Marital fertility transition in patriarchal Ghana: The falls, the stalls and the drivers

Introduction

The problem of persistent high fertility rates in most of sub-Saharan Africa (SSA) has been well documented. The fertility transitions of countries from Central and West Africa have been especially slow. In the past century, countries from other regions that had high levels of fertility rates like Asia and South America underwent considerable fertility transitions with some countries now approaching desirable replacement level fertility. The case of SSA has stood out due to the stubbornly high fertility levels and notoriously slow transitions marked periods of stalling. Different factors pertaining the social organisation and economic modes of production prevailing in the sub-continent have been cited to explain why societies from SSA have sustained high fertility regimes. One of the factors that has been identified is the high rates of marriage and relatively early age at first union in most African countries. For instance, data from the Demographic and Health Surveys from Ghana reveal that the average age at first union for women has barely changed between 1985 and 2015.

The importance of marriage in understanding fertility levels in Ghana stems from that it is the proximate social unit where patriarchy's productive and reproductive forces that affect women's fertility behaviour find currency. Marriage in patriarchal societies can be understood as the social contract through which the pro-natal aspects of patriarchy erode the assertive room for women to determine their own fertility outcomes. As a system of social organisation, patriarchy apportions more power to men and husbands over women and wives. It is conceivable that within the context of patriarchy, women can be bestowed with decision making powers but remain subconsciously obliged to make choices that comply with their male counterparts would approve. Some studies have attempted to examine indicators of women empowerment while others have employed two-sex modelling approaches to understand the context of fertility transition in SSA. These past studies shed light on the underlying determinants of fertility differentials using cumulative fertility and parity progression ratios as the dependent variables indicating fertility levels and differentials. This study seeks to contribute to this body of literature by employing two-sex modelling to the study of fertility transition of married women in Ghana. The study however, departs from the existing approaches of using cumulative fertility and parity progression ratios as dependent variables and uses age-specific marital fertility rates (ASMFRs) as the indictor of fertility levels. The use of mean ASMFRs to the investigation of fertility transition yields explanations of temporal fertility changes that are applicable to total marital fertility rates (TMFRs) and is equally be useful when modelling transitions in total fertility rates (TFRs). This is because cumulative fertility, widely obtained in survey data as children ever born (CEB) is not age adjusted and its averages at different periods may contradict with prevailing trends in measures of fertility rates. The current study also goes further than the existing SSA literature by employing a regression-based decomposition technique with the aim of quantifying the adjusted conditional contributions of variables when classified into proximate, female background and male background characteristics to the fertility transition that has so far occurred in Ghana.

Methodology

The data were obtained from six Ghana Demographic and Health Surveys (GDHS) collected in 1988, 1993, 1998, 2003, 2008 and 2014. The GDHS surveys collect using standardised questionnaires data from nationally representative number of households selected through multistage sampling process. As already highlighted, the dependent variable was an age-adjusted measure of marital fertility rates, that is, ASMFRs. The ASMFRs variable was analysed as a continuous variable. The independent variables included proximate and background variables. The background variables were for reporting expediency classified into categories namely female variables, male variables, demographic, and socioeconomic and geographic variables.

The examination of the data followed a three-tier analytical strategy. The first tier involved estimation of fertility rates (TMFRs and TFRs) and reconstruction of annual trends. Although the focus of the study was on TMFR transition, TFRs were computed and trends reconstructed to provide a platform to measure the extent to which marital fertility has influenced Ghana's fertility transition. The estimation of TMFRs and TFRs was conducted through applying Poisson regression to birth history data from women enumerated in the Individual Recode of DHS. The application of

Poisson regression to birth history data transforms fertility data and expresses it as a logarithm linked to the linear function of age such that;

$$TMFR = 5 * \left(\exp[a] + \sum_{k=20-24}^{40-49} \exp[a + b_k]\right) \quad [1]$$

