewhat regular "outside wives" (Karanja 1994; Mann 1994).

In addition to making the control of sexually transmitted diseases difficult (Caldwell, Caldwell, and Orubuloye 1992), the culture of polygamy also helps maintain a very high fertility level. It has thus contributed to the explosive population growth in sub-Saharan African countries since the 1950s when the transplantation of relatively cheap and effective health and sanitary technologies from developed countries began to substantially reduce the extremely high mortality level. By exposing nearly all women to early and prolonged risks of pregnancy, the polygamy system has helped maintain very high total fertility rates of between six and

The first author would like to express her gratitude for the advice and help of Mr. John Simons, Professor John Cleland, and the staff at the Center for Population Studies, London School of Hygiene and Tropical Medicine, University of London. The second author is grateful to the financial support of the Social Sciences and Humanities Research Council of Canada (Award No. 410-87-0704). We are also thankful to the helpful comments of the three referees.

eight children in most of these countries.[1] Since all monogamous wives in sub-Saharan Africa have the possibility of becoming polygamous wives, and are keenly aware of this possibility (Fapohunda and Todaro 1988), it is not surprising that the fertility levels of both types of wives are similarly high.[2]

As a form of behavior, polygamy has been considered to be morally wrong by Christian missionaries and from the dominant viewpoint of Eurasian societies (Goody 1976). Even some well-educated Christianized African elites in sub-Saharan Africa feel polygamy shameful and label it as "backward" or "bush" behavior, although they found out that the Bible has nothing to say against polygamy and they continued to enjoy the life of multiple sexual partners in the form of outside wives (Karanja 1994).

Despite its appearance to outsiders as a highly undesirable social system, polygamy has been a well-developed, coherent, and even preferred (or at least generally acceptable) way of life for many sub-Saharan Africans since precolonial times (Caldwell, Caldwell, and Quiggin 1989). At the societal level, it has helped the survival of various tribes in a rather unproductive and hostile physical environment. At familial and individual levels, it remains appealing in many respects (Maillu, 1988).

Believing that polygamy is a highly significant aspect of sub-Saharan African societies, this paper uses the micro data of the Demographic and Health Surveys (DHS)[3] to gain some insights into the effects of several socio-demographic factors on the married women's propensities of being in polygamous unions in four sub-Saharan countries: Senegal and Ghana, selected from the region with the highest level of polygamy (West Africa: 30 to over 50%); Kenya from the region with a moderate level (East Africa: 20 to 35%); and Zimbabwe from the region with the lowest level (Southern Africa: less than 20%).[4]

[1] In addition to the marked fertility decline among the blacks of South Africa (TFR = 4.6), there seems to be a general pattern of moderate fertility decline in several sub-Saharan countries in recent years. This pattern is quite different from those observed in the early stage of the European and Asian fertility transitions in the sense that a significant decline has now happened to all reproductive ages (Caldwell, Orubuloye, and Caldwell 1992).

[2] There have been many attempts to find the difference in fertility between polygamous and monogamous women in sub-Saharan countries, with various data and methodologies (e.g., Mulder 1989; Garenne and van de Walle 1989). The overall impression derived from these studies is that the difference is minor and irregular.

[3] Started in the mid-1980s as a follow-up of the World Fertility Surveys, the DHS is a thirteen-year project to assist government and private agencies in developing countries to conduct national sample surveys on population and maternal and child health. Funded primarily by the United States Agency for International Development (USAID), DHS is administered by Macro International Inc., 11785 Beltsville Drive, Suite 300, Calverton, MD 20705, U.S.A. (WWW site: http://www.macroint.com/dhs/). The DHS Data Archive has data sets available for forty-seven countries.

[4] The DHS data indicate that a few East African countries also have relatively low polygamy proportions (Burundi: 11.6%; and Rwanda 14.4%). For more details, see Westoff et al. (1994, p. 19).

The organization of the remaining part of the paper is as follows. We present a brief review of the intrinsic nature of polygamy in the historical and cultural context of sub-Saharan Africa in Section II. The selection of our samples from DHS data and a description of the statistical method are presented in Section III. Our empirical findings on the effects of socio-demographic factors on the propensities of being in polygamous unions are presented in Section IV. The main points of the paper are summarized in Section V.

II. POLYGAMY IN THE HISTORICAL AND CULTURAL CONTEXT OF SUB-SAHARAN AFRICA

Although sub-Saharan Africa has had a long history of contacts with the outside world, a form of rather ancient culture that was based on an economy of high land/man ratio became well-established in sub-Saharan Africa. Due to the high mortality caused by unfavorable climate, deadly diseases, and wars, population density remained very low for many centuries, and the decimation of whole tribes has been of serious concern. Therefore, at the core of this culture are the values and customs that promote reproduction. Sterility is not only undesirable but also evil. In contrast, moral judgments on sexual conduct tend to be relatively mild or largely absent (Caldwell, Caldwell, and Orubuloye 1992).

In this culture, the number of children is maximized by (1) the system of polygamy which is designed to ensure no shortage of potential husbands and to maximize women's chances of pregnancy, and (2) the custom of long female postpartum sexual abstinence that is believed to be able to reduce infant mortality (Caldwell and Caldwell 1987).

The main features of polygamy in this culture are (1) women's very early age at first marriage, which ensures their early exposure to pregnancy, (2) men's very late age at first marriage, which is determined by their family's ability to pay for the marriage and to support a household, and (3) the quick remarriage of separated, divorced, or widowed women, which helps extend their reproductive duration. The payments of the bride-price by the groom's family to the bride's family can be a substantial amount and may be stretched through a long period until or even beyond the birth of the first child (Ueda 1992). The bride-price originally took the form of tangible goods like livestock but has never included land. However it has increasingly been replaced by cash. The remarriage of a widow is usually of the nature of levirate (i.e., to another male of the deceased husband's family, usually one of his younger brothers).

Polygamy in sub-Saharan Africa exists under the cult of ancestry and gerontocracy (Caldwell and Caldwell 1987). Having presumably the ability to communicate with the deceased ancestors who are believed to possess the powers to reward good behavior and to punish bad behavior, the old patriarch of a family has

authority over all of his descendants. This includes the arrangement and timing of their marriages. The main goal of the cult is to have many descendants so that the family line is strengthened, and the deceased ancestors are given the opportunities of rebirth within the family. Polygamy serves as a means to maintain the endless line of births and rebirths and to strengthen the power of the family as well as the status of the old patriarch through the growth in family size and the expansion of conjugal linkages to other clans.

Polygamy, in a large part of sub-Saharan Africa, has long coexisted with a primitive system of agriculture in which women do most of the farmwork (Boserup 1970). Typically, when a man gets a new wife, he clears a field for her, and later her children, to cultivate. Men are motivated to have two or more wives and many children, because their wives and children serve as a form of cheap labor and as a means to expand their ownership of farmland cleared from communally owned land (Boserup 1985). Since, in addition to farming, there are many domestic chores to do (e.g., fetching water and firewood, cleaning, cooking, and nursing), a woman may even encourage her husband to take in a co-wife to share her heavy workload. Since, the first wife is usually vested with the authority to assign and distribute domestic chores to her co-wives, the existence of co-wives also helps enhance her status.[5]

Having little property right and being treated essentially as a form of property to be exchanged for material goods between families, women in the polygamy system of sub-Saharan countries have much lower status than men and are especially vulnerable when they become spouseless or childless (Boserup 1970). Without the right to inherit the property of her husband, a wife in this system is motivated to maintain high fertility, hoping that at least one of the surviving children is a son on whose inherited field she can continue farming after her husband's death. Her greatest fear is the inability to bear children, which is not only a valid reason for her husband to divorce her but also a cause for her community to make her an outcast.

From the perspective of individuals, polygamy in sub-Saharan Africa tends to be a rather unstable marriage system, because the obsession with the lineage weakens the conjugal bond. Many women experience divorces and remarriages through their life courses.[6] Since the bride price is basically given in exchange for the labor and reproductive capacity of the bride, a divorce is accompanied by the return of the bride price to the husband's family. In a patrilineal system, the repayment can be partial, if the wife has given birth to a son who will remain in the husband's

[5] Jealousy between co-wives is likely to be a problem that threatens the harmony in a polygamous family (Wilson 1962). It is reduced by such means as (1) the establishment of a separate hut for each wife and her children, and (2) the choice of a co-wife who is a sister of the existing wife.

[6] Before the colonial era, divorces were initiated by husbands, usually on the ground that their wives were infecund or unable to bear enough sons. After the colonial administrators permitted females to initiate divorce, it became quite common for a woman to get a divorce in order to marry a man with greater wealth or higher status.

family. The repayment is the responsibility of the woman's own family or her new husband's family.

At any moment in time, a high proportion of adult males in polygamous sub-Saharan countries are single (Caldwell, Caldwell, and Orubuloye 1992).[7] Because of the near balance in sex composition at birth and the large gap between husband's and wife's ages at marriage (about ten years), the polygamy system always has a large surplus of spouseless young adult males. Traditionally the sexual needs of these single adults are satisfied mainly by the wives of the male relatives within the family (e.g., the wives of their brothers and uncles and their father's younger wives).[8] Discreet sexual relationship with pre-marital girls is in general tolerated, as long as it does not result in pregnancy. Separated or divorced women who are not yet remarried, as well as prostitutes, are additional alternatives. In addition to the single males, many married males, especially those in monogamous unions, also look for female sexual partners, mainly because of the long (traditionally about two years) postpartum female sexual abstinence (Caldwell, Orubuloye, and Caldwell 1991). Thus, pre-marital, extra-marital, and inter-marital sexual relationships, involving multiple and overlapping partners, are an integral part of the polygamy system in sub-Saharan Africa.[9]

The culture of polygamy in sub-Saharan Africa remained relatively undisturbed until the major expansion of the European colonial powers in the late nineteenth century. Together with the Christian missionaries, the colonial administrators attempted to replace polygamy by monogamy through changing marriage regulations and giving preferential treatments to monogamous men (Ngondo a Pitshandenge 1994). Through their schools, they transmitted the Western ideal of the nuclear family based on a strong conjugal bond. By commercializing the economy, they created income opportunities to young adults and hence weakened the parental authority. The urbanization process further physically removed many young adults from the social constraints of their family compounds. The cumulative effects of such changes on polygamy varied substantially among and within sub-Saharan countries. The prevalence of polygamy among married women has

[7] In their study of the Ekiti population in Nigeria, Caldwell, Caldwell, and Orubuloye (1992) estimated that "around 42 per cent of males over 17 years old were, at any given time, single." (p. 390)

[8] Although such sexual relationships may appear to be incestuous to outsiders, they are morally acceptable in sub-Saharan societies, because a marriage is arranged by and for the groom's and bride's families. The bride price is paid by the groom's family for the use of the bride's family. It is understood implicitly that the bride has the obligation to satisfy the sexual needs of both her husband and some other males of the affine family.

