Gender, Mortality and Fertility : the association between gender preference, child mortality and number of children born to mothers in Kenya

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Abstract

To determine the impact of gender preference and child mortality on fertility, hierarchical multiple regression was performed on a random sample of 2,791 mothers drawn from 1999 micro data census. The results indicate that the control variables of age, SES, marital status, and area of residence accounted for 43% of variance. Age and marriage were positively associated with fertility while, socio-economic status and urban residence had negative associations. Compared to mothers in monogamous marriages, being single, separated and widowed were all significant negative predictors of fertility. Having children of the same gender was positive predictor and having females only explained a higher (8%) of variance compared to 4% for mothers with male children only. Death of a child was also positively related with fertility, explaining about12% of variance. The findings of this study have implications for further research and policy in both health and education. For example, family planning programs need to address gender preference and increase service to rural communities. Additionally, reduction in child mortality would go a long way in decreasing fertility. Moreover, if the healthcare achievements which reduced child mortality significantly in the past four decades are showing an upsurge then, the need to address child mortality has been underscored by the results of this study.

Gender, mortality and Fertility: the association between preference for male child(ren), child mortality and number of children born to mothers in Kenya

Fertility is closely monitored especially within developing countries because low birth rates have the potential to reduce poverty, hunger, maternal and child deaths (Cleland et al., 2006). Kenya experienced high fertility before the onset of the demographic transition. The country registered a total fertility rate (TFR) of 8.2 children per woman in the 1970s (Bongaarts, 2006), but currently registers a TFR of 4.9 (Population Reference Bureau, 2008). Despite the decline in the number of children borne per woman, Kenya is still grappling with a relatively high fertility rate. Theories that support fertility are embedded in effects of globalization and perceived intergenerational needs of families. The former is proposed by Bongaarts (1999) who posits that there is fertility transition in Africa. This is due to learned values that have swept across the region that led to regional changes such as reduction in fertility. On the other hand Caldwell (1999) theorizes that families decide the number of children borne as a response to the perceived future needs.

Fertility is dependent on many factors such as mother's education, area of residence and age at first birth; however, research has constantly shown that childhood mortality is one of the key predictors of fertility (Preston, 1978; Cohen, 1998). For decades, the impact of lowered childhood mortality for controlled fertility has been at the center of demographic research (Gyimah, 2002). But the link between fertility and childhood mortality is complicated by the reverse causality between the two phenomena. Fertility is affected by childhood mortality through biological and behavioral factors, while mortality is affected by fertility through birth spacing (Gyimah, 2002). The research on the effect of mortality on fertility remains inconsistent and inconclusive. Thus, this study seeks to extend the dialogue on the effect of childhood mortality on the number of children borne to women in Kenya.

Family planning programs uphold the rights of women as they are able to practice reproductive health rights which enable them to determine when, and how many children they want. However, histories of families show that fertility especially in Sub Sahara is not dependent on the women alone. Communities and families influence women's fertility. Education, delayed first birth and marriage have been found to account for low fertility. Women delay birth when they pursue education and consequently shorten their reproductive period. Education also empowers women in diverse ways therefore enabling them to exercise reproductive health right. This notwithstanding, fertility continues to be a response to childhood mortality (Preston, 1978; Cohen, 1998), and that there is a wide spread preference for sons in Africa (Kuate Defo, 1998; Nyarko, Madise & Diamond 1999). Against this background, fertility continues to be driven by the number of children that survive and the preferred gender of the child among couples in many countries in Sub-Saharan Africa. It is no wonder that Cleland et al. (2006) observed that even though there was a remarkable unmet need for family planning, context is the most important determinant of what combinations of intervention will work.

Thus, the aim of this study is to determine the association between preference for male children, child mortality, and the number of children born to mothers in Kenya. We test two hypotheses: The preference for male children will influence the number of children born to mothers in Kenya, and the number of children that have died per mother will be related to the number of subsequent births. Precisely the research question guiding this study states: How much variability in number of children borne to a mother is explained by gender preference, and mortality, when you control for mothers age, SES, marital status, and area of residence?