Where $\boldsymbol{\alpha}$ is a constant term and $\boldsymbol{b}$ is the intercept. Because TMFR is obtained by multiplying age specific rates (ASMFRs) by 5, obtaining age specific rates using Poisson regression involves exponentiating the sum of the constant term and the regression coefficients for the respective age groups that would have been obtained from;

$$\lambda_i = \exp\left[\alpha + \sum_{k=20-24}^{45-49} b_k\, A_{ki}\right] \quad [2]$$

Where $\boldsymbol{A_{ki}}$ are dummy variables for five-year age groups from 20-24 to 45-49 years with 15-19 years being used as the reference category (Schoumaker, 2013). As already highlighted, trends in fertility rates were reconstructed for women in unions and all women enumerated in the Individual Recodes. This helped to identify the potential role marital fertility played in shaping the fertility transition of Ghana.

The second tier of the analytical strategy involved modelling ASMFRs using multivariate variance components linear regression. Models estimating the magnitude of influence that the selected independent variables have on ASMFRs for each survey can be mathematically represented as;

$$Y_{ij} = \beta_{0j} + \beta_{1j}x_{1j} + \beta_{2j}x_{2j} \ldots \beta_{kj}x_{kj} + e_{ij} \quad [3]$$

Where:

$\boldsymbol{\gamma_{ij}}$ is the expected value of average ASMFR for an individual *i* in group *j*;

$\boldsymbol{x}$ represent the independent variables included in the study which are education, employment status, place of residence and age group;

$\boldsymbol{\beta_0}$ is the intercept;

$\boldsymbol{\beta_0}$ are regression coefficients;

$\boldsymbol{e_{ij}}$ is the residual error term;

Multilevel regressions were vital in understanding cross-sectional differentials in marital fertility. It has however been stated in past studies that socioeconomic transformations in a country affect fertility levels but there has been limited attempts to quantify the extent to which population compositional changes have contributed to fertility transitions. Consequently, the third tier of the analysis involved the application of the Oaxaca-Blinder decomposition method to estimate the magnitude by which compositional changes in Ghanaian society contributed to the nature of the fertility transition that has prevailed in the country to date. The Oaxaca-Blinder decomposition is a regression-based decomposition to partition difference in a distributional statistic between two groups into an 'explained' and an 'unexplained' part (Fortin et al., 2011). The explained part of the decomposition refers to the difference the outcome which is attributable to group differences in levels of a set of measured predictor variables, between the first and second groups (Jann and Zurich, 2008). The unexplained portion arises from differences in how the predictor (independent) variables are associated with the outcome which is represented by the distributional statistic such as the mean (Jann and Zurich, 2008). This unexplained portion would remain even if the first group were to attain the same average levels of measured predictor variables as the second group. This is because it also captures the effects of unobservable variables reported in the form of a constant (Jann and Zurich, 2008; Sen, 2014). The Oaxaca-Blinder method is frequently used in economics where it was originally developed to examine income differences between advantaged and disadvantaged groups. The rationale behind this decomposition method can also be applied to the study of fertility changes over time.

Taking DHS1 to represent the base survey and DHS2 to represent the current survey, this study decomposed change in the average ASMFR over time as follows;

$$\Delta ASMFR = \{E(X_{DHS1}) - E(X_{DHS2})\}'\beta_{DHS2} + E(X_{DHS1})'(\beta_{DHS1} - \beta_{DHS2}) + \{E(X_{DHS1})\}'(\beta_{DHS1} - \beta_{DHS2}) \quad [4]$$

Where;

$\boldsymbol{\{E(X_{DHS1}) - E(X_{DHS2})\}'\beta_{DHS2}}$ = the explained part. The change in average ASMFRs (means) that was due to group differences in the predictors, that is, the endowments effect weighted by the coefficients of later DHS

