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Childbearing Behavior Before and After the 1994 Population Policies in Ghana

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Abstract Due to the high population growth rate in the mid-20th century, the government of Ghana introduced population policies to reduce the growth rate. Encouraging girls' education and increasing contraceptive use were the two main policy measures to reduce population growth. In order to get a clear picture of the childbearing dynamics of Ghanaian women in response to the population policy of 1994, we analyzed individual reproductive histories from 1969 to 2003 using 2003 Ghana Demographic Health survey data to disentangle patterns by parity, calendar period, and educational groups. Exponential hazard regression models were used to estimate the relative risk of births. We find some evidence of a critical juncture in fertility trends, particularly for the fifth child. In addition, higher parity transition rates continuously declined for women with secondary or higher education and these educational levels were achieved by a higher share of the population after the policy was implemented. The 1994 population policy was successful if only by virtue of the increasing number of women with secondary or higher education. Belonging to this group is not only associated with lower fertility, but this suppressing effect strengthened in the years following the policy implementation. We also suspect that the increasing similarity between women with no education and with primary education reflects the diffusion of contraceptive knowledge and norms related to childbearing. The educational reform and contraceptive initiatives did result in increased education and contraceptive awareness and are therefore beneficial programs.

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Introduction

Ghana is one of the countries in Sub-Saharan Africa that has been characterized by high fertility, particularly in the mid-20th century (Malmberg 2008; Tabutin and Schoumaker 2004). Concerns about supporting the population growth rate (Winckler 1998) led the government to introduce different measures to reduce fertility. The first of these policies was introduced in 1969. Before the policy was introduced, the total fertility rate (TFR) was 6.8 for the period 1960–1965. It increased slightly to 6.9 children per woman for the period 1970–1975 (United Nations 2015). This policy has been called a "paper policy" because the set objectives and targets were not achieved (NPC 1994). In 1994, new policies were introduced to once again lower the fertility rate. By 2008, there was evidence that Ghana had met its fertility target with a TFR of 4.0 (GSS 2009) and Ghana is known as having experienced one of the most rapid declines in fertility in sub-Saharan Africa (Parr 2002).

The TFR is commonly used in Ghana as a measure to assess fertility trends and the effect of family planning policies (see GSS 1999, 2009). Although the TFR can be useful as a summary period indicator, neither effects nor non-effects of policy can be established if we rely solely on aggregate measures of behavior (Neyer and Andersson 2008). Besides potentially indicating an effect when other factors are at work, an analysis based on aggregate measures may also miss an effect that is obscured by trends in other components of fertility behavior or subgroups of the population. To demonstrate the effect of policy on childbearing, we must "study the impact of policies on individual behavior, taking into account the features of family policies and their various connections with time, space and uptake'' (ibid: 700).

This study aims to address both methodological and substantive issues in relation to Ghana's fertility decline. The methodological objective centers on the use of a more accurate description of fertility change than the one based on the TFR. We also explore how birth rates related to specific birth orders changed after the 1994 population policy. The second objective, which is more substantive in nature, is to investigate how childbearing behavior of women with different educational levels changed after the population policies were implemented. Observing parity-specific trends over time within educational groups tells us if the policy had a wide impact or its success was limited to certain segments of the population.

In the context of Ghana, only Finlay and Fox (2013) have examined fertility trends over time using individual-level data. However, they do not distinguish between parity events, which means we miss whether birth rates are being influenced largely by the timing of parenthood (e.g., lower first birth transition rates) or for which parity transitions we see the largest changes. Also, they do not distinguish between educational levels, which is important due to specific components of the population policy.

Population Policies and Fertility in Ghana

Aims

The lack of adequate resources and infrastructure to support the increasing population growth rate in Ghana led to population policies being introduced in both 1969 and 1994 with the aim to decrease the high TFR. The policies shared two main objectives.

The first objective was to increase the use of modern contraceptives such as condoms and pills (GSS 1989, 1999, 2009). Previous research and findings from other countries show that increased awareness and use of various modern contraceptive methods greatly reduce fertility rates, because modern contraceptive methods are significantly more effective than traditional methods in preventing pregnancy (Trussell and Kost 1987). Contraceptive use is therefore a major determinant of the fertility rate (Bongaarts 1978).

The second objective of the policies was to encourage girls' education up to the secondary level. A number of studies on fertility have pointed to education—girls' and women's education in particular—as an important factor in reducing family size in developing countries (see Vavrus and Larsen 2003; Kravdal 2002; Bbaale and Mpuga 2011). Through education, women become more informed of their reproductive rights (Caldwell 1982) as well as gain knowledge related to reproduction (Martin and Juarez 1995). Research in developing countries has consistently shown that education supports women's ability to use modern contraceptives and switch from one method to another (Bbaale and Mpuga 2011; Benefo 2006; Cleland 2002; Parr 2002; Curtis and Blanc 1997). Less educated women are less capable of understanding family planning messages via newspapers, magazines, and posters as compared to highly educated women due to differences in literacy rates (Parr 2002). Educated women therefore end up with more information about modern family planning methods and know how to use them more effectively.

