Effects of Education on Determinants of High Desired Fertility: Evidence from Ugandan Villages

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Abstract:
High desired fertility is an important factor contributing to the population explosion in sub-Saharan Africa. On a broad sample of 910 respondents from the rural areas of Uganda this paper assesses the impact of health risks, economic contributions from children, traditional community institutions and unequal position of women on desired fertility levels. The paper further scrutinizes how these determinants are affected by education.

The results show that fear of diseases and involvement in traditional clan institutions increase desired number of children. Interestingly, these effects can be remarkably mitigated through education that improves the individual health prevention as well as reduces the influence of clans. Economic incentives for having children seem to be less significant than other factors. In addition, a very significant difference in desired fertility between men and women emerges, nevertheless education leads both to reduction and convergence of their desired fertility levels.
All these findings suggest that education stimulates a complex change in fertility preferences and underline the importance of education as efficient tool for reducing rapid population growth.

**Keywords:** fertility, education, development., demography

**JEL:** I1, I2, J1

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INTRODUCTION AND HYPOTHESES

Average fertility in least developed countries (LDCs) in the last 50 years has declined from more that 6 to slightly less than 3 children per woman. Fertility has declined most quickly in Latin America and Asia from 5.9 to 2.6 and less rapidly in North Africa and Western Asia, from 6.6 to 3.5 children per woman (UNFPA, 2006; Makinwa-Adebusoye, 2001). However, the demographic transition did not happen in sub-Saharan Africa. In the past thirty years, sub-Saharan Africa has become the world’s region with fastest population growth. Despite high mortality levels caused by AIDS pandemics, the population more than doubled between 1975 and 2005, rising from 335 to 751 million (UNFPA, 2006). Currently, it is growing at a rate of 2.2% a year (WDI, 2004). Furthermore, sub-Saharan Africa is the world’s poorest region and the only developing region which during the period 1980–2000 suffered a decline in per capita income (WDI, 2004). During this period per capita income decreased on average by more than 1 percentage point annually.

During the previous decades heated discussion on what makes the fertility to decline and its link to economic growth has taken place. Originally, the experience of increasing living standards accompanied by the decreasing birth rates in developed and successfully developing Asian and Latin American countries contributed to the understanding of economic development as the best contraceptive. When summarizing the major conclusions of the World Population Conference held in 1974 in Bucharest Finkle and Crane (1975) write: “the basis for an effective solution of population problem is, above all, socio-economic transformation.” This was taken to mean that economic growth would lead to change in rationale for having children and slow down population growth. Nevertheless, the challenge remains for those countries that are stuck in a situation of no growth accompanied by high fertility levels - sub-Saharan Africa being the prime example. When empirically analyzing the causes of high fertility rates this paper builds on theoretical advances of desired fertility approach (Easterlin, 19751; Becker, 1991; Pritchett,

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1 According to Easterlin, at early stages of socio-economic development there is high demand for children and therefore there is no desire to limit fertility.
1994), which emphasizes the importance of demand for children and suggests that high fertility is predominantly a result of people’s choices.2

However, in relevant literature there is no consensus on the relative importance of particular determinants behind high desired fertility and as Pritchett (1994:3) puts it “the key question is to what extent fertility desires are determined by economic influences and to what extent by social and cultural forces.” This is also the key question for the design of efficient policies, which would enable sub-Saharan Africa to get out of poverty. A growing body of development researchers and institutions (e.g. World Bank, 2005) has emphasized the importance of education as a factor that affects desired fertility. But still, the specific pathways through which education influences these determinants are ambiguous in the existing research (see e.g. Dreze and Murthi, 1999 or Axinn and Barber, 2001). It is the aim of this paper to contribute to this ongoing discussion by assessing the impact of key factors on the determination of individual desired fertility and to scrutinize how these factors are affected by education. The analysis will be based on the set of micro-level data collected from 910 participants of a questionnaire survey, which we have undertaken in rural areas of Uganda.