[9] In sub-Saharan Africa, an adultery that is indiscreet or results in pregnancy is taken as an offense on the woman's husband and his family. The penalty usually involves the beating of the female and a fine on the male. When the female happens to be the wife of a person with high status such as a chief, the penalty can be as severe as death. However, since the fear of being known as impotent is much greater than the anger over the wife's adultery, the husband may choose to be complacent or even secretly invite a trusted young man to satisfy his wife's sexual needs.

fallen to less than 20% in Zambia and areas further south, but remains at over 40% in most West African countries (Lesthaeghe, Kaufmann, and Meekers 1989; Clark et al. 1995). In some villages, the recruitment of young adult males for mines, plantations, and urban industries has resulted in a prolonged shortage of males in the 20–35 age group and the further lengthening of the difference in marriage age between the two sexes (Boserup 1970). The relatively large rural-to-urban net migration of males has resulted in a large surplus of unmarried males in urban areas where a different economic reality forces the polygamy system to mutate into various irregular forms of sexual relationships and living arrangements (Locoh 1994).

The independence of sub-Saharan countries since the early 1960s was accompanied, to some extent, by the reassertion of the values of the native culture. The rapidly expanding local African churches in West Africa have largely removed from Christianity the Western value judgement on marriages (Caldwell, Orubuloye, and Caldwell 1991). Many well-educated and wealthy men are not ashamed of enjoying the advantages of having several wives. It has also become rather common for Christianized monogamous men to have one or more "outside wives" or "girl friends," provided that they are wealthy enough to afford the luxury. Actually, many sub-Saharan African men in urban areas consider the possession of outside wives as a reflection of high status and achievement (Karanja 1994). So the spirit of polygamy still remains very strong.

It is useful to obtain further insight into the evolving living arrangements of sexually related individuals in sub-Saharan African countries. These arrangements, largely rooted in the culture of polygamy, may have important implications on the care for children and elderly parents, the sense of belonging and identity, the status of women, the diffusion of sexually transmitted diseases, fertility levels, and other socioeconomic problems. In the remaining part of this paper, we will attempt to gain some insights into the factors on married women's propensities of being in polygamous unions, based on the micro data of the DHS.

III. THE DHS DATA AND THE STATISTICAL METHOD

The micro data used in this paper are from the DHS (phase 1) conducted in the late 1980s on women aged 15 to 49 in the four chosen countries (Senegal: 1986, Ghana: 1988, Kenya: 1989, and Zimbabwe: 1988/89).[10] Since the survey questionnaires are not completely standardized, we use somewhat different variables to distinguish the status of monogamy and polygamy in different countries: the variable "wife rank number" (V506) for Zimbabwe, and the variable "number of other wives" (V505) for the other three countries.

[10] A similar analysis for Uganda is also reported in Hayase (1995). We will not include the analysis of Uganda in this paper partly because of space limitations and partly because the names of the coded ethnic groups are unavailable.

The selection of potentially useful socio-demographic factors to explain the polygamous tendencies is based on our preference for having them "predetermined" (i.e., not affected by whether the women became polygamous or monogamous). Therefore, factors such as the current age, the age at first marriage, and the ethnicity of women were selected. Since the levels of educational attainment of women and their husbands, as well as women's religion are most likely to remain unchanged after marriage, these factors have also been selected. Although the urban/rural place of residence may have changed after marriage, we also selected this as one of the explanatory factors, because it has been widely mentioned in previous research reports (Garenne and van de Walle 1989; Maillu 1988). However, we have to be careful in interpreting the estimated coefficient of this factor.

Although it is highly desirable to have a household's income and wealth included in the set of explanatory factors, the DHS does not collect data on such economic attributes. The survey does yield information on a husband's occupation at the time of survey. For Kenya and Zimbabwe, we have broadened our multifactor model by including this factor and found that it did not have a statistically significant effect on polygamy in the context of our chosen factors. Consequently, our analysis focuses on the effects of socio-demographic factors. In interpreting our findings, we will assume that educational attainment is positively correlated with income and wealth.

With respect to the selection of observations, we first restrict our samples to currently married women, including those in the "married" and "living together" categories. This restriction results in nearly the same proportions of women in polygamy as those reported for Senegal, Ghana, and Kenya in Westoff et al. (1994).[11] We further delete from our samples the observations with (1) missing values for our chosen variables and (2) foreign nationalities. For Zimbabwe, since very few non-blacks are found in the micro data, we have restricted our sample to black women only.

The multivariate statistical model for explaining the propensity of being in a polygamous union is the following binomial logit model:

$$p(i) = \exp[b_0 + b'x(i)] \,/\, \{1 + \exp[b_0 + b'x(i)]\}, \qquad (1)$$

where $p(i)$ is the probability that the ith woman is in a polygamous union; $x(i)$ is a column-vector containing the variables representing the attributes of the ith woman; b′ is a row-vector of unknown coefficients; and b_0 is another unknown coefficient.

The unknown coefficients in the model are estimated by the maximum likelihood method (Ben-Akiva and Lerman 1985). That is, they are estimated by maxi-

[11] The information on polygamy for Zimbabwe is not shown in Westoff et al. (1994), probably because they did not realize that the variable "wife rank number" could be used to distinguish polygamy from monogamy.

mizing the log likelihood function:

$$L[b_0,\ b'] = \sum_{i=1}^{N} \{Y(i) \cdot \ln[p(i)] + [1 - Y(i)] \cdot \ln[1 - p(i)]\}, \qquad (2)$$

where $Y(i)$ is a dummy variable assuming the value of 1 if the ith woman turns out to be in polygamous union; and N is the sample size.

Whether an estimated coefficient is significantly different from zero or not, is to be judged by the magnitude of the corresponding t-ratio (i.e., the estimated coefficient divided by its asymptotic standard error). Since our sample size is quite large, the t-ratio can be treated as the standard normal variate so that a t-ratio with a magnitude of about 2.0 can be considered as an indication of a statistically significant relationship.

The overall goodness-of-fit of a model in question is to be measured by:

$$\text{Rho-square}(q) = 1 - L_q/L_0, \qquad (3)$$

where L_q is the maximum log likelihood of the model in question, and L_0 is the maximum log likelihood of the null model (i.e., the model with b' set to zero). Alternatively, the goodness-of-fit of the model in question can be measured by a chi-square statistic:

$$\text{Chi-square}(q) = -2 \cdot (L_0 - L_q) \qquad (4)$$

with the degrees of freedom being the number of variables in $x(i)$.

An explanatory factor may be represented by several dummy variables in $x(i)$. For example, the factor representing a husband's level of education has four categories (no education, primary, secondary, and higher) and can be represented by three dummy variables in $x(i)$. The t-ratios associated with these dummy variables are to some extent arbitrary, because they depend on the arbitrary choice of the reference category. When none of the women in a given category chose polygamy, the estimated coefficient of the dummy variable representing this category will be negative infinity and the corresponding t-ratio is undefined. Due to such reasons, we choose to assess the relative importance of an explanatory factor in a multifactor context by deleting it from the general model (i.e., the model containing all available explanatory factors) and observing the resulting decrease in explanatory power. A convenient measure of the decrease in explanatory power due to the deletion of factor j is:

$$\text{Decrease in rho-square from the general model} = \text{rho-square}(g) - \text{rho-square}(j), \qquad (5)$$

where the first term is the rho-square of the general model, and the second term is the rho-square of the model resulting from deleting factor j from the general model.

The greater the decrease, the more important the deleted factor. An alternative measure is the *P*-value computed from:

$$\text{Decrease in chi-square from the general model} = \text{chi-square}(g) - \text{chi-square}(j), \quad (6)$$

where the first term is the chi-square of the general model; the second term is the chi-square of the reduced model after factor *j* is deleted; and the number of the degrees of freedom equals the number of dummy variables representing factor *j*. The *P*-value is the probability that the chi-square variate can assume a value greater than the value computed from equation (6). The smaller the *P*-value, the more important the deleted factor. The *P*-value is theoretically better than the decrease in rho-square, because the former does not have the latter's tendency of being somewhat inflated by the number of dummy variables used to represent the distinctions in an explanatory factor. However, to serve as a sharp tool for comparing the relative importance of different explanatory factors in our study, the *P*-value has to be written in a scientific format, which makes the reading rather unpleasant. For the sake of readability, we will rely on the decreases in rho-square, keeping in mind the risk of making an erroneous interpretation when their values do not differ much and the two factors under comparison are represented by different numbers of dummy variables. The *P*-values will, however, be listed with the decreases in rho-square in all of the tables of our multifactor analysis: they prevent us from making such an error.

IV. ESTIMATION RESULTS

The sizes of our samples range between 2,000 to 5,000 married women: 2,850 Senegalese, 2,676 Ghanaians, 4,563 Kenyans, and 2,393 black Zimbabweans. From these samples, we found that the proportions of polygamy among women were 48% for Senegal, 31% for Ghana, 23% for Kenya, and 16% for Zimbabwe. Although our statistical analysis is focused on the variations within each of these countries, it is useful to point out some of the explanations for the differences among them.

Some of these differences are probably due to the different modes of production in the rural economy. The extensive involvement of rural women in the hoe cultivation of root crops and in trading at local markets in West African countries like Senegal and Ghana, enhances the importance of female labor and hence provides a stronger incentive for males to form polygamous unions. However, in plow cultivation and livestock-raising, widely practiced in the Southern African countries like Zimbabwe, the importance of rural female labor is lowered and is a factor in making multiple wives an economic burden for potentially polygamous husbands (Boserup 1970; Moyo 1995).