New ideas, behavior, and techniques have been known to spread from one social group or individual to another (Retherford and Palmore 1983). The "early adopters and innovators" of contraceptive use are usually individuals who are well educated (Weinberger 1987; Casterline 2001), live in urban areas (Casterline 2001), and then later spread their ideas and behavior to other parts or segments of society. Educational expansion can therefore lead to change at the societal level through diffusion of knowledge and behavior. Beyond innovation in contraception, even women with no education may be affected by changing societal norms regarding smaller family size (Carr 2000).

Through education, women learn more western views on fertility-related issues (Caldwell 1982) and a high level of education empowers women to question traditional roles (McDonald 2006) and reject traditional beliefs and values supporting a large family size (Weinberger 1987). Education also increases women's autonomy or power in decision making within the household, which gives them greater control over the number of children they have (Sathar 1996).

Many studies (e.g., Jejeebhoy 1995; Sathar 1996; Basu 1996) have used the female education rate as a proxy for women's autonomy. Basu (1996) points out, however, that women's education and autonomy is not sufficient for fertility decline. She argued that contraceptive use and other family planning measures are also necessary.

Even though women's autonomy plays a role in reproductive decision making, men's fertility desire cannot be overlooked, particularly in a male-dominated society like Ghana. Nevertheless, DeRose and Ezeh (2005) found that although a man's influence on fertility decision outweighs a woman's in Ghana, her education plays a role in the decision making process as well. Education also increases spousal communication (Weinberger 1987), which can lead to fertility decline (Oyediran and Isiugo-Abanihe 2002). Avogo and Agadjanian (2008) found that communication on reproductive matters significantly increases the likelihood of contraceptive use among women in the northern region of Ghana.

Prolonging education itself is a strong motivation for postponing childbearing to later years. Postponement of parenthood is a well-documented mechanism for declining fertility rates in developed countries (Cygan-Rehm and Maeder 2013) because it reduces the number of years in a woman's fertility career as well as reduces period fertility estimates due to tempo effects (Bongaarts and Feeney 1998).

Implementation

In spite of the similarities in the overall aim and objectives of both the 1969 and 1994 policies, the implementation strategy adopted in 1994 differed significantly from the former policy. Kumekpor et al. (1989) pointed out that the 1969 policy lacked well-modulated and functional institutions to translate the policy into action. Other factors that account for the dismal performance of the policy were the over-dependence of family planning services on the public health care delivery system and the exclusion of men and special groups such as Non-Governmental agencies from the family planning programs (Benneh et al. 1989). In terms of educational reform, there was a lack of funds (NPC 1994) to implement key activities and programs to reform the educational system.

In order to address these limitations, the National Population Council (NPC) was established in 1992 and *Act 485* was passed in 1994 by the parliament of Ghana to give legal backing to population-related activities. As a result, the NPC was well placed to collaborate with other Non-Governmental agencies such as the Planned Parenthood Association of Ghana (PPAG) and development partners to coordinate and execute family planning programs in Ghana (Kwankye and Cofie 2015). Key policies, programs, and activities have been undertaken after the policy was formulated. In 1994, the Navrongo Community Health and Family Planning Project (CHFP) was launched. Funded by the Rockefeller Foundation and the Population Council Africa Operations Research and Technical Assistant Project, the CHFP was an experiment to test and develop culturally appropriate family planning delivery systems in the rural northern region of Ghana (Binka et al. 1995). In the same year, USAID provided $6 million to improve access and quality of clinical family services in the public and private sectors. In 1996, the National Reproductive Health

Services policy and standards were set, and a policy was approved that enabled nurses to provide Norplant implants in clinics and hospitals. The Adolescent Reproductive Health Policy was later established in 1999. Subsequent policies and family planning programs were implemented in the early to late 2000s (see Solo et al. 2005). One outcome of these initiatives was widespread campaigning through radio, television, newspapers, and posters by the Government and Non-Governmental organizations to inform women about contraception.

To address the aim of helping girls achieve a secondary education level, the Free Compulsory Universal Basic Education (FCUBE) program was implemented in 1995 (MOE & GES 2001). The most important components of FCUBE were that school fees were eliminated, the quality of education was increased, and more schools were built. One noticeable educational expansion project after the 1994 population was the Quality Improvements in Primary Schools (QUIPS) in 1997 funded by USAID with a budget of $53 million. The main objective of this project was to improve the overall quality and teaching at the classroom level in some urban and rural communities across Ghana (World Bank 2004). These developments increased the demand for school and encouraged girls to continue their education up to at least secondary school.

Preliminary Evidence of Policy Effects

Evidence from Ghana Demographic Health Survey shows that knowledge of modern contraceptives did indeed increase significantly from 90.2% in 1993 to 97.5% in 2003 (GSS 1994, 2004). The most commonly known methods were condoms, pills, injectable, foam tablets, and implants. Detailed survey reports and empirical research suggest that knowledge about family planning methods has increased substantially over the past years. One possible explanation for this phenomenon may be due to the intensive dissemination of family planning information through radio, television, newspapers, and posters by the Government and Non-Governmental organizations. Radio is the most common source of family planning messages in Ghana. Women who had heard family planning messages through the radio increased from 35% in 1993 to 77% in 2003, while those who had seen family planning messages on television also increased from 22% in 1993 to 52% in 2003 (GSS 1994, 2004). Parr's (2002) study on family planning and fertility decline in Ghana concluded that women who are exposed to family planning messages are more likely to use contraceptive methods than those who have not seen or heard such messages. Nevertheless, the use of these methods remained low in comparison to other African countries. For example, only about 14% of women reported using modern contraceptive methods between 2000 and 2009 (Finlay and Fox 2013).