The most frequently considered forces behind high desired fertility in sub-Saharan Africa are the following. Children in rural areas may be regarded by parents as a net economic asset by providing household labor (Ntozi and Kabera, 1991). Moreover, great majority of adults in sub-Saharan Africa, particularly in rural areas, are not covered by any social security system and rely on their children for economic support in old age and in time of need (Gille, 1985; Merrick, 2002). Children in poor health environment are more likely than other children to die. As a consequence parents have large numbers of children to compensate this risk in actuarial sense (Gille, 1985; Sachs, 2004). Another group of determinants influencing desired fertility are cultural factors. Caldwell and Cadwell (1987) and Makinwa-Adebusoye (2001) emphasize traditional community institutions that favor childbearing. These remain highly influential in many developing countries bringing more prestige to those with more children. High fertility is associated with the right life, divine approval and approbation by both living and dead ancestors. The unequal position of women also plays a role. Mason and Taj (1987) discuss the impact of traditional patriarchal family systems. While men are primer decision-makers about number of children, day-to-day care is mostly the responsibility of their mother. This effect may be further reinforced by low opportunity costs of women (Becker, 1991).

The statistic and econometric research in this field of interest is usually based on datasets from World Fertility Surveys (WFS) or Demographic and Health Surveys (DHS), which do not allow to assess the relevance of above-mentioned determinants perceived by individuals. Some empirical studies at micro-level in sub-Saharan Africa and Uganda aimed to solve this drawback, however, majority of them does not focus directly on the determinants of desired fertility but rather on the use of contraceptives and its effect on fertility rates (Ntozi and Kabera, 1991; Kirk and Pillet, 1998).

Several specific effects of education through which it can influence desired fertility were identified. Firstly, besides changing attitudes or values it contributes to the reduction of economic utility of children. Education raises opportunity costs of parents’ time and opens up greater opportunities for them in comparison to investment in children as a productive asset (Weinberger, 1987; Becker, 1991). Secondly, education may reduce infant and child mortality. Parents can therefore afford to plan fewer births in order to achieve a desired family size (Schultz, 1994; Martin, 1995). Thirdly, the position of women improves with higher education,

2 For the alternative perspective that emphasize the supply side and argues that the problem lies in the lack of contraceptives in developing countries see e.g. Robey, Rutstein and Morris (1993) or Westoff and Bankole (2000).
which could alter the decision-making process of the family on the number of children (Pritchett, 1994). Finally, educated people may be more receptive to modern social norms and the effect of traditional approaches might be mitigated (Caldwell, 1980). Weinberger (1987), Martín (1995) and Kravdal (2002) used macro-level correlation between average education level and fertility rate to support the relationship. Kirk and Pillet (1998) made similar analysis focusing on sub-Saharan African countries.

This paper will test the relevance of above-mentioned determinants and the effects of education on individual level. The hypotheses are the following:

- Health risks increase the desired number of children.
- Economic contributions from children to parents increase desired number of children.
- Traditional Ugandan community institutions contribute to higher desired number of children.
- The desired number of children differs for men and women.
- Higher level of education enhances prevention and reduces the risk of diseases perceived by respondents.
- Higher level of education decreases the importance of children’s economic contributions in fertility considerations.
- The influence of traditional community institutions (e.g. clans) decreases with the level of education.
- The position of woman within Ugandan family strengthens with the level of education she has.

SAMPLE, RESEARCH DESIGN AND MAJOR VARIABLES

The questionnaire survey was conducted in ten villages in rural area of Mukono district (southern part of Uganda) under the auspices of the Institute of Economic Studies, Charles University in Prague and the Uganda Czech Development Trust. A total of 910 respondents participated in the study and all the questionnaires were filled in November 2005. The villages and respondents were selected so as to have representative sample with the indication of level of education, age, sex, marital status and structure of economic activities. With regard to the fact that 85% of Ugandan inhabitants live in rural areas with similar characteristics, this sample can be considered as representative also for the whole Uganda. Most of the respondents are farmers and others are students, housewives, drivers, teachers, shopkeepers, etc. Distribution of the respondents in particular villages was following: Kikube 105, Busagazi 42, Kateete 143, Buikwe 160, Nakifuma 47, Bwinyogerere 95, Kasolo 89, Kygaya 58, Lugasa 122 and Kirugu 49. The questionnaires were bilingual – in English and Luganda – allowing us to approach also less educated people, who speak only Luganda.

