The Relationship Between Schooling and Fertility in Tanzania

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The inverse relationship of women's education to fertility is well documented in most regions of the world. In general, there is a negative association between the number of years a girl spends in school and her childbearing as an adult. It is hypothesized that education has a direct effect on fertility through the knowledge, skills, and behaviors imparted through schooling that guide childbearing and childcare practices in adulthood (Caldwell 1980, 1982; Cleland and van Ginneken 1988; Dexter, LeVine, and Velasco 1998; Diamond, Newby, and Varle 1999; LeVine et al. 1991). It is also widely believed that education affects fertility through a number of indirect pathways by delaying the age at first marriage and increasing the practice and efficacy of contraception (Cochrane 1979; Jejeebhoy 1995; Lesthaeghe et al. 1989). Education is also thought to enhance women's autonomy and control over childbearing decisions through more egalitarian conjugal relationships and increased control over economic resources (Jejeebhoy 1995; Mahmud and Johnson 1994; Mason 1984).

The education-fertility relationship is most consistent among women who complete secondary and tertiary schooling (Cleland and Kaufmann 1998; Jejeebhoy 1995), but this may reflect the similar socioeconomic status of this relatively small group of women rather than a unique set of skills acquired through post-primary education (Diamond, Newby, and Varle 1999). At the primary and pre-primary school levels, the categories into which most women in developing countries fall, the inverse relationship of education to childbearing is inconsistent since an increase in the years of schooling may not lead to a decline in fertility in a linear fashion (LeVine 1999). Fertility may be lower among women with no formal education than among those with some primary schooling in countries with low levels of literacy because even a few years of schooling may increase the likelihood of having a live birth due to improvements in the mother's health and nutrition (Cochrane 1979). A further inconsistency is that the autonomy often associated with schooling may remain limited for the vast majority of women, regardless of their level of education, even though a country's fertility rate has begun to decline. This situation has been documented in Bangladesh and Egypt (Amin and Lloyd 1998) and Kenya (Bradley 1995). The variation in the relationship between women's education and fertility decline at the primary and pre-primary levels suggests the need for further study of the factors that affect school attendance and fertility regulation at this important stage in the schooling process.

Sub-Saharan Africa is a region that has garnered a great deal of interest among researchers studying the interplay between education and fertility. Although the educational attainment of women in the region is generally below that of men, the gender gap at the primary and secondary levels has begun to close in a number of African countries (Knodel and Jones 1996; Stromquist 1998). Moreover, while fertility remains high in Africa as a whole, this is changing in several parts of the continent, most notably in southern Africa (Kirk and Pillet 1998) and Kenya (Robinson 1992; Watkins 1995). The fertility decline in these areas has been attributed to a number of different factors, including the increased use of contraceptives, the rising age of marriage, and the higher levels of education for women in countries like Zimbabwe, Botswana, and Kenya relative to the rest of the continent.

The rapid and precipitous fertility decline in Kenya has received a great deal of attention from demographers over the past decade (Brass and Jolly 1993; Watkins 1998; Westoff and Rodriguez 1995). The school system in Kenya and the factors affecting girls' educational achievement have also been examined by researchers interested in the education-fertility relationship (Lloyd and Mensch 1999; Lloyd, Mensch, and Clark 2000; Mensch and Lloyd 1998). Compared to neighboring Tanzania and Uganda, Kenya has achieved a higher level of economic development and a higher level of educational attainment for girls at the primary and secondary levels, which are factors that may help explain the fertility transition underway in the country (UNICEF 1999).[i] The relationship between education and fertility in Tanzania and Uganda has not been as well studied even though the situation in these two countries is as intriguing as the Kenyan case. According to Lloyd, Kaufman, and Hewett (1999), both Tanzania and Uganda have lower levels of contraceptive use than expected when compared to other African countries with similar levels of educational attainment. Yet this is where the similarities between the two countries end: Fertility has declined over the past decade in Tanzania (Kirk 1996; Larsen 1997), but it has not in Uganda (Uganda Demographic and Health Survey 1995 [UDHS 1995]). Moreover, Tanzania's female secondary school enrolment ratio of 5 is one of the lowest in sub-Saharan Africa and falls well below the ratio of 22 in Kenya and 9 in Uganda (UNICEF 1999).[ii] That a substantially larger percentage of young women are in secondary school in Uganda than in Tanzania makes the fertility trends in these two countries somewhat surprising.

The education-fertility pattern is similar to the unexpected relationship between economic development and fertility decline in Tanzania and Uganda. The economy of Uganda nearly doubled from 1986 to 1996, making it one of the "best-performing economies in Africa" despite recuperating from the civil war of the 1970s and 1980s (Bigsten and Kayizzi-Mugerwa 1999, p. 3). Tanzania, on the other hand, has experienced negative or very slight economic growth since the 1980s even though it has not been hampered by widespread civil unrest (Raikes and Gibbon 1996). The fact that fertility has declined only modestly in Uganda but has decreased significantly in Tanzania is an anomaly requiring further investigation.

This study takes a closer look at the education-fertility relationship in Tanzania and Uganda by comparing data from the most recent Demographic and Health Surveys (DHS) for the two countries. We hypothesize that the modest fertility decline in Uganda is due to both intra- and inter-national factors related to schooling and social interaction. Should the political and economic situation in Uganda continue to improve, we predict that the next DHS will show evidence of a fertility decline similar to the one underway in Tanzania.

The East African Context

The countries of Kenya, Tanzania, and Uganda constitute the diverse cultural, political, and geographic region often referred to jointly as East Africa. Together, their total land area is approximately 1.76 million square kilometers, with Tanzania being the largest of the three countries and Uganda the smallest. The climate varies widely in the region as there is semi-desert vegetation in some areas and tropical rain forests in others. The countries' economies are based primarily on agriculture, although manufacturing and tourism are also important in Kenya and to a lesser extent in Tanzania and Uganda. English is one of the official languages in Kenya, Tanzania, and Uganda, with Swahili being used extensively in the former two countries but not as widely in the latter. Despite the attention to education in the region during the past thirty years, the adult literacy rates for men range from a high of 86% in Kenya to 79% in Tanzania and 74% in Uganda, and the rates for women remain substantially lower at 70% in Kenya, 57% in Tanzania, and 50% in Uganda (UNICEF 1999). Moreover, although family planning activities began in the late 1950s in all three countries, it was not until the 1990s that Tanzania and Uganda

adopted a National Population Policy, while Kenya developed a National Council for Population and Development in 1982 (KDHS 1993; TDHS 1996; UDHS 1995).

Despite the vast cultural, political, and geographic differences within and among the three countries, Kenya, Tanzania, and Uganda were viewed by the British colonial administration as a union. Kenya, one of the Crown's coveted colonies, became independent in 1963 but only after a great deal of resistance to the colonial authorities. Tanzania, a British territory, and Uganda, a British protectorate, gained independence in 1961 and 1962, respectively, with much less turmoil than in the formal colony of Kenya. Under British rule, Kenya, Tanzania, and Uganda had a common currency, postal system, and school examination schedule. After independence in the early 1960s, the countries maintained economic linkages through the East African Community and a shared system of higher education through the establishment of the University of East Africa, whereby students from Kenya, Tanzania, and Uganda could attend any of the three constituent colleges (Ssekamwa 1997).