The population compositions by women's education and religion and their husbands' education computed from our sample (Tables I.A through I.D) suggest that a large part of these differences are due to different levels of modernization and Westernization among the four countries. In the highly polygamous Senegal, 87% of the women and 88% of their husbands had no education and 97% of the women were Muslims. By contrast, in the least polygamous Zimbabwe, only 17% of the women and 12% of their husbands had no education and 65% of the women were Christians. While they were located in the region of West Africa which had a high incidence of polygamy, Ghanaian women were quite different from Senegalese women: the former were less polygamous, better educated, and more in the Christian category than the latter.

To gain a concrete and comprehensive impression of the effects of different explanatory factors in each country, we will first present the category-specific proportions of polygamy for each factor and indicate whether certain contrasts in these proportions are statistically significant in single-factor logit models, using the information in Tables I.A through I.D. We will then assess the relative importance of the explanatory factors in a multifactor context by using the information in Tables II.A through II.D.

A. *Single-factor Analysis*

1. *Effects of women's formal education*

Rooted in the tradition of missionary schools, the formal education systems of most African countries introduce to children and young adults not only scientific knowledge but also Western values, including the preference for monogamy and the recognition of women as individual human beings rather than family properties. We may thus hypothesize that women with better education are less likely to be in polygamous unions.

The observed proportions of polygamy computed for four levels of education (no education, primary, secondary, and higher) in all four countries generally support this hypothesis. From no education to secondary, the proportions drop monotonically from 50% to 30% in Senegal, from 38% to 19% in Ghana, from 34% to 11% in Kenya, and from 29% to 8% in Zimbabwe. These drops of about 20 percentage points are all highly significant in single-factor logit models (i.e., they are associated with highly negative *t*-ratios). For example, the drop for Senegal is represented by an estimated coefficient of −0.88, which is associated with a highly negative *t*-ratio of −4.0. Note that a way to interpret the estimated coefficient is to transform it into an odds ratio as shown in the note of Table I.A.

Except for Ghana, where the proportions of polygamy remain at 19%, the polygamous tendency is reduced further with an increase in a woman's education from secondary to a higher level. For Kenyan and Zimbabwean women with higher education, the proportion of polygamy is reduced to zero. The corresponding figure

TABLE I.A

THE OBSERVED PROPORTIONS OF POLYGAMY AMONG SENEGALESE WOMEN BY SOCIO-DEMOGRAPHIC FACTORS AND THEIR RELATIVE EXPLANATORY POWERS IN SINGLE-FACTOR LOGIT MODEL

Socio-Demographic Factor	Observed Proportions of Polygamy (%)	At-Risk Population		Explanatory Power in Single-Factor Logit Model			
		Size (Persons)	Composition (%)	Coefficient	*T*-Ratio	Odds Ratio	Rho-Square
Women's education				(0.01)	(0.2)		0.0083
No education	50.2	2,492	87.4	—	—	—	
Primary	39.3	244	8.6	–0.44	–3.2	0.64	
Secondary	29.5	105	3.7	–0.88	–4.0	0.42	
Higher	11.1	9	0.3	–2.09	–2.0	0.12	
Husbands' education				(0.04)	(1.0)		0.0157
No education	51.0	2,497	87.6	—	—	—	
Primary	35.9	142	5.0	–0.62	–3.5	0.54	
Secondary	25.2	155	5.4	–1.13	–6.0	0.32	
Higher	26.8	56	2.0	–1.05	–3.4	0.35	
Religion				(–1.15)	(–4.4)		0.0052
Christian	24.1	79	2.8	—	—	—	
Muslim	49.1	2,764	97.0	1.11	4.2	3.05	
Other	42.9	7	0.2	0.86	1.1	2.37	
Residence				(0.01)	(0.2)		0.0024
Rural	50.2	2,037	71.5	—	—	—	
Urban	43.8	813	28.5	–0.26	–3.1	0.77	
Ethnicity				(0.08)	(1.4)		0.0065
Wolof	52.1	1,170	41.1	—	—	—	
Poular	45.9	776	27.2	–0.25	–2.7	0.78	
Serer	39.8	427	15.0	–0.50	–4.3	0.61	
Mandingue	48.1	156	5.5	–0.16	–0.9	0.85	
Diola	47.2	123	4.3	–0.20	–1.0	0.82	
Other	56.1	198	6.9	0.16	1.0	1.18	
Current age				(–0.51)	(–8.4)		0.0513
15–19	28.9	305	10.7	–0.40	–2.8	0.67	
20–29	37.6	1,162	40.8	—	—	—	
30–39	61.5	925	32.5	0.98	10.7	2.65	
40–49	62.2	458	16.1	1.01	8.8	2.73	
Age at first marriage				(–0.40)	(–3.3)		0.0031
10–14	50.7	609	21.4	0.43	3.0	1.53	
15–19	49.1	1,897	66.6	0.36	2.8	1.43	
20–24	40.2	291	10.2	—	—	—	
25–29	38.3	47	1.6	–0.08	–0.2	0.92	
30–37	66.7	6	0.2	1.09	1.2	2.97	
Total	48.4	2,850	100.0				

Source: Based on the 1986 DHS data.

Note: The values in parentheses are for the constant terms of the single-factor logit models. Since the specific value of a coefficient cannot be interpreted directly, it is changed by an exponential transformation into an odds ratio. This shows the change in the odds of being in polygamy due to a change from the reference category to the category in question. For example, the odds ratio of the secondary category of women's education is 0.42, which means that the change from no education (the reference category) to secondary education (the category in question) is expected to reduce the odds of being in polygamy by a factor of 0.42.

TABLE I.B

THE OBSERVED PROPORTIONS OF POLYGAMY AMONG GHANAIAN WOMEN BY SOCIO-DEMOGRAPHIC FACTORS AND THEIR RELATIVE EXPLANATORY POWERS IN SINGLE-FACTOR LOGIT MODEL

Socio-Demographic Factor	Observed Proportions of Polygamy (%)	At-Risk Population		Explanatory Power in Single-Factor Logit Model			
		Size (Persons)	Composition (%)	Coefficient	*T*-Ratio	Odds Ratio	Rho-Square
Women's education				(–0.50)	(–8.1)		0.0131
No education	37.8	1,131	42.3	—	—	—	
Primary	27.5	1,380	51.6	–0.47	–5.4	0.63	
Secondary	18.8	144	5.4	–0.97	–4.3	0.38	
Higher	19.0	21	0.8	–0.95	–1.7	0.39	
Husbands' education				(–0.27)	(–3.6)		0.0223
No education	43.4	758	28.3	—	—	—	
Primary	27.8	1,395	52.1	–0.69	–7.3	0.50	
Secondary	23.7	392	14.6	–0.90	–6.5	0.41	
Higher	21.4	131	4.9	–1.04	–4.6	0.35	
Religion				(–1.02)	(–19.5)		0.0251
Christian	26.5	1,892	70.7	—	—	—	
Muslim	45.7	208	7.8	0.84	5.7	2.33	
Traditional	51.1	229	8.6	1.06	7.5	2.89	
Other	62.5	8	0.3	1.53	2.1	4.61	
No religion	35.1	339	12.7	0.40	3.2	1.50	
Residence				(–0.72)	(–14.6)		0.0018
Rural	32.8	1,862	69.6	—	—	—	
Urban	28.0	814	30.4	–0.22	–2.4	0.80	
Ethnicity				(–1.03)	(–14.5)		0.0143
Twi	26.3	1,023	38.2	—	—	—	
Fante	25.9	332	12.4	–0.02	–0.1	0.98	
Other Akan	27.8	133	5.0	0.08	0.4	1.08	
Ga-Adangbe	30.2	242	9.0	0.19	1.2	1.21	
Ewe	37.7	459	17.2	0.53	4.4	1.70	
Guan	36.6	71	2.7	0.48	1.9	1.62	
Mole-Dagbani	41.8	416	15.5	0.70	5.7	2.02	
Current age				(–1.05)	(–15.5)		0.0214
15–19	11.9	143	5.3	–0.96	–3.6	0.38	
20–29	26.0	1,142	42.7	—	—	—	
30–39	37.0	887	33.1	0.51	5.3	1.67	
40–49	38.9	504	18.8	0.59	5.2	1.81	
Age at first marriage				(–0.88)	(–9.4)		0.0016
8–14	29.6	338	12.6	0.02	0.1	1.02	
15–19	32.1	1,678	62.7	0.14	1.3	1.15	
20–24	29.2	544	20.3	—	—	—	
25–29	31.7	101	3.8	0.12	0.5	1.12	
30–41	53.3	15	0.6	1.02	1.9	2.77	
Total	31.3	2,676	100.0				

Source: Based on the 1988 DHS data.