Each respondent was asked to specify his/her desired number of children and factors which are of utmost importance for his/her decision-making about number of children. The selected factors broadly cited in the desired fertility literature were “translated” into the language understandable for all respondents in the following way. “Help of children now and their support when parents are old” was used as a proxy of economic incentives behind high fertility. “Fear from the child’s fatal diseases” was used as a proxy of high child mortality argument. The opportunity to “expand the size of respondent’s clan” approximates the cultural factors.
Besides the analysis of factors affecting decision-making about number of children, we have analyzed the impact of more general characteristics such as age, education level and sex. The sample was divided into five education levels: lower primary school (P1-P4), higher primary school (P5-P7), lower secondary school (S1-S2), higher secondary school (S3-S6) and above secondary school (diploma, bachelor degree or other university education). The average age of respondents is 26 years. The Table 1 summarizes the frequencies of different groups in the sample.

**Table 1: Descriptive statistics: total, by sex and age group**

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Sex</th>
<th>Age group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Man</td>
<td>Woman</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>910</td>
<td>496</td>
<td>414</td>
</tr>
<tr>
<td>Fraction in sample</td>
<td>100%</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>Desired number of children (mean)</td>
<td>6.0</td>
<td>7.1</td>
<td>4.8</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction who completed P4</td>
<td>92%</td>
<td>94%</td>
<td>91%</td>
</tr>
<tr>
<td>Fraction who completed P7</td>
<td>69%</td>
<td>74%</td>
<td>64%</td>
</tr>
<tr>
<td>Fraction who completed S2</td>
<td>48%</td>
<td>51%</td>
<td>45%</td>
</tr>
<tr>
<td>Fraction who completed S6</td>
<td>7%</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>26</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Family and society embeddedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>510</td>
<td>287</td>
<td>223</td>
</tr>
<tr>
<td>Married or divorced</td>
<td>400</td>
<td>209</td>
<td>191</td>
</tr>
<tr>
<td>Respondents with strong clan linkage</td>
<td>177</td>
<td>132</td>
<td>45</td>
</tr>
</tbody>
</table>

Advantages and disadvantages of this type of experimental studies noted in the literature apply to this study as well (for details see for example Benzion and Yagil, 2001). Nonetheless, the questions were examined carefully so that the risks connected to e.g. misunderstanding of particular questions from the side of respondents were limited in the highest possible extent. There were three rounds of pre-testing with 10 representatives of the expected sample, based on which the questionnaires were adjusted. In cooperation with Uganda Czech Development Trust thirty local instructors well-respected in the community were trained. The instructors not only facilitated distribution and retribution of the questionnaires but approached the respondents individually and due to their social status openness and serious approach of the respondents were ensured. Therefore, we believe that respondents were positively motivated to complete the questionnaire with necessary care and diligence even without being offered monetary incentives, which some authors claim, do not necessarily improve performance (Gneezy and Rustichini, 2000).

**STATISTICAL RESULTS**

**Health risks**

Uganda belongs among the countries with highest fertility rates in the world. Actual fertility rate in Uganda is 6.1 per woman (WDI, 2004). The mean desired fertility in our sample is equal to 6.0. It is not the primer focus of the paper to analyze the difference between actual and
desired fertility levels, but this comparison indicates that actual number of children largely reflects the people’s desires.