The alliance among these three East African countries needs to be understood as a political union rather than as an outcome of a natural affinity from a common cultural heritage. Differences among the countries' post-colonial leaders were evident by the late 1960s, when conflicting political and economic policies led first to the dissolution of the University of East Africa in 1970 (Ssekamwa 1997) and finally to the collapse of the East African Community in 1977 (Bigsten and Kayizzi-Mugerwa 1999). Under the leadership of President Julius Nyerere, Tanzania embarked on a socialist development program in 1967, and President Milton Obote of Uganda began making similar moves toward government control of industry in 1969. While Tanzania continued on a socialist path through the early 1980s, Obote was overthrown by Idi Amin in 1971. Meanwhile, in Kenya, where colonial penetration and infrastructure development went far deeper than in either Tanzania or Uganda, President Jomo Kenyatta and his successor, Daniel Arap Moi, maintained a market approach to economic development (Brass and Jolly 1993).

Despite the divergent political and economic paths that Kenya, Tanzania, and Uganda have followed since the 1970s, they once shared a number of demographic characteristics. The censuses conducted prior to the late 1960s were replete with problems of under-enumeration in some areas and over estimation in others (Colwell 1997; Ominde 1975). The more reliable censuses of 1967 in Tanzania and of 1969 in Kenya and Uganda provide the following population figures: 12,313,469 in Tanzania, 10,942,705

in Kenya, and 9,548,847 in Uganda (Ominde 1975). The total fertility rate (TFR) was estimated to be 6.6 in Tanzania (Ominde 1975),[iii] 6.6 in Kenya (KDHS 1989), and 7.1 in Uganda (UDHS 1988/1989). The TFR remained high in Kenya and Tanzania through the late 1970s (with no reports for Uganda during this period of civil war), with Kenya reporting rates of 7.9 in the 1977/78 Kenya Fertility Survey and in the 1979 census (KDHS 1989), and Tanzania reporting a TFR of 6.9 in its 1978 census (TDHS 1993). Yet by the late 1980s and early 1990s, Kenya, Tanzania, and Uganda were in the midst of quite different fertility transitions. The Kenya DHS for 1989 reported a TFR of 6.7, and the report stated that this was "the first evidence of a major decline in fertility in Kenya" (1989, p. 18). The Tanzania DHS for 1991/1992 also indicated that fertility rates were lower in the survey than in the 1988 census (TDHS 1993). However, the Uganda DHS for 1988/1989 noted that the data in the survey "indicate high levels of fertility in Uganda (an average of 7.4 births per woman) with no indication of a recent decline" (UDHS 1988/1989, p. 19).

These different overall trends in fertility in Kenya, Tanzania, and Uganda continue to the present. The most recent round of the DHS provides the following TFRs for the three countries: 4.7 in Kenya (KDHS 1998), 5.8 in Tanzania (TDHS 1997), and 6.9 in Uganda (UDHS 1995). Since the demographic transition in Kenya has been studied far more than the situation in Tanzania or Uganda, we have chosen to examine these latter two cases in greater detail. Our main goals are to document the fertility decline underway in Tanzania and the continued high level of fertility in Uganda, and to suggest several factors that may be responsible for the different trends in the two countries from the mid 1970s to the mid 1990s. The rest of this paper will further these goals by focusing on the distinct educational patterns for girls in the two countries.

Data and Methodology

Our analysis is based on the 1996 Tanzania Demographic and Health Survey (TDHS) and the 1995 Uganda Demographic and Health Survey (UDHS). These nationally-representative surveys are conducted by Macro International Inc. in collaboration with the national statistics departments in the participating countries. The surveys provide detailed information about fertility, education, socioeconomic status, and health issues for women between the ages of 15-49. They also include similar information for men age 15-59 in Tanzania and 15-54 in Uganda as well as information about household composition and resources. There were 8,120 women in the 1996 TDHS from the country's six geographical zones, and

7,070 women in the 1995 UDHS from the four regions included in the survey, with part of the Northern Region excluded due to civil unrest.

The use of TDHS and UDHS data for this study is beneficial because the surveys are nationally representative, comparable across countries, and generally regarded to be of high quality. We can be fairly confident of the quality of the surveys because previous assessments of DHS data similar to those upon which we are drawing have not indicated any serious problems (DHS 1990, 1994, 1996; Gage 1995). For instance, the reporting of birth dates, which we used to calculate the parity progression ratios (PPR), the TFRs, and median waiting times to next live birth, appears to be relatively accurate and complete. Furthermore, the response rate for women between the ages of 15-49 was 96% in both Tanzania and Uganda, and the data for the woman's education level were 100% complete in the two countries (TDHS 1996; UDHS 1995). The major drawback to the DHS data about education is that they do not include an assessment of literacy or numeracy skills by which to compare the information on highest level of education achieved with the ability of a woman to apply her education to practical life situations.[iv] This drawback does not diminish the accuracy or the completeness of the data, but rather it should serve as a reminder that measuring a woman's level of education is more complicated than simply computing the number of years she has spent in school (Carter 1999; LeVine 1999).

In our analysis of the education-fertility relationship, we examined both the quantum and the tempo of fertility in Tanzania and Uganda for all women regardless of their marital status while taking their level of education into account. The quantum of fertility was measured by calculating the TFR for two time periods: 0 – 9 years and 10 – 19 years prior to survey. The TFRs for the two time periods in Tanzania and Uganda were based on the PPRs from parity 0 through parity 11, a ratio that expresses the proportion of women who become mothers in a given cohort and then the subsequent probability that a woman in that cohort will have another child after already having had a certain number of live births (Newell 1988). PPRs were also calculated for all women in the survey based on level of education rather than on time period to allow for a comparison of Tanzanian and Ugandan women with no education, incomplete primary education, complete primary education, or secondary education and above. The tempo of fertility in the two countries was measured using the median age at first birth and the median waiting time to next live birth for all women. The median age at first birth, the waiting times, and the PPRs were calculated

according to life table procedures that account for censoring of incomplete birth intervals. The PPR_0 and the median age at first birth for the 0 – 9 year period were computed using data for women who were less than 30 years of age, while the PPR_0 and the median age for the 10 – 19 period were based on data for women who were over 30 years at the time of survey.

Since the education-fertility relationship may be confounded by a number of different household and environmental factors, we also conducted a multivariate analysis to examine the probability of a woman having a birth each year while controlling for other characteristics. The multivariate models were estimated using discrete logistic regression with childbirth as the dichotomous dependent variable (Allison 1995). Many women contribute more than one birth; therefore, to account for the fact that events are not independent, robust standard errors were calculated. The variables used in the multivariate analysis include characteristics commonly associated with a woman's educational attainment, including age, education, region, religion, marital status, and household wealth and resources.