Ghana has made good progress in terms of educational provision, access, and expansion. With financial support mainly from the World Bank and other donor partners such as USAID and DFID, the FCUBE focused on eliminating school fees and providing quality and equitable education to all by improving physical infrastructure and increasing the number of schools through large-scale construction of classrooms (World Bank 2004). Financial assistance for educational reform from

the World Bank increased from $85.7 million in the period 1987–1993 to $156.7 million in the period 1994–2000. The bilateral funding from USAID and other donor institutions also rose significantly from $64.1 million in the period 1987–1993 to $253.2 million in the period 1994–2000. According to Nudzor (2013), a nation-wide assessment of the FCUBE during the implementation period by the Ministry of Education indicates that "through the capacity building programs carried out at the various levels of implementation, the quality of teaching and learning had improved tremendously so also had children's enrolment and retention and the management of schools" (p.935).

Statistics from United Nations Educational, Scientific and Cultural Organization (UNESCO) show that gross female enrolment ratio for secondary education decreased from 31.0% in 1980 to 28.6% in 1989 and then substantially increased to 36.3% in 1999 and 40.9% in 2004 (UNESCO - Institute for Statistics 2014). The enrolment rate between men and women became virtually the same at the primary level. Some gender gap at the secondary and higher level continued to exist (World Bank 2004), but the gap improved over time (MOE & GES 2006).

As expected on the basis of theory and past research (see Bbaale and Mpuga 2011; Benefo 2006; Cleland 2002; Parr 2002; Curtis and Blanc 1997), well-educated women in Ghana were early adopters and innovators of contraceptive use: about 28% of women with secondary and higher education were current users of modern contraception compared to 11% of women with no education (GSS 2004). Over the late 1990s and early 2000s, the share of women with secondary education using modern contraception increased (Parr 2002). The Ghana Demographic Health Survey reports revealed that women with secondary and higher education who were current users of modern contraception was about 6.7% in 1988, 13.8% in 1993, and then increased to 20.3% in 1998 and 28.1% in 2003 as compared to women with no education: 3.2% in 1988, 3.6% in 1993, 8.9% in 1998, and 11% in 2003 (GSS 1989, 1994, 1999, 2004).

Data and Methods

The data for the study were obtained from the Ghana Demographic & Health Survey (GDHS) conducted in 2003. The survey was undertaken by the Ghana Statistical Service (GSS) in collaboration with the Noguchi Memorial Institute for Medical Research (NMIMR) and Ghana Health Service (GHS) and was conducted between July and October in 2003. The GDHS in 2003 was a national representative survey of women and men in their reproductive age, 15–49 years from 6251 households. A total of 5691 women and 5015 men were interviewed yielding a response rate of 96 and 94%, respectively. Only women were included in this analysis because the population policy was mainly targeted at women. The survey obtained detailed information on reproductive histories.

We estimate the propensity to have a first, second, third, fourth, and fifth birth. In a high fertility context, the transition to higher parity births is important to observe because we would expect to see changes particularly for these parities if family size began to decrease. We also study low-parity birth transitions in order to capture any

changes in the timing of these births. Examining the risk of birth with survey data incurs the issue that some of the events of interest may not yet have occurred (Allison 2010). To appropriately deal with this form of censoring, we apply event history models that take into account incomplete observation of fertility careers. We apply a piece-wise constant exponential hazard model to estimate the relative risk of births, which has become a standard approach in demographic research, and adjust these propensities for relevant covariates:

$$\lambda_{ij} = \lambda_j e^{\beta_1 x_{i_1} + \beta_2 x_{i_2} + \cdots + \beta_p x_{ip}},$$

where λ_{ij} is the hazard corresponding to the individual i in interval j, λ_j is the baseline hazard for interval j, and $e^{\beta_1 x_{i_1} + \beta_2 x_{i_2} + \cdots + \beta_p x_{ip}}$ is the relative risk for an individual with covariate x_i, compared to the baseline, at any given time.

The dependent or outcome variable in our study is the risk of bearing a(nother) child (or survival time of women until the time they bear a(another) child), up to the fifth birth. To observe childless women at risk of having a first child, the trajectory is followed from age 15 until the first birth, age 50, or the interview (by October 2003), whichever comes first. Age is categorized into five levels 15–19, 20–24, 25–29, 30–34, and 35+ years. In the case of higher order births, duration since the previous birth serves as the basic time scale and women are observed until the birth of interest, age 50, or the interview, whichever comes first. This variable is categorized into six levels: 0–2 years, 3–4 years, 5–6 years, 7–8 years, 9–10 years, and 11–12 years.