$\boldsymbol{E}(\boldsymbol{X}_{\boldsymbol{DHS1}})'(\boldsymbol{\beta}_{\boldsymbol{DHS1}} - \boldsymbol{\beta}_{\boldsymbol{DHS2}})$ = the contributions of differences in the coefficients and intercepts. Shows expected outcome in earlier survey if it had later DHS survey's coefficients,

$\{\boldsymbol{E}(\boldsymbol{X}_{\boldsymbol{DHS1}})\}'(\boldsymbol{\beta}_{\boldsymbol{DHS1}} - \boldsymbol{\beta}_{\boldsymbol{DHS2}})$ = be an interaction term accounting for the fact that the differences in the endowments and coefficients of the two successive DHS samples exist simultaneously, and

$\boldsymbol{E}$ = mean of the predictor variables [adapted from Jann and Zurich (2008)].

After quantifying the conditional contributions of the endowments, coefficients for each variables and taking into account interaction, one is left with a residual term. This residual term in included as part of coefficients in the aggregate results of the decomposition. Its significance is that it measures the effect of unobservables, that is, the magnitude of the impact of the factors that were not included in the decomposition model. This includes those factors that cannot be empirically measured directly, for instance, the influence of pro-natal values and attitudes emanating from systems of patriarchy.

Results

Trends in TMFRs and TFRs

The trend in the TMFRs of Ghana started with four-year period of steady annual increase in marital fertility from 1982 to 1985 while TFRs were already declining **[figure 1 below]**. The ten-year period between 1985 and 1995 in Ghana was characterised by fast decline in TMFRs with a similar trend occurring in TFRs. The post-1995 period was characterised by a widening gap between TMFRs and TFRs mainly due to the stalling of marital fertility when national-level TFRs continued on a downward trend albeit mildly.

