The Determinants of Regional Fertility: A Statistical Analysis of Socioeconomic Effects in Uganda

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Appendices

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Studies of fertility in Sub-Saharan Africa (SSA) tend to assess indicators at the state level, concluding that a few states have begun the demographic transition, although rather moderately and slowly. In reality, fertility rates have declined more rapidly in smaller pockets within countries than across countries, and the differentials tend to be just as substantial. As expected, the declines have largely occurred in wealthier, urban areas that offer greater access to public services, specifically education and health. While the determinants of fertility are discussed in a broad literature, there is widespread agreement that socioeconomic factors indirectly – albeit heavily – affect fertility trends by influencing women's decisions at a personal level. These links combine to drive down fertility, usually as incomes and public services rise accordingly.

Although intuitively fertility seems like a no-brainer (raise the quality of life and lower fertility), empirical analyses are necessary for teasing apart the nuanced nature of population growth and shifts. Fertility is a very personal decision with very social and economic consequences, and is thus a sensitive issue for policymakers. Uganda is one example where the demographic transition is underway in small segments of the country, while the population in most areas continues to explode with rather dire outcomes. Understanding the within-country dynamics will help Ugandan policymakers to gain meaningful insights into the variables determining fertility trends among different regions throughout the country.

According to the U.S. Census Bureau and the Uganda Bureau of Statistics (UBOS), the total fertility rate (TFR) for Uganda in 2007 was 6.8, down from 7.3 in 1988. The TFR is defined as the number of children a woman reaching reproductive years could expect to have, on average, throughout her reproductive cycle (15-49 years). Uganda's persistently high TFR has generated a population growth rate of 3.6 percent annually. The U.S. Census Bureau estimates that the TFR in 2025 will fall only slightly to 6.1, while the population will continue to grow at 3.4 percent - Uganda's population will double every twenty years. The rapid surge in population is detrimental economically, as the population grows faster than income in a steady progression over time. Its human face is also quite daunting, as high fertility signals poor health development, particularly for infant mortality and maternal health.

A study by the Population Reference Bureau in 2006 claims that Uganda's population of just over 30 million is projected to explode to 130 million by 2050, a nearly five-fold increase[1] in a country slightly smaller than the state of Oregon. Coupled with a per capita GDP of little more than $1,100 (PPP) and a poverty rate of 35 percent,[2] a population explosion will further expand the poverty gap, driving a wedge between the few haves and the many have-nots.

The socioeconomic divide between the urban and rural populations further compounds the problem. According to UBOS, Uganda's urban population stands at 12 percent, with 5.9 percent in Kampala, the capital. The 2006 Demographic and Health Survey (DHS) for Uganda outlined the growing inequality between the urban and rural populations. The rural TFR of 7.1 dwarfs the urban TFR of 4.4 (3.7 in Kampala), suggesting that the demographic transition is underway in a small section of the country, while the majority remain at the status quo. The urban-rural divide illustrates how continued high fertility could spark massive land scarcity and/or excessive urbanization over time.

Decreasing fertility, in practice, goes hand-in-hand with rising incomes and improved human capital. The TFR differential thus highlights an important socioeconomic divide within Uganda. Uganda's most recent Poverty Eradication Action Plan cites reducing population growth as a priority in poverty reduction. The report projects that a decrease in annual population growth to 2.4 percent – in conjunction with maintaining 6 percent annual economic growth – would reduce poverty to 18 percent by 2013/14,[3] a nearly 20 percentage point drop.

This paper assumes that rapid population growth is harmful for Ugandan development and it aims to provide insights into fertility trends within Uganda through a statistical analysis of socioeconomic determinants on a regional scale. Most fertility studies look at differences across countries, but there are also very distinct differences *within* countries that may be overlooked. Empirically testing some correlative factors thought to determine fertility will help to detangle some of the confusion behind Uganda's rapidly rising population and its implication for future development.

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[1] Herro, Alana. "Uganda on Track to Have World's Highest Population Growth." Worldwatch Institute. Available from http://www.worldwatch.org/node/4525. Internet; accessed 12 Feb 2008.

[2] CIA World Factbook, "Uganda." <https://www.cia.gov/library/publications/the-world-factbook/geos/ug.html#Geo>

[3] PEAP 2005, p. 53.

Part II of this paper will provide a brief literature review about the determinants of fertility, specifically studies focusing on Sub-Saharan Africa. Next, Part III will lay out the methodology of the analysis, offering a detailed outline of model building. Part IV lists the results according to regions, age cohorts, and socioeconomic groupings, along with the author's interpretations. Part IV is particularly important as it separates regions and assesses the short list of determinants within the scope of the socioeconomic makeup of each region, and compares it to Uganda at the state-level. Finally, Part V contains policy recommendations for the Ugandan government based on the paper's analytical findings. As an early disclaimer, this paper does not hope to offer concrete evidence of the direct causes of high fertility in Uganda, but rather aims to provide insights for policymakers as they grapple with controlling fertility in a developmental context. The underlying foundation behind this study is the belief that fertility reduction is an instrumental tool for economic and social development.

Part II: Literature Review

The literature discussing the general causes of fertility is quite large, with theories ranging from micro-level economic behavior to an author's belief in a single socioeconomic factor such as women's education or literacy. This paper focuses on the framework articulated by John Bongaarts, built from his study in 1978 of the proximate determinants of fertility.[4] Proximate determinants are simply intermediate variables that have a direct causal link to fertility that is indisputable. These intermediate variables are biological and behavioral traits that effectively determine fertility, such as breastfeeding and postpartum abstinence.

The proximate determinants are then shaped by indirect, socioeconomic variables like education and wealth, what Bongaarts calls "background" variables. The framework is particularly useful because it lends itself to more simplified within-country comparisons, as it separates the variables that can be policy-influenced (indirect) and those that are not within the realm of public decisions (direct). This helps policymakers to better interpret fertility differentials, and most importantly, to better address them through policy. For example, education is often cited as having a significant correlative link with lower fertility; however,

[4] Bongaarts, Jon. "A Framework for Analyzing the proximate Determinants of Fertility." *Population and Development Review*, no. 4 (March 1978): 105-132.

increased education lowers the average breastfeeding period per woman, thereby raising the biological likelihood of another pregnancy. It is common knowledge that education is strongly negatively correlated with fertility per woman despite its biological effect. Therefore, education must be linked to another direct variable that helps explain its generally negative relationship with fertility. By using the proximate determinant model, one can more fully understand how education affects direct, behavioral variables that ultimately determine fertility.