Results

As shown in Table 1, Tanzania exhibits a clear pattern of fertility decline from the 1991/92 TDHS to the 1996 TDHS as the TFR has fallen from 6.3 to 5.8. With the exception of women in the 45-49 age cohort, the fertility rate has declined for all age groups and especially among women from 20-29. In contrast, there has been little change in the TFR in Uganda from the 1990 census to the 1995 UDHS even though the age specific fertility rates have decreased among all but the youngest women in the 15-19 age cohort. These data show that there is higher fertility at lower ages in Uganda than in Tanzania, while there are comparable levels of fertility at higher ages among women in the two countries.

INSERT TABLE 1 ABOUT HERE

Further evidence of the different fertility patterns in Tanzania and Uganda comes from the analysis presented in Table 2 of the TFRs, the PPRs, and the median waiting time to next live birth for women who had their births 0 - 9 years or 10 - 19 years before survey. As in Table 1, we see that the TFRs have declined in the recent period in both countries, but the decline in Tanzania is steeper than in Uganda. For Tanzania, the decline in the TFRs is consistent with the TFR presented in Table 1; however, the TFR for the 10 –19 year period in Uganda is somewhat high when compared to the TFR in the previous table. This discrepancy may be due to the problem of backdating births from the 0 – 9 year period that results in the

TFR for that period being relatively low and the TFR for the 10 – 19 year period being relatively high compared to the estimates in Table 1.

INSERT TABLE 2 ABOUT HERE

The PPRs also indicate a change over time in when women stop childbearing. While the fraction of women who have one or two children is roughly the same for both time periods and for both countries, there is a smaller fraction of women in the 0 - 9 year period with high parity births than in the 10 - 19 period. In Tanzania, for example, the PPR drops below .90 from P_3 to P_4 in the 0 - 9 year period, whereas it does not reach this level until the transition from P_6 to P_7 for the 10 - 19 period. A similar pattern obtains in Uganda, whereby the PPR dips below .90 at a lower parity for the 0 - 9 year period than for the 10 - 19 period. However, since the PPRs are lower and they start to decline at lower parities in Tanzania than in Uganda for the 0 - 9 year period, this provides further evidence that there is currently a stronger trend toward having fewer children in Tanzania than in Uganda.

The data on the median waiting time to next live birth also suggest a change over time in fertility trends in Tanzania and Uganda. In both countries, there has been an increase in the median age at first birth and in the waiting time for every single child thereafter. The median age at first birth in Tanzania has risen by almost one year for women less than 30 (0 – 9 years) compared to women over 30 (10 - 19 years). Moreover, there has been a pronounced increase in the time to next live birth at higher parities in Tanzania. There has been a similar change in birth spacing in Uganda, with an increase of half a year in the age at first birth and longer waiting times to next live birth, but once again we find that the change has been greater in Tanzania in the 0 - 9 year period. Together, the data on stopping and spacing presented in Table 2 support our contention that fertility is declining more rapidly in Tanzania than in Uganda.

To study the effect of education on fertility decline in Tanzania and Uganda, we calculated the TFRs and the PPRs for women with no formal education, incomplete primary education, complete primary education, and secondary education or higher (Figure 1). The TFRs conform to the pattern found in the literature on the education-fertility relationship in that women with incomplete primary education often have slightly higher fertility rates than women with no education. We also found the expected relationship of the lowest TFRs among women with the highest level of education. The TFRs by education level for Tanzania are as follows: 7.1 (no education), 7.2 (incomplete primary education), 6.1 (complete primary

education), and 5.5 (secondary education and above). The figures for Uganda are slightly higher at each level of education: 7.5 (no education), 7.5 (incomplete primary education), 7.0 (complete primary education), and 5.6 (secondary education and above).

INSERT FIGURE 1 ABOUT HERE

The PPRs also show that the probability of having another birth after a woman has already had a given number of births is lower in Tanzania than in Uganda at each level of education. At lower parities, women in the two countries have very similar PPRs when compared by education level, but the ratios begin to differ at higher parities where Tanzanian women are, in general, less likely to have another child. The differences in the PPRs between the two countries are smallest for women with no formal education, with only slightly lower PPRs for Tanzanian women from P_4 through P_8, when the probability of having a ninth child after having had the eighth is virtually identical (.79 in Tanzania and .80 in Uganda). Greater differences in the PPRs for women in Tanzania and Uganda appear at the incomplete primary and the complete primary school levels. For women who have not completed primary school, the PPRs remain above .90 in both countries through P_5. At that point, the probability of having a subsequent birth begins to decline steadily in both countries but more rapidly in Tanzania than in Uganda. A similar trend is observed for women who have completed primary school, though the decline begins earlier in both countries and drops precipitously in Tanzania from P_8 to P_{10}.

The one exception to the fairly steady decline in births at higher parities among Tanzanian women relative to Ugandan women is in the secondary and higher category. The women who have achieved this level of education in the two countries have almost identical PPRs through the fourth birth, but then the ratios become erratic for subsequent births. This irregularity may be due to the rapid decline in the number of women in the sample as parity increases. The small number of women who have completed secondary school, especially in Tanzania, makes it difficult to compare the results of the PPR analysis beyond the fourth birth. Nonetheless, the TFRs for Tanzanian and Ugandan women who have completed secondary school show that Tanzanian women have slightly lower fertility.[v]

A multivariate analysis was conducted to determine whether a woman's education has the anticipated effect on the fertility regimes in Tanzania and Uganda when one controls for other factors, such as age, region, religion, and possessions in the household. The pattern in the univariate models was

replicated in the multivariate models, but the differences were generally less pronounced in the latter. The multivariate model for Tanzania shows that the relative odds of having a child are significantly lower both for women who have completed primary school and for women who have completed secondary or tertiary education relative to women with no education (Table 3). In the univariate model, education is highly significant in the primary incomplete, primary complete, and secondary and above categories, but the differences are not as great in the multivariate calculations. The multivariate model also indicates that having a husband with a secondary education or higher reduces a woman's relative odds of having a child. As anticipated, marriage cohort is an important factor given the analysis of the effect of time period on fertility presented in Tables 1 and 2. Marital status also proves to be significant in that women in polygamous unions have lower odds of having a child than women in monogamous unions, with women who have never been married having the lowest odds of all. This is most likely related to the finding that having a husband who does not stay with his wife significantly lowers the woman's odds of having a child.

INSERT TABLE 3 ABOUT HERE

There are also several significant regional differences in fertility trends in Tanzania. The data in Table 3 show that the regions of Lindi and Mtwara in the south have lower fertility, while the regions of Mara, Mwanza, Shinyanga, and Kagera around Lake Victoria have higher levels of fertility than in the rest of the country. These regions with high fertility are also the regions with the smallest percentage of women ages 15-49 using a modern contraceptive (TDHS 1996). However, the low levels of fertility in the south are not due to higher rates of contraceptive use but rather to the higher levels of infertility in these regions (Larsen 2000b).