In Uganda mortality of children under 5 years reaches 14%. In sub-Saharan Africa in total the average is 17%, whereas in OECD countries it is 0.6% (WDI, 2004). Responses from our sample indicate that fear from child mortality contributes to higher desired fertility levels. Respondents for whom the fear of diseases was of utmost importance want to have on average 9.8 children, whereas the mean for the people without such strong fear from diseases is 5.4. According to ANOVA test of mean stability the difference is significant on 1% level.

Chart 1 suggests two interesting outcomes. Firstly, education decreases the desired fertility for both groups. Secondly, perception of poor health environment and higher child mortality increases desired fertility for all education levels. However, the difference in desired fertility between the groups tends to diminish with the education level. The effect of education is further reinforced by the change in proportion of respondents fearing the diseases, which diminishes by 15 percentage points on secondary school.

**Chart 1: Number of desired children, fear of diseases and education levels***

* The charts depict average values for particular groups and 95% confidence intervals.

These outcomes can be attributed to the link between education and attitude to health prevention. There is considerable evidence surveyed and contributed to by Mirowsky and Ross (1998) that suggests that changes in high mortality risks are symptomatic for higher levels of education which encourage the adoption of healthy lifestyle. Malaria is responsible for a huge share of early mortality and risk of infection by this disease is very closely knit with individual prevention, especially with the usage of mosquito nets (Gyapong et al, 1996 or Choi et al., 1995). To examine the link between education and health prevention Ugandan respondents were asked, if they use mosquito net. The results indicate that the share of people who use mosquito net increases for each level of education. Only 25% of respondents with lower primary school use it in contrast to 67% of those with finished secondary school. This finding goes in line with the empirical study of Nuwaha (2001) on mosquito net usage, which was also undertaken in Uganda. Education of parents can be therefore perceived as a factor that limits risk of child being infected by malaria. Consequently, more educated parents do not need to insure so much against high child mortality in the form of additional children.
Economic contributions from children

In rural areas as Mukono region, where most of the income has origin in subsistence farming, children might be perceived as a source of labor. Additionally, as in most other sub-Saharan countries the social security system is almost absent in Uganda (Reinikka and Collier, 2001) and people do not have guaranteed any social minimum as in developed countries. For many Ugandans children are their only security for the time of old age or bad health. The respondents’ answers from our sample do not provide clear picture on the relevance of economic contributions from children on higher desired fertility. On one hand big share of respondents (59%) claimed that support of children is an important factor in their fertility decision-making. On the other hand, there are no significant differences in means of desired fertility between the group that highly appreciates children’s economic support (6.5 children) and the group that considers this factor as unimportant (5.4 children). On 5% level we cannot refuse the hypothesis that means are the same for both groups (ANOVA test).

The possibility of child’s economic support to parents does not make a big difference in desired fertility for any education level (Chart 2). This finding contrasts with the argument of Weinberger (1987) or Kravdal (2002) who claim that education significantly reduces the economic utility of children and consequently pushes down the desired number of children. Our data suggest rather weak link between education and desired fertility through the changing perception of child as an economic asset.

Chart 2: Number of desired children, importance of economic support and education levels

Traditional community institutions

According to Makinwa-Adebusoye (2001:6) in African clan-based rural societies there is a need to ensure that fertility level is well above mortality level and the clan thus won’t disappear. “Considerable expansion of membership enhances the power and prestige of the clan and reduces the likelihood of extinction through death.” Therefore there is a pressure from clan leaders towards clan members to personally contribute to growth of the clan population through higher number of children. The social status of especially men in traditional Ugandan society is thus closely tied with the number children they have.
The data confirm that being embedded within the informal institutions of clan very strongly enhances the number of desired children. The people with strong clan linkage desire to have on average 10.5 children, whereas the people with weak clan linkage desire to have only 4.9 children (ANOVA significant on 1% level). Clan linkage increases the desired fertility also for each education level (see Chart 3). Though, the difference between the groups with strong and weak clan linkage is not stable. The desired fertility of respondents with weak clan linkage steadily decreases with education. Interestingly, the people with strong clan linkage want to have more than 8 children until the first half of secondary school. Their fertility preferences tend to change very rapidly at the second half of secondary school, where the number of children decreases to 5. The people with strong clan linkage seem to resist the effect of education until higher level of secondary education.