In a subsequent article, Bongaarts, with Odile Frank and Ron Lesthaeghe,[5] concentrates on SSA in illustrating his framework. The article cites three, primary proximate determinants: 1) lactational amenorrhea due to breastfeeding; 2) postpartum sexual abstinence; 3) involuntary infertility (due to gonorrhea). The authors argue that these proximate determinants are susceptible to modern influences in SSA, namely education and urbanization. [6] The convenient approach is to assume that the proximate determinants have a depressing influence on fertility. But, in reality, fertility tends to decline among women for which the proximate determinants also decline. For example, as Bongaarts, Frank and Lesthaeghe note in their study of Cameroon: "The lower fertility rates among better educated and urban women are primarily caused by later age at first union and by higher prevalence of contraceptive practice. However, higher levels of education and urban residence are also associated with shorter durations of postpartum abstinence and breastfeeding and perhaps with lower levels of postpartum amenorrhea."[7]

At the national and subnational levels, the proximate determinants are responsible for the variations in fertility among individual women, but interpreting exactly *how* socioeconomic variables like education and residence are influencing more direct determinants like breastfeeding and contraceptive practice is difficult and involves more in-depth country analyses. Bongaarts framework for SSA outlines five basic proximate determinants, three biological (1-3) and two behavioral (4-5): 1) lactational amenorrhea; 2) postpartum abstinence; 3) natural or pathological sterility; 4) age at first union; and 5) contraceptive use.[8] Within this framework,

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[5] Bongaarts, Jon; Odile Frank: Ron Lesthaeghe. "The Proximate Determinants of Fertility in Sub-Saharan Africa." *Population and Development Review*, no. 10 (Sept. 1984): 511-537.

[6] Bongaarts, Frank, and Lesthaeeghe, p. 528.

[7] Bongaarts, Frank, and Lesthaeghe, p. 531-532.

[8] Idib, p. 532.

reduction in fertility will occur where increases in the age at first union and the prevalence of contraceptive use outpace decreasing amenorrhea and postpartum abstinence.

Barney Cohen uses Bongaarts proximate determinants framework to argue that age at first union and contraceptive use are the most dynamic variables in determining fertility. He also expounds on the interpretive difficulty in correctly linking background variables to proximate determinants when evaluating fertility trends. He is worth quoting at length:

> Most scholars assume that the length of breastfeeding and postpartum abstinence will decline in the face of modernization. In support of this hypothesis, analyses of breastfeeding and postpartum practices typically reveal that the length of breastfeeding is shorter in the urban than in rural areas. Small amounts of education also are often held responsible for breaking down traditional postpartum practices, leading to the much documented inverted U-shaped relationship between education and fertility in Africa.[9]

Cohen goes on to assert that proximate determinants are changing very slowly and any recent fertility shifts are largely attributable to changing marriage patterns and increasing contraceptive use. Thus, Cohen concentrates more on the effects of behavioral factors than biological factors.

The debate over contraception as a direct, behavioral variable is mixed, only with respect to the direction - positive or negative - of its relationship with fertility. John C. Caldwell, I. O. Orubuloye and Pat Caldwell claim contraceptive use to have a strong association with fertility. In addition, they cite infant mortality and education level as significant variables.[10] Infant mortality is perhaps the best measure of the existence and effectiveness of health services in a country or region, and the authors assert that it is the prime background variable pushing upwards on fertility. Infant mortality's effect is undeniable as an important socioeconomic factor, and thus, Caldwell does not concentrate on elaborating an argument for it. The authors, rather, focus on explaining contraception's depressing effect on fertility.

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[9] Cohen, Barney. "The Emerging Fertility Transition in Sub-Saharan Africa." *World Development*, no. 26 (1998): 1431-1461, p.1444.

[10] Caldwell, Jogn C.; I. O. Orubuloye; Pat Caldwell. "Fertlity Decline in Africa: A New Type of Transition?" *Population and Development Review*, no. 18 (June 1992): 211-242.

Caldwell et.al assert that contraceptive use in Africa is largely used to space births among women who are not necessarily looking to reduce fertility, but rather to have children in a more time-convenient way. Therefore, if contraceptive use is interpreted as depressing fertility, it is probably working in concert with rising educational achievements. Nonetheless, the article cites contraception as associated with decreasing fertility, as it is generally viewed. Caldwell et. al are largely concerned with how family planning programs can better foster a fertility decline in Africa, and thus, they concentrate heavily on the role of contraceptives rather than closely evaluating the role of background variables.

The importance of contraceptive use as a strong fertility indicator is refuted by both Charles Westoff and Lant Pritchett. Westoff argues that contraceptive practice is largely demand-driven, meaning it is a result of an interest in controlling rather that stopping fertility. He claims that a more obvious interpretation is that "populations in which high proportions of women want no more children are likely to have large proportions of couples practicing fertility control."[11] Pritchett attacks the widely-held perception that contraceptive use has a significant negative association with fertility and that SSA has a large unmet need for contraceptives. As evidence, he states that 27 percent of Ugandan women are said to have an unmet need while only five percent of married, fecund women who want no more children are not using contraceptives.[12] Pritchett argues that desired number of children is the most significant determinant of fertility, explaining over 80 percent of the fertility variation in Pritchett's study.

By concentrating on the literature that focused on SSA, the field was greatly narrowed. However, there seems to be a debate among those that generally subscribe to the proximate determinant framework, about how significantly certain behavioral and background variables affect fertility. It also seems that every author has empirical evidence to back up his/her claims, meaning not only does fertility vary greatly across countries, but also across time. In addition to these variations, model building is always dependent on authors' assumptions and preconceived notions about what drives fertility, as well as the general idea of fertility's role in the

[11] Westoff, Charles F. "Reproductive Intentions and Fertility Rates." *International Family Planning Perspectives*, no. 16 (Sept. 1990): 84-89+96, p. 86.
[12] Pritchett, Lant H. "Desired Fertility and the Impact of Population Policies." *Population and Development Review*, no. 20 (March 1994): 1-55, p. 34.

development process. Therefore, while no model can fully explain fertility, even at the most constrained level, every study can offer insights into the factors effecting women's fertility decisions within the scope of the analysis.

Part III: Building the Model

While the literature on fertility determinants is mixed, it is unquestionable that fertility is a profoundly personal decision that cannot be fully explained by any set of variables, but rather better understood in a societal context. The literature is primarily about examining the choices available to women. Therefore, I do not expect that my model will have great explanatory power: first, it is conducted using micro-data; second, as previously mentioned, fertility is exceedingly complex. I only aim to determine which socioeconomic factors may stand out as significantly correlated with fertility – these factors can then be influenced by public policy decisions to help reduce fertility in Uganda. The goal of the analysis is to gain insights on a regional scale to determine if certain variables have different effects in separate regions or socioeconomic stratas. Fertility is too often analyzed on a cross-country level. In practice, national policy should actually be tailored on a more local level if controlling population growth is the goal – an assumption this study makes.

