**Education Matters. But whose Education? The Relative Importance of women and their spouse's education in explaining fertility response of a reproductive health program in rural Ghana.**

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## EXTENDED ABSTRACT

Although previous research has established a strong link between educational attainment and reproductive health outcomes, much of this research has focused on the education status of the woman. This paper seeks to investigate the relative importance of educational attainment of women and the educational attainment of their spouse in explaining fertility outcomes in the context of rural Africa. To do this, we investigate the relative importance of the education of women and their spouses in determining the impact of the introduction of a of reproductive health program in the Kassena-Nankana district in rural Northern Ghana. We use longitudinal data on 24,204 women over a period of 18 years from the Navrongo Health and Demographic Surveillance estimate long term effects of the program. Our regression analysis show that 1) the spouse's education is as important as the women's education in explaining the fertility effect of the program; and 2) the effect of the program was strongest when both the woman and the man were educated. Our results suggest that in highly patriarchal societies like those on many sub-Saharan African countries the education status of the men may an equally important effect on fertility outcomes as the education status of the women themselves.

## 1 Introduction

The relationship between socio-economic status and fertility is a subject of long-standing research interest among social scientists. Following seminal work of Becker and Lewis (1973), a number of empirical studies have demonstrated that family size has negative effect on socio-economic outcomes of children (Rosenzweig and Wolpin, 1980; Gruber, Levine and Staiger 1999; Donohue, Grogger and Levitt, 2002; Charles and Stephens, 2006; Pop-Eleches, 2006) although recent studies from developed countries fail to find any causal effect of family size on socio-economic status (Black et al, 2005; Angrist, Lavy and Schlosser, 2006; Aaslund and Gronquist, 2007). Another body of work has sought to shed light on the effect of socio-economic status on fertility outcomes, mostly showing a negative gradient (Gertler and Molyneaux1994; Bongaarts, 2003; Breierova and Duflo, 2004; Dust, 2005; Al Kandari, 2007; Schellekens, 2009; Kim, 2010; Pop-Eleches, 2010; Brand and Davis, 2011; Dribe and Scalone, 2011).

This paper takes the approach of the latter group of studies. The paper seeks to explore whether women from different socio-economic backgrounds responded differently to a quasi-experimental introduction of reproductive and family planning services in the Kassena-Nankana districts of the Upper East Region of Ghana. Using a rich longitudinal data from the Navrongo Demographic and Health Surveillance (NHDSS) we follow 24204 women who were of reproductive age (15-49 years) in 1993, for 18 years.

In 1995 the Navrongo Community Health and Family Planning Project (CHFP) was launched in the districts to test the hypothesis that family planning services can induce sustained reproductive change in a traditional rural African population (Binka, Nazzar and Phillips 1995). The CHFP employed a quasi-randomized design that assigned treatments to different parts of the district called treatment cells[1]. One cell was assigned to receive a community health nurse who provided doorstep family planning and ambulatory services (henceforth CHO). The range of services provided under this intervention included provision of oral contraceptives and condoms, and injectable contraceptives as well as treatment of common ailments and immunization. This intervention also included scheduled visits by nurses to all compounds within an assigned catchment area in 90-day cycles to provide these services although this requirement was not strictly enforced. In another cell (YZ), existing traditional social and political structures were mobilized in support of community health and family planning services. Known as the zurugelu (togetherness), it involved constituting health action committees from existing socio-political structures and mobilizing traditional peer networks to provide outreach to men. A third cell was assigned to receive the two interventions (CHO+YZ) while a forth cell was designated a control cell.

### Data Sources

The data resources for this paper are from the Navrongo HDSS. Over the last 20 years, the HDSS has collected information on births, deaths, relationships and migration and other demographic information on all residents of the two Kassena-Nankana districts that provides a unique platform for monitoring health and demographic change over time. The HDSS also includes an annual

[1] Detailed description of the design can be found in Debpuur et al (2002)

update of educational attainment, immunization and frequent updates of compound belongings[2]. Since 2004 these have been collected at the household level.

**Regression model**

We investigate differential response to the CHFP project by socio-economic status by interacting baseline socio-economic status with treatment cell assignment from the CHFP project. The general regression equation used for these estimations is:

$$fertility_{wct} = \beta_0 + \beta_1 treat_{wc} + \beta_2 socio_{wct} + \beta_3 (treat_{wc} * socio_{wct-1}) + \sum_k \sigma_k X_{wct-1} + \varepsilon_{wct} \quad (2)$$