**Chart 3: Number of desired children, importance of clan and education levels**

![Chart 3](chart3.png)

Furthermore, the highest proportion of people with strong clan loyalty has finished less than first half of primary school. This proportion is even higher in the case of uneducated men (69%, Chart 4) as the traditional system of clans is predominantly masculine. Education very rapidly decreases the influence of the clan through reducing the proportion of people with strong clan linkage. The proportion of men with strong clan linkage decreases by 40 percentage points during higher primary school.
To the knowledge of authors the existing fertility studies do not offer any quantitative support for the link between desired fertility and traditional community structures. Our data suggest strong positive relationship between the clan loyalty and desired fertility and show that education has a capacity to eliminate the influence of the clan on fertility decisions.

**Sex and unequal position of women**

The literature on differences in desired fertility between men and women in developing countries is ambiguous. Bankole and Singh (1998) show on DHS data collected in developing countries between 1990-1996 that both men and women want to have large families and that husbands want more children than their wives. This is because women are those who take full care of children in traditional societies and thus want less of them. In their surveying article Mason and Taj (1987) analyze a variety of channels for women’s desired fertility to be either lower or higher than men’s desired fertility. Higher desired fertility of women under patriarchal system may arise due to their effort to insure against the risk of divorce.

Our research results support the view that women want to have less children than men. Men want to have on average 7.0 children, whereas women only 4.8. The difference is significant on 1% level (ANOVA test).
Several authors show an overall pattern of decreasing women’s desired fertility with increasing education. Martín (1995) in her study based on DHS provides the indicator of mean ideal family size according to women’s education for 26 developing countries, including 10 sub-Saharan countries. For Uganda, the results suggest that women with no education want to have on average 7.2 children, and this number is decreasing with education to 5.1 for the most educated women. Similarly, Kirk and Pillet (1998: 12) show that in the group of sub-Saharan countries with the highest fertility rates, which includes Uganda, desired fertility falls down from 6.2 for women with no education to 4.0 for women with secondary education. Our data (lower line in Chart 5) are in compliance with these observations. Women’s desired fertility decreases for all levels of education - from the average of 6.8 for women having finished less than first half of primary school to 4.2 for those with higher secondary school education.

The relevant studies do not systematically account for possible differences between desired fertility of men and women. The focus is on women’s desired fertility, for example WFS relied almost exclusively on the reports of women. As mentioned earlier due to a number of socio-cultural factors women are very often voiceless and powerless in matters affecting their reproduction and men are dominant decision-makers on fertility in many African countries (Makinwa-Adebusoye’s, 2001).

The upper line in Chart 5 depicts the desired number of children for men across education levels. It shows that education changes the fertility preferences of men more considerably than of women. Uneducated men want to have more than 12 children, whereas men with higher secondary school education want to have only 5.1 children. These data outcomes together with the strong position of man in Ugandan society highlight the provision of education to men as critical measure to reduction of high fertility rate.

On the other hand the position of woman within the family alters with the level of education she has. Women in our sample were asked to what extent polygamy of their husbands is or is not acceptable for them. Chart 6 shows the results. Polygamy is remarkably less acceptable for educated women in comparison with women almost without any education. Unacceptability of polygamy increases from 10% to almost 50%.
The data suggest three interesting findings resulting from sex differences. Firstly, men want to have more children than women. Secondly, education has stronger impact on man’s fertility choices rather than on woman’s, which is especially important in the context of patriarchal society in Uganda. Thirdly, education strengthens the position of woman within the family, which may reinforce the effect of education on lower desired fertility.