The multivariate analysis also reveals that region is a significant factor in some cases but residence in an urban or rural setting is not significant in the adjusted calculations. Moreover, religion is not an important factor, with the odds of having a child being no greater for women of Catholic, Protestant, or Islamic faiths. The analysis of a woman's wealth is more complicated since there are items that suggest durable wealth, such as piped water or electricity, as well as possessions like a radio or bicycle that maintain their value for a shorter duration. The durable household characteristics that are significantly associated with the relative odds of having a child are electricity and cement flooring, while water source and toilet facility do not have any effect. The type of toilet may not be significant because of the small

number of women in the sample who have flush toilets (N = 211) compared to the vast majority who have pit latrines (N = 6,848). None of the possessions included in the index of household wealth (radio, television, refrigerator, bicycle, car) prove to be significant in the multivariate analysis.

The results for Uganda are similar though not identical to those for Tanzania (Table 4). As in Tanzania, region is a significant factor in some cases but not in others. In addition, one's marriage cohort, marital status, and living in a house with electricity and a cement floor are all important characteristics related to the odds of having a child in both Tanzania and Uganda. Furthermore, ownership of a radio, television, or other household items listed in the index is not associated with fertility in either country.

INSERT TABLE 4 ABOUT HERE

There are some important differences between the two countries revealed by the multivariate analysis. First, whereas completing both primary and secondary school is significantly associated with lower fertility in Tanzania, the relative odds of having a child are only affected by a woman's level of education at the secondary level and above in Uganda. Second, unlike Tanzania, the education level of a woman's husband in Uganda bears no relationship to her having a child. Third, whether a woman's husband stays with her or whether he lives elsewhere does not appear to be significant in terms of childbearing. Fourth, place of residence is associated with childbearing in Uganda since living in a rural area increases the odds of having a child. A final difference between the two countries is that being Muslim is a significant characteristic in terms of childbearing in Uganda but not in Tanzania. However, in neither country was there a significant difference between Protestants, Catholics, and women with other religious affiliations.

Discussion and Conclusion

Over the past four decades, the fertility patterns in the East African countries of Kenya, Tanzania, and Uganda have diverged sharply. In the late 1960s, the TFRs were between 6.6 and 7.1 in all three countries, but today Kenya reports a TFR of 4.7, Tanzania a TFR of 5.8, and Uganda a TFR that remains near 7. Since fertility rates were quite similar in the region in the recent past, we sought to explain the difference between the less well-studied countries of Tanzania and Uganda. In this article, we have examined some of the reasons for the fertility transition in Tanzania and the absence of a similar decline in

Uganda. One reason that may help explain the different fertility trends in the two countries is the greater change in the quantum and tempo of fertility among young women in Tanzania than in Uganda. We have shown that there has been a more rapid decline in the TFR and the PPRs in the period 0-9 years before survey in Tanzania compared to the same time period in Uganda. This is because women in Tanzania today are stopping childbearing at lower parities, increasing the age at which they first give birth, and spacing their subsequent births at longer intervals than they did in the past. These differences lead us to conclude that the trend toward having fewer children is currently more pronounced in Tanzania than in Uganda. However, we anticipate finding evidence of a similar trend in the future in Uganda if the political and economic situation in the country remains stable.

A second and complementary reason for the different fertility patterns today concerns the different educational attainment patterns among women in Tanzania and Uganda. As shown in Figure 1, the PPRs for women differ by level of education in both countries, and it was also noted that the TFRs were different for women with no education, incomplete primary education, complete primary education, and secondary education or higher. There are also large differences in the percentage of women in each country who reach each of these levels of education. In Tanzania and Uganda, the percentage of women with no formal education is approximately 25%. The differences start to emerge beyond this point, with 20% of women in Tanzania falling into the incomplete primary school category compared to 45% of women in Uganda who do not complete their primary education. Another striking difference is that primary school is the highest level of education achieved by 46% of Tanzanian women, while secondary school is the highest level for a mere 5% of the female population. These figures can be compared with Uganda, where complete primary school is the highest level of education for only 10% of women although secondary or tertiary schooling is the highest level for 19% of the women in the country. Another way to look at these figures is to point out that 71% of women in Uganda have less than a complete primary education compared to 49% in Tanzania. While the literature on the education-fertility relationship shows that the most consistent pattern of fertility decline is among women with a secondary education, it may be that a complete primary education is the threshold in countries such as Tanzania, where nearly 50% of the female population has achieved this level of education. The results of the multivariate analysis presented in Table 3 show that receiving a complete primary, secondary, or tertiary education in Tanzania significantly reduces the odds of a woman having a

child. In contrast, the results in Table 4 indicate that it is only at the secondary and higher level where schooling affects childbearing in Uganda.

In addition to these different educational patterns, there are geographic, sociocultural, and economic factors that might explain why young women in Tanzania and Uganda have different fertility trajectories. For instance, there may be important differences at the regional or district levels in terms of contraceptive knowledge, contraceptive use patterns, and mean ideal number of children that have not been captured in our analysis of data at the national level. Both countries began their family planning programs in the late 1950s and adopted national population policies in the early to mid 1990s, but we do not know whether these programs have been accepted equally by women all over the country. We do know that at the national level there is a high level of contraceptive knowledge reported by women in both countries. What we find anomalous is that at this level, a greater percentage of women in Uganda, especially women between the ages of 15-19, report knowing some contraceptive method and some modern method. In the 15-19 age group, 66% of Tanzanian women know some modern method compared to 91% in Uganda. The percentage of women with knowledge of contraceptives in both two countries is above 90% for women between the ages of 20-34, but then one finds that it is Ugandan women in the older age cohorts who report a greater knowledge of at least one contraceptive method (TDHS 1996; UDHS 1995).

A similarly surprising pattern occurs at the national level when one examines the contraceptive use patterns for women in the 15-19 age group compared to the rest of the women in the two countries. Both married and unmarried Ugandan women in this youngest cohort are more likely to use some method of contraception than their Tanzanian counterparts. If one examines ever use of contraception among all women in the two countries, one finds that the differences are slight, with 31% of Tanzanian women and 32% of Ugandan women having used some birth control method, and 23% Tanzanian women and 16% of Ugandan women having used a modern method (TDHS 1996; UDHS 1995). Yet if one looks at the age specific fertility rates presented in Table 1, it is clear that fertility remains high among young Ugandan women even though some of them use birth control and the vast majority know about it.

There are further similarities between the two countries at the national level when one considers the mean ideal number of children. Comparing urban and rural women in each age cohort, one finds that there is never a difference greater than .3 in the ideal number reported by women in Tanzania and Uganda.

For example, urban women between the ages of 20-24 in both Tanzania and Uganda report a mean ideal number of children of 3.9, and rural women in the same age group report a mean of 5.2 in Tanzania and 5.0 in Uganda. There is more than a one-child difference in the ideal number of children between urban and rural women within each country, but the difference between the two countries when women are matched by age and residence is negligible (TDHS 1996; UDHS 1995). In sum, it does not appear that the difference in the fertility trends in Tanzania and Uganda can be explained solely by looking at the national data for level of contraceptive knowledge, contraceptive use, and for ideal number of children. It is likely that women in both countries, particularly in Tanzania, are relying on other strategies to control their fertility than the methods measured in the DHS.