Calendar period is the key indicator in this study to observe whether any change in fertility behavior followed the population policy of Ghana in 1994. Using a critical juncture approach, we consider 1994 the turning point, but acknowledge that an immediate reaction is not likely due to the time it takes for implementation of educational reform and family planning initiatives as well as a noticeable effect of these factors. The effect of a policy may take time before the impact is evident, and we therefore analyze whether the policy appears to be related to fertility behavior in the first years following implementation and in a later time period as well. The women in our sample who turned 49-year old in 2003 were born in 1954, which means they fall under observation in 1969 (when they were 15-year old). We therefore begin with 1969, and observe women when they become at risk of a parity event until 2003 in seven groups of years (1969–73, 1974–78, 1979–83, 1984–88, 1989–93, 1994–98, 1999–03) for the first to third birth and in six groups of year (1969–78, 1979–83, 1984–88, 1989–93, 1994–98, 1999–03) for the fourth and fifth births. The year the policy was implemented is categorized at the beginning of the period instead of putting it in the middle or at the end so we can more easily see whether a change appears after the policy is implemented.

Educational histories are not complete in DHS data, which make it difficult to create a time-changing variable, but we constructed educational histories with the limited information provided. We combined the variable "highest educational level" and "highest year of education" to construct a time-varying education variable and categorized it into three groups: (1) no education, (2) primary, and (3) secondary/higher. The education system in Ghana follows a (6–3–3–4) plan: 6 years

of primary school, 3 years of junior high school, 3 years of senior high school, and 4 years of university or 3 years for other tertiary institutions like polytechnic or teachers training college.

We also adjust for socio-cultural factors. Ethnicity is categorized based on the major ethnic group classification in Ghana: Akan, Ga-Adangme, Ewe, Mole-Dagbani, and Others. Religion is categorized into four groups: Christian, Muslim, Traditionalist, and no religion. Childhood place of residence is introduced to measure the importance of being raised in an urban or rural environment.

Sex composition of previous child(ren) is another factor that may affect a family's decision making because gender preference may lead to higher fertility (Bongaarts 2001). In Ghana, agricultural production is predominant in rural areas (Sutton 1983; Duncan 1997), which can increase the desire for sons to provide economic assistance. We considered the importance of this factor only for the second and third birth analyses, where sex composition is more likely to be unbalanced.

Results

Time Period Associations

We first present a summarized view of time trends for each parity event. Figure 1 plots change over time in which each parity risk is relative to the 1989–1993 time

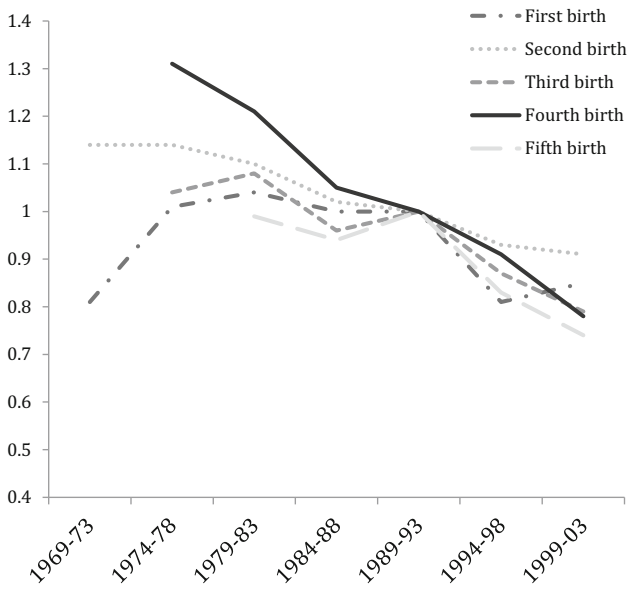

Fig. 1 Relative risks for parity 1–5 transitions across time. *Note*: data points for fourth and fifth births in the 1974–1978 period include 1969–1973 as well, as these periods were collapsed in the model to account for low sample size of spells

period. A relative risk greater than one implies a higher risk of birth than the 1989–1993 time period, whereas a relative risk less than one implies a lower risk of birth. The relative risks are adjusted for woman's age, childhood place of residence, educational level, ethnicity, and religion. For parities two and three, they are also adjusted for the sex composition of previous children. When sample sizes in a cell were low (<100 observations), we do not include estimates; for example, too few women in our sample were at risk of having higher order births in the earliest (1969–1973) time period.

As displayed in Fig. 1 and Table 1 (Appendix), the first birth risk remained stable from 1974 to 1993. Compared to that period, the risk was 19% lower in two periods (1969–1973 and 1994–1998, although the former difference was significant at only 10% level), and 15% lower in the latest time period (1999–2003). The difference between the first groups of years reflects a falling age at first birth in this time period. The decline in the relative risk of first birth toward the end of the observation period may be due to the 1994 population policy, where the benefits were seen in the first years and no greater postponement was observed after five years.

The change in second births is characterized by a gradual decline over time. The risk for the last period is around 10% lower than immediately before the policy was implemented. Second birth risks have declined about 30% from the mid-1960s until 1996. From 1999 onwards, the decline leveled off. Because of the relatively high TFR across this entire time range, the decline likely reflects a gradual lengthening of the birth interval (ICF Macro 2010) rather than fewer women progressing to a second child. No evidence of a relationship to the policy appears for this parity transition.

For third births, we see minor fluctuations in birth risks before the policy was implemented and a marked and continued decline after the policy was implemented. The risk for the last period is around 21% lower than for the 1989–93 period. This may be evidence of a policy relationship for this parity transition.