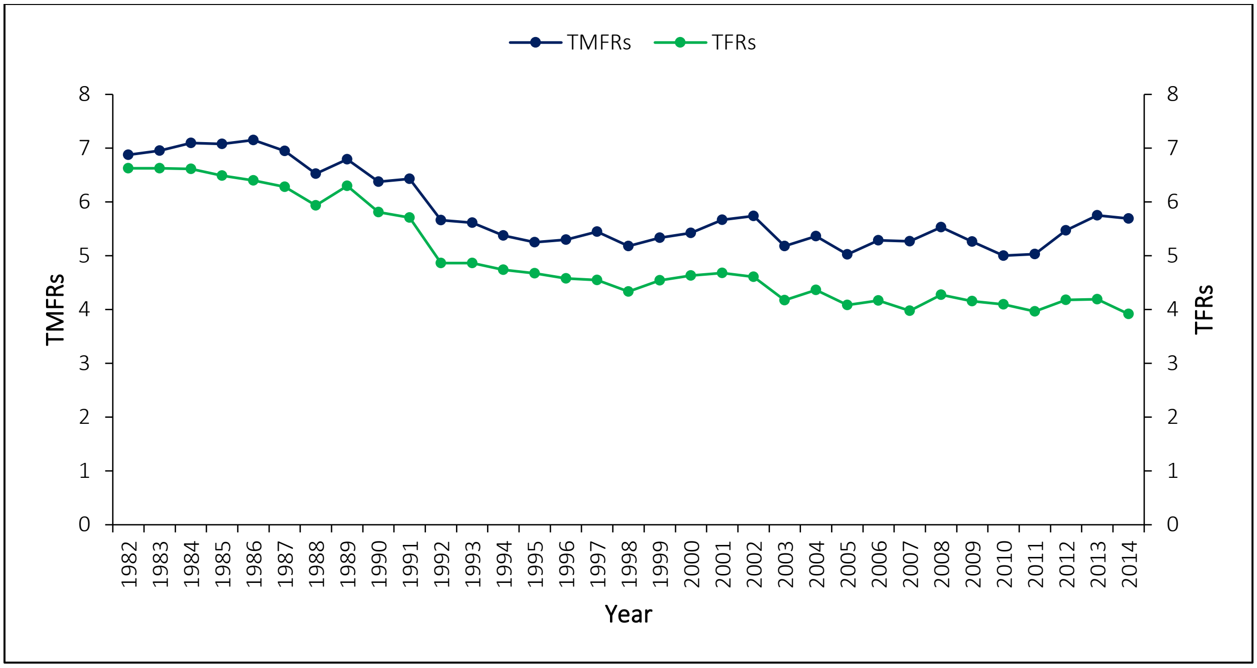
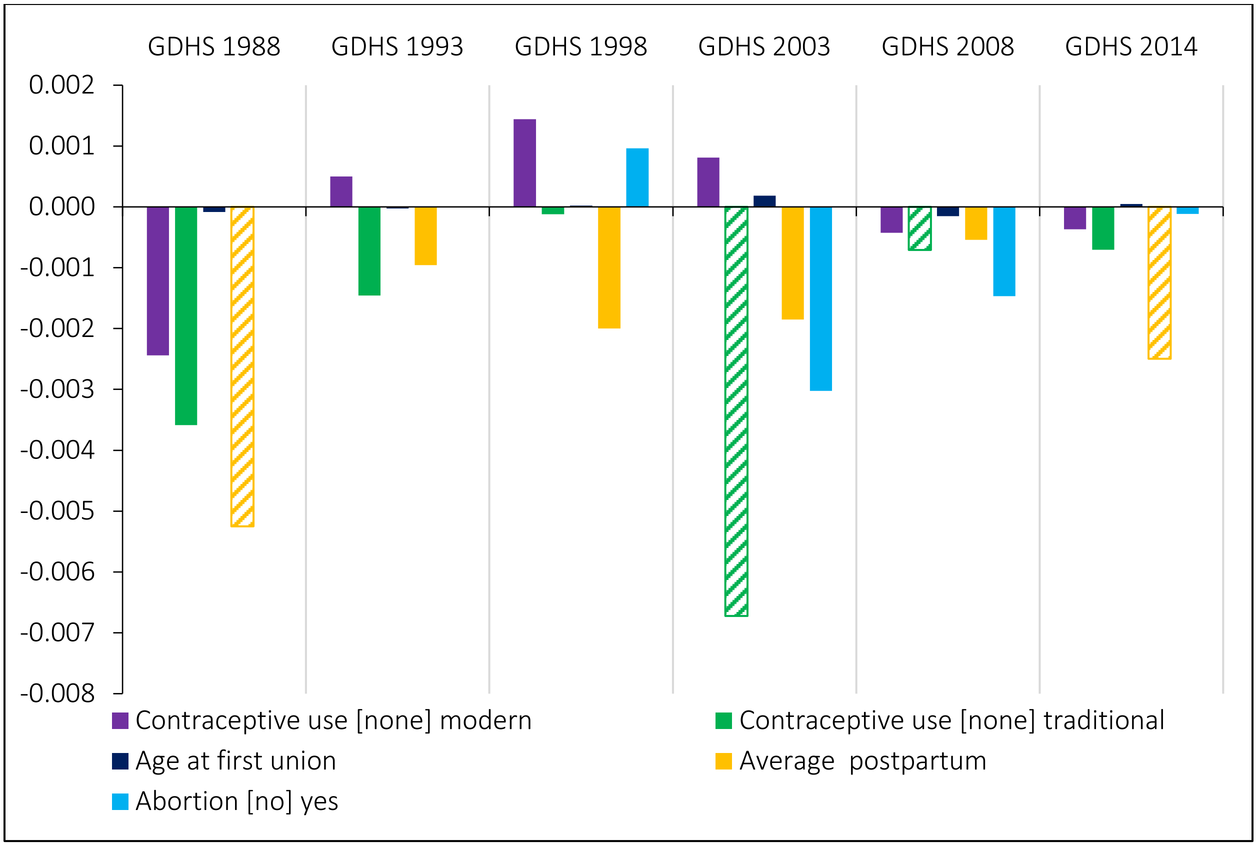