TABLE I.C

THE OBSERVED PROPORTIONS OF POLYGAMY AMONG KENYAN WOMEN BY SOCIO-DEMOGRAPHIC FACTORS AND THEIR RELATIVE EXPLANATORY POWERS IN SINGLE-FACTOR LOGIT MODEL

Socio-Demographic Factor	Observed Proportions of Polygamy (%)	At-Risk Population		Explanatory Power in Single-Factor Logit Model			
		Size (Persons)	Composition (%)	Coefficient	*T*-Ratio	Odds Ratio	Rho-Square
Women's education				(–0.67)	(–11.6)		0.0374
No education	33.9	1,352	29.6	—	—	—	
Primary	20.4	2,319	50.8	–0.69	–8.9	0.50	
Secondary	11.1	873	19.1	–1.41	–11.6	0.24	
Higher	0.0	90	2.0	–infinity	undefined	0.00	
Husbands' education				(–0.49)	(–6.2)		0.0305
No education	38.1	685	15.0	—	—	—	
Primary	23.4	2,262	49.6	–0.70	–7.5	0.50	
Secondary	15.0	1,530	33.5	–1.25	–11.8	0.29	
Higher	10.5	86	1.9	–1.66	–4.6	0.19	
Religion				(–1.32)	(–34.4)		0.0127
Christian	21.1	4,095	89.7	—	—	—	
Muslim	28.9	194	4.3	0.42	2.6	1.52	
Other	23.3	73	1.6	0.13	0.5	1.14	
No religion	45.8	201	4.4	1.15	7.8	3.16	
Residence				(–1.15)	(–28.9)		0.0044
Rural	24.1	3,468	76.0	—	—	—	
Urban	17.5	1,095	24.0	–0.40	–4.5	0.67	
Ethnicity				(–2.33)	(–20.6)		0.0483
Kikuyu	8.9	966	21.2	—	—	—	
Kalenjin/Kamba/ Meru/Embu	18.1	1,064	23.3	0.82	5.9	2.26	
Kisii/Luhya/Other	25.4	1,388	30.4	1.25	9.7	3.49	
Luo	32.6	817	17.9	1.60	11.8	4.94	
Mijikenda/Swahili	39.4	338	7.4	1.89	11.9	6.64	
Current age				(–1.55)	(–26.0)		0.0183
15–19	13.9	280	6.1	–0.27	–1.5	0.77	
20–29	17.8	1,937	42.5	—	—	—	
30–39	25.6	1,494	32.7	0.49	5.8	1.63	
40–49	31.7	852	18.7	0.79	8.3	2.19	
Age at first marriage				(–1.35)	(–27.8)		0.0127
5–14	31.4	778	17.1	0.57	6.2	1.77	
15–19	20.6	2,589	56.7	—	—	—	
20–24	19.1	995	21.8	–0.09	–1.0	0.91	
25–29	27.0	167	3.7	0.36	2.0	1.43	
30–38	52.9	34	0.7	1.47	4.2	4.35	
Total	22.6	4,563	100.0				

Source: Based on the 1989 DHS data.

TABLE I.D

THE OBSERVED PROPORTIONS OF POLYGAMY AMONG BLACK ZIMBABWEAN WOMEN BY SOCIO-DEMOGRAPHIC FACTORS AND THEIR RELATIVE EXPLANATORY POWERS IN SINGLE-FACTOR LOGIT MODELS

Socio-Demographic Factor	Observed Proportions of Polygamy (%)	At-Risk Population		Explanatory Power in Single-Factor Logit Model			
		Size (Persons)	Composition (%)	Coefficient	*T*-Ratio	Odds Ratio	Rho-Square
Women's education				(–0.89)	(–8.2)		0.0390
No education	29.1	412	17.2	—	—	—	
Primary	14.7	1,495	62.5	–0.87	–6.6	0.42	
Secondary	7.7	469	19.6	–1.60	–7.8	0.20	
Higher	0.0	17	0.7	–infinity	undefined	0.00	
Husbands' education				(–2.24)	(–17.7)		0.0132
No education	27.9	290	12.1	1.30	7.1	3.66	
Primary	16.2	1,350	56.4	0.60	4.1	1.83	
Secondary	9.6	720	30.1	—	—	—	
Higher	21.2	33	1.4	0.93	2.1	2.54	
Religion				(–1.91)	(–25.2)		0.0249
Christian	12.8	1,549	64.7	—	—	—	
Traditional	22.6	252	10.5	0.68	4.1	1.98	
Spiritual	19.9	482	20.1	0.52	3.8	1.69	
Other	20.3	74	3.1	0.54	1.8	1.72	
No religion	25.0	36	1.5	0.82	2.1	2.26	
Residence				(–1.49)	(–23.8)		0.0160
Rural	18.3	1,702	71.1	—	—	—	
Urban	9.3	691	28.9	–0.79	–5.4	0.45	
Current age				(–1.97)	(–20.1)		0.0194
15–19	11.2	161	6.7	–0.10	–0.4	0.90	
20–29	12.2	974	40.7	—	—	—	
30–39	15.5	825	34.5	0.28	2.0	1.32	
40–49	25.6	433	18.1	0.91	6.2	2.48	
Age at first marriage				(–1.79)	(23.6)		0.0149
8–14	24.9	281	11.7	0.69	4.4	1.99	
15–19	14.3	1,420	59.3	—	—	—	
20–24	13.4	590	24.7	–0.08	–0.5	0.93	
25–29	17.1	76	3.2	0.21	0.7	1.24	
30–36	42.3	26	1.1	1.48	3.7	4.40	
Total	15.7	2,393	100.0				

Source: Based on the 1988/1989 DHS data.

for Senegalese women with higher education is 11%. Although the number of women with higher education in each country is mostly too small (less than 2%) to permit formal statistical inferences, the consistent pattern among three of the four countries suggests strongly that the transition from secondary to higher education results in a substantial further decrease in the tendency for polygamy.

2. *Effects of men's formal education*

Since a man with more formal education is in general subject to be more greatly influenced by Western values and hence is more willing to be monogamous, we may hypothesize that a woman's propensity of being in a polygamous union is a decreasing function of her husband's level of education. However, the perceived advantages of polygamy (e.g., greater kinship network, more descendants, and the sense of achievement) can counter the imported values against polygamy. Furthermore, the males with higher education are more likely to be rich enough to pay for an additional bride and the cost of maintaining a larger family. We may thus further hypothesize that unlike the effect of women's education, an increase in their husbands' education from secondary to a higher level may result in very little reduction or even some increase in the tendency for polygamy.

For the women in the West African countries of Senegal and Ghana, the observed polygamy proportions decline rather sharply and significantly with an increase in their husbands' education from no education to secondary education (from 51% and 43% to 25% and 24%, respectively), but then stay at about the same level at higher education. For the women in the East African country of Kenya, their husbands' education shows a significant monotonic negative effect: 38% for no education, 23% for primary education, 15% for secondary education, and 11% for those who have had higher education. For the women in the Southern African country of Zimbabwe, the observed proportion of polygamy decreases sharply and significantly with an increase in their husbands' education up to secondary level: 28% for no education, 16% for primary education, and 10% for secondary education. The proportion of polygamy, however, jumps to 21% at the higher level of education. The associated *t*-ratio of 2.1 indicates that this jump is statistically significant.

In short, we found that an increase in education up to secondary level for either females or males, tended to reduce the females' propensities of being in polygamous unions. Except for Kenya, the effects of a further increase in education diverged so that, an increase for females continued to show a strong negative effect, whereas an increase for males had no practical effect (Senegal and Ghana) or even a positive effect (Zimbabwe) on their polygamous tendencies.

3. *Effects of religion*

The four sub-Saharan countries under study are dominated by one of two world

religions: Senegal (97%) by Islam, and Ghana (71%), Kenya (90%), and Zimbabwe (65%) by Christianity. Except for some minor sects like the Mormon church, Christian authorities prohibit or discourage polygamy, whereas Islamic authorities permit it, up to a maximum of four wives in principle. Thus, we may hypothesize that Christian women are less likely to be in polygamous unions, whereas Muslim women would have an opposite tendency.

It is, however, important to point out that in other regions of the world (e.g., the Middle East and South Asia), where women are not expected to support themselves through such activities as farming, Muslim men have a rather low tendency of forming polygamous unions, around 5% or less (Chamie 1986). Islam stipulates that a polygamous man must treat all his wives equally and has the duty to support all of them (Boserup 1970). Although a woman who has no choice but to be a higher-rank wife in a polygamous union, would probably prefer a Muslim husband so that she could avoid being treated as a servant to the first wife. An orthodox Muslim man is unlikely to take in more than one wife, unless he has the means to support more. In sub-Saharan Africa where most women are traditionally expected to support themselves to a large extent, it may be expected that Muslims would be more prone to be polygamous than Christians but not more likely than the followers of traditional religions. It is useful to remember that the culture of polygamy was undoubtedly well-established in sub-Saharan Africa before the arrival of Islam.

In the three countries where both Christian and Muslim religions are identifiable in the survey data, we found that Muslim women were significantly and substantially more prone to be in polygamous unions than Christian women: the observed proportions of polygamy of these two groups were 49% versus 24% in Senegal, 46% versus 27% in Ghana, and 29% versus 21% in Kenya. As expected, in the two countries where other categories of religion are identifiable, the followers of a "traditional" religion turn out to be much more prone to be in polygamous unions than their Christian counterparts: the corresponding observed proportions of polygamy are 51% versus 27% in Ghana, and 23% versus 13% in Zimbabwe. For the women with no religion, the observed proportions of polygamy (35% in Ghana, 46% in Kenya, and 25% in Zimbabwe) also turn out to be significantly higher than those of their Christian counterparts.

It is interesting to note that the data on Zimbabwean women shows that the followers of the Spiritual religion (a kind of Africanized Christian religion) are much more prone to be in polygamous unions than the so-called Christians: the observed proportions of polygamy are 20% versus 13%. With an associated *t*-ratio of 3.8, this difference is highly significant. It is also worth noting that even among Christian women the observed proportions of polygamy are not near zero, but 24% in Senegal, 27% in Ghana, 21% in Kenya, and 13% in Zimbabwe. Clearly, the Christian authorities continue to tolerate polygamy in all these countries.

4. *Effects of urbanization*

In urban areas, the difficulties in forming and maintaining traditional polygamous unions can be increased by housing shortages, the high cost of living, the high risk of unemployment, low wages in the informal sector, the weakened kinship network, the high cost of raising and educating children, and the high sex ratio of the rural-to-urban migrants (Maillu 1988). Thus, we may hypothesize that proportions of polygamy are lower in urban areas than in rural areas.

In all four countries studied, we found that the observed proportions of polygamy are indeed lower in urban areas than in rural areas: 44% versus 50% in Senegal, 28% versus 33% in Ghana, and 18% versus 24% in Kenya, and 9% versus 18% in Zimbabwe. All of these differences are statistically significant.

5. *Effects of current age* (*birth cohort*)

Since current age corresponds exactly to year of birth, the different age groups defined by current age represent different birth cohorts. To the extent that more recent cohorts are more subject to the ongoing process of modernization, we may hypothesize that the proportions of polygamy tend to be lower for more recent cohorts (younger age groups). Another reason for this hypothesized relationship is that a married woman of an older age group has a longer exposure to the risk that her husband acquires an additional wife.

The observed proportions of polygamy indeed show declining trends towards younger ages in all four countries. The contrasts between the 15–19 and 40–49 age groups are highly significant and extremely large: 29% versus 62% in Senegal, 12% versus 39% in Ghana, and 14% versus 32% in Kenya, and 11% versus 26% in Zimbabwe.