The trend over time for the fifth parity transition is remarkably similar to that of the third birth trend. In contrast, fourth births follow a unique pattern in which the strongest decline over time is noticeable. Fourth birth risks were 30% higher in the late 1970s than in the early 1990s. In the last period, the risk is about 22% lower than in the 1989–93 period. The fourth and fifth birth declines mirrored the third birth decline after the policy, which indicates that the policy did influence higher parity births to some degree; however, we cannot rule out that the long-term decline of fourth births indicates the continuation of a secular decline after the policy became enacted. Considering these parity transitions together, it appears that the decision to have a fourth child may have been an important threshold in the development of fertility behavior in Ghana. Fewer women proceeded to the fourth parity transition over time, but for the increasingly select group of women who did, the decision to have a fifth child did not change much until the 1994 policy was implemented.

In terms of other covariates, the patterns we see across all parity events are consistent with other research. The Akans tended to have higher fertility or entered parenthood earlier than other ethnic groups, which was also found by Gyimah

(2003). Muslims entered parenthood later than women of other denominations and also tended to have lower fertility. Our findings also reveal that women who were brought up in rural areas had higher risk of parity transitions than their urban counterparts. No significant or clear evidence of sex preference is seen, which is consistent with other research (Goody et al. 1981).

Education Associations

The relationship between educational level and each birth is presented in tables in the Appendix. As expected, women with secondary or higher education had the lowest risk of first birth, which means that they waited the longest to enter parenthood. The risk for women with secondary or higher education was about 12% lower than women with primary education. In contrast, the risk of first birth for women with no education was about 30% higher than the risk for women with primary education, leading to a perfectly negative education gradient.

Women with secondary or higher education also had a lower risk of second, third, fourth, and fifth births. Compared with women with primary education, the risk for women with a higher level of education is about 30% lower for second births, 20% lower for third births, 27% lower for fourth births, and 17% lower for fifth births. We also observe that women with no education had about 15% higher risk at third birth and 20% higher risk at fifth birth, compared to women with primary education. For second and fourth births, the difference between no education and primary education was not significant.

Interactions: The Changing Role of Education Over Time

In order to gain insight into how the policy may have influenced women differently and observe which women were most responsive to the policy, we made an interaction between calendar period and education level. We are interested in both the differences in birth risk by women's educational level in each period and the change over time in birth risks for women of the same educational level. With educational expansion, women attaining higher educational levels may have become a less select group over time, which may lead to diminishing differences among educational levels. On the other hand, if contraceptive use is facilitated by education, women with more education should consistently have lower birth risks and we may even see increasing differences related to higher education if new family planning initiatives were particularly successful among that group. For all parities, the likelihood ratio test confirmed that the interaction of education and calendar period improved the model fit. Relative risks are all adjusted for control variables.

Figure 2 shows the relative risks for how the influence of education on first births varied over time. The relationship between women's education and first birth risk appears to have become negative only since the early 1990s. In earlier years, we could not discern a clear pattern in which women with higher education levels entered parenthood later than women with lower education levels. Postponement began in the early 1990s already for women with secondary or higher education. In

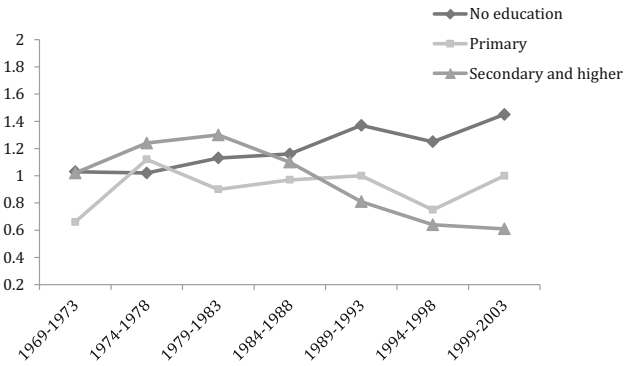

Fig. 2 Relative risks for first birth, interaction between calendar period and women's educational level

contrast, we did not see a change in first birth risks for women with no education or primary education until the period when the policy was implemented. But postponement did not persist for these two groups. The overall pattern across educational levels is one of the increasing differentials in first birth timing. Excluding the highest educated women, a slightly increasing secular trend appears (a slowly decreasing age at first birth), which the 1994 policy reversed in the short term but this was not a lasting trend. No policy relationship is evident for secondary and higher educated women

Figure 3 shows the interaction between calendar period and educational level for second births; again, women with primary education in 1989–1993 were used as the reference category. The pattern across educational levels is generally negative, although the difference between having no education and primary education disappeared during the 1980s and early 1990s. A slight convergence in second birth transitions by educational level over time has occurred for second births. No evidence of a policy relationship that was specific to any educational level is evident for the second parity transition.