**Total effect of education**

Results from Ugandan survey strongly accord with the view that education has a significant negative impact on desired fertility. The relationship between these two variables is depicted in Chart 7. We can observe a rapid decline in desired fertility at the lower primary school; further significant decline appears at secondary school. Average desired number of children decreases from 9.5 to 6.5 at primary school and further to 4.1 at secondary school.

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3 Number of empirical studies warns against overestimating the effects of education on outcomes of interest when one relies solely on correlation between the two variables. This may arise due to the omission of unobserved abilities correlated with education (in the context of fertility see Breierova and Duflo, 2002). To address the omitted variable bias the level of education is usually instrumented by the exogenous accessibility of education measured by number of schools in respondent’s region. We have found negative correlation between number of schools and desired number of children, which is significant on 1% level. This outcome supports the existence of causality that runs from education to fertility.
The inverse relationship between desired fertility and education is well established. Less clear is the magnitude and pathways through which education influences desired fertility. As mentioned above according to Martin (1995) and Kirk and Pillet (1998), uneducated Ugandans want to have on average two more children than the most educated ones. We have observed stronger impact of education – the difference of five children. However if we used data for women only as the referenced studies did, similar results would be obtained. Since the role of men in decision-making process on the number of children is strong, it is important to take into account also their desired fertility when measuring the magnitude of education effect.

The types of observed effects of education are summarized in Table 5. Firstly, education decreases the fear of diseases due to improvement in prevention and thus the parents do not tend to desire additional children as an insurance against child’s death. Secondly, the economic influences are lower for more educated parents as they rely more on themselves when they are old or in the time of need. However, this effect emerged as less significant when compared to other factors. Thirdly, the influence of traditional community institutions that favor childbearing is moderated by higher education. Finally the unequal position of women improves with higher education, which can be shown on women’s attitude to polygamy. As a consequence of better position in the household, woman’s preferences about the number of children, which are in general lower than those of men, may be more respected. Education thus mitigates the importance of all four factors, which were identified as contributing to high desired fertility level in Uganda.

Table 2: Effects of education on desired fertility: summary

<table>
<thead>
<tr>
<th>Factors behind desired fertility</th>
<th>Impact on desired fertility</th>
<th>Impact of education on importance of the factor</th>
<th>Impact of education on desired fertility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear of diseases</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Economic help of children</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Clan linkage</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sex and unequal position of women</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
ECONOMETRIC RESULTS

The preceding statistical analysis demonstrates the impact on desired fertility of three factors: fear of diseases, clan linkage and sex. Economic support of children seemed to be positively correlated, but insignificant. Regression analyses reported below tests the hypotheses jointly and controls for the effects of other particular factors. OLS estimation was used to analyze the data, assuming a normally distributed error term.

In regression form we can model hypotheses in the following way:

\[ F = b_0 + b_1D + b_2H + b_3C + b_4S + e \]  

(1)

where \( F \) = desired fertility, \( D \) = fear of diseases, \( H \) = economic help of children, \( C \) = clan linkage, \( S \) = sex. B’s are the OLS coefficients, and \( e \) is the error term. The hypotheses are the following: \( b_1>0 \), \( b_2=0 \), \( b_3>0 \) and \( b_4<0 \). Table 3 presents the econometric results for the whole sample. The level of relationship is an average for this type of experimental studies, R Square is equal to 0.21 and the significance level is below 1%.

Table 1: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for the whole sample.

<table>
<thead>
<tr>
<th></th>
<th>Whole sample</th>
<th>Rsq=0.21 Adj Rsq=0.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.84 *** (9.59)</td>
<td></td>
</tr>
<tr>
<td>Fear of diseases</td>
<td>3.03 *** (6.03)</td>
<td></td>
</tr>
<tr>
<td>Child’s support</td>
<td>1.32 *** (3.77)</td>
<td></td>
</tr>
<tr>
<td>Clan linkage</td>
<td>4.71 *** (10.37)</td>
<td></td>
</tr>
<tr>
<td>Sex (man=1, woman=2)</td>
<td>-1.36 *** (-3.84)</td>
<td></td>
</tr>
</tbody>
</table>

Dependent variable: Desired fertility

* Indicates statistical significance at the 10% level.
** Indicates statistical significance at the 5% level.
*** Indicates statistical significance at the 1% level.