It is interesting to note that a substantial drop in the proportion of polygamy from the 40–49 to the 30–39 age group is observed only in Kenya and Zimbabwe, and that in Senegal and Ghana a large drop in the proportion of polygamy is observed from the 30–39 to the 20–29 age group. It seems that the major negative impacts of modernization on polygamy occurred about a decade earlier in the East and Southern African countries of Kenya and Zimbabwe than in the West African countries of Senegal and Ghana. This idea is worth further testing with longitudinal data, with which the effects of period, cohort, and life-cycle can be separated.

6. *Effects of age at first marriage*

The sub-Saharan countries are characterized by early ages at first marriage. According to our samples, the mean ages at first marriage for women are 16 in Senegal and 18 in Ghana, Kenya and Zimbabwe. It may be hypothesized that the women who get married at excessively late ages, say beyond 29, are more likely to be from poor or problematic families so that they have a greater chance of being in polyga-

mous unions, perhaps as a wife of lower status.[12] On the other hand, it may also be hypothesized that a woman who marries too early (in or even before the early teens) has more years to be at risk of seeing her husband acquiring an additional wife so that her chance of being in a polygamous union in the later part of her life is increased. Taken together, these two hypotheses imply a U-shaped pattern of proportions of polygamy with respect to the age at first marriage.

The observed proportions of polygamy found in Kenya and Zimbabwe show statistically significant support for these two hypotheses. In Kenya, these proportions are 31% in the 5–14 age interval, about 20% in the 15–24 age interval, 27% in the 25–29 age interval, and 53% in the 30–38 age interval. In Zimbabwe, the corresponding figures are 25% in the 8–14 age interval, about 14% in the 15–24 age interval, 17% in the 25–29 age interval, and 42% in the 30–36 age interval.

For Senegal, the U-shaped pattern is also observed. But the shape is somewhat different: about 50% in the 10–19 age interval, about 40% in the 20–29 age interval, and 67% in the 30–37 age interval. For Ghana, the proportions of polygamy remain about the same (30%) from the early teens to the late twenties and then jump to 53% in the 30–41 age interval. For both Senegal and Ghana, the jump to a very high level in the thirties is statistically insignificant, because extremely few females remain single in their thirties.

7. *Effects of ethnicity*

Most African countries, as unified political entities, reflect the extent of the colonial powers that created them largely for administrative convenience. In many of these countries, there are distinct ethnic groups with different traditions and values. Furthermore, the susceptibilities of these ethnic groups to the influence of the forces of modernization may differ substantially. Therefore, proportions of polygamy may differ significantly among the ethnic groups within each country. Actually, we eliminated the small numbers of women belonging to the White and Colored groups in Zimbabwe, partly because we believe that their polygamous tendencies are much lower than that of the blacks.

In Senegal, Wolof is the largest ethnic group, representing 41% of all Senegalese women in the sample. The observed proportion of polygamy of this group (52%) is somewhat higher than the national average (48%). Using Wolof as the reference group, we find that the proportions of polygamy of Poular (46%) and Serer (40%) are significantly lower.

In Ghana, Twi, the largest ethnic group representing 38% of all Ghanaian women in the sample, has an observed proportion of polygamy of 26%, which is lower than the national average of 31%. Relative to Twi, the two ethnic groups with

[12] Although women with higher education tend to marry at a later age, our samples of all four countries show that none of the women with higher education, whose ages at first marriage were older than twenty-nine, were in polygamous unions.

significantly different proportions of polygamy are Ewe (38%) and Mole-Dagbani (42%).

Kenya has a highly diversified ethnic composition, with Kikuyu being the largest group representing 21% of all Kenyan women in the sample. Kikuyu's observed proportion of polygamy is only 9%, which is much lower than the national average of 23%. Relative to Kikuyu, all other ethnic groups have significantly higher proportions of polygamy. The groups with the highest polygamous tendencies are Luo (33%) and Mijikenda/Swahili (39%).

B. *Multifactor Analysis*

The single-factor analysis presented in Sub-section A may overstate the importance of the individual factors, because the explanatory power of some factors (e.g., women's education, their husbands' education, and urbanization) may overlap to a certain degree. It is, therefore, useful to create for each country a general model that includes all the factors and see if a factor in question is still important in the context of all other factors. By deleting each factor in turn from the general model and observing the resulting decrease in rho-square or the smallness of the *P*-value, we will also be able to assess the relative importance of the factors. By looking at the changes in the estimated coefficients of the remaining factors and their associated *t*-ratios after the deletions, we will also be able to see whether and how the explanatory powers of different factors overlap. For example, if the magnitudes of the coefficients of the dummy variables representing women's education increase markedly after the deletion of their husbands' education from the general model, we may say that the explanatory power of women's education overlaps substantially with that of their husbands'.

In our multifactor analysis, we make a slight modification by merging the "secondary" and "higher" categories of women's education into one category (secondary+), because very few women are in the "higher" category. For the ease of presentation, we will now report our multifactor results for each of the four countries in turn.

1. *Senegal* (*Table II.A*)

In the multifactor context, the effects of women's education have disappeared, mainly as a consequence of being overwhelmed by the effects of their husbands' education, which remain highly significant and strong. The estimated coefficients of the dummy variables representing the distinctions in the husbands' education in the general model (–0.53, –1.08, and –1.05) show clearly that the women's polygamous tendency is continually reduced as the level of their husbands' education increases from no education to secondary. Further improvement in their husbands' education beyond the secondary level does not result in a significant further decrease in their polygamous tendency.

TABLE II.A

ESTIMATION RESULTS OF THE MULTIFACTOR LOGIT MODEL OF SENEGALESE WOMEN'S PROPENSITIES OF BEING IN POLYGAMOUS UNIONS
(Reference Alternative = Monogamy)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Ethnicity		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Constant term	–1.55	–4.8	–1.54	–4.7	–1.72	–5.3	–1.85	–5.7	–0.48	–3.1	–1.59	–4.8	–1.62	–5.3	–0.88	–2.8	–1.36	–4.4
Women's education (No education)																		
Primary	0.11	0.6	—	—	–0.14	–0.9	—	—	0.09	0.6	0.06	0.4	0.08	0.5	–0.10	–0.7	0.09	0.5
Secondary+	–0.02	–0.1	—	—	–0.70	–2.9	—	—	–0.04	–0.1	–0.08	–0.3	–0.07	–0.2	–0.12	–0.4	–0.07	–0.3
Husbands' education (No education)																		
Primary	–0.53	–2.6	–0.50	–2.6	—	—	—	—	–0.57	–2.9	–0.56	–2.9	–0.53	–2.7	–0.54	–2.8	–0.54	–2.7
Secondary	–1.08	–4.6	–1.06	–5.0	—	—	—	—	–1.13	–4.9	–1.13	–4.9	–1.03	–4.4	–1.01	–4.5	–1.12	–4.8
Higher	–1.05	–2.9	–1.06	–3.2	—	—	—	—	–1.03	–2.8	–1.10	–3.0	–0.93	–2.5	–1.02	–2.9	–1.12	–3.1
Religion (Christian)																		
Muslim	1.09	3.7	1.09	3.7	1.17	4.0	1.21	4.2	—	—	1.10	3.7	1.01	3.6	0.97	3.4	1.12	3.8
Other	1.09	1.3	1.10	1.2	0.98	1.1	1.02	1.2	—	—	1.11	1.2	1.14	1.3	0.85	1.0	1.15	1.3
Residence (Rural)																		
Urban	–0.14	–1.3	–0.13	–1.3	–0.26	–2.6	–0.36	–3.9	–0.15	–1.5	—	—	–0.10	–1.0	0.00	0.0	–0.14	–1.4
Ethnicity (Wolof)																		
Poular	–0.21	–2.2	–0.21	–2.1	–0.20	–2.0	–0.20	–2.1	–0.22	–2.2	–0.20	–2.1	—	—	–0.29	–3.1	–0.20	–2.0
Serer	–0.55	–4.5	–0.55	–4.4	–0.52	–4.3	–0.52	–4.3	–0.60	–4.9	–0.53	–4.3	—	—	–0.48	–4.0	–0.56	–4.6
Mandingue	–0.13	–0.8	–0.13	–0.7	–0.13	–0.7	–0.15	–0.8	–0.14	–0.8	–0.11	–0.6	—	—	–0.18	–1.0	–0.13	–0.7
Diola	–0.02	–0.1	–0.01	–0.1	–0.04	–0.2	–0.01	–0.1	–0.19	–0.9	–0.02	–0.1	—	—	0.13	0.6	–0.05	–0.2
Other	0.35	2.0	0.35	2.1	0.35	2.1	0.34	2.0	0.22	1.3	0.36	2.1	—	—	0.28	1.7	0.36	2.1

TABLE II.A (Continued)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Ethnicity		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Current Age (20–29)																		
15–19	–0.52	–3.7	–0.52	–3.6	–0.52	–3.6	–0.52	–3.6	–0.51	–3.6	–0.51	–3.6	–0.51	–3.6	—	—	–0.50	–3.5
30–39	1.05	11.1	1.05	11.1	1.05	11.1	1.04	11.2	1.05	11.1	1.04	11.1	1.04	11.1	—	—	1.05	11.1
40–49	1.02	8.6	1.02	8.7	1.02	8.7	1.05	9.0	1.01	8.6	1.02	8.6	1.00	8.6	—	—	1.02	8.7
Age at first marriage (20–24)																		
10–14	0.29	1.9	0.28	1.7	0.37	2.3	0.47	3.0	0.32	2.0	0.29	1.8	0.31	1.9	0.13	0.8	—	—
15–19	0.24	1.9	0.24	1.7	0.31	2.3	0.40	2.9	0.27	1.9	0.24	1.7	0.25	1.8	0.12	0.8	—	—
25–29	0.09	0.2	0.08	0.2	0.00	0.0	–0.03	–0.1	0.03	0.1	0.08	0.2	–0.01	0.0	0.22	0.6	—	—
30–37	0.42	0.5	0.41	0.5	0.46	0.5	0.44	0.5	0.48	0.5	0.45	0.5	0.47	0.5	0.92	1.0	—	—
–2 log likelihood	3,619.43		3,619.93		3,648.45		3,657.77		3,634.63		3,621.43		3,651.31		3,840.46		3,622.96	
Rho-square	0.0832		0.0831		0.0759		0.0735		0.0794		0.0827		0.0751		0.0272		0.0823	
Decrease in rho-square from general model	—		0.0001		0.0074		0.0097		0.0039		0.0005		0.0081		0.0560		0.0009	
Decrease in chi-square from general model	—		0.50		29.02		38.34		15.20		2.00		31.88		221.03		3.53	
(Degree of freedom)	—		2		3		5		2		1		5		3		4	
P-value	—		7.78E–01		2.22E–06		3.22E–07		5.00E–04		1.58E–01		6.29E–06		0		4.74E–01	

Source: Based on the 1986 DHS data.