It is possible that there are other sociocultural factors related to the fertility trends in Tanzania and Uganda that we have not examined sufficiently in this article. We did look at religious affiliation and marital status in both countries, but we found that religion only had an impact on childbearing in Uganda and that marital status had a similar effect in Tanzania and Uganda. However, we did find that living with one's husband increased the odds of childbearing in Tanzania but not in Uganda. There may be important cultural differences in marital unions to explain this phenomenon that are not captured by data from the DHS. There may also be social factors that we have left unexplored that would help to explain the significant difference in the odds ratios for Muslims and Christians in Uganda but not in Tanzania. Even though there is a larger percentage of Protestants in Tanzania and Catholics in Uganda, this religious distinction did not have a major effect on fertility in either country (TDHS 1996; UDHS 1995). In contrast, monogamy and polygamy are important distinctions in terms of their relationship to fertility in both countries. As expected, we found that women in polygamous unions have lower fertility than women in monogamous ones in both Tanzania and Uganda (Pebley and Mbugua 1989). Since the percentage of married women in polygamous unions is approximately the same (29% in Tanzania and 30% in Uganda), it does not appear that marital status is an important sociocultural factor in determining different fertility trends in the two countries (TDHS 1996; UDHS 1995).

The factors that may be more relevant to understanding the differences between Tanzania and Uganda are those referred to as the proximate, or intermediate, determinants of fertility (Bongaarts 1982). We have considered use or non-use of contraception in this article, but we have not examined in detail

other factors that affect fertility, such as age at first intercourse, breastfeeding, and infertility. The median age at first intercourse, like the median age at first birth, is higher in Tanzania than in Uganda. The difference is particularly striking among women between the ages of 20-24 since the median age of first intercourse for women in this cohort is 17.4 years in Tanzania and 16.5 in Uganda. Additionally, the median duration of average breastfeeding is slightly longer in Tanzania than in Uganda, with the median in Tanzania being approximately 22 months but slightly less than 20 months in Uganda (TDHS 1996; UDHS 1995). The data on infertility show that the percentages of women with primary and secondary infertility are virtually the same in the two countries, making it unlikely that this proximate determinant explains the fertility differences in the region (Larsen 2000a). In short, the most important proximate determinant of fertility for our analysis appears to be exposure to intercourse since women in Tanzania are entering sexual unions later, and having their first child at later ages, than women in Uganda. Breastfeeding, infertility, and contraceptive use patterns do not appear to be as important in explaining the difference between these two countries as are the unobserved variables related to intercourse.

Two other possibilities we want to consider to explain the different fertility patterns among young women in Tanzania and Uganda concern the economic and political conditions within each country and in East Africa more broadly. As noted above, Tanzania has lagged behind Uganda in recent years in terms of economic growth, and thus one explanation for the fertility decline in the former country is that young Tanzanian women are responding to economic difficulties by reducing the number of children they bear. In Kenya, economic hardship is one of the reasons given for the decline in fertility as costs associated with children increase and the perceived benefits from large families diminish (Buckley 1998; Dow et al. 1994). As Watkins concludes in her study of reproductive ideologies in Kenya, “the advantage of a small number of educated children is now not that they are a route to a modern and progressive life, but rather that they are the only conceivable way to avoid sinking further into poverty” (1998, p. 33). Very similar sentiments were expressed by young Tanzanian men and women during interviews about education and fertility in the Kilimanjaro Region of Tanzania (Vavrus 1998).

If the benefits of economic growth in Uganda were widespread and had led to an increase in living standards throughout the country, then it would be conceivable that the fertility transition underway in Tanzania is largely the result of economic conditions unlike those in Uganda. Yet once again we find that

studies at the national level do not bear this out and that more detailed analyses may be needed to understand the impact of economic change on fertility in different regions of Tanzania and Uganda. Research on the macro-economic conditions in both countries, for example, highlights the same problems of the declining value of wages and the rising costs of commodities and social services (Bigsten and Kayizzi-Mugerwa 1999; Jamal 1998; Raikes and Gibbon 1996). Moreover, development in Uganda in recent years reflects the country's need to rebuild its industrial base after the severe setbacks imposed by the civil war (Collier and Pradhan 1998). Since the 1980s, both Tanzania and Uganda have attempted to improve their economic conditions by adopting economic reform measures put forth by the World Bank and the International Monetary Fund. These measures include the imposition of user fees for many social services, including education and health care. Households, rather than the state, must now pay the costs of these reforms, and this may be one of the reasons for the increase in the primary school drop-out rate in Tanzania (World Bank 1999) and Uganda (Bigsten and Kayizzi-Mugerwa 1999). Further research is needed to understand how these economic changes may be affecting the educational opportunities and the fertility-related behavior of young women in different parts of Tanzania and Uganda. A more detailed analysis of each country by region or district would allow one to study the connections between education, economics, and fertility.

We have looked at some of the intra-national factors that may affect the fertility trends in Tanzania and Uganda, and we would like to conclude by considering the international context in which these countries are situated. In an important study of the international dimension of fertility trends in developing countries, Bongaarts and Watkins (1996) found that there is no change in development indicators in the first decade after the demographic transition and that there is no correlation between the improvement in socioeconomic conditions and fertility decline. However, they did discover a strong association between the pace of the decline and the level of development when the onset of the fertility transition occurred. Our research appears to confirm their findings: Kenya, when compared to neighboring Tanzania and Uganda, would be expected to have the most rapid decline because it began the transition after it had achieved a fairly high level of development compared to other countries in eastern Africa. One would also anticipate that countries entering the transition before having achieved such levels of development, such as Tanzania, would proceed more slowly. Furthermore, the slower pace of the fertility transition in Tanzania and

Uganda compared to Kenya, and the concomitant phenomena of fertility decline and limited economic growth throughout the region, support the thesis of Bongaarts and Watkins that development and reproductive behavior are not inextricably linked.

Bongaarts and Watkins also contend that social interaction across national borders is an important yet often overlooked factor in the analysis of fertility transition in a region. Their hypothesis about the importance of transnational communication as a factor in fertility transitions has not been sufficiently examined in Sub-Saharan Africa, but our study provides some evidence to support several of their claims about the social processes that may affect it. They write: "As in our consideration of national channels of interaction, we also expect the availability of and variation in international channels to be associated with relative levels of development (migrants go from less developed to more developed locations) and with a shared language . . . or culture . . ." (1996, pp. 664-665). We pointed out earlier that the concept of 'East Africa' was a colonial construct of political and economic convenience rather than a union formed because of a natural affinity among the people of Kenya, Tanzania, and Uganda. While ethnic affiliation within each country was an important aspect of social organization before and during the colonial period, the situation in Uganda, with its highly structured and centralized kingdoms, was different from Kenya and Tanzania (Musisi 1991). The continued strength of these affiliations in Uganda may be one of the reasons why today the most widely spoken language in the country is Luganda (UDHS 1995), which is the language associated with the Baganda from the former Buganda kingdom. In contrast, Swahili, a language associated with no single ethnic group, is the lingua franca in Kenya and Tanzania. Even though Swahili is used by many people in Uganda, it has never served as a language of wider communication to the same extent as in Kenya and Tanzania. And even though ethnic identity remains important in Kenya and Tanzania, we suspect that further research into the patterns of social interaction within each country would reveal more extensive intra-national channels in these countries than in Uganda. We would also expect to find a greater affinity between Kenya and Tanzania that may be an important explanation for the fertility transition currently underway in these two countries.