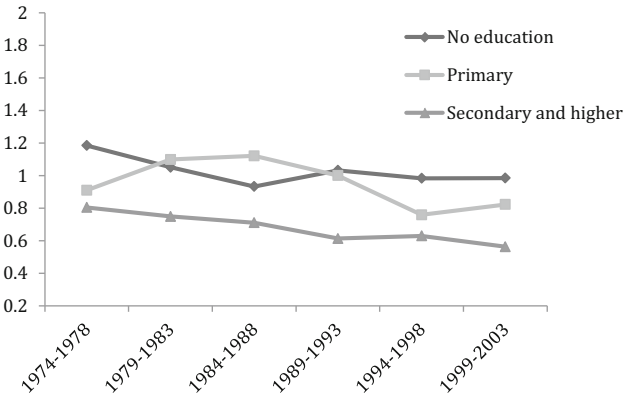

Fig. 3 Relative risks for second birth, interaction between calendar period and women's educational level

No clear educational gradient appears for third birth risks until the early 1990s (Fig. 4). At this time, a lower birth risk was established for women with secondary or higher education. Women with no education generally had a higher birth risk than women with primary education, but this difference was mostly minor. It is unclear whether there was an education-specific policy relationship for this parity transition: the decline in third births within the highest educational group deepened after the policy was implemented, but this trend had begun already.

Figure 5 displays fourth birth risks by education and calendar time. Again, we find an emerging negative gradient from the 1990s onward. Before the 1990s, birth risks were similar except for women with primary education. The decline in fourth births was strongest for this group over the 1980s. Similar to third births, we see a decline in this parity transition deepening after the policy was implemented for women with secondary or higher education. This may be evidence that the policy influenced their childbearing behavior more than for women with less education.

The relationship between women's education and progression to fifth birth (Fig. 6) shares similarities with patterns we found for the progression to fourth birth. In particular, women with primary education had the highest fifth birth transitions in the 1980s. We find a slight decline in fifth birth risks from the mid-1990s onwards at all levels of education, but a more marked decline for women with secondary or higher education. Unlike fourth birth transitions, the decline for higher education women did not occur before the policy was implemented. This indicates that the policy may have influenced behavior of all women in relation to the fifth birth decision, but particularly higher educated women.

Discussion

In order to get a clear picture of the childbearing dynamics of Ghanaian women in response to the population policy of 1994, we analyzed individual reproductive histories from 1969 to 2003. Our approach was to disentangle patterns by parity,

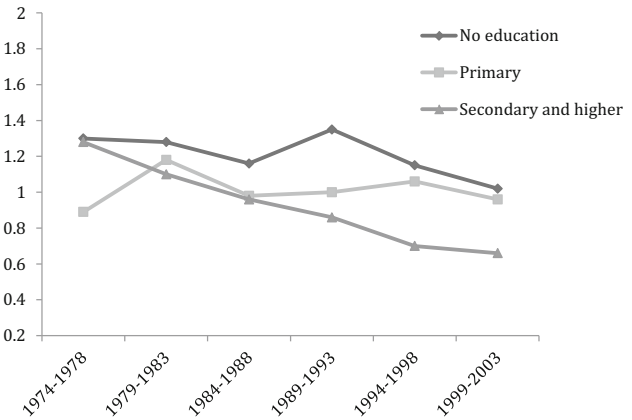

Fig. 4 Relative risks for third birth, interaction between calendar period and women's educational level

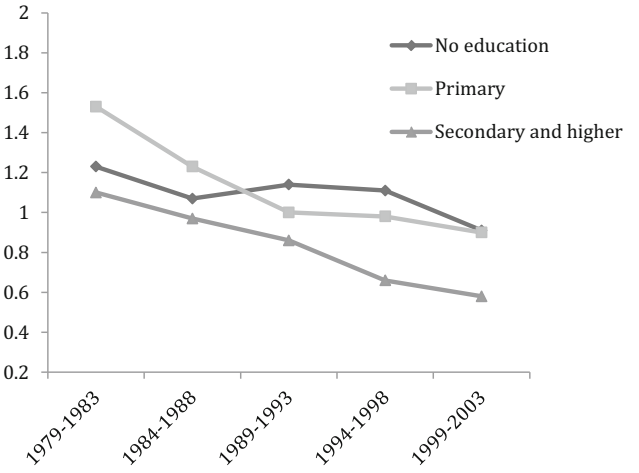

Fig. 5 Relative risks for fourth birth, interaction between calendar period and women's educational level

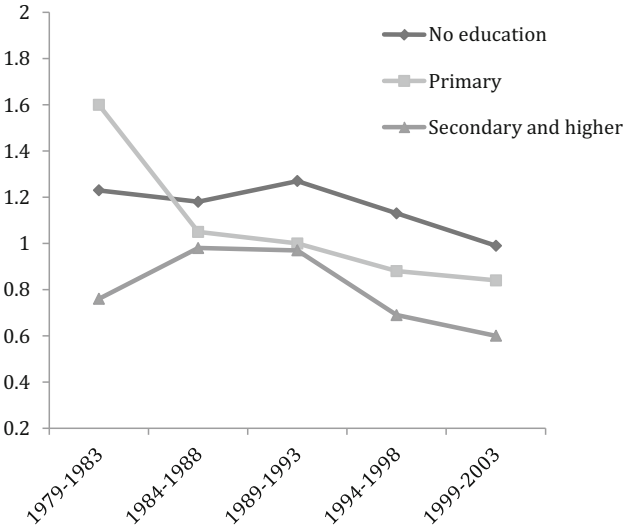

Fig. 6 Relative risks for fifth birth, interaction between calendar period and women's educational level

calendar period, and educational groups. We hoped to discern whether there was an association between the policy time period and specific components of fertility behavior and whether this varied according to women's educational level.