The findings re-establish the impact of above analyzed factors on desired fertility.\(^4\) In contrast to statistical testing the results of overall regression suggest the positive impact of child’s economic support being significant on 1% level.

The sample was divided on more educated half and less educated half of respondents in order to compare the coefficients for the two sub-samples (see Table 4). The coefficients of explanatory variables show lower slopes for educated half of respondents than for the less educated half (differences significant on 1% level). These results comply with the hypothesis, that education mitigates the effect of all analyzed determinants of high fertility and thus contributes to reduction of desired fertility. In addition, intercept for more educated half is lower by almost 3.8 children.

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\(^4\) To deal with the fixed effects of specific villages where the data were collected we have also included clustering into the OLS regression. The resulting standard errors and significance levels did not emerge substantially altered from those of simple OLS in Table 3.
Table 4: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for more educated and less educated half of respondents.

<table>
<thead>
<tr>
<th>Education</th>
<th>Less educated half</th>
<th>More educated half</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>8.21 *** (7.23)</td>
<td>4.52 *** (12.84)</td>
</tr>
<tr>
<td>Fear of diseases (important=1)</td>
<td>3.24 *** (4.07)</td>
<td>1.55 *** (4.29)</td>
</tr>
<tr>
<td>Child's support (important=1)</td>
<td>1.27 ** (1.98)</td>
<td>0.95 *** (4.66)</td>
</tr>
<tr>
<td>Clan linkage (important=1)</td>
<td>5.54 *** (7.48)</td>
<td>1.71 *** (5.44)</td>
</tr>
<tr>
<td>Sex (man=1, woman=2)</td>
<td>-2.55 *** (-4.02)</td>
<td>-0.56 *** (-2.68)</td>
</tr>
</tbody>
</table>

Besides the regression model in equation (1) we have undertaken series of OLS regressions for different sub-samples to observe how the variables interact. The slopes for different sub-samples are in Table 5 and Table 6.

Table 2: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for the sub-samples divided according importance of fear of diseases and child’s support.

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Unimportant</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.54 *** (9.59)</td>
<td>11.07 *** (4.64)</td>
</tr>
<tr>
<td>Fear of diseases (important=1)</td>
<td>1.09 *** (3.22)</td>
<td>2.14 (1.56)</td>
</tr>
<tr>
<td>Child's support (important=1)</td>
<td>4.17 *** (9.04)</td>
<td>6.03 *** (4.31)</td>
</tr>
<tr>
<td>Sex (man=1, woman=2)</td>
<td>-1.00 *** (-2.97)</td>
<td>-3.71 (1.27)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child's support</th>
<th>Unimportant</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.73 *** (8.89)</td>
<td>7.22 *** (8.53)</td>
</tr>
<tr>
<td>Fear of diseases (important=1)</td>
<td>2.37 *** (4.40)</td>
<td>3.48 *** (4.40)</td>
</tr>
<tr>
<td>Child's support (important=1)</td>
<td>4.16 *** (8.56)</td>
<td>5.09 *** (7.09)</td>
</tr>
<tr>
<td>Sex (man=1, woman=2)</td>
<td>-1.13 *** (-2.83)</td>
<td>-1.49 *** (-2.81)</td>
</tr>
</tbody>
</table>

Table 3: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for the sub-samples divided according importance of clan linkage and sex.