Variables

The statistical analysis employed for this paper is a multiple linear regression using survey data, the 2006 Ugandan Demographic and Health Survey (UDHS). Panel data would have been more useful; unfortunately, the UDHS from 1988, 1995 and 2001 excluded significant portions of the Northern population due to conflict in the area. Since this study is primarily meant to tackle regional fertility trends, using earlier surveys would have meant leaving out an entire region of the country. Therefore, this analysis is restricted to a single year (2006) and covers all nine regions as specified in the survey: Central 1, Central 2, Kampala, East Central, Eastern, North, West Nile, Western, and Southwest (Map 1). The survey oversamples the Northern region, particularly the IDP[13] camp areas and the northeastern Karamoja region, known

[13] IDP – Internally displaced people.

to be one of the poorest regions in the country. This oversampling was intended to address past failures to survey portions of these regions, and to create more well-targeted social programs based on the survey results.

The basic equation is,

$$Y = b_0x_o + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + \varepsilon$$

where the dependent variable is total children ever born per household, or more specifically, per respondent. The variable "total children ever born" is a proxy for TFR. It is a robust measure as it is precisely the quantitative measure used per age cohort to calculate the TFR in any given year. The independent variables are based on my literature review. I chose a combination of variables substantiated by research, although Bongaarts' three biological proximate determinants were excluded as they cannot effectively be manipulated by policy (they will be explored in Part IV in the interpretation of socioeconomic variables). The variables chosen, thus, do not have the explanatory power of direct, biological determinants, but they are more importantly factors that have a place in fertility research as well as on the policymaker's agenda.

The independent variables are: 1) age at first union; 2) age at first intercourse; 3) education level; 4) residence; 5) desired children; 6) wealth score; 7) contraception. Age at first union and age at first intercourse are self-explanatory; they are simply measured in years. I chose to add age at first intercourse as a separate variable to see if it had any significant association with fertility that outweighed age at first union, as children outside marriage are becoming more common on a global scale.

The UDHS included data on total years of education completed and the final level completed per respondent. Education level proved a better measure as Uganda displays the inverted U-shaped educational effect on fertility that is principally a SSA phenomenon. Table 1 shows the mean children per woman separated by years of education. Fertility actually increases from 0-2 years and then begins to decrease slightly per year after two. Therefore, it seems to be the *completeness* of education that is more closely associated with fertility, which is why education level was chosen using a scale ranging from no education to completed tertiary. Residence is a dichotomous variable measured as: 0 = rural and 1 = urban. Desired children is

based on a survey question that asks women to answer how many children they want or wanted, regardless of the number they currently have or their biological status (i.e. infecundity).

Unfortunately the UDHS does not ask directly about income or expenditure patterns, so creating a variable for income is impossible. The survey, however, does contain a wealth index – a composite score that places respondents in wealth quintiles based on questions about durable goods. The index is judged to be a generally accurate measure of poverty rates in Uganda.[14] The wealth variable was constructed as the log of the wealth score derived from the survey's index. The log is a better measure because the wealth score is a five digit number with large disparities between the poorest and richest respondents.

Finally, the contraception variable is rather simplistic, and perhaps detrimental to the model overall. It is the sum of a scale of knowledge about contraceptives and their use (0=no knowledge, 1=tribal method, 2= traditional method, 3 = modern method); the same scale is used for use. I chose not to sum the length of use in years because it is directly associated with age, which automatically gives women likely to have more children a higher score in contraception. This would have automatically increased the probability of contraceptive use being positively correlated with fertility. Excluding a measure for length of use makes the contraception variable less meaningful, but I chose to err on the side of safety in order to get a more easily interpretive model.

Infant and/or child mortality is not included as a variable in the model. This is disappointing because it is widely agreed that high infant mortality contributes greatly to high fertility rates, particularly among work by John Caldwell. For poor, rural women, the existence of the high probability of a child dying within its first days, or first five years of life, will tend to push upward on fertility as protection against what is considered inevitable. The survey did not include a basic measure of infant mortality, nor did it include even a simple question about how many children per respondent died within a certain timeframe of life, namely the first five years. In fact, the only survey question related to mortality included in the birth index was a question that asked how many sons and daughters each respondent had lost, and how many living children

[14] UDHS 2006.

they currently had. Using total child mortality per respondent is not a true measure of infant or child mortality because it does not define a timeframe for death. Therefore, a respondent could reply that she lost three children, perhaps two in infancy and one during conflict, not necessarily as a child. When this very basic measure of mortality was included as a variable in the early stages of the model, its explanatory power jumped off the page. But, I had to exclude it from the regression because it was effectively a general measure of death rather than of child mortality. It could be related to several extra factors, including prevalence of conflict, poor health services, poor sanitation, etc; so, it would have been confusing at best to interpret.

While this study focuses on regional differentials, I also felt it was important to include a cultural component. The survey did not ask about ethnicity, but it did include a question about religion. When I attempted to construct an ethnicity variable, it resulted in a rather arbitrary dichotomous measure based on linguistic differences (Bantu-speaking and non Bantu-speaking). I felt the variable was far too simplistic and failed to correctly divide the regions ethnically. Thus, I concentrated on using religion as my cultural measure. Unfortunately, creating a dummy variable for religion would leave little interpretive power within a linear regression, as there is no scale that is recognized within the literature associated with increased or decreased fertility. Because a simple variable of religion was difficult, I assessed each region on its religious composition – along with a group of other socioeconomic variables – in order to compare it to Uganda as a whole (Table 2). This allows for a more robust interpretation; if a certain variable is statistically significant for a region, perhaps its religious composition may help in the interpretation of its effect on fertility trends (this proved to be a factor in the results). In addition, the actual regression was also split by religion – absent of region – which will be explained later in the section.

Obviously among broad socioeconomic factors there is likely to be colinearity issues. When I checked the correlation among variables, no coefficient exceeded 0.25, so I felt it unnecessary to perform a factor analysis or include interaction variables. However, while the variables were being built, I constructed an interaction variable from years of education and wealth score; the variable was statistically significant. But, because level of education was chosen over years for the model, I did not retain the interaction variable. When I constructed a new interaction variable from education level and wealth score, it was not significant. This is

probably because education level is measured on a discrete, categorical scale rather than a continuous one.

Regression

Total fertility rate is measured as a rate based on children born annually per age cohort. Therefore, when performing a regression which predicts mean children ever born, it is important to keep in mind that if the regression is not truncated per age group, there is an implicit assumption that age composition is uniform across all regions. I chose to split the regression per region without truncating it for age group because the proportions for each five-year age group tended to be markedly similar across region, although the survey is somewhat skewed toward younger cohorts across the board. This may affect variable interpretation as it will likely dampen explanatory power (older cohorts will explain more as they have passed through more of the reproductive cycle), but it means assuming a uniform age composition across regions is not overly simplistic. To find any differences per age group or to see trends in younger generations, I performed a regression that separated the age groups without separating the regression for region. This allows any age-specific trends to be recorded without having to rely on the very small sets of observations available when the regression was constrained by *both* region and age group. Table 3 contains country-wide regression results; Table 4 is split by age groups; Table 5 is split by region.