**Preliminary results**

Table 1 presents descriptive statistics of the samples. The variables for the HDSS sample are measured in 1993 to enable comparison of the two samples. For continuous variables, means and standard deviations (in brackets) are presented. The Panel sample is largely representative of the HDSS with the exception of the age distribution. The HDSS sample is almost evenly distributed across age groupings 15-24, 25-34 and 35-49 while the Panel sample has fewer women under the age of 25 (22%) and more older women (41% aged 35-49). The fraction of married women is identical at 81% and about 42% of women (41% in the Panel) are in polygamous marriages. About 90% of women have at least one child but the number of number children per woman (4.33) and number of surviving children (3.77) is slightly higher in the Panel than in the HDSS. Majority of women (70% in the Panel and 66% in the HDSS) practise traditional African religion with just under 30% being Christians and under 5% being Muslims. About 76% of women (77% in the HDSS sample) have no formal education while 86% of their husbands (85% in the HDSS sample) have no formal education. The distribution of women across the CHFP treatment groups is comparable across the two samples. Our measure of fertility preference (desired family size) and fertility regulation (use of modern contraceptives) are available only in the Panel. The average woman wants a family size of 6 people. About 11% of women report using modern contraceptives.

**Table 1: Descriptive statistics**

| | **HDSS (N=24204)** |
|---|---|
| Woman age group | |
| 15-24 | 32.61% |
| 25-34 | 33.57% |
| 35-49 | 33.82% |
| Women is married | 81.12% |
| Age at married | 18.72(3.56) |
| In polygamous marriage | 42.33% |
| Woman has at least one child | 90.31% |
| No of children ever born | 3.97(2.13) |
| No. of surviving children | 3.57 (1.96) |
| Religion | |
| Traditional African religion | 65.67% |
| Christian | 29.78% |
| Muslim | 4.5% |

[2] A compound is composed of one or more households. Prior to 2004, assets information was collected at the compound level.

| | |
|---|---|
| Woman's education | |
| No education | 77.55% |
| Some Education | 22.45% |
| Husband's education | |
| No education | 85.21% |
| Some education | 15.79% |
| CHFP assignment | |
| Regular (control) | 36.16% |
| Yezura (YZ) only | 13.95% |
| CHO only | 15.98% |
| CHO + YZ | 33.90% |

Notes: Standard deviations are reported in parenthesis. HDSS sample is the universe of women in aged 15-49 years as of 1993 whose education status do not change over the next 18 years of the study. The Panel sample is a random sample of these women who were sampled in 1993 and interviewed annually until 2003 with the exception of 1995.