Literature Review

Childhood Mortality and Fertility

Research in the context of the developing world has documented a relationship between childhood mortality and the parental desires to have many children. On the contrary, scholars have argued that when childhood mortality declines, many more children survive, making couples to practice fertility control. This research on the relationship between childhood mortality and fertility behavior, has concentrated on two dimensions, an insurance effect and a replacement effect. The insurance effect stems from prior anticipation of high mortality by couples, while a replacement effect arises from the experience of couples having lost a child thereby, adjusting their reproductive behavior. It is argued, that the replacement effect has two components: biological and volitional component. Biological component of replacement is associated with the death of a breastfeeding infant thereby interfering with lactational amenorrhea and a volitional component results from parents trying to have an extra child to replace the one who has been lost (Mensch 1985; Rahman et al., 1992; Park et al., 1998; Hill et al., 2001; Le Grand et al., 2003; Gyimah, 2002a). Therefore, the link between child mortality and fertility is embedded in the survival of children, a phenomenon that reduces the propensity to *hoard* and/or *replace* children (Makinwa-Adebusoye, 2001).

According to Gyimah (2002), in addition to the well established behavioral component of replacement, fertility response to mortality is an outcome of the short term physiological effect. The physiological effect of childhood mortality can be a result of the sudden discontinuation of breast feeding which leads to the immediate onset of menses and ovulation. Consequently a mother is exposed to the possibility of pregnancy, which can happen faster than when her child would have been alive. Moreover, research in the context of Sub-Saharan Africa shows that within communities that have longer durations of breast feeding and strict sex practices, during the period when a mother is breast feeding, the physiological effect of child mortality on fertility is part and parcel of the behavior patterns (Ware, 1977; Kuate Defo, 1998).

Childhood mortality and fertility link is affected by demographic, socioeconomic, and socio-cultural variables. In this study, these variables have been statistically controlled. These variables include: Age, socioeconomic status, education**,** marital status and area of residence. Age at first marriage, as well as age at first birth is significant to the study of fertility because they are inversely related to exposing women to the risk of conception (Gyimah & Fernando, 2002). According to Gyimah & Fernando (2002), these two variables are important predictors of women's differences in the timing of births and total fertility. Research shows that women who give birth early are likely to be of low SES and, therefore, are at an increased risk of more births than those women whose give birth late.

Additionally, the link between childhood mortality and fertility is mediated by education of the mother and urban residence (Cochrane, 1983; Martin, 1995). For instance, maternal education is hypothesized to influence fertility through "age at marriage, high contraceptive use, and labor force participation and cultural factors such as beliefs and norms regarding reproduction" (Gyimah, 2001b cited in Gyimah & Fernando, 2002). Therefore, it is expected that women with secondary education will be more likely to have fewer births compared to women with primary and no education.

According to Gyimah and Fernando (2002), urban areas of Sub-Saharan Africa have a much lower fertility than the rural areas. It is estimated that the difference in the number of births between the urban areas and the rural is 1.8 births per women (Cohen 1993). In addition, other differences exist between the urban and rural areas that do influence fertility: These include high levels of education, ability to participate in the job market, presence of norms and institutionalized structures that influence fertility (Gyimah and Fernando 2002).

Sex Preference and Fertility

Studies in the context of developing countries have consistently found that couples have a definite preference for a child of a particular sex (Arnold 1992; Kuate Defo, 1998; Nyarko, Madise & Diamond 1999). The preference of sons is common in many countries around the world. However, preference for both sons and daughters is also prevalent, to the extent that even when couples express the desire to have sons, they will want to have both sexes in order to strike a balance (Arnold, 1985, 1987). But a strong desire for children of a specific sex could be a major hindrance to lowered fertility, if couples with an optimum family size continue to get children, with an aim of getting a particular sex (Arnold, 1992). Other scholars have disputed the sex preference and fertility link by arguing that it's weak (Bairagi & Langsten, 1986; De Tray, 1984). The argument has been that even where the preference for a particular sex is strong, couples will have achieved their desired family size—a desired number of sons and daughters by biological chance (Arnold, 1992). Thus, only a small number of couples will have the motivation to have additional children beyond what they would have had in the absence of sex preference.