Next, I split the regression by residence, religion and wealth quintiles (Table 6) to understand differences in the variables explanatory power in separate socioeconomic stratas. I mainly chose to include regressions based on socioeconomic characteristics in order to glean a better picture of fertility trends per region. Given each regression's low R^2, finding different ways to explain fertility per region is necessary. For example, while very similar variables show up as constant across regions, examining the regressions split by socioeconomic factors and comparing them to the socioeconomic makeup of the country can better explain why some variables are significant.

Part IV: The Results

Table 3 lists the basic regression results for Uganda. All the variables except age at first intercourse are statistically significant, with t-scores that mitigate spuriousness. Education level has a very large negative correlation (t-score = -16.99), although it is likely correlated with other variables like residence and wealth that may boost its explanatory power. Interestingly, contraception is positively correlated with fertility – it remains so for every regression - at a high significance level. This may help to prove Charles Westoff's claim that contraception is often demand-driven, perhaps it is women looking to space births or stop them only after they have reached their desired level of children that are using contraception. Another explanation may be that knowledge of modern methods is widespread along with use of traditional methods. Given the scale of the composite contraceptive score, this would result in the second highest score possible (5), while knowledge of and use of a modern method earns only one extra point (6). Overall, all the variables chosen from the literature review prove to be significant at a state level in Uganda. The only exception is age at first intercourse, which is not drawn from the literature and which is also positively, albeit insignificantly, associated with fertility.

Table 4 contains the results of the regression split by age groups; there are some slightly different trends. Age at first union is the only variable to be consistently significant across all age groups, with a very high significance level. It has, in fact, the biggest effect overall, different from the regionally-split regression whereby education takes first place. Education level and residence are also negatively correlated among the majority of age groups (all except 15-19). However, the coefficient for residence jumps above 1 for age groups past 30 years, meaning it is probably correlated with another variable and the result is skewed. The remaining variables are significant for some age groups and not for others. One would assume that desired children would become significant as age increases, and that is precisely the case. Contraception remains positively correlated with fertility, even at younger ages. This could be due to the simplicity of the variable scale as mentioned earlier.

Regional Variation

The crux of this study is in analyzing regional differentials in Uganda. Table 5 lists the results of the regression split per region. Education level is significant across all regions, although its level of significance is much higher in some areas than others. Age at first union

and desired children also seem to be universally significant, with some exceptions. Overall, there is a decent amount of variation among regions, due chiefly to differences in socioeconomic makeup.

Central 1, TFR 5.6. Central 1 is rather wealthy, urban and educated compared to Uganda as a whole. According to survey results, its literacy rate is 70 percent (Uganda's average is 45.6 percent) and its average wealth score 3.84 out of 5. The regression reveals only education level and desired children as statistically significant. As populations get wealthier, more urbanized and more highly educated within the regression, the explanatory power of the model rises, as each variable's effect tends to lessen. This happens across the board, and is revealed in greater detail in Table 6.3, where one can see the R^2 value rising with each successive wealth quintile.

Central 2, TFR 6.3 Central 2 is characteristically similar to Central 1, it has a high wealth index score, and a higher literacy rate on average than most regions. Education level, desired children, age at first union, and contraceptive use are all statistically significant. The TFR for Central 2 and its mean for desired children reveal that the two are closely associated. It seems that wealthier regions throughout the country have lower means for desired children than the national average. Their TFR also tends to be closer on average to the desired number of children, meaning simply that those regions have greater control over fertility.

Kampala, TFR 3.7 Kampala is used as a region in itself because it contains nearly 6 percent of the national population. It is so drastically different, socioeconomically, from the eight other regions that comparisons are difficult. Table 2.1 and 2.2 show how much more educated and wealthy the Kampala population is than Uganda in general; 96 percent of the city's population falls into the richest wealth quintile, compared to only 25 percent for the entire Ugandan population. Just the TFR reveals a demographic transition well underway, while it is relatively absent in most regions. Much the same as Central 1 and 2, age at first union, education level and desired children are significant for Kampala. There is, however, a meaningful change with respect to the degree of significance afforded education level in Kampala; it is markedly lower than in the eight other regions. This is most likely due to the accessibility of opportunities for

women in Kampala, namely through wealth, wherefore education does not encompass the overwhelming effect found in other regions.

East Central, TFR 7.5 East Central is an interesting region with respect to fertility studies in Uganda. It has a rather high wealth score (3.25), even given its largely rural population (92.7 percent) and low literacy rate (42.3 percent), meaning it's a solidly upper middle class (50 percent of its population resides in the top two wealth quintiles), rural society. It also has one of the highest TFRs in the entire country; it is second only to the Eastern region. According to the regression, age at first union, education level and desired children are significant. While residence shows up as significant, its overly high coefficient means the result could possibly be skewed by colineraity.

The region also has a high Muslim population relative to Uganda (22.7 percent). This may explain why for such a rural population, education is not as important as in other regions with comparable rural proportions. Table 6.2 shows the regression split by religion, and one can see that education level is slightly less significant among the Muslim population. However, this can largely be explained by Muslims' average wealth. Table 2.3 lists the proportions of wealth per religion and average wealth score. Muslims tend to be wealthier on average than Ugandans, particularly compared to Catholics, the poorest religious group in the country. Over 65 percent of Muslims fall into the top two wealth quintiles, and Muslims have the highest average wealth score across all religions in Uganda – South Asians have historically constituted a large proportion of Uganda's business class. This may largely explain education's lower significance among Muslims, as well as in the East Central region.

In addition, age at first intercourse is positively and significantly correlated with fertility among Muslims. There is no easy method for explaining why this is so, but the regression clearly shows that Muslim women who engage in intercourse at older ages tend to have more children on average. Each region has at least a small Muslim presence; thus, it may help explain why age at first intercourse tends to have a positive correlation across regions.

Eastern, TFR 7.7 The Eastern region has the highest TFR in Uganda. This is not surprising given its high rural proportion (94 percent), low literacy rate (36.5 percent), and lower average wealth score (2.49). The regression shows that only education level and contraceptive use are

significant. One can see in Table 5 that education tends to have a greater effect on poorer regions. The significance of contraception in the Eastern region is positively correlated with fertility, meaning, like in the country-wide regression, it is probably used as a spatial means for birthing rather than for eliminating fertility. This seems to be the case across the board, especially given contraception's significance in the East and North. The extremely high poverty rate of the two regions means public health services probably do not have efficient distributional channels, yet contraception still has an effect. In fact, the use of modern contraceptives, as measured in the UDHS, are low across all regions. Therefore, the likely result is simply widespread knowledge of all methods and a pervasive use of different methods (perhaps tribal or traditional) for spacing births.

North, TFR 7.2 The North is Uganda's poorest region, with over 65 percent of its population residing in the poorest wealth quintile. The poverty of the Northern region is unmatched across Uganda. It has the highest rural population, at 95.1 percent, an appalling literacy rate (18.4 percent), and the lowest average wealth score among all regions (1.53). The region has experienced conflict for over two decades and there are several Internally Displaced Persons (IDP) camps in the area, which does not help living standards for the inhabitants. The regression shows that education level, desired children and contraception are significant. Education level has the highest significance level in the North, with a t-score of -7.98. This conforms to the finding that education gains significance as wealth decreases. The mean number of desired children in the North is 14.9, way above the averages for other regions, revealing why the desired children variable would have an effect. Contraceptive use is probably significant for the same reason as in the East, largely demand-driven with a spatial component. The North is a prime example of high fertility among rampant poverty that plagues the majority of Uganda's rural population.