Fertility behavior was changing in Ghana even before the 1994 policy. We speculate that the economic crisis in Ghana from the late 1970s until mid-1980s (Baden et al. 1994) may have contributed to the onset of decline, particularly for fourth and fifth births. During this period, inflation was very high—around 100%,

coupled with a high cost of living and low standard of living among the populace (Konadu-Agyemang 2000).

We find some indication that the 1994 policy was related to the postponement of parenthood, but no evidence that it influenced the decision to have a second child. Likewise, fourth births were already declining rapidly before the policy was implemented, which makes it difficult to attribute to the policy. In contrast, we see more indication that the fluctuation of third and fifth births changed toward a pattern of decline after the policy was implemented. We interpret this to mean that the policy had a minor but relevant impact on higher order births.

As found in previous studies in sub-Saharan countries, achieving secondary or higher education was consistently associated with a lower birth risk across all parities. The difference between having no education and primary education was not always significant, however. We looked closer at the relationship between education and fertility by observing changes over time because the structural changes in the educational sector and increased knowledge of contraceptives after the policy implementation might be better reflected in birth trends by the level of education. We expected to see that women who continued until secondary or higher education would consistently have lower fertility than lower educated women and that this difference might grow in response to the family planning initiatives associated with the population policy—as higher educated women have often been shown to be the first users of contraception in a society (Casterline 2001; Weinberger 1987).

We found variation over time in the educational gradient. The 1980s were characterized in general by increasing similarity in birth risks by educational level, which we interpret as a general reaction to societal developments in which there were no population policies targeted by educational level. By the early 1990s, a negative gradient began to emerge clearly for first, third, and fourth births. The difference by education was greatest by the 1999–2003 time period for first and second births. In contrast, women with no education began to look more like women with primary education in terms of third, fourth, and fifth birth transitions in this period. In other words, we see declining fertility in particular for women with secondary or higher education, but women with no education caught up to women with primary education in the decline of higher order births by the early 2000s.

Comparing patterns before and after the 1994 policy, it is possible to see a marked difference in parity transitions within educational groups, even if some declines appeared already in the early 1990s. Women with no education and primary education may have postponed first births in the first years of policy implementation, but the short-term nature of this trend does not provide convincing evidence to link it to the policy. In relation to higher order births, which are of most interest when disentangling fertility decline from a high level, we find that the highest educated women changed their fertility behavior the most following the 1994 policy. In particular, the lower rates related to having a fifth child began at this point in time, which may indicate that this was the parity transition most impacted of all the transitions analyzed here.

Further research on how the policy influenced contraception related to specific births for women differently is needed to confirm the link we established here

between parity-specific, time-specific, and education-specific trends in Ghana. Nevertheless, we believe our approach sheds new light on the process through which Ghana's population policy operated. One important factor not discussed in our approach is the basic contribution of an increasingly educated population, which is one direct success of the population policy. We can conclude that the 1994 population policy was successful if only by virtue of the increasing number of women with secondary or higher education. Belonging to this group is not only associated with lower fertility, but this determinant strengthened in the years following the policy implementation. We also suspect that the increasing similarity between women with no education and with primary education reflects the diffusion of contraceptive knowledge and norms related to childbearing. The educational reform and contraceptive initiatives did result in increased education and contraceptive awareness and are therefore beneficial programs. Nevertheless, we cannot discount the role of other socio-cultural factors not studied here, such as urbanization, contributing to Ghana's fertility decline.

The study should be interpreted bearing in mind some limitations. First, we miss cohorts of women that were potentially influenced by the policy change in our study because we do not study a later time period. The educational experiences of women who entered their fertility careers after 2003 were likely to have been influenced as well by the Free Compulsory Basic Education policy, and we do not observe this group due to our choice of data. As mentioned, the 2003 dataset provides a unique opportunity to analyze the data from the late 1960s which covers the period in which the 1969 population policy was implemented. This enabled us to examine the fertility trend immediately before and after the policy was implemented. We could have added more recent data to the 2003 data, but looking at trends much further in time from the policy would allow a host of additional contextual changes to influence our results. Another limitation relates to exact channels through which policies may affect demographic behavior. After the 1994 policy measures, there have been many programs as well as actors implementing program interventions in relation to the policy objective. However, evidence exists that the share of women achieving a basic or higher educational level increased after the policy intervention, and we believe that this study was able to establish that the relationship between education and specific parity births became stronger after the policy interventions.

Appendix

See Tables 1, 2, and 3.

Table 1 Relative risk of first birth for Ghanaian women 1969–2003 by woman's age, calendar period, education level, ethnicity, religion, and childhood place of residence

Covariates	Relative risks	SE
Woman's age		
15–19	1	–
20–24	2.24***	0.08
25–29	2.14***	0.13
30–34	1.27*	0.17
35+	0.56***	0.13
Calendar period		
1969–73	0.81*	0.09
1974–78	1.01	0.07
1979–83	1.04	0.06
1984–88	1	0.06
1989–93	1.00	–
1994–98	0.81***	0.04
1999–03	0.85***	0.04
Education level		
No education	1.30***	0.06
Primary	1	–
Secondary/higher	0.88***	0.04
Childhood place of residence		
Rural	1.21***	0.04
Urban	1	–
Ethnicity		
Akan	1	–
Ga-Adangme	0.87**	0.06
Ewe	0.90**	0.05
Mole-Dagbani	0.87***	0.05
Others	0.90*	0.05
Religion		
Christians	1.10*	0.06
Muslims	1	–
Traditionalist	1.17*	0.10
No religion	1.17**	0.09
# of subjects	5499	
# of failures	3813	
Time at risk	363 778	
Log Likelihood	−5781.53	
Prob > chi^2	0.0000	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2 Relative risk of second and third birth for Ghanaian women 1969–2003, by duration, woman's age, calendar period, sex of previous child, educational level, ethnicity, childhood place of residence, and religion