Furthermore, sex preference does not affect fertility behavior in circumstances where the knowledge of and access to family planning is limited ((Arnold, 1992). The author further argues that sex preference by couples takes various forms: Couples may exhibit a particular attitude regarding what sex of a child they prefer, in addition to the advantages and drawbacks of getting sons and daughters. Additionally, couples may adjust fertility and their ability to practice family planning depending on the sex of a child they prefer. In the context of Sub-Saharan Africa, when women have few children, they will continue to give birth without paying attention to their living children's sex composition. However, when women give birth to their fourth child, the desire for an equal number of sons and daughters sets in. In contrast, Gyimah & Fernando (2002), contend that the number of children that a woman has is associated with the age at first birth. Thus, women who tend to give birth earlier have a higher risk of additional births compared to those women who delay the onset of first birth.

In the context of Sub-Saharan Africa, the role of social-cultural factors in the reproductive practices of women in fertility control cannot be underestimated. The social structure of a given community is maintained by the values, beliefs and the normative behavior of that particular community. In turn, the individual members' aspirations and preferences are shaped by these norms. One area, where the effects of the norms are manifested is on the surviving children's sex composition. In communities where giving birth to a son is privileged compared to girls, the absence of sons leads increased fertility because of faster additional births (Gyimah and Fernando 2002). Research also shows that compared to Asia, societies in Sub-Saharan Africa do not show an overt preference for sons (Trussell, Van De Walle, & Van De

Walle, 1989). But recent research confirms that there is still a wide spread preference for sons in Africa (Kuate Defo, 1998; Nyarko, Madise & Diamond 1999).

Method

The study design is analytic in that the authors used the census micro data to select variables that captured factors that have been established to influence fertility as control and tested the impact of gender preference and child mortality as independent variables. These factors have historically been associated with fertility. However their impact at the specific time in history is important due to the advent of HIV/AIDS which has been associated with increased child mortality. Establishing the indirect influence of the epidemic on fertility needs to be established if family planning is to be seen in a new light from the pre HIV era. The control variables included mother's age, SES, area of residence and marital status. Independent variables included measurements of outcomes that reflect societal norms of preference for male children and the "replacement" of a dead child through another birth. Family systems theory was used to explain the connections between what is observed i.e. number of children born as associated with preference for male or female gender and child mortality.

Population

Population was drawn from the micro data of 1999 census of Kenya which is a random sample survey conducted on 5% of the Kenyan population. The census data has been collected every ten years since 1969 for the purpose of gauging living standards so as to guide national development plans. The 1999 census is the latest and reflects life situations that are closest to what might be considered current. The micro data are more detailed than the regular census and include variables for demographic, family, and household characteristics of members using a household head or a selected respondent as the family spokesperson. The census data are rated highly for accuracy and are comparable to other highly regarded national surveys such as the Demographic Health Surveys (McCaa & Odinga, 2002). Households that responded to section "C" of the census form on information regarding females aged 12 years and above constituted the sampling frame of mothers. The sample was selected from households that had indicated a child had been born to any women age 12 and above. There were of 502,568 women whose demographic details including data on their children.

Sample

From the sampling frame of 502,568 a random sample of 2971 cases making 10% of the population was selected. Frequencies were run on the selected variables and missing cases were noted on questions of child births and deaths, marital status and educational attainment. Missing value analysis yielded a Little's MCAR score $\chi^2(45, N = 2832) = 109.36, p < .001$. This is an indication that missing values were not missing completely at random. Since the variables with missing values could not be imputed. For example, death and births do not have reference variables from which scores can be deduced. However *t* and chi square tests between cases with missing values and those with complete data indicated mixed results with age being somewhat significant while no difference was observed in educational attainment. Cases with missing values were omitted from analysis. The sample constituted 2,791 cases.