Notes: 1. –2 log likelihood of null model = 3,947.97.
2. Sample size = 2,850 persons.

In addition to the husbands' education, religion (Muslim versus Christian), ethnicity (Poular and Serer versus Wolof), and current age (with a big jump from the 20–29 to the 30–39 age group) continue to have highly significant effects. However, the negative effect of urbanization is no longer significant, mainly because of the strong overlap of its explanatory power with that of women's and especially their husbands' education. Also, the U-shaped effects of the age at first marriage are no longer significant, although the contrast between the high level of polygamy in the 10–14 and 15–19 age intervals on the one hand and the low level of polygamy in the 20–24 age interval on the other is almost significant ($t = 1.9$).

The selective deletions of explanatory factors from the general model reveal that current age (birth cohort) is by far the most important factor, because its deletion results in the largest decrease in rho-square (0.0560); that ethnicity and husbands' education are highly important (decreases in rho-square = 0.0081 and 0.0074); that religion is moderately important (decrease in rho-square = 0.0039); and that age at first marriage, urbanization, and women's education are unimportant (decreases in rho-square = 0.0009, 0.0005, and 0.0001, respectively). The most salient features of the polygamous tendencies in Senegal are (1) a steep declining trend from the cohort aged 30–39 (62%) toward the cohort aged 15–19 (29%), (2) the contrast between the moderately high levels of the Poular and Serer ethnic groups (46% and 40%) and the very high level of the Wolof ethnic group (52%), and (3) a sharp decrease due to an increase in husbands' education from no education (51%) up to only the secondary level (25%).

2. *Ghana* (*Table II.B*)

In the multifactor context, women's education no longer has a significant effect, again mainly as a consequence of being overwhelmed by their husbands' education, which continues to have highly significant negative effects. Although the coefficients of the dummy variables representing their husbands' education in the general model show a monotonic trend (–0.38 for primary, –0.51 for secondary, and –0.66 for higher education), the decrease in polygamous tendency from the secondary to the higher category is not statistically significant.

Although all non-Christian religions still have significantly positive effects on polygamous tendencies, the negative effect of urbanization is no longer significant. Again, urbanization's loss of significant effect is mainly due to the overlap of its explanatory power with those of women's and their husbands' education. The effects of current age (birth cohort) remain highly significant, whereas those of the age at first marriage remain insignificant.

With respect to ethnicity, we find in the general model that although the Ewe group continues to have a positive effect, the coefficient of the dummy variable representing the Mole-Dagbani group (the most polygamous among all ethnic groups in Ghana) is no longer significantly different from zero. The explanatory

TABLE II.B

ESTIMATION RESULTS OF THE MULTIFACTOR LOGIT MODEL OF GHANAIAN WOMEN'S PROPENSITIES OF BEING IN POLYGAMOUS UNIONS
(Reference Alternative = Monogamy)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Ethnicity		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Constant term	–0.89	–5.7	–0.89	–6.2	–1.19	–9.3	–1.27	–12.6	–0.67	–4.6	–0.90	–5.7	–0.88	–6.6	–0.51	–3.9	–0.94	–6.1
Women's education (No Education)																		
Primary	0.02	0.2	—	—	–0.07	–0.7	—	—	–0.07	–0.7	0.01	0.1	0.04	0.4	–0.11	–1.1	0.02	0.1
Secondary+	–0.28	–1.1	—	—	–0.51	–2.2	—	—	–0.37	–1.5	–0.30	–1.2	–0.26	–1.1	–0.44	–1.8	–0.30	–1.3
Husbands' education (No education)																		
Primary	–0.38	–3.2	–0.37	–3.2	—	—	—	—	–0.45	–3.9	–0.38	–3.3	–0.35	–3.1	–0.49	–4.3	–0.37	–3.1
Secondary	–0.51	–3.0	–0.54	–3.3	—	—	—	—	–0.62	–3.8	–0.53	–3.3	–0.47	–2.9	–0.61	–3.8	–0.50	–3.0
Higher	–0.66	–2.6	–0.76	–3.2	—	—	—	—	–0.78	–3.0	–0.69	–2.7	–0.62	–2.4	–0.66	–2.6	–0.66	–2.6
Religion (Christian)																		
Muslim	0.73	4.1	0.73	4.1	0.80	4.5	0.83	4.7	—	—	0.71	4.0	0.67	4.1	0.65	3.7	0.73	4.1
Traditional	0.79	4.7	0.79	4.8	0.87	5.2	0.91	5.6	—	—	0.80	4.7	0.89	5.7	0.69	4.2	0.80	4.8
No religion	0.29	2.1	0.29	2.1	0.34	2.4	0.37	2.7	—	—	0.29	2.1	0.30	2.2	0.20	1.4	0.29	2.0
Other	1.50	2.0	1.48	2.0	1.50	2.0	1.46	2.0	—	—	1.50	2.0	1.53	2.1	1.51	2.0	1.51	2.0
Residence (Rural)																		
Urban	–0.08	–0.8	–0.09	–0.9	–0.14	–1.4	–0.19	–1.9	–0.06	–0.6	—	—	–0.08	–0.8	–0.03	–0.3	–0.08	–0.8
Ethnicity (Twi)																		
Fante	–0.12	–0.8	–0.12	–0.8	–0.08	–0.6	–0.07	–0.5	–0.12	–0.8	–0.13	–0.9	—	—	–0.12	–0.8	–0.13	–0.9
Other Akan	0.02	0.1	0.02	0.1	0.07	0.3	0.09	0.4	–0.04	–0.2	0.02	0.1	—	—	–0.06	–0.3	0.01	0.0
Ga-Adangbe	0.21	1.3	0.20	1.3	0.24	1.5	0.24	1.5	0.19	1.2	0.20	1.2	—	—	0.19	1.2	0.19	1.2
Ewe	0.32	2.4	0.32	2.4	0.32	2.5	0.33	2.5	0.47	3.8	0.31	2.4	—	—	0.30	2.3	0.30	2.3

TABLE II.B (Continued)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Ethnicity		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Guan	0.30	1.1	0.30	1.1	0.38	1.4	0.38	1.4	0.37	1.4	0.30	1.1	—	—	0.25	1.0	0.30	1.1
Mole-Dagbani	–0.04	–0.3	–0.04	–0.3	0.12	0.8	0.15	1.0	0.30	2.0	–0.05	–0.3	—	—	–0.11	–0.7	–0.04	–0.2
Current age (20–29)																		
15–19	–1.04	–3.8	–1.03	–3.8	–1.03	–3.8	–1.03	–3.8	–0.99	–3.7	–1.04	–3.8	–1.05	–3.9	—	—	–1.02	–3.8
30–39	0.51	5.0	0.51	5.1	0.54	5.4	0.55	5.6	0.48	4.8	0.50	5.0	0.50	4.9	—	—	0.51	5.1
40–49	0.44	3.5	0.45	3.7	0.52	4.2	0.56	4.8	0.40	3.3	0.43	3.5	0.46	3.7	—	—	0.46	3.7
Age at first marriage (15–19)																		
8–14	–0.11	–0.8	–0.11	–0.8	–0.11	–0.8	–0.09	–0.7	–0.12	–0.9	–0.11	–0.8	–0.10	–0.7	–0.15	–1.1	—	—
20–24	–0.15	–1.3	–0.16	–1.5	–0.14	–1.3	–0.18	–1.6	–0.15	–1.3	–0.15	–1.3	–0.13	–1.2	–0.08	–0.7	—	—
25–29	–0.08	–0.4	–0.11	–0.5	–0.11	–0.5	–0.17	–0.8	–0.13	–0.6	–0.09	–0.4	–0.01	0.0	0.09	0.4	—	—
30–41	0.56	1.0	0.55	1.0	0.50	0.9	0.47	0.9	0.66	1.2	0.56	1.0	0.57	1.0	0.82	1.5	—	—
–2 log likelihood	3,134.28		3,135.98		3,148.53		3,153.78		3,167.51		3,134.86		3,145.44		3,192.34		3,137.65	
Rho-square	0.0579		0.0574		0.0536		0.0520		0.0479		0.0577		0.0545		0.0404		0.0569	
Decrease in rho-square from general model	—		0.0005		0.0043		0.0059		0.0100		0.0002		0.0034		0.0175		0.0010	
Decrease in chi-square from general model	—		1.69		14.25		19.50		33.23		0.58		11.16		58.06		3.37	
(Degree of freedom)	—		2		3		5		4		1		6		3		4	
P-value	—		4.28E–01		2.58E–03		1.55E–03		1.07E–06		4.46E–01		8.36E–02		1.53E–12		4.98E–01	

Source: Based on the 1988 DHS data.

Notes: 1. –2 log likelihood of null model = 3,326.81.
2. Sample size = 2,676 persons.

power of this dummy variable is lost against the factors of education and religion. Compared with other ethnic groups, the Mole-Dagbani group has relatively little exposure to formal education and is mostly non-Christian. As many as 78% of the Mole-Dagbani women have husbands with no formal education, compared with the average of 28% for the women of all ethnic groups. Only 15% of Mole-Dagbani women are Christians, compared with the overall average of 71%.

The deletions of the explanatory factors from the general model reveal that current age (birth cohort) is clearly the most important factor (decrease in rho-square = 0.0175), whereas religion is clearly the second most important factor (decrease in rho-square = 0.0100). The husbands' education and ethnicity are moderately important (decreases in rho-square = 0.0043 and 0.0034, respectively), whereas the remaining factors (marriage age: 0.0010, women's education: 0.0005, and urbanization: 0.0002) are unimportant.