West Nile, TFR 7.3 West Nile is the North's neighbor but differs in several respects, namely that its average wealth score is higher (2.43). It also has a high Muslim population, while the North is predominantly Catholic. According to the regression, age at first union, age at first intercourse, education level, and desired children are all significant. West Nile is the only region where age at first intercourse is statistically significant. More importantly, age at first

intercourse is *positively* correlated with fertility. As previously mentioned, Table 6.2 shows that when the regression is split by religion, Muslims are the only group for which age at first intercourse is statistically significant and positively correlated with fertility. West Nile's sizeable Muslim population relative to Uganda's proportion helps explain the variable's effect.

Western, TFR 6.2 The Western region is characteristically similar to West Nile except that it is more Christian, wealthier on average (wealth score of 2.96), and has a slightly higher literacy rate. The regression shows that age at first union, education level, desired children and wealth are significant. The finding that the significance level of education decreases as wealth increases in consistent with the regression results for this region. This is further explained by Table 6.3 where the regression is split by wealth quintiles. One can see that education's effect declines as wealth rises. Interestingly, wealth is also statistically significant, which is a change because it is not even a factor for the other regions (Southwest is an exception). This will be explained further in the description of the next, and final, region.

Southwest, TFR 6.2 The Southwest is a cross between the central regions and the West, with respect to socioeconomic status (see Table 2). Standing out as significant for the region are: age at first union, education level, wealth, and contraception. The Southwest has a high significance for education, second only to the North. It is an interesting result because education's overall effect tends to decrease as wealth increases. The Southwest is not necessarily a rich region but it is far above the average income level of the North. Only 25 percent of its population falls into the bottom two wealth quintiles compared to over 86 percent in the North. So, the result is curious given that it does not conform to the trend in education's declining influence as wealth increases, especially given that the trend is universal across the board with this one exception.

There may be another factor at play, namely religion. It may be speculative, but most of the wealthier regions have larger proportions of Muslims relative to the country average. The Southwest, in contrast, has a very small Muslim population; it is predominantly Christian. Table 6.2 shows that while education is still quite significant for the Muslim population overall, it seems to have a lower level of significance then among the Catholic and Protestant populations. This was earlier explained by Muslims' wealth status, but it seems that some aspect of religion is at play that is not directly associated with wealth score.

Wealth is also significant in the Southwest, as well as in the West, while it does not play a role in any other regions. This is an interesting result with no clear link to socioeconomic status as listed in Table 2. There may be a more prevalent urbanization movement within both regions that is not picked up by this study, which helps explain the effect. Table 2.2 shows that the West and Southwest are more economically mixed than other regions; this may also play a role in the variable's influence.

A few variables were somewhat uniformly significant across region: education, and, to a lesser extent, age at first union and desired children. There is some variation within Uganda that would seem unexpected if someone were just looking at a regional regression. However, when interpreted in the light of the socioeconomic differences among regions and the different regression results when split for residence, religion and wealth, one can see that the variables affect fertility differently depending on the socioeconomic makeup of the region, mainly wealth. Tables 6.1 and 6.3, as previously mentioned, list the regression results per residence and wealth quintiles respectively. Table 6.1 shows that the model has greater explanatory power for urban residents. In addition, while the same variables are significant for both groups, the level of significance is much greater for rural residents. In the regression for wealth, one can see that, like the residence regression, the explanatory power of the model increases with wealth (as it did going from rural to urban). This means, perhaps, that as incomes rise, the variables chosen for this study explain more about the respondents than when poverty is the norm.

The effects of age at first union, residence, and desired children rise with wealth, while the effect of education declines. This fits the regressions per region, as education mattered least for the wealthiest regions. Age at first union and desired children acted in approximately the same (inverse in this case) way, meaning as wealth increases, those variables matter more.

The trend in the significance level in marriage patterns and desired children show that wealthier, more urban residents have greater control over their fertility, which is an expected finding. Ugandan women living in regions where these variables are highly significant – and to a certain extent where education level is significant but lower than other regions – possess opportunities that rival having children, increasing the opportunity cost of continued childbearing. It is obvious that the demographic transition has begun in smaller, more urbanized sections of certain regions (i.e. Central 1 and Southwest), while some regions have been left

behind (Eastern and North). Having a good grasp on the socioeconomic and cultural characteristics of each region can help policymakers to frame public decisions in a way that respects and truly targets the needs of local areas.

Splitting the regression for socioeconomic groupings was essential for understanding regional differentials, because it highlighted the role that socioeconomic characteristics play in shaping women's decisions about fertility. One can see undoubtedly in Table 9 that Bongaarts biological determinants do vary greatly per region, with poorer regions showing much longer periods of breastfeeding and amenorrhea per woman relative to wealthier ones. Tables 10.1 and 10.3 also highlight the vast difference per residence and wealth quintile. This also emphasizes the quagmire that exists with respect to how background variables influence biological variables. Education's overwhelming effect across all aspects of the regression is most likely a result of its effect on most of the other variables, particularly age at first union. In fact, age at first union stands out as the most significant variable among age groups; this may be a direct result of educational patterns among the population.

Education level's effect on direct behavioral variables can largely explain its diametrically opposed relationship with biological determinants like shortened breastfeeding periods. One effect is simply outweighing the other, creating a negative effect overall. One can see that fertility declines as incomes and educational opportunities rise, but its effects can only be explained by a subsequent increase in the average age at first union; because, breastfeeding and amenorrheaic periods decrease with income and education. This is exactly the problem that Barney Cohen framed in his research. However, unlike Cohen's argument, contraceptive use does not prove to have a negative influence on fertility that would help to outweigh education level's decreasing effect on the biological determinants. It was positive overall, pointing towards a demand-driven market for contraceptives in Uganda, and further solidifying the negative effect of changing marital patterns toward later stages of life.

Contraception's positive effect may be due to the variable simplicity. Perhaps, by adding a measure for length of modern contraceptive usage, the model would gain robustness. However, that is largely dependent on the prevalence of modern use throughout the country, which, as previously mentioned, is very low. Regardless of the variable's shortcomings, its basic scale property can at least confirm that poorer women with higher fertility levels do indeed know and use some form of contraception – mostly traditional. The study cannot confirm or quantify a

measure for unmet need, but the findings tend to lessen contraception's independent behavioral effect. Any shift toward a negative effect level would likely be attached to a subsequent change in wealth and/or education.