Variables

Dependent variable. The outcome variable was named "number of children born". This is a continuous variable that did not require recoding.

Control variables

Mother's individual system. Demographic characteristics of the mother included were: socio-economic status, age and area of residence. An SES scale was created from six items. They included: education attained, type of fuel used for cooking, floor material, water, toilet and sewage. For *education* the census question was: "What is the highest level of education reached? *Education attained* was recoded to have a range from 1 to 7 in ascending order. Those who had no education were coded "1", some primary "2", 6 years of primary "3", unspecified lower secondary "4", secondary, "5", some college, "6" and "7" for university degree and above. *Water, sewage*, and *toilet* were dummy coded "0" when the commodity in not available and "1" when it is available. Cooking fuel was recoded as follows "5" electricity/gas, "4" kerosene, "3" wood, "2" charcoal and "1" for other like straw etc. Floor materials were coded in an ascending order, "1" earth, "2" cement, "3" wood, "4" tile "5" other that is superior to all. Correlations were run between these six items to test for multicollinearity. The correlations ranged from a coefficient of .44 to .07 which shows that multicollinearity was not an issue (Leech, Barrett & Morgan, 2005). Reliability test yielded a cronbach alpha of .61 and a summation of the items created an SES scale ranging from 3 to 19 where higher scores mean higher SES and vice versa. *Age* and area of residence were included with residence coded "0" for rural and "1" for urban.

Marital Status. Children born out of wedlock have continued to have labels that express the societal disapproval. Marriage is held as the sanctioned union to get children, hence the interest in testing the association between a mother's marital status and the number of children she gives birth to. For *marital status* the census question was: what is the mother's marital status and the options to choose from were: never married, monogamous, polygamous, widowed, divorced, separated, and don't know. *Marital status* was dummy coded.

Independent variables

Preference for male and girl child. The recorders registered for every mother the total number of children born by gender. Two variables were computed to allow for comparing the preference for either gender so as to determine which one had the greater influence. Mothers' who had no boy children were coded "0" and "1" if they had any male child(ren). The same applied to the recorded cases for girls. Each variable enabled the researchers to compare mothers who had at least one and those who had none. Likewise those who had at least girl child were compared to those who had none. When numbers of children are regressed on these two independent variables they indicate which them i.e. no girl or no boy would explain more variance on mothers' fertility.

Child mortality. This was the response from the census question, "*how many children have you born alive that have died?*

Analytic Method

Hierarchical multiple regression was chosen to determine association between mother's individual characteristics as control with gender of children born and child mortality as the independent variables. Hierarchical regression was chosen as the most appropriate for the data meeting he assumptions of independent measurements, continuous dependent variables and also it allows for differentiating control from independent variables. Hierarchical approach allows for entering variables in a series of blocks or individually to determine the strength of association between each block or individual variables to the outcome variable.

Meeting the assumptions of multiple regressions. Age, SES and child mortality were positively skewed with scores of 1.23, 1.45 and 2.98, respectively. These variables were considered as moderately skewed and were consequently transformed by square rooting scores (Tabachnick, 2003). Skewness was subsequently reduced to .74 for age, 1.06 for SES and 1.24 for child mortality. These scores meet the assumptions of regression which is a skewness between -1 and 1 (Leech, Barrett, & Morgan, 2005).

Results

Sample Characteristics

The average number of children born to each mother was 4.72 with a standard deviation of 3.7. The least number of children born to a woman was one and the highest 18. The mean for number of children who were dead was .74 per mother with a standard deviation of 1.5. About 15% of mothers had not given birth to any boys and 17% had no girls. The majority (61.1%) were in monogamous marriages, 13.5% in polygamous marriages and a similar percentage had never married. Single parents who were once married made up about 12%, 2% were separated, 1.7%, divorced, and 7.9% were widowed. The mean age of the mothers was 36.8 years with a standard deviation 0f 16.3, the youngest being 12 years and oldest 97 years old. The educational attainment varied over seven sequential categories. About 32% had not been to school at all, 20.3% had some elementary education, 33.8% had six years of elementary education, .4% high school, .4% had some college training and only .5% had completed university. Some 13.3% had general education of some unspecified lower secondary. About 77.7% lived in rural and 22.3% in urban areas. Table 1 shows a summary of descriptive characteristics of the mothers included in the sample.