Our findings about the education-fertility relationship are consistent with other studies that have found an inverse pattern between level of schooling for girls and childbearing. We conclude, however, that the threshold for this fertility transition may be primary schooling in countries like Tanzania, where almost

half the female population completes this level of education. In countries where a smaller percentage of women complete primary school than secondary school, as in the case of Uganda, the benefits of education are not sufficiently widespread to trigger a reduction in fertility. One of the policy implications of this study is that more educational resources should be directed at the primary school level so that a larger percentage of girls can complete this important stage of schooling. While the secondary and tertiary levels remain critical to economic development, it is also imperative that the majority of girls finish primary school. A second policy consideration concerns the disjuncture between knowledge and use of contraceptives in developing countries. This study suggests that women in Tanzania may be using some other kind of fertility control besides modern contraceptives since fertility is declining more rapidly than might be expected given the low levels of contraceptive use in the country. Despite high levels of contraceptive knowledge among women in the region, there appear to be significant barriers to the use of modern methods that should be studied if family planning programs are to have their intended impact.

Intra-national factors, such as educational attainment patterns and contraceptive use at the national and regional levels, require further investigation if we are to understand more fully the different fertility trends in East Africa. Yet we should also undertake a concomitant examination of inter-national channels of communication to see how they may affect the pace of the fertility transition in different countries within the same region. We contend that further research on fertility transitions in developing countries needs to consider both the national and the international dimensions of this important process.

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Notes

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[1] The gross national product (GNP), one of many measures of economic development, was estimated as follows for 1996: $320 in Kenya, $300 in Uganda, and $170 in Tanzania (UNICEF 1999, pp. 115-117). The gross primary and secondary school enrolment ratios, a common measure of educational attainment, also show Kenya to be well ahead of its neighbors. Kenya's gross primary school enrolment ratio was 85 for both boys and girls compared to 79 for boys and 67 for girls in Uganda, and 68 for boys and 66 for girls in Tanzania. An even more striking pattern obtains at the secondary level, where Kenya's gross enrolment ratio is 26 for boys and 22 for girls compared to 15 for boys and 9 for girls in Uganda, and 6 for boys and 5 for girls in Tanzania (UNICEF 1999, pp. 107-109).

[1] The gross secondary school enrolment ratio is calculated by dividing the number of children of all ages enrolled in secondary school by the population of children in the official age group for secondary school (UNICEF, 1999, p. 109). The same formula is used to calculate the gross primary school enrolment ratio described in endnote #1. There are problems with this formula, however, since it is difficult to interpret the reasons for an increase or a decline in the ratio. For this reason, some researchers have called for alternative measures of educational progress using survey data such as that provided by the DHS (Lloyd, Kaufman, and Hewett 1999).

[1] The TFR for Tanzania as reported in the 1967 census was 7.275, but this figure was regarded as too high by the editors of the census because of a likely misunderstanding of the reference period by the respondents. Therefore, the TFR we report is the one that has been adjusted and "is considered a reasonable estimate for Tanzania" (Ominde 1975, p. 20).

[1] The UDHS, unlike the TDHS, includes one question in which the respondent is asked to read a sentence, and then the interviewer evaluates her ability using one of three categories: "reads easily"; "with difficulty"; or "not at all". Although this type of assessment is an attempt at providing more meaningful data about education, it is still very limited in its utility because it does not include oral language skills or numeracy.

[1] Since the number of women with secondary education and above declines rapidly at higher parities, one may want to calculate the TFR only through P_4. These calculations also indicate that the fertility rate for Tanzania (TFR of 3.8) is slightly lower than the rate for Uganda (TFR of 3.9).

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Table 1 Age specific fertility rates per 1,000 women and total fertility rates, Tanzania and Uganda.

	Tanzania		Uganda	
Age	TDHS 1989-92	TDHS 1993-1996	Census 1990	UDHS 1992-95
15-19	144	135	152	204
20-24	282	260	329	319
25-29	270	255	324	309
30-34	231	217	275	244
35-39	177	167	207	177
40-44	108	87	95	89
45-49	37	42	32	29
TFR	6.3	5.8	7.1	6.9

Sources:

Bureau of Statistics [Tanzania] and Macro International Inc. (1997). Tanzania Demographic and Health Survey 1996 [TDHS 1996]. Calverton, Maryland: Bureau of Statistics and Macro International, p. 31.

Statistics Department [Uganda] and Macro International Inc. (1996). Uganda Demographic and Health Survey 1995 [UDHS 1995]. Calverton, Maryland: Statistics Department and Macro International, p. 33.

Table 2 Parity progression ratios for women 0-9 and 10-19 years before survey, Tanzania (TDHS 1996) and Uganda (UDHS 1995)

	Tanzania		Uganda	
Parity progression ratio[a]:	0 – 9 years	10-19 years	0 – 9 years	10-19 years
P_0	.93	.95	.95	.95
P_1	.92	.94	.94	.94
P_2	.91	.94	.93	.95
P_3	.93	.94	.94	.95
P_4	.89	.92	.91	.94
P_5	.86	.92	.89	.94
P_6	.81	.91	.87	.92
P_7	.80	.87	.83	.91
P_8	.70	.90	.78	.84
P_9	.73	.83	.80	.83
P_{10}	.62	.68	.68	.79
P_{11}	.72	.68	.50	.73
TFR[b]	5.9	7.3	6.7	7.7
Median waiting time to next live birth[c]:				
0	19.7	18.8	19.0	18.5
1	2.9	2.7	2.6	2.4
2	2.9	2.7	2.6	2.4
3	2.9	2.7	2.5	2.4
4	2.9	2.7	2.7	2.4
5	3.0	2.7	2.6	2.5
6	3.1	2.8	2.7	2.5
7	3.4	2.9	2.8	2.5
8	3.4	2.8	3.1	2.5
9	3.5	3.0	2.9	2.6
10	4.6	3.6	3.6	2.5
11	3.9	3.5	-	2.8
Sample size[d]	4,838	2,949	4,514	2,265

Notes:

[a] P_0 is the progression from parity 0 to 1.

[b] TFR = $P_0+P_0P_1+P_0P_1P_2+ \ldots +P_0P_1P_2P_3P_4P_5P_6P_7P_8P_9P_{10}$.

[c] The waiting time at parity 0 is the median age at first birth. This was calculated for women below the age of 30 and above the age of 30.

[d] Sample size at parity 1.