Religion as a means for explaining fertility trends proved difficult to interpret. Education's large effect in the Southwest region seems to indicate a cultural factor that helps to explain the magnitude of some socioeconomic variables' effects. Muslims, as a group, were a focus in this model in order to help explain results that were generally unexpected, like age at first intercourse's positive effect and the curiously large significance for education in the Southwest. However, it seems too easy to try and attribute some minor differentials to Islam as a religion; because, a large group of Muslims are fundamentally different culturally as well. Many Muslims in Uganda are from South Asia, mainly India, and thus, generally constitute a separate cultural group aside from just religious differences. Further study is necessary as this model cannot definitively interpret the results, but, nonetheless, ethnicity cannot be counted out as an important socioeconomic determinant of fertility in Uganda.

Overall, the differentials across regions seem to be chiefly explained by the regions' respective wealth profiles. Aside from a few results that do not conform, like education's high significance in the Southwest (a relatively wealthy region), incomes seem to be closely associated with the trends in fertility across all regions. While policymakers will have to pay close attention to findings about religious and cultural influences on the significance of certain variables like education and intercourse age patterns, decisions must be centered on raising incomes in poorer, rural regions, which account for the majority of the population explosion. By ignoring rural poverty, the Ugandan government will do its people a great disservice and will affect fertility within only the small pocket of Kampala and other cities in the southern regions. Curbing fertility within the poor, rural population depends crucially on creating and expanding opportunities for women within regions that have a high proportion of these residents.

Part V: Policy Recommendations

This paper set out to trace specific differentials throughout regions in Uganda to offer policy advice that is locally-tailored. While the study did uncover important regional differentials, the variation across Uganda is largely explained by socioeconomic differences.

Where you live counts less than if you live on a farm or in a city. Also, education level seems to count significantly more in some regions, but it seems largely explainable by region's rural proportions and income status. Therefore, policies need to be locally tailored to regions as understood by the area's socioeconomic characteristics. In addition, policies need to be feasible within the medium-term. For example, suddenly implementing a policy that legally raises the marriage age to 18 would seem out of line with cultural norms as well as premature given the socioeconomic conditions of several regions. While it may seem a useful tool for decreasing fertility in the short-term, its effect is tied to educational patterns which will remain unchanged on any large scale during such an implementation. Locally-tailored and feasible options are key for striking the right balance. Within this scope, I offer some broad policy recommendations:

Rural Education and CCTs

The government should establish a rural education system that targets the poorest residents, particularly in the East and North. While the returns for education with respect to lowering fertility are very high in Southwest, it may not be the best region to begin such a program; the error of inclusion would likely be too high, given the region's relatively high average wealth score. This is a sensitive political issue because, according to the study, increased educational opportunities in the Southwest would cause a greater reduction in fertility than in the East. However, the relative wealth of the Southwest in comparison would make a poverty-targeted education program difficult to justify, before implementing it in poorer regions.

The best way to achieve an increase in rural education is through conditional cash transfers (CCTs). Due to the financial infrastructure necessary to implement and sustain CCTs, the program must be very small-scale, perhaps only a few districts among selected regions. Given the small-scale of the program, the districts chosen could easily be randomized – districts could literally be pulled from a hat after the regions are chosen based on poverty measures. This could help solve the political problem of choosing not to target the Southwest because of its wealth. The program could target certain regions, and then literally pick the district out of a hat. Given Uganda's lack of financial infrastructure, post offices could be used until the banking sector can take over.

The system should offer cash transfers that are pragmatic in two respects. First, the transfers must be enough to offset the opportunity costs of child labor, specifically in rural communities.

Thus, the CCTs must increase with age, and should be gender-based, as high fertility is a primary goal – keeping young girls in school is crucial in slowing population growth over time. Second, the transfers must be feasible within the budget. Given Uganda's favorable track record with the World Bank, an investment loan from the institution may be the best way to start, particularly by bringing in the Bank's expertise. The program could then be evaluated and expanded is judged to have had a sizeable impact. Eventually, the program should encompass Uganda's entire poor population, and include transfers for under-five child health visits and antenatal care.

Occasionally people argue that CCTs will raise fertility because women receive more transfers based on the number of children they have in school. However, Turkey's CCT program assessment showed conclusively that fertility actually declined about 2-3 percent per woman.[15] This drastic drop shows the need to implement an identical program in Uganda.

Rural Health Workers

Uganda should employ a system of rural health workers that do not specialize, but are general, quickly-trained health workers. The workers should be women, to respect the gender roles ensconced in religious groups, particularly tribal elements of all official religions. Ideally, these workers would offer free or publically subsidized contraceptives. At a minimum, they should possess knowledge of family planning techniques and basic maternal and childcare, specifically with respect to nutrition and easily treatable, early-onset illnesses. For example, the health workers would carry and provide instructions for the use of ORS packets in treating diarrhea. The workers would act in both a service-oriented and educational capacity, specifically for young mothers. The program would target areas where infant and child mortality are highest, acting as a negative check on fertility.

To offer the program on a large-scale, the government should partner with NGOs, specifically in the poorest areas, whereby the public sector could gain time to train and equip workers for areas with little public health presence. In the long-term, the rural public health program should become attached the CCTs, where mothers would receive transfers contingent on their adherence to basic child health visits. These transfers would likely be less than transfers

[15] Impact Evaluation from Turkish CCT program implemented by the World Bank.

for school-age children, but not by much. The program must ensure that the transfers are adequate given the difficulty of reaching a health clinic in a particular area.

Raising Income in Rural Communities

According to the literature, and this paper's findings, fertility is highly associated with socioeconomic indicators per region. In fact, aside from a few select exceptions, the fertility trends revealed by the statistical analysis can chiefly be explained by wealth differentials across regions. Therefore, any policies aimed at reducing fertility must focus on raising incomes over time, increasing educational achievement and raising marriage ages in the process. A rural electrification program that targets villages should be established in order to increase agricultural productivity. Electrification can also be used to increase irrigation for semi-arid land. This program could be achieved through lifeline tariffs, whereby the government provides the electricity (and water in some cases) to a certain point after which the users must pay progressive rates. Given Uganda's lack of electric infrastructure, a program based on Brazil's rural electrification program could be tried on a piecemeal basis and evaluated to ensure results. The program would simply establish basic electricity lines with low-cost materials to bring a minimum amount of electricity to rural residents. Lifeline tariffs may be a better decision for poorer families in urban areas.

Unlike CCTs which require a great deal of existing financial infrastructure, rural electrification could truly be a large-scale program within a few years. It depends wholly on the government's willingness to bargain with electric companies to amend any regulatory obstacles, and to hire outside help to begin the process. Rural electrification could, over time, generate additional rural employment and can easily become sustainable.

Female Empowerment

Finally, females must be empowered politically. This may include quotas for regional or local governments that create a voice for women, or fostering a civil society that promotes female empowerment through women's activist NGOs on a national scale. As of 1996, only 8.9

percent of all government positions were held by women.[16] Including women as arbiters of the CCT program within their respective district gives them at least a minor voice in policy. Simply by putting women in a decision-making position, more opportunities for women will automatically be ensured. It is both an intrinsically and instrumentally important for lowering fertility.