The most salient features of the polygamous tendencies in Ghana are (1) a trend of sharp decrease from the cohort aged 30–39 (39%) toward the cohort aged 15–19 (12%), (2) the sharp contrast between the moderate level of Christians (27%) and the high levels of Muslims (46%) and Traditionals (51%), and (3) the monotonic decrease in response to an increase in the husbands' level of education from no education (43%) up to the secondary level (24%).

3. *Kenya* (*Table II.C*)

In the general model for Kenya, both women's education and their husbands' education have significant negative effects on polygamous tendencies. The estimated coefficients for both factors have a simple monotonic pattern, implying that the higher the education, the lower the polygamous tendency.

With respect to religion, the Muslim/Christian distinction is no longer significant, because its explanatory power overlaps with those of education and ethnicity: Muslim women are more likely to be poorly educated and be members of the Mijikenda/Swahili ethnic group (the group with the highest observed proportion of polygamy in Kenya). The strong positive effect of "no religion" on polygamy remains to be clearly significant in the multifactor context, although its explanatory power also overlaps substantially with educational factors.

The positive effect of every ethnic group relative to the Kikuyu remains highly significant. The estimated coefficients indicate that the group with the sharpest contrast to the Kikuyu is the Luo. Relative to other ethnic groups in Kenya, the Luo have been characterized in literature (Lesthaeghe and Eelens 1989; Caldwell, Caldwell, Orubuloye 1992) as the group with (1) the highest prevalence of polygamy, (2) the fewest pre-marital births, (3) exceptionally infrequent divorce followed by remarriage, and (4) the total submission of women's reproductive value to the husbands' family.

Despite the overlap of its explanatory power with those of educational factors,

TABLE II.C

ESTIMATION RESULTS OF THE MULTIFACTOR LOGIT MODEL OF KENYAN WOMEN'S PROPENSITIES OF BEING IN POLYGAMOUS UNIONS
(Reference Alternative = Monogamy)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Ethnicity		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Constant term	–2.02	–11.7	–2.17	–13.4	–2.35	–15.2	–2.74	–20.9	–1.96	–11.5	–2.04	–11.8	–0.88	–7.3	–1.56	–10.4	–1.93	–11.4
Women's education (No education)																		
Primary	–0.15	–1.6	—	—	–0.27	–3.0	—	—	–0.17	–1.9	–0.16	–1.7	–0.28	–3.1	–0.29	–3.2	–0.17	–1.9
Secondary+	–0.61	–3.9	—	—	–0.90	–6.4	—	—	–0.64	–4.1	–0.68	–4.4	–0.85	–5.6	–0.76	–5.0	–0.64	–4.1
Husbands' education (No education)																		
Primary	–0.40	–3.9	–0.44	–4.3	—	—	—	—	–0.44	–4.2	–0.41	–3.9	–0.38	–3.7	–0.46	–4.5	–0.42	–4.0
Secondary	–0.64	–4.8	–0.84	–6.8	—	—	—	—	–0.68	–5.1	–0.68	–5.1	–0.54	–4.2	–0.77	–5.9	–0.65	–4.9
Higher	–1.06	–2.7	–1.44	–3.8	—	—	—	—	–1.07	–2.8	–1.17	–3.0	–0.85	–2.2	–1.01	–2.6	–1.03	–2.7
Religion (Christian)																		
Muslim	0.11	0.6	0.13	0.7	0.18	0.9	0.24	1.2	—	—	0.05	0.2	0.22	1.3	0.10	0.5	0.13	0.7
Other	0.17	0.6	0.13	0.4	0.18	0.6	0.10	0.3	—	—	0.11	0.4	0.32	1.1	0.15	0.5	0.17	0.6
No religion	0.56	2.7	0.60	2.9	0.67	3.3	0.80	4.0	—	—	0.53	2.6	0.68	4.3	0.50	2.4	0.54	2.6
Residence (Rural)																		
Urban	–0.28	–2.7	–0.35	–3.4	–0.34	–3.3	–0.51	–5.2	–0.27	–2.6	—	—	–0.01	–0.1	–0.34	–3.4	–0.26	–2.5
Ethnicity (Kikuyu)																		
Kalenjin/Kamba/ Meru/Embu	0.73	5.1	0.75	5.3	0.75	5.3	0.81	5.7	0.73	5.1	0.74	5.2	—	—	0.66	4.7	0.71	5.0
Kisii/Luhya/Other	1.37	10.2	1.39	10.4	1.35	10.1	1.38	10.4	1.38	10.3	1.36	10.2	—	—	1.28	9.7	1.34	10.1
Luo	1.84	12.7	1.89	13.1	1.82	12.6	1.89	13.3	1.84	12.7	1.77	12.4	—	—	1.72	12.1	1.81	12.7
Mijikenda/Swahili	1.33	6.3	1.41	6.7	1.35	6.4	1.49	7.2	1.61	9.3	1.34	6.3	—	—	1.21	5.7	1.30	6.2

TABLE II.C (Continued)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Ethnicity		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Current age (20–29)																		
15–19	–0.48	–2.5	–0.43	–2.3	–0.50	–2.7	–0.43	–2.3	–0.47	–2.5	–0.50	–2.7	–0.34	–1.8	—	—	–0.49	–2.6
30–39	0.36	3.9	0.40	4.5	0.39	4.2	0.49	5.6	0.35	3.8	0.37	4.0	0.24	2.7	—	—	0.39	4.3
40–49	0.54	5.0	0.62	5.9	0.60	5.7	0.79	7.7	0.53	4.9	0.56	5.2	0.38	3.6	—	—	0.59	5.5
Age at first marriage (15–24)																		
5–14	0.14	1.5	0.19	2.0	0.17	1.8	0.28	3.0	0.13	1.4	0.15	1.6	0.30	3.2	0.15	1.6	—	—
25–29	0.56	2.9	0.52	2.7	0.56	2.9	0.49	2.6	0.55	2.8	0.53	2.7	0.42	2.3	0.67	3.5	—	—
30–38	1.40	3.8	1.45	3.9	1.41	3.8	1.49	4.1	1.39	3.8	1.37	3.7	1.11	3.1	1.58	4.3	—	—
–2 log likelihood	4,370.48		4,386.78		4,396.58		4,439.80		4,378.16		4,378.00		4,592.66		4,413.76		4,392.70	
Rho-square	0.1028		0.0995		0.0975		0.0886		0.1013		0.1013		0.0572		0.0939		0.0983	
Decrease in rho-square from general model	—		0.0033		0.0054		0.0142		0.0016		0.0015		0.0456		0.0089		0.0046	
Decrease in chi-square from general model	—		16.30		26.10		69.32		7.68		7.52		222.18		43.28		22.22	
(Degree of freedom)	—		2		3		5		3		1		4		3		3	
P-value	—		2.89E–04		9.09E–06		1.42E–13		5.31E–02		6.10E–03		0		2.15E–09		5.87E–05	

Source: Based on the 1989 DHS data.

Notes: 1. –2 log likelihood of null model = 4,871.4.
2. Sample size = 4,563 persons.

urbanization remains to have a significant negative effect on the polygamous tendencies. With respect to current age, its monotonic effects remain highly significant. By contrast, the U-shaped effects of the age at first marriage are only partly significant: the high polygamous tendency in the 5–14 age interval is no longer statistically significant ($t = 1.5$).

The deletions of the explanatory factors from the general model show that ethnicity is by far the most important factor (decrease in rho-square = 0.0456), that the combined explanatory power of women's and their husbands' education (0.0142) and that of current age (0.0089) are very strong, that the age at first marriage (0.0046) is moderately important, and that religion (0.0016) and urbanization (0.0015) are marginally important.

The most salient features of the polygamous tendencies in Kenya are (1) the sharp contrast by ethnicity between the very low level of the Kikuyu (9%) and the higher levels of all other ethnic groups, especially the Luo (33%), (2) the strong negative effects of increases in husbands' education (from 38% for no education to 11% for higher education) and in women's education (from 34% for no education to 0% for higher education), (3) the strong monotonic effect of current age (from 32% in the 40–49 age group to 14% in the 15–19 age group), and (4) the strong positive effect of late ages at first marriage (26% in the 25–29 age interval and 53% in the 30–37 age interval).

4. *Zimbabwe* (*Table II.D*)

In the general model for Zimbabwe, every factor turns out to have statistically significant effects on polygamous tendencies. The patterns of the effects are similar to those revealed in the single-factor analysis. The effects of women's education are negative and monotonic, whereas those of their husbands' education are U-shaped. Contrary to the situations in Senegal, Ghana, and Kenya, we find for Zimbabwe that women's education is much more important than their husbands' education in determining the polygamous tendencies, and that the increase in the husbands' education from secondary to a higher level has a significantly positive effect on polygamy. The effect of urban/rural contrast turns out to be more important in Zimbabwe than in the other three countries, although its explanatory power also overlaps with those of education and religion.

With respect to religion, it is interesting that the Spiritual religion turns out to be the only religion that is significantly different from the Christian religion in the multifactor context. It seems that the Spiritual church in Zimbabwe has indeed largely removed the preference for monogamy from the Christian doctrine so that its members are more likely to keep the African traditional way of life.