**Figure 1**

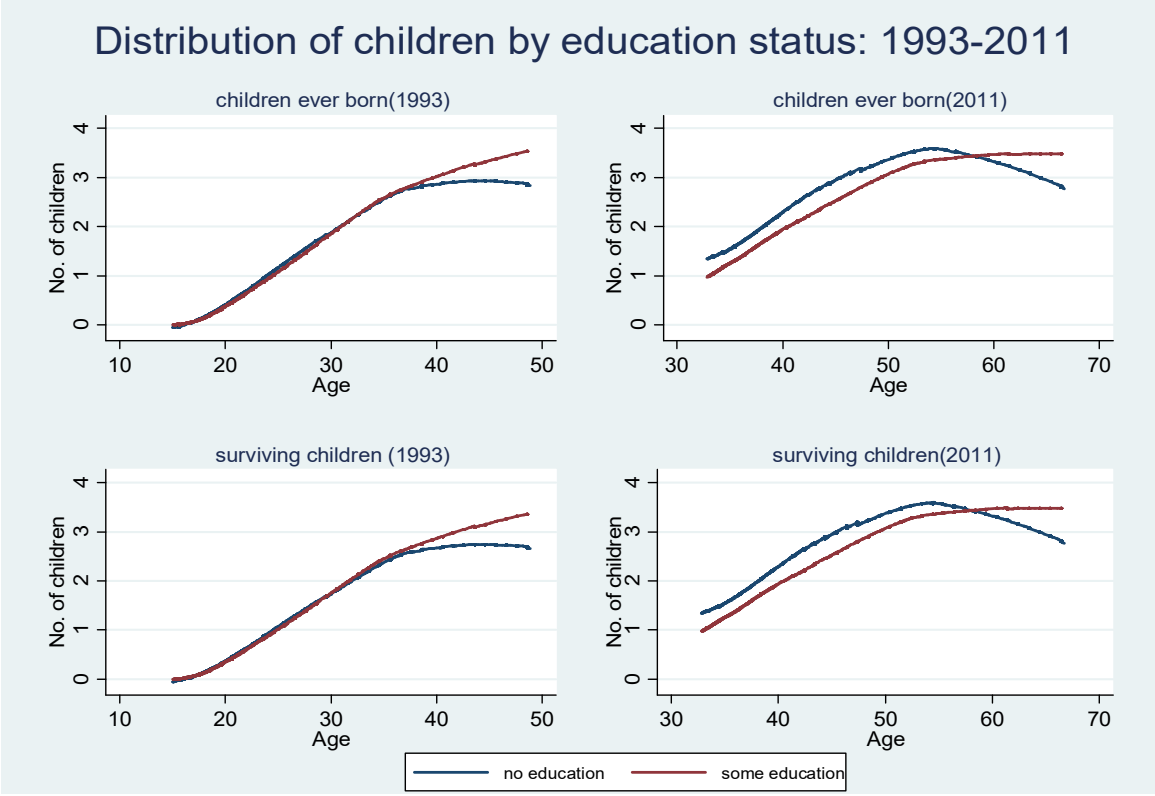

**Table 2: Fertility response to CHFP by socioeconomic status**

| Outcome variable: Total children ever born | | | | |
|---|---|---|---|---|
| CHFP treatment | | | | |
| YZ | -0.019 | -0.014 | -0.015 | -0.012 |
| | (0.022) | (0.020) | (0.021) | (0.021) |
| CHO | -0.055*** | -0.054*** | -0.054*** | -0.054*** |
| | (0.013) | (0.012) | (0.013) | (0.014) |
| CHO + YZ | -0.041*** | -0.039*** | -0.034*** | -0.033*** |
| | (0.011) | (0.011) | (0.011) | (0.011) |
| Woman is educated | -0.057*** | -0.010 | 0.015 | 0.012 |
| | (0.011) | (0.010) | (0.019) | (0.023) |
| Husband is educated | -0.057*** | -0.030*** | -0.031*** | -0.028* |
| | (0.013) | (0.011) | (0.011) | (0.017) |
| Woman & husband are educated | | -0.127*** | -0.125*** | -0.123*** |
| | | (0.020) | (0.020) | (0.020) |
| YZ * woman is educated | | | -0.014 | -0.008 |
| | | | (0.032) | (0.031) |
| CHO*woman is educated | | | -0.013 | -0.008 |
| | | | (0.039) | (0.038) |
| YZ+CHO * woman is educated | | | -0.049* | -0.045* |
| | | | (0.028) | (0.026) |
| YZ * husband is educated | | | | -0.018 |
| | | | | (0.031) |
| CHO*husband is educated | | | | -0.001 |
| | | | | (0.025) |
| YZ+CHO*husband is educated | | | | -0.013 |
| | | | | (0.024) |
| N | 24204 | 24204 | 24204 | 24204 |
| Pseudo R2 | 0.0502 | 0.0505 | 0.0502 | 0.0505 |
| Wald chi-square | 3196.31 | 3202.09 | 3224.89 | 3238.54 |

Robust standard errors clustered at compound level are reported in parenthesis. *, ** and *** denote p<0.10, p<0.05 and p<0.01 respectively. All regressions estimated using Poisson models. All regressions include controls for age group, marital status, indicator for being in a polygamous marriage, religion, age at first marriage and its square.

**Table 3: Fertility response to CHFP by socioeconomic status**

| Outcome variable: Number of surviving children | | | | |
|---|---|---|---|---|
| CHFP treatment | | | | |
| YZ | -0.008 | -0.009 | -0.008 | -0.005 |
| | (0.017) | (0.017) | (0.018) | (0.018) |
| CHO | -0.049*** | -0.049*** | -0.048*** | -0.051*** |
| | (0.013) | (0.012) | (0.013) | (0.014) |
| CHO + YZ | -0.031*** | -0.032*** | -0.025*** | -0.024*** |
| | (0.010) | (0.010) | (0.011) | (0.011) |
| Woman is educated | -0.038*** | 0.011 | 0.054** | 0.052** |
| | (0.011) | (0.010) | (0.023) | (0.023) |
| Husband is educated | -0.037*** | -0.007 | -0.008 | -0.005 |
| | (0.011) | (0.011) | (0.011) | (0.018) |
| Woman & husband are educated | | -0.129*** | -0.126*** | -0.123*** |
| | | (0.020) | (0.020) | (0.021) |
| YZ * woman is educated | | | -0.037 | -0.031 |
| | | | (0.030) | (0.031) |
| CHO*woman is educated | | | -0.025 | -0.029 |
| | | | (0.037) | (0.038) |
| YZ+CHO * woman is educated | | | -0.073*** | -0.071*** |
| | | | (0.028) | (0.027) |
| YZ * husband is educated | | | | -0.018 |
| | | | | (0.033) |
| CHO*husband is educated | | | | 0.020 |
| | | | | (0.034) |
| YZ+CHO*husband is educated | | | | -0.008 |
| | | | | (0.024) |
| N | 24204 | 24204 | 24204 | 24204 |
| Pseudo R2 | 0.0487 | 0.0490 | 0.0491 | 0.0505 |
| Wald chi-square | 3210.52 | 3217.03 | 3231.11 | 3245.07 |

Robust standard errors clustered at compound level are reported in parenthesis. *, ** and *** denote p<0.10, p<0.05 and p<0.01 respectively. All regressions estimated using Poisson models. All regressions include controls for age group, marital status, indicator for being in a polygamous marriage, religion, age at first marriage and its square.