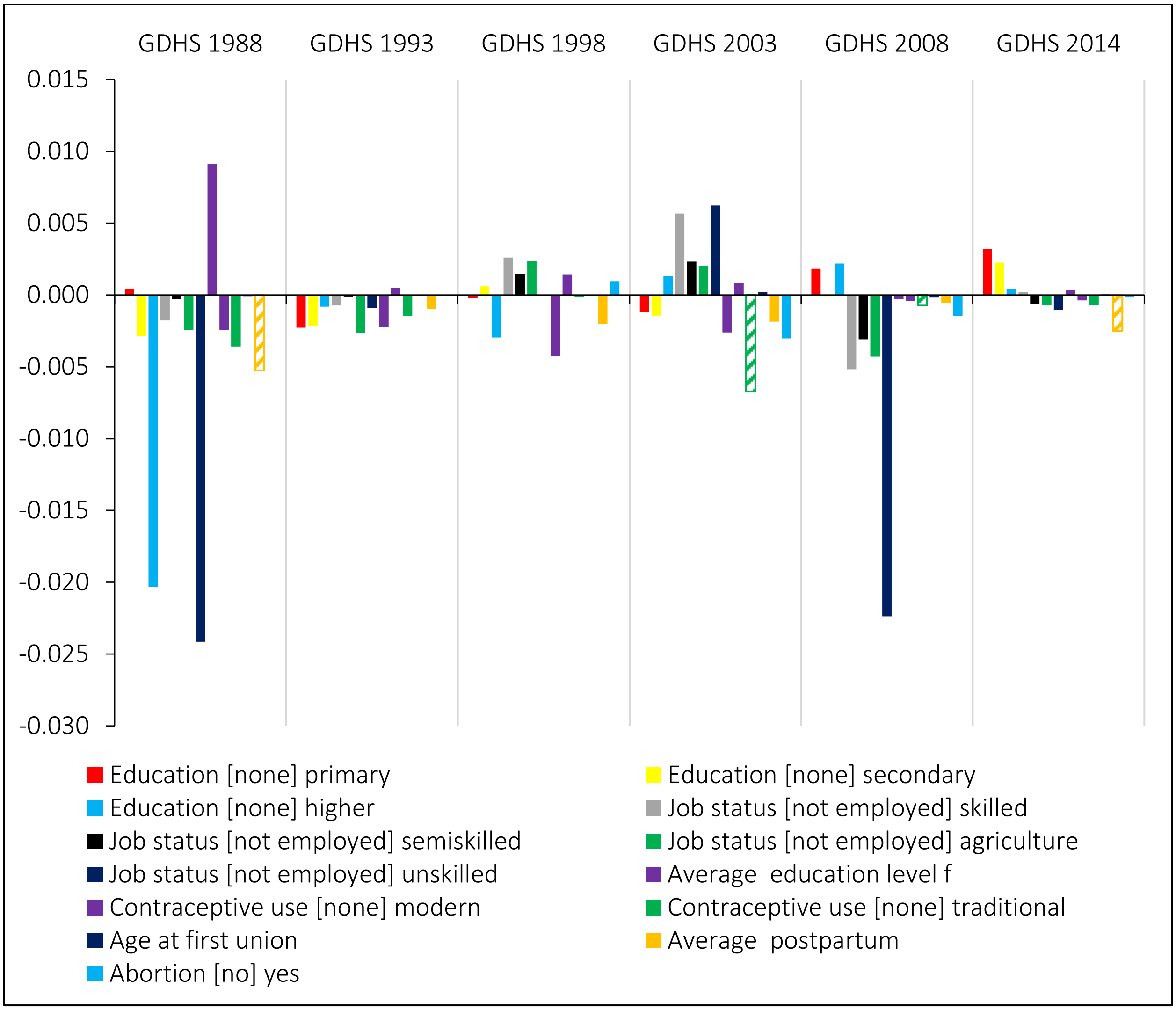
Figure 1: Reconstructed trends in TMFRs and TFRs for Ghana, DHS data 1988-2014