Table 3. Relative odds of having a child for women in Tanzania

Characteristic	Crude[1]			Adjusted			Sample Size
	OR	95% CI	p-value	OR	95% CI	p-value	
Age group							
<20	1.00			1.00			1,729
20-24	4.19	4.04-4.34	<.0001	3.66	3.53-3.80	<.0001	1,694
25-29	4.09	3.92-4.25	<.0001	3.19	3.06-3.33	<.0001	1,415
30-34	3.36	3.21-3.52	<.0001	2.41	2.29-2.53	<.0001	1,135
35-39	2.41	2.27-2.56	<.0001	1.62	1.52-1.72	<.0001	896
40-44	1.18	1.06-1.30	.001	.77	.69-.85	<.0001	670
45-49	.37	.28-.49	<.0001	.24	.18-.32	<.0001	581
Education							
None	1.00			1.00			2,241
Primary incomplete	.93	.89-.96	<.0001	.97	.93-1.01	.17	1,636
Primary complete	.72	.70-.74	<.0001	.90	.86-.94	<.0001	3,685
Secondary and above	.51	.47-.55	<.0001	.75	.69-.82	<.0001	558
Husband’s education							
None	1.00			1.00			1,326
Primary incomplete	1.04	1.00-1.08	.06	1.03	.99-1.08	.13	1,249
Primary complete	.85	.82-.88	<.0001	1.00	.96-1.04	1.00	2,921
Secondary and above	.74	.70-.79	<.0001	.93	.87-1.00	.04	666
No husband	.20	.18-.22	<.0001				1,899
Don’t know	.93	.81-1.07	.34	1.07	.93-1.24	.35	59
Region							
Dodoma	1.00			1.00			315
Arusha	.94	.86-1.03	.21	1.03	.94-1.13	.48	469
Kilimanjaro	.91	.83-1.00	.04	.97	.88-1.07	.51	393
Tanga	.96	.88-1.06	.42	.97	.88-1.08	.61	398

Morogoro	1.01	.92-1.11	.79	1.05	.95-1.15	.37	377
Coast	.88	.80-.98	.02	.89	.80-1.00	.04	277
Dar es Salaam	.72	.66-.78	<.0001	.89	.75-1.06	.18	764
Lindi	.87	.78-.96	.01	.85	.77-.95	.004	318
Mtwara	.85	.78-.94	.001	.82	.74-.90	<.0001	441
Ruvuma	.93	.85-1.02	.11	.96	.88-1.06	.44	466
Iringa	.97	.89-1.07	.58	1.02	.93-1.12	.70	389
Mbeya	.97	.88-1.07	.55	.97	.87-1.07	.50	314
Singida	1.13	1.03-1.23	.01	1.14	1.04-1.25	.01	394
Tabora	1.00	.90-1.11	.97	1.03	.91-1.16	.59	198
Rukwa	1.15	1.05-1.27	.003	1.13	1.02-1.24	.02	353
Kigoma	1.14	1.04-1.26	.005	1.17	1.07-1.29	.001	367
Shinyanga	1.14	1.04-1.26	.004	1.21	1.10-1.33	<.0001	375
Kagera	1.23	1.11-1.35	<.0001	1.23	1.11-1.36	<.0001	284
Mwanza	1.09	.99-1.20	.10	1.19	1.07-1.31	.001	310
Mara	1.30	1.18-1.43	<.0001	1.36	1.23-1.51	<.0001	277
Pemba	1.39	1.26-1.53	<.0001	1.51	1.36-1.68	<.0001	295
Zanzibar	1.07	.97-1.18	.19	1.31	1.18-1.46	<.0001	346

Table 3. Continued

Characteristic	Crude			Adjusted			Sample Size
	OR	95% CI	p-value	OR	95% CI	p-value	
Residence							
Dar es Salaam	1.0			1.00			666
Other urban	1.20	1.12-1.28	<.0001	.93	.79-1.10	.39	1,422
Rural	1.53	1.44-1.63	<.0001	1.03	.88-1.21	.69	6,032
Religion							
Muslim	1.00			1.00			3,200
Catholic	1.05	1.01-1.09	.005	1.04	1.00-1.09	.08	2,418
Protestant	1.04	1.00-1.08	.06	1.02	.97-1.07	.49	1,792
Other, none	1.19	1.13-1.25	<.0001	1.01	.95-1.08	.72	689
Marriage cohort							
< 1976	1.00			1.00			3,352
1976 - 1985	1.09	1.05-1.12	<.0001	.84	.81-.87	<.0001	1,801
1986+	.82	.79-.85	<.0001	.62	.59-.65	<.0001	2,967
Marital status							
Married							
Momogamous	1.00			1.00			3,874
Polygamous	1.00	.97-1.03	.91	.95	.92-.99	.01	1,530
Formerly	.81	.77-.84	<.0001	.89	.67-1.18	.42	817
Never	.22	.20-.23	<.0001	.22	.16-.29	<.0001	1,899
Husband sleeps							
With her	1.00			1.00			4,824
Elsewhere	.89	.84-.93	<.0001	.91	.86-.96	<.0001	554
Missing	.55	.53-.57	<.0001	.85	.65-1.13	.26	2,742
Ever contracepted							
Yes	1.13	1.10-1.16	<.0001	1.31	1.27-1.35	<.0001	2,632
No	1.00			1.00			5,488
Water source				NS			

Piped	1.00						959
Public tap	1.23	1.17-1.30	<.0001				2,398
Well	1.42	1.35-1.50	<.0001				2,305
Stream, spring, etc.	1.37	1.30-1.45	<.0001				2,372
Missing	1.16	.99-1.36	.06				86
Toilet facility				NS			
Flush toilet	1.00						211
Pit latrine	1.53	1.38-1.71	<.0001				6,848
No facility, bush	1.83	1.63-2.05	<.0001				965
Missing	1.38	1.15-1.65	<.0001				96
Electricity							
No	1.00			1.00			7,032
Yes	.65	.62-.68	<.0001	.89	.84-.95	.001	998
Missing	.84	.73-.97	.02	1.08	.87-1.34	.50	90
Floor material							
Earth & sand	1.00			1.00			5,906
Cement & other	.72	.70-.75	<.0001	.90	.85-.94	<.0001	2,120
Missing	.79	.68-.92	.002	.89	.71-1.11	.28	94

Table 3. Continued

Characteristic	Crude			Adjusted			Sample size
	OR	95% CI	p-value	OR	95% CI	p-value	
Index[3]				NS			
0	1.00						3,044
1	.97	.94-1.00	.06				2,788
2	.99	.96-1.03	.64				1,844
3	.60	.53-.69	<.0001				157
4	.62	.53-.71	<.0001				110
5	.54	.37-.77	.001				23
Missing	.88	.79-.98	.03				154
Log likelihood					61,942	-	
Number of observations			155,161		155,160		
Pseudo R^2					.09		

NS Variable did not add to the model fit at the 5% level. Variable is not in the model

1 Adjusting for age and one variable.

2 Year of first marriage. For never married women the year turning age 19.

3 The index includes whether the subject has a radio, television, refrigerator, bicycle or car. It ranges from 0, if the subject has none of the items to 5, if the subject has all 5 items.