These recommendations are broad, but that is because fertility is a rather difficult subject to tackle with policy. It is a personal decision which can be influenced by socioeconomic variables, but these variables cannot decide for a woman. Framing policy must be about creating opportunities for women. Uganda's fertility is high because there is a serious opportunity disparity among regions based on educational and economic alternatives for women. The North has persistently high fertility because its literacy rate is well below the national average and more than 90 percent of its women have no education. The policy recommendations are primary aimed at raising incomes over time, which, when centered on women, will raise marriage ages and educational achievement across all regions and cultures. It is in understanding the regional and socioeconomic dynamics that policymakers can come to make decisions that will truly lower fertility over time

[16] Division for the Advancement of Women, United Nations. "Percentage of Women in Government." Worldwide Government Directory, 1996. Available from http://www.un.org/womenwatch/daw/public/percent.htm. Internet; accessed 14 May 2008.

Map 1

UGANDA

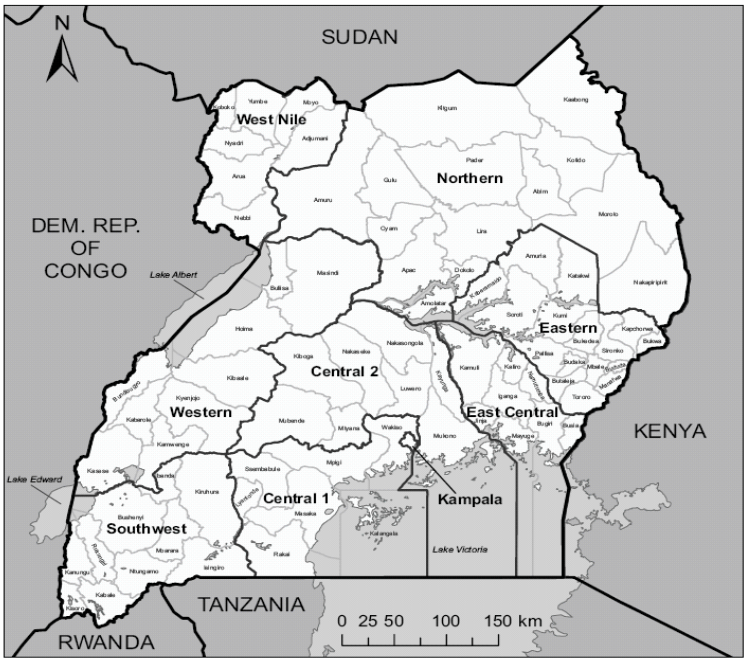
N
SUDAN
West Nile
Northern
DEM. REP. OF CONGO
Lake Albert
Eastern
Central 2
Western
East Central
KENYA
Lake Edward
Central 1
Kampala
Southwest
Lake Victoria
TANZANIA
RWANDA
0 25 50 100 150 km

Table 1

Education (yrs)	Fertility (mean)
0	2.60
1	3.11
2	3.30
3	3.16
4	3.00
5	2.82
6	2.83
7	3.22

Table 2.1

Socioeconomic Factors by Region

	Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	Southwest	Uganda
Literacy (%)										
illiterate	20	23.3	6.4	47.7	42.8	72.7	44.8	41.7	31.7	40.4
partially literate	9.2	5.9	5	9.2	15.9	7.4	15.3	8.1	11.3	9.5
literate	70	66.8	85.6	42.3	36.5	18.4	25.9	35.4	56.6	45.6
Religion (%)										
Catholic	41.6	36.1	31.3	23.6	35.0	71.1	52.7	43.9	41.6	44.4
Protestant	26.1	32.9	32.2	43.1	39.1	20.6	27.4	36.7	47.4	33.1
Muslim	19.4	15.9	19.5	22.7	10.0	0.8	17.9	5.0	3.7	11.4
Pentecostal	10.2	10.4	14.2	9.0	7.9	6.3	1.1	5.6	3.6	7.5
SDA	2.5	4.3	1.4	0.6	0.9	0.06	0.69	4.6	2.5	1.8
Residence (%)										
Rural	89.4	88.1	0.0	92.7	94	95.1	89.1	92.8	91.2	83.0
Urban	10.6	11.6	100.0	7.3	6.0	4.9	10.9	7.2	8.2	17.0
Age at first union (mean)	17.9	17.6	18.7	16.6	17.1	17.7	17.2	17	17.8	17.5
Education level (mean)	1.55	1.51	2.43	1.28	1.31	0.68	0.95	0.98	1.12	1.21
Desired children (mean)	7.03	6.63	5.03	6.85	7.76	14.9	7.27	10.3	8.77	9.17
Wealth index (mean)	3.84	3.79	4.94	3.25	2.49	1.53	2.43	2.96	3.15	2.91

Table 2.2

Wealth	Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	Southwest	Uganda
Poorest	3.64	2.90	0.00	9.91	25.2	65.3	21.3	12.1	7.2	21.1
Poorer	8.98	11.3	0.00	18.1	27.8	21.5	40.1	20.2	17.4	18.5
Middle	18.3	18.8	0.23	19.4	21.0	6.25	15.2	31.1	34.0	17.5
Richer	24.5	29.4	3.78	31.4	16.4	4.33	11.4	25.0	24.9	17.8
Richest	44.5	37.5	96.0	21.3	9.60	2.64	12.0	11.5	16.5	25.1

Table 2.3

Wealth	Catholic	Protestant	Muslim	Pentecostal	SDA	Uganda
Poorest	32.3	13.7	5.15	15.3	10.5	21.1
Poorer	18.1	20.3	14.9	17.5	16.4	18.5
Middle	15.8	20.0	14.6	17.9	20.4	17.5
Richer	15.2	19.3	25.7	13.7	23.0	17.8
Richest	18.6	26.7	39.6	35.6	29.6	25.1
Ave wealth score	2.70	3.25	3.80	3.37	3.45	3.07

Table 3

Country Regression:	t-score	coefficient
AGEUNION	-6.76	(-.072)
AGESEX	1.73	
EDULEVEL	-16.99	(-.615)
RESIDENCE	-6.70	(-.755)
DCHILD	8.56	(0.017)
LOGWEALTH	-3.47	(-.116)
CONTRACEPTION	8.70	(0.201)
R-sq	0.1071	

-Coefficients are provided for t-scores > 1.96.