[Insert table 1 here]

Multivariate Analysis

Intercorrelations among variables in the model were checked for multicollinearity. The range of correlations was between -.262 and .538. Another test of multicollinearity is tolerance, and the scores were greater than 34 or (1- R^2). This is an indication that multicollinearity was not a problem with the selected variables (Leech, Barrett & Morgan, 2008).

[**Insert table 2 here**]

Both models with transformations and without transformations show a similar trend in results. Both model summaries show how much R^2 increases with additional variables. The R^2 changes were statistically significant in each of the steps. When age, SES and area of residence were entered, they significantly predicted number of children borne to a mother, without transformation $F(8,2782) = 228.95, p < .001, R^2 = 40$ and with transformation $F(8,2782) = 228.95, p < .001,$ adjusted R^2=.43. With every addition of variables, prediction improved significantly. The entire group of variables significantly predicted number of children born, $F(11,2779) = 383.86, p < .001,$ adjusted R^2=.60. With the transformations the scores increased. The control variables predicted $F(8,2782) = 259.92, p < 001$, adjusted $R^2 = 43$. The entire group of variables predicted $F(11,2779) = 928.95, p < .001$, adjusted $R^2 = .66$. Mothers' demographics including; age, SES and area of residence accounted for the most variability in number of children borne to a mother. The SES and urban residence negatively correlated to number of children borne. Living in the urban increased the odds by 1.078 over the rural residence. (See table 2 for details).

Discussions

The objective of this study was to determine the association between preference for male children, child mortality, and the number of children born to mothers in Kenya. We tested the hypotheses that: the preference for male children will influence the number of children born to mothers in Kenya, and the number of children that have died per couple will be related to the number of subsequent births. We find that the gender and mortality of children significantly influences the number of children born to women in Kenya. Our findings are similar to what other authors have found in other countries, for instance, Le Grand et al., (2003) and Gyimah, (2002a) establishes the effect of mortality and fertility in Zimabwe, Kenya and Ghana respectively. Therefore, our findings suggest that as children die there is more desire to have children, making it inevitable that death of a child is likely to be followed by another pregnancy. We also find that there is preference for male children such that mothers with girls only are likely to exhibit higher fertility. The R^2 change for number of male children though significant was smaller than for female children born. This implies that specific gender preference influenced number of children born. Mothers with more girl children were more likely to have increased fertility.

Preference for male child(ren) increases fertility and may cause deterioration of women's health due to multiple pregnancies, coupled with more workload and worsened with poor nutrition (Lartey, 2008). It is ironic that in countries where women are burdened with other challenges of providing livelihood to families, are equally burdened with frequent pregnancies to fulfill the desire to meet the male sex preference. Women who give birth to sons are treated better than those who do not by their husbands and even extended relatives. This becomes an incentive for more births.

Recommendations

The results are limited by the absence of several variables that were not taken into account in this analysis. Total fertility was underestimated in our analysis because pregnancies, abortion, miscarriages, and still births were not included. In addition, the full impact of child mortality that takes into account these situations is not reflected in the study. Furthermore, our results are limited by the absence of direct measures for socio-economic status (SES). The SES scale is created without variables such as land and presence of animals that do not reflect cultural wealth. Including such measures would increase the reliability of the SES scale. This study used cross section data and therefore, it is not possible to do a trend analysis. In essence, we have not been able capture the impact of gender preference and childhood mortality on fertility over time. Additionally our findings are limited to one context—Kenya, thus it can not be generalized to other African countries.

Overall, our findings have significant policy implications for family planning programs in Kenya. Family planning education should take into account factors such as gender preference and child mortality, since they have a significant impact on fertility. In addition to addressing a woman's reproductive rights and privileges, policymakers should address underlying cultural norms and practices that tend to favor male children over the females.