Covariates	Second birth		Third birth	
	Relative risks	SE	Relative risks	SE
Duration since first and second birth				
0–2 years	0.39***	0.02	0.35***	0.02
3–4 years	1	–	1	–
5–6 years	0.56***	0.04	0.57***	0.05
7–8 years	0.45***	0.05	0.51***	0.06
7–10 years	0.24***	0.04	0.44***	0.08
11–12 years	0.16***	0.03	0.09***	0.03
Woman's age				
15–19	0.61***	0.04	0.58***	0.06
20–24	0.92*	0.04	0.89*	0.04
25–29	1	–	1	–
30–34	0.96	0.09	0.90*	0.06
35+	0.61***	0.11	0.68***	0.08
Calendar period				
1969–73	1.14	0.22	0.61	0.36
1974–78	1.14	0.10	1.04	0.13
1979–83	1.10	0.07	1.08	0.08
1984–88	1.02	0.06	0.96	0.06
1989–93	1	–	1	–
1994–98	0.93	0.05	0.87**	0.05
1999–03	0.91*	0.05	0.79***	0.05
Sex of previous child				
Male	0.97	0.03		
Female	1	–		
2 males			1	–
2 females			0.96	0.06
Male and Female			1.00	0.05
Childhood place of residence				
Rural	1.14***	0.04	1.11**	0.05
Urban	1	–	1	–
Educational level				
No education	1.08	0.06	1.15**	0.07
Primary	1	–	1	–
Secondary/higher	0.70***	0.04	0.80***	0.05
Ethnicity				
Akan	1	–	1	–
Ga-Adangme	0.81***	0.06	0.96	0.06
Ewe	0.91	0.05	0.85**	0.06
Mole-Dagbani	0.90*	0.05	0.92	0.06

Table 2 continued

Covariates	Second birth		Third birth	
	Relative risks	SE	Relative risks	SE
Others	0.95	0.06	0.93	0.06
Religion				
Christians	1.02	0.06	0.96	0.06
Muslims	1	–	1	–
Traditionalist	1.15	0.10	1.18*	0.11
No religion	1.16*	0.09	1.08	0.09
# of subjects	3949		3143	
# of failures	3163		2472	
Time at risk	173 518		133 132	
Log likelihood	−4032.35		−3123.09	
Prob > chi^2	0.000		0.000	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3 Relative risk of fourth and fifth birth. Ghanaian women 1969–2003, by duration, woman's age, Calendar period, educational level, ethnicity, religion, and childhood place of residence

Covariates	Fourth birth		Fifth birth	
	Relative risks	SE	Relative risks	SE
Duration since third and fourth birth				
0–2 years	0.37***	0.02	0.36***	0.02
3–4 years	1	–	1	–
5–6 years	0.56***	0.05	0.53***	0.06
7–8 years	0.36***	0.05	0.32***	0.05
7–10 years	0.21***	0.05	0.30***	0.08
11–12 years	0.16***	0.04	0.10***	0.04
Woman's age				
15–19	0.66*	0.16	0.49	0.35
20–24	0.87**	0.06	0.82*	0.09
25–29	1	–	1	–
30–34	1.03	0.12	1.00	0.07
35+	0.65***	0.15	0.70***	0.06
Calendar period				
1969–78	1.31	0.26	0.72	0.30
1979–83	1.21**	0.12	0.99	0.14
1984–88	1.05	0.08	0.94	0.09
1989–93	1	–	1	–
1994–98	0.91	0.06	0.83**	0.06
1999–03	0.78***	0.05	0.74***	0.05

Table 3 continued

Covariates	Fourth birth		Fifth birth	
	Relative risks	SE	Relative risks	SE
Childhood place of residence				
Rural	1.16***	0.06	1.19***	0.07
Urban	1	–	1	–
Educational level				
No education	1.02	0.07	1.20**	0.10
Primary	1	–	1	–
Secondary/higher	0.73***	0.05	0.83**	0.07
Ethnicity				
Akan	1	–	1	–
Ga-Adangme	0.97	0.09	0.88	0.11
Ewe	0.89*	0.07	0.96	0.09
Mole-Dagbani	0.92	0.07	0.95	0.09
Others	0.97	0.08	0.92	0.09
Religion				
Christians	0.91	0.07	1.08	0.09
Muslims	1	–	1	–
Traditionalist	0.94	0.10	1.14	0.14
No religion	1.18*	0.12	1.07	0.12
# of subjects	2452		1838	
# of failures	1813		1324	
Time at risk	105 994		80 404	
Log likelihood	−2504.17		−1889.16	
Prob > chi^2	0.000		0.000	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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