<table>
<thead>
<tr>
<th>Clan linkage</th>
<th>Weak</th>
<th>Strong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.49 *** (15.09)</td>
<td>12.54 *** (4.86)</td>
</tr>
<tr>
<td>Fear of diseases (important=1)</td>
<td>2.10 *** (6.05)</td>
<td>4.54 *** (2.76)</td>
</tr>
<tr>
<td>Child's support (important=1)</td>
<td>1.03 *** (4.76)</td>
<td>1.97 (1.27)</td>
</tr>
<tr>
<td>Clan linkage (important=1)</td>
<td>-0.94 *** (-4.46)</td>
<td>-3.60 *** (-2.05)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.98 *** (7.77)</td>
<td>3.78 *** (9.13)</td>
</tr>
<tr>
<td>Fear of diseases</td>
<td>4.05 *** (4.97)</td>
<td>1.38 *** (3.66)</td>
</tr>
<tr>
<td>Child's support</td>
<td>1.60 *** (2.66)</td>
<td>0.86 *** (3.55)</td>
</tr>
<tr>
<td>Clan linkage (important=1)</td>
<td>5.32 *** (7.71)</td>
<td>3.06 *** (7.87)</td>
</tr>
<tr>
<td>Sex (man=1, woman=2)</td>
<td>-0.94 *** (-4.46)</td>
<td>-3.60 *** (-2.05)</td>
</tr>
</tbody>
</table>

Three observations from this analysis are worth noting. Firstly, fertility decision-making of the respondents who perceive one factor as important for number of children is in general more affected by other determinants as well. For example, people with strong clan linkage reflect the fear of diseases more strongly in their desired number of children than people with weak linkage. Secondly, all intercepts are substantially higher for the groups perceiving particular
factors with higher importance. Thirdly, men and women have similar intercept, but men have higher coefficients of all determinants than women.

**CONCLUSIONS**

Rapid population growth in sub-Saharan Africa is one of the critical forces that undermine economic growth prospects of the region. It would have to grow by more than 2.2% annually in order to only keep the living standards on the same level, not mentioning the convergence to more developed countries. There is substantial literature on possible causes of high desired fertility in poor countries. We have classified these factors on four broad types: health risks, economic contributions from children, traditional community institutions and unequal position of women in the society. Usually observed correlation between education and fertility based on aggregate data does not allow assessing if and to what extent the importance of these factors changes with education. In contrast to most existing studies this paper analyzes more detailed individual-level data from a questionnaire survey among 910 respondents from villages in Mukono district, Uganda. Quantification of the influence of particular factors on desired number of children and decomposition of the education impact are the key results of the research.

The average number of desired children in the sample amounts to 6.0 which is almost identical to actual fertility rate in Uganda, which reaches 6.1 children per woman. We have found that fear of diseases motivates respondents to desire higher number of children. The results also suggest that more educated people put higher emphasis on prevention and reduction of health risks, which were measured by mosquito net usage. As a consequence, more educated respondents attributed to health risks substantially lower importance in their fertility decisions than their less educated counterparts and their final desired number of children was lower.

The data draw attention to the fact that traditional community institution of clan may substantially increase the desired number of children, on average by as much as 5.6 children. At the same time the data provide rare quantitative support for the role of education in the reduction of clan influence on fertility. This effect takes place both on primary and also secondary level education.

Another interesting finding stems from the analysis of different fertility preferences of men and women. The decline in desired fertility of women due to education shows in our sample similar pattern as in other comparable studies which measure the impact of education on fertility. However, these studies predominantly consider women’s fertility preferences as decisive and often omit the role of men. Remarkably high impact of education on men’s desired fertility draws education of men as being equally important as it is in the case women.

Economic contributions of children emerged to be important for majority of respondents, but statistical tests did not provide clear picture on the significance of this factor in altering desired fertility.

In general, it seems that it is not just one specific pathway through which education influences desired number of children as often assumed. Rather the responses indicate that education stimulates a complex change in preferences and fertility attitudes. The change in perceptions of respondents ranges from health and economic to cultural influences behind high desired fertility. We hope that our findings provide a sharper picture as to why education should be considered as the most appropriate contraceptive and that the foreign aid focusing on mitigating rapid population growth should have the form of widespread education provision until the secondary education level equally available for women and men.
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