Conclusion

Traditional approach was used to determine fertility (Bongaarts, 1986). The fundamental determinants including mother's age, sex preference, child mortality, and marriage were positive predictors. Fertility may be explained as having its origin in the society that supports procreation for various reasons. However, it is sustained by the social system expectations of male sex preference and replacement theory that explains the connection between fertility and child mortality. Other factors such as SES engage women in other activities such as education and employment which cause decline in fertility. If societal expectation changes to embrace fertility decline, then we do not need to rely on education alone, but rather include other means like contraceptives. The latter is also correlated to education. While delayed marriage can be achieved through education, sex preference is a systemic problem that requires similar solutions. It should not be the family planning program alone tackling this problem. It requires concerted efforts from different government departments and community based organization as well as Non Governmental Organizations to help counter the sex preference. Programs that enhance child survival would not only benefit women and children, but would alleviate problems that emanate from population.

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Table 1

Means, Standard Deviations, and Intercorrelations for Mothers' Demographics, Child Gender and Mortality as Predictors of Fertility.

Variable	M	SD	1	2	3	4	5	6	7
Number of Children Borne	4.7	3.3	.6**	-.3**	-.2**	.3**	.4**	.4**	.6**
Predictor Variable									
1. Age	36.8	16.3		-.2**	-.1**	.4**	.2**	.3**	.4**
2. SES	1.3	1.12			.5**	-.0*	-.0*	-.1***	-.2***
3. Area of Residence	.22	.42				-.0	-.1**	-.1**	-.1**
4. Marital Status	220.1	71.9					.2***	.2***	.2***
5. Male Children Borne	.89	.31						-.2***	.46**
6. Female Children Borne	.81	.40							.2**
7. Child Mortality	.49	.72							

*p<.05. **p<.01.

Table 2.

Hierarchical Multiple Regression Analysis Summary for, Gender Preference and Child Mortality Controlling for Mother's Age, SES, Area of Residence and Marital Status, Predicting Fertility (*N=2.791*).

Variable	*B*	SE*B*	β	R^2	ΔR^2
Step 1				.43	.43
Age	1.6	.05	.54***		
SES	-1.3	.20	-.12***		
Area of Residence	-.32	.15	-.04*		
Marital Status					
Single	-1.53	.15	-.16***		
Polygamous	.17	.17	.01		
Separated	-1.50	.32	-.07***		
Divorced	-.96	.32	-.04**		
Widowed	.02	.2	.00		
Step 2				.46	.04
Age	1.5	.05	.51***		
SES	-1.4	.20	-.13***		
Area of Residence	-.22	.14	-.03		
Marital status					
Single	-1.14	.15	-.12 ***		
Polygamous	.16	.17	.01		
Separated	-1.38	.31	-.06***		
Divorced	-.80	.31	-.04*		
Widowed	-.04	.18	-.00		

All Male child(ren) Borne	2.12	.16	.20***		
Step 3				.54	.08
Age	1.22	.05	.41***		
SES	-1.20	.18	-.11***		
Area of Residence	-.21	.13	-.02		
Marital status					
Single	-.36	.14	.04*		
Polygamy	.57	.15	.05***		
Separated	-1.27	.29	-.06***		
Divorced	-.40	.29	-.02		
Widowed	-.01	.17	-.04		
All Male Child(ren) Borne	3.17	.15	.30***		
All Fmale Child(ren) Borne	2.71	.12	.32***		
Step 4				.66	.12
Age	.89	.04	.3***		
SES	-.63	.15	-.06***		
Area of Residence	-.30	.12	-.03*		
Marital Status					
Single	-.36	.12	-.04**		
Polygamous	-.02	.14	-.00		
Separated	-1.1	.25	-.03**		
Divorced	-.32	.25	.00		
Widowed	-.54	.15	-.04***		
All Male Child(ren) Borne	2.9	.13	.27***		
All Female Child(ren) Borne	2.4	.11	.28***		

Number of Children Dead	1.80	.06	.4***

*p<.05; **p<.01 & ***p<.001