Table 4. Relative odds of having a child for women in Uganda

Characteristic	Crude[1]			Adjusted			Sam
	OR	95% CI	p-value	OR	95% CI	p-value	siz
Age group							
<20	1.00			1.00			1,
20-24	3.93	3.79-4.08	<.0001	3.49	3.36-3.63	<.0001	1,
25-29	3.75	3.60-3.92	<.0001	3.03	2.90-3.17	<.0001	1,
30-34	2.91	2.77-3.06	<.0001	2.19	2.07-2.31	<.0001	
35-39	1.99	1.86-2.14	<.0001	1.43	1.33-1.54	<.0001	
40-44	.93	.82-1.05	.24	.65	.58- .74	<.0001	
45-49	.23	.15- .35	<.0001	.16	.11- .24	<.0001	
Education							
None	1.00			1.00			1,
Primary incomplete	.96	.93-1.00	.04	1.03	.99-1.06	.15	3,
Primary complete	.89	.84- .94	<.0001	1.00	.95-1.06	.87	
Secondary and above	.59	.57- .62	<.0001	.82	.77- .87	<.0001	1,
Husband's education				NS			
None	1.00						
Primary incomplete	1.07	1.02-1.12	.01				2,
Primary complete	1.01	.96-1.07	.70				1,
Secondary and above	.84	.80- .88	<.0001				1,
No husband	.16	.14- .17	<.0001				1,
Don't know	.94	.87-1.02	.12				
Region							
Central	1.00			1.00			2,
Eastern	1.04	1.00-1.08	.06	.94	.90- .98	.01	1,
Northern	.96	.92-1.01	.12	.84	.80- .88	<.0001	1,
Western	1.07	1.03-1.12	<.0001	1.01	.97-1.06	.63	1,
Residence							
Kampala	1.00			1.00			
Other urban	1.01	.94-1.08	<.89	.95	.88-1.02	.17	1,
Rural	1.38	1.30-1.47	<.0001	1.10	1.02-1.19	.01	4,
Religion							
Catholic	1.00			1.00			2,
Protestant	.96	.93- .99	.01	.98	.94-1.01	.14	2,
Muslim	1.02	.97-1.07	.40	1.09	1.04-1.15	.001	
Other, none	.90	.83- .99	.02	.98	.89-1.06	.52	
Marriage cohort							
< 1976	1.00			1.00			2,
1976 - 1985	1.11	1.08-1.15	<.0001	.86	.83- .90	<.0001	1,
1986+	.88	.84- .91	<.0001	.65	.62- .68	<.0001	2,
Marital status							
Married							
Momogamous	1.00			1.00			3,
Polygamous	.95	.92- .98	.01	.92	.89- .96	<.0001	1,

Formerly	.79	.75- .82	<.0001	.76	.72- .79	<.0001	[illegible]
Never	.16	.14- .17	<.0001	.14	.13- .16	<.0001	1,[illegible]
Husband sleeps				NS			
With her	1.00						4,[illegible]
Elsewhere	.95	.90- .99	.02				[illegible]
Missing	.58	.56- .60	<.0001				2,[illegible]
Ever contracepted							
Yes	1.12	1.09-1.15	<.0001	1.26	1.22-1.31	<.0001	2,[illegible]
No	1.00			1.00			4,[illegible]

Table 4. Continued

Characteristic	Crude			Adjusted			Sam
	OR	95% CI	p-value	OR	95% CI	p-value	siz
Water source				NS			
Piped	1.00						
Public tap	1.35	1.23-1.47	<.0001				
Well	1.69	1.57-1.83	<.0001				2,
Stream, spring, etc.	1.73	1.60-1.87	<.0001				3,
Missing	1.07	.77-1.49	.69				
Toilet facility							
Flush toilet	1.00			1.00			
Pit latrine	1.66	1.53-1.80	<.0001	1.15	1.05-1.26	.003	5,
No facility, bush	1.78	1.63-1.95	<.0001	1.19	1.08-1.32	.001	
Missing	1.24	.93-1.65	.15	.89	.53-1.48	.65	
Electricity							
No	1.00			1.00			5,
Yes	.65	.62- .68	<.0001	.91	.86- .97	.004	1,
Missing	.63	.46- .87	.01	.86	.48-1.53	.60	
Floor material							
Earth & sand	1.00			1.00			4,
Cement, other	.72	.69- .74	<.0001	.93	.88- .98	.004	2,
Missing	.77	.62- .96	.02	1.13	.84-1.54	.42	
Index[3]				NS			
0	1.00						2,4
1	.96	.93-1.00	.03				2,3
2	1.00	.96-1.04	.93				1,7
3	.77	.70- .84	<.0001				2
4	.71	.61- .84	<.0001				
5	.64	.51- .79	<.0001				
Missing	.97	.81-1.16	.74				
Log likelihood						-	
				54,732			
Number of observations			128,298				
				128,298			
Pseudo R^2							
				.09			

NS Variable did not add to the model fit at the 5% level. Variable is not in the model

4 Adjusting for age and one variable.

5 Year of first marriage. For never married women the year turning age 19.

6 The index includes whether the subject has a radio, television, refrigerator, bicycle or car. It ranges from 0, if the subject has none of the items, to 5, if the subject has all 5 items.

Notes

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[i] The gross national product (GNP), one of many measures of economic development, was estimated as follows for 1996: $320 in Kenya, $300 in Uganda, and $170 in Tanzania (UNICEF 1999, pp. 115-117). The gross primary and secondary school enrolment ratios, a common measure of educational attainment, also show Kenya to be well ahead of its neighbors. Kenya's gross primary school enrolment ratio was 85 for both boys and girls compared to 79 for boys and 67 for girls in Uganda, and 68 for boys and 66 for girls in Tanzania. An even more striking pattern obtains at the secondary level, where Kenya's gross enrolment ratio is 26 for boys and 22 for girls compared to 15 for boys and 9 for girls in Uganda, and 6 for boys and 5 for girls in Tanzania (UNICEF 1999, pp. 107-109).

[ii] The gross secondary school enrolment ratio is calculated by dividing the number of children of all ages enrolled in secondary school by the population of children in the official age group for secondary school (UNICEF, 1999, p. 109). The same formula is used to calculate the gross primary school enrolment ratio described in endnote #1. There are problems with this formula, however, since it is difficult to interpret the reasons for an increase or a decline in the ratio. For this reason, some researchers have called for alternative measures of educational progress using survey data such as that provided by the DHS (Lloyd, Kaufman, and Hewett 1999).

[iii] The TFR for Tanzania as reported in the 1967 census was 7.275, but this figure was regarded as too high by the editors of the census because of a likely misunderstanding of the reference period by the respondents. Therefore, the TFR we report is the one that has been adjusted and "is considered a reasonable estimate for Tanzania" (Ominde 1975, p. 20).

[iv] The UDHS, unlike the TDHS, includes one question in which the respondent is asked to read a sentence, and then the interviewer evaluates her ability using one of three categories: "reads easily"; "with difficulty"; or "not at all". Although this type of assessment is an attempt at providing more meaningful data about education, it is still very limited in its utility because it does not include oral language skills or numeracy.

[v] Since the number of women with secondary education and above declines rapidly at higher parities, one may want to calculate the TFR only through P_4. These calculations also indicate that the fertility rate for Tanzania (TFR of 3.8) is slightly lower than the rate for Uganda (TFR of 3.9).