Table 4

Regression by Age Groups:

Age groups	AGEUNION	AGESEX	EDULEVEL	RESIDENCE	DCHILD	LOGWEALTH	CONTRACEPTION	R-squared
15-19	-8.24	-1.61	1.80	-1.21	-0.44	0.38	2.79	0.1695
	(-.170)						(0.061)	
20-24	-19.98	-2.40	-4.08	-2.19	0.03	-3.04	3.83	0.3256
	(-.248)	(-.002)	(-.126)	(-.184)		(-.083)	(0.073)	
25-29	-21.68	-0.92	-4.63	-3.15	2.01	-3.13	0.05	0.3811
	(-.265)		(-.162)	(-.338)	(0.004)	(-.105)		
30-34	-13.15	-0.44	-2.98	-6.00	1.19	-2.13	-0.01	0.2208
	(-.205)		(-.160)	(-1.00)		(-.104)		
35-39	-9.19	0.65	-3.27	-6.39	0.27	-0.46	3.79	0.1781
	(-.185)		(-.259)	(-1.58)			(0.187)	
40-44	-4.22	0.27	-3.09	-4.38	2.19	-0.63	5.10	0.1206
	(-.107)		(-.360)	(-1.61)	(0.013)		(0.372)	
45-49	-4.93	-3.72	-3.54	-2.74	2.54	0.21	4.06	0.1319
	(-.144)	(-.012)	(-.431)	(-1.15)	(0.011)		(0.301)	

Table 5

Regional Regressions:

	AGEUNION	AGESEX	EDULEVEL	RESIDENCE	DCHILD	LOGWEALTH	CONTRACEPTION	R-squared
Central 1 - TFR 5.6	-1.61	1.39	-5.33	-0.64	2.58	-0.41	1.56	0.1026
			(-.571)		(0.022)			
Central 2 - TFR 6.3	-3.39	-0.58	-5.81	-1.37	3.13	0.04	2.71	0.1280
	(-.113)		(-.685)		(0.033)		(0.243)	
Kampala - TFR 3.7	-3.60	0.64	-2.78		3.71	-1.75	1.75	0.1237
	(-.095)		(-.226)		(0.036)			
East Central - TFR 7.5	-3.89	0.49	-4.63	-2.83	4.23	-0.14	1.51	0.1279
	(-.155)		(-.555)	(-1.31)	(0.043)			
Eastern - TFR 7.7	-0.61	1.46	-6.16	-1.47	1.88	-1.73	3.89	0.0850
			(-.693)				(0.304)	
North - TFR 7.2	-0.56	1.51	-7.98	0.31	3.76	1.55	3.70	0.0687
			(-.816)		(0.011)		(0.173)	
West Nile - TFR 7.3	-2.24	2.08	-5.40	-0.53	2.03	0.62	1.64	0.1000
	(-.090)	(0.006)	(-.761)		(0.018)			
Western - TFR 6.2	-2.77	0.45	-5.52	-0.86	3.36	-2.61	1.05	0.1000
	(-.097)		(-.698)		(0.019)	(-.282)		
Southwest - TFR 6.2	-3.02	0.21	-7.00	-1.75	1.42	-2.49	5.72	0.1437
	(-.108)		(-.758)			(-.230)	(0.413)	

Table 6.1

Regressions by Socioeconomic Factors:

Residence	AGEUNION	AGESEX	EDULEVEL	DCHILD	LOGWEALTH	CONTRACEPTION	R-squared
Rural	-6.02	1.39	-16.35	7.56	-3.41	8.43	0.0769
	(-.072)		(-.699)	(0.016)	(-.130)	(0.212)	
Urban	-4.13	1.13	-5.33	4.89	-2.25	3.15	0.1401
	(-.089)		(-.344)	(0.029)	(-.158)	(0.195)	

Table 6.2

Religion	AGEUNION	AGESEX	EDULEVEL	RESIDENCE	DCHILD	LOGWEALTH	CONTRACEPTION	R-squared
Catholic	-3.52	0.94	-11.60	-4.45	5.20	-0.54	5.76	0.0901
	(-.052)		(-.649)	(-.820)	(0.013)		(0.189)	
Protestant	-3.92	0.01	-9.75	-2.89	3.88	-3.31	4.59	0.1067
	(-.078)		(-.611)	(-.577)	(0.017)	(-.198)	(0.200)	
Muslim	-3.83	2.24	-4.78	-3.93	4.92	-2.97	3.45	0.1823
	(-.124)	(0.007)	(-.488)	(-.985)	(0.039)	(-.265)	(0.257)	
Pentecostal	-2.57	1.19	-4.98	-1.75	2.39	1.16	1.46	0.1662
	(-.104)		(-.682)		(0.019)			
SDA	-2.67	-0.14	-3.04	-0.26	1.83	-0.17	1.93	0.2476
	(-.230)		(-.886)					

Table 6.3

Wealth Quintiles	AGEUNION	AGESEX	EDULEVEL	RESIDENCE	DCHILD	CONTRACEPTION	R-squared
Poorest	-2.36	2.79	-10.55	-0.13	2.16	4.00	0.0835
	(-.050)	(0.006)	(-1.21)		(0.006)	(0.179)	
Poorer	-2.72	-0.04	-8.25	0.81	3.65	4.84	0.0828
	(-.076)		(-.900)		(0.016)	(0.271)	
Middle	-1.90	-0.59	-7.94	-3.51	4.40	2.57	0.0866
			(-.830)	(-1.59)	(0.024)	(0.156)	
Richer	-5.80	-0.71	-6.74	-3.13	3.60	3.63	0.1079
	(-.163)		(-.577)	(-.856)	(0.022)	(0.215)	
Richest	-5.05	2.10	-6.16	-7.77	6.35	3.270	0.1652
	(-.097)	(0.005)	(-.340)	(-1.07)	(0.040)	(0.194)	

Table 7

Region	Fertility (mean)
Central 1	3.24
Central 2	4.03
Kampala	1.78
East Central	4.03
Eastern	3.87
North	3.91
West Nile	3.32
Western	3.71
Southwest	3.44

Table 8.1

Residence	Fertility (mean)
Rural	3.80
Urban	2.18

Table 8.2

Wealth Quintiles	Fertility (mean)
poorest	4.12
poorer	3.85
middle	3.94
richer	3.77
richest	2.34

Table 9

Means	Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	Southwest
BREASTFEEDING	13.72	13.35	7.67	15.39	17.76	19.29	16.25	15.62	14.81
PPAMENORRHEA	6.79	6.62	4.22	8.42	9.92	11.62	10.08	8.48	9.35
PPABSTINENCE	2.61	3.12	2.42	3.18	5.84	7.34	6.28	2.95	2.70

Table 10.1

Means	Rural	Urban
BREASTFEEDING	16.64	8.95
PPAMENORRHEA	9.52	4.83
PPABSTINENCE	4.95	3.02

Table 10.2

Means	Catholic	Protestant	Muslim	Pentecostal	SDA
BREASTFEEDING	16.30	15.08	13.95	13.26	13.86
PPAMENORRHEA	9.39	8.46	7.12	7.77	7.11
PPABSTINENCE	5.01	3.96	3.42	4.01	2.36

Table 10.3

Means	Poorest	Poorer	Middle	Richer	Richest
BREASTFEEDING	19.65	18.1	16.29	14.88	9.31
PPAMENORRHEA	11.69	10.91	9.77	7.88	4.48
PPABSTINENCE	7.47	4.85	3.37	3.56	2.51

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