Multilevel regression results

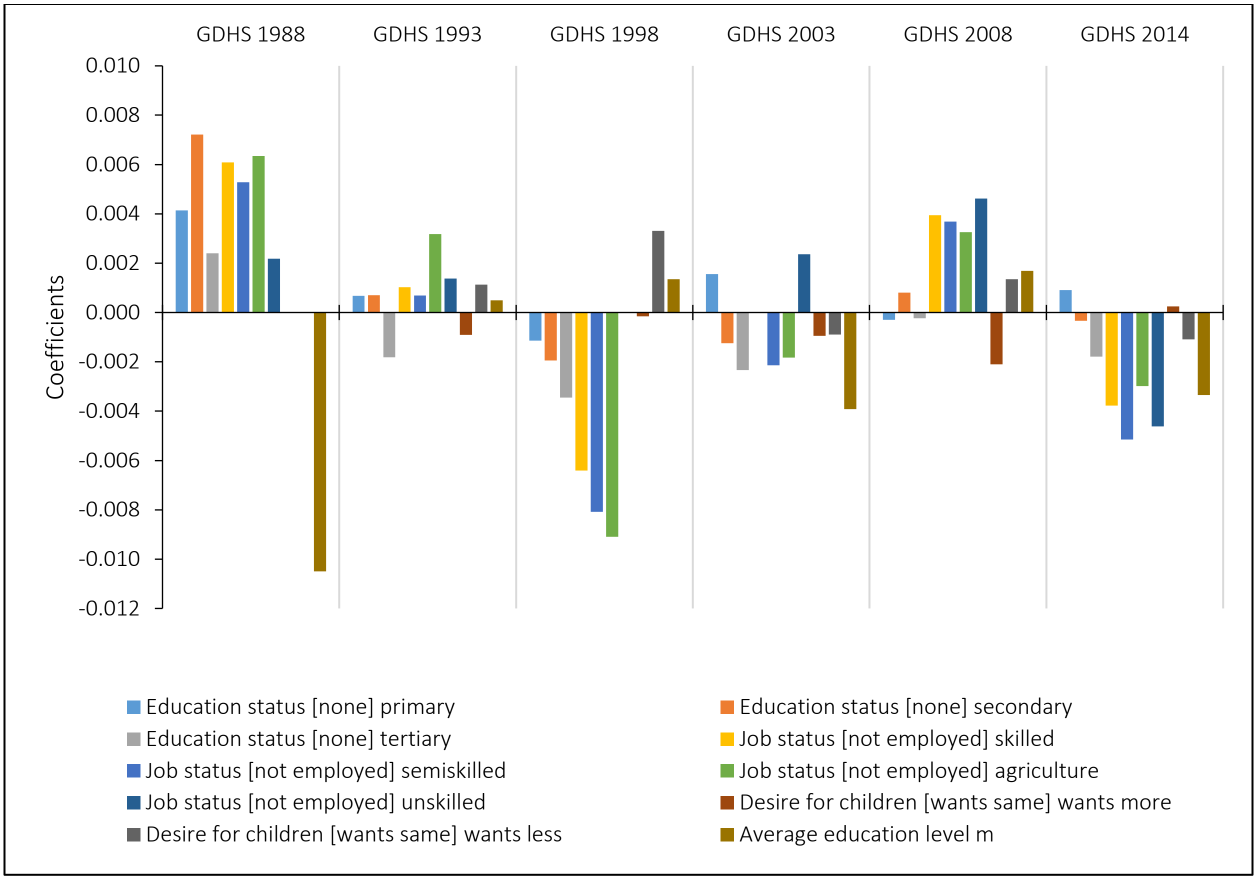
Results from multilevel linear regression analysis are