The multifactor analysis for Zimbabwe also reveals that the decline in polygamous tendency toward more recent birth cohorts is particularly sharp and significant in the transition from those aged 40–49 to those aged 30–39 at the time of the

TABLE II.D

ESTIMATION RESULTS OF THE MULTIFACTOR LOGIT MODEL OF ZIMBABWEAN WOMEN'S PROPENSITIES OF BEING IN POLYGAMOUS UNIONS
(Reference Alternative = Monogamy)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Constant term	−1.57	−6.7	−2.30	−13.8	−0.45	−8.1	−2.10	−16.8	−1.37	−6.3	−1.74	−7.6	−1.38	−6.4	−1.47	−6.4
Women's education (No education)																
Primary	−0.55	−3.7	—	—	−0.62	−4.3	—	—	−0.59	−4.1	−0.56	−3.7	−0.61	−4.1	−0.61	−4.2
Secondary+	−0.99	−3.9	—	—	−1.02	−4.4	—	—	−1.04	−4.1	−1.11	−4.4	−1.14	−4.6	−1.08	−4.3
Husbands' education (Secondary)																
No education	0.34	1.5	0.68	3.3	—	—	—	—	0.38	1.7	0.45	2.1	0.48	2.2	0.36	1.6
Primary	0.03	0.1	0.21	1.3	—	—	—	—	0.04	0.2	0.11	0.6	0.12	0.7	0.03	0.2
Higher	1.08	2.3	0.96	2.1	—	—	—	—	1.03	2.2	1.04	2.2	1.23	2.7	1.09	2.4
Religion (Christian)																
Traditional	0.16	0.9	0.34	1.9	0.20	1.1	0.48	2.7	—	—	0.22	1.2	0.09	0.5	0.21	1.1
Spiritual	0.44	3.0	0.48	3.3	0.44	3.0	0.50	3.5	—	—	0.49	3.4	0.37	2.6	0.45	3.1
Other	0.21	0.7	0.37	1.2	0.27	0.8	0.53	1.7	—	—	0.24	0.8	0.09	0.3	0.21	0.7
No religion	0.57	1.4	0.73	1.8	0.60	1.4	0.82	2.0	—	—	0.60	1.4	0.50	1.2	0.60	1.4
Residence (Rural)																
Urban	−0.48	−3.0	−0.56	−3.6	−0.49	−3.1	−0.63	−4.2	−0.53	−3.4	—	—	−0.47	−3.0	−0.46	−2.9
Current Age (20–29)																
15–19	−0.15	−0.5	−0.21	−0.8	−0.18	−0.6	−0.30	−1.1	−0.13	−0.5	−0.07	−0.3	—	—	−0.07	−0.3
30–39	0.17	1.2	0.24	1.7	0.17	1.2	0.27	1.9	0.12	0.8	0.17	1.2	—	—	0.20	1.4
40–49	0.62	3.9	0.72	4.6	0.66	4.2	0.82	5.3	0.56	3.6	0.63	3.9	—	—	0.67	4.3

TABLE II.D (Continued)

Explanatory Variable	General Model		Women's Education		Husbands' Education		Both Education Factors		Religion		Urbanization		Current Age		Marriage Age	
	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*	Coef.	*T*
Age at first marriage (15–24)																
8–14	0.48	3.0	0.57	3.6	0.48	3.0	0.61	3.9	0.48	3.0	0.45	2.8	0.48	3.0	—	—
25–29	0.11	0.3	0.12	0.4	0.14	0.4	0.15	0.5	0.14	0.4	0.04	0.1	0.22	0.7	—	—
30–36	1.01	2.3	1.09	2.6	1.04	2.4	1.12	2.7	1.03	2.4	0.98	2.3	1.21	2.8	—	—
–2 log likelihood	1,937.94		1,956.31		1,946.16		1,970.56		1,947.94		1,947.53		1,954.86		1,950.60	
Rho-square	0.0689		0.0601		0.0649		0.0532		0.0641		0.0643		0.0607		0.0628	
Decrease in rho-square from general model	—		0.0088		0.0040		0.0157		0.0048		0.0046		0.0081		0.0061	
Decrease in chi-square from general model	—		18.37		8.22		32.62		10.00		9.59		16.92		12.66	
(Degree of freedom)	—		2		3		5		4		1		3		3	
P-value	—		1.02E–04		4.16E–02		4.47E–06		4.04E–02		1.95E–03		7.33E–04		5.42E–03	

Source: Based on the 1988/89 DHS data.

Notes: 1. –2 log likelihood of null model = 2,081.29.
2. Sample size = 2,393 persons.

survey. The U-shaped pattern of the effects of the age at first marriage is also strong and statistically significant. The women with excessively early and excessively late marriages are more likely to be in polygamous unions.

The deletions of individual factors from the general model show that women's education is the most important explanatory factor (decrease in rho-square = 0.0088). With a decrease in rho-square by 0.0081, current age (birth cohort) is the second most important factor. Being highly correlated with women's education, the husbands' education turns out to be the least important factor (decrease in rho-square = 0.0040). However, the joint explanatory power of women's and their husbands' education is very strong, because their deletion results in a very large decrease in rho-square (0.0157). Of moderate importance are age at first marriage (0.0061), religion (0.0048), and urbanization (0.0046).

The most salient features of polygamous tendencies in Zimbabwe are (1) the very strong negative effect of women's education (29% for no education, 15% for primary, 8% for secondary, and 0% for higher education), (2) the significant positive effect of an increase in their husbands' education from secondary (10%) to a higher level (21%), (3) the sharp decrease with a decrease in current age from 40–49 (26%) to 30–39 (16%), and (4) the significant U-shaped effect of the age at first marriage (25% in 8–14, about 15% in 15–29, and 42% in 30–36).

V. SUMMARY AND CONCLUDING INTERPRETATIONS

Using the DHS data, we have found that the prevalence of polygamy not only differs substantially but also is affected differently by socio-demographic factors in different sub-Saharan countries. It seems that these differences can be largely interpreted as a reflection of the different stages in the transition toward a modernized (Westernized) society. At the risk of over-simplification, we may interpret our results by positioning the four countries studied on a traditional/modernized scale: Senegal (most traditional), Ghana, Kenya, and Zimbabwe (most modernized).[13]

We found that the importance of women's education in reducing polygamous tendency increases with the societies' level of modernization. This is true in both single-factor and multifactor contexts. In single-factor context, the values of rho-square for women's education show a monotonic pattern on our scale of modern-

[13] This ranking is based primarily on educational attainment and secondarily on the extent of Christianization. Infant mortality and life expectancy also yield the same ranking. The use of per capita income puts Zimbabwe and Senegal above Ghana and Kenya. In our opinion, the higher income of Senegal is mainly due to reasons that are not related to modernization, such as (1) its better economic tie to a developed country (France), (2) the better prices for its main crop (peanuts) in the world market, (3) its historically central role in western Africa's trade routes, and (4) its state intervention of all aspects of economy being less extreme than in some other sub-Saharan countries like Ghana and Kenya (EIU 1996a through 1996d).

ization: 0.0083 for Senegal, 0.0131 for Ghana, 0.0374 for Kenya, and 0.0390 for Zimbabwe. In multifactor context, the corresponding values are also monotonic: 0.0001 for Senegal, 0.0005 for Ghana, 0.0033 for Kenya, and 0.0088 for Zimbabwe.

The relative importance of women's education versus their husbands' education in the multifactor context increases with the level of modernization. In the more traditional countries of Senegal and Ghana, the effects of women's education are completely overwhelmed by the effects of their husbands' education. In the more modernized country of Kenya, both women's education and their husbands' education have significant effects on the polygamous tendency, with the former being less important than the latter. In the most modernized country of Zimbabwe, women's education becomes more important than their husbands' education, although the effects of the latter are also statistically significant. Actually, women's education turned out to be the most important among all the factors included in our multifactor model for Zimbabwe. The increased relative importance of women's education suggests that individual preferences become less dominated by familial considerations in marriage arrangements. More importantly, it also suggests that an improvement of females' education is, in the long run, more effective than an improvement of males' education in reducing polygamy.

Although the negative effect of urbanization on polygamy also tends to be more important in more modernized countries (Kenya and Zimbabwe) than in more traditional countries (Senegal and Ghana), it is in general less important than educational factors. The relative weakness of the effect of urbanization is probably partially due to the greater tendency of higher-rank polygamous rural wives to migrate to urban areas. This tendency is probably stronger in more traditional societies.

With respect to religion, Christianity with its negative moral judgment on polygamy has a clear negative effect on the polygamy propensity in all four countries. Of particular interest is the relatively high polygamous tendencies of the followers of the Spiritual religion in Zimbabwe. To the extent that this religion represents an adaptation of Christianity to traditional African values, we find that the Africans have become more assertive in dealing with imported cultures.

No matter whether polygamy is undesirable for society or not, it seems to remain an attractive option for some males. The males who are well off enough to afford it may be more tempted to choose this option. We found for Zimbabwe that the women who are married to men with higher education (who tend to be more wealthy) are more likely to be in polygamy than the women who are married to men with secondary education. For Senegal and Ghana, we also found that the increase in men's education from secondary to a higher level is not accompanied by a significant decrease in the polygamous tendency, suggesting that the increased influence of Western values is countered by the greater ability to pay for polygamy.

For Zimbabwe, and to a lesser extent, Kenya and Senegal, we found that age at first marriage has U-shaped effects on polygamous tendencies: the women with excessively early or excessively late marriages were more likely to end up in polygamous unions. The reasons for the two extremes may be quite different: the former is probably due to long years of exposure to the risk of seeing her husband acquiring an additional wife, whereas the latter is probably due to poor or problematic family conditions.

In all four countries, we found a clear declining trend of polygamy from older to younger cohorts. A sharp decline occurred about ten years younger in Senegal and Ghana than in Kenya and Zimbabwe. If this difference could be interpreted mainly as a lag in the effect of modernization on more recent cohorts (rather than a normal life-cycle effect), the prevalence of polygamy in Senegal and Ghana could be expected to decline substantially within a few decades. However, such an interpretation cannot be safely made without good longitudinal data, with which the effects of period, cohort, and life-cycle can be separated.

It is useful to realize that several distinct ethnic groups with rather different cultural norms reside in each of the sub-Saharan countries. In addition to such factors as religion and education, these cultural norms, which are not explicitly identified in our study, may be mainly responsible for the large difference in polygamous tendencies between such ethnic groups as the Kikuyu and the Luo in Kenya. Our findings suggest the usefulness of a close examination of such norms.

Finally, it is important to mention that our use of the polygamy/monogamy distinction in analyzing the DHS data does not imply that a decline in polygamy is necessarily accompanied by an increase in monogamy, if all forms of living arrangements are considered. Actually, the strength of some aspects of polygamy as a value system suggests that both polygamous and monogamous formal marriages would decline in the future in most sub-Saharan countries. A more comprehensive analysis of the evolving forms of living arrangements in these countries requires a survey that identifies not only formal marital unions but also various types of informal living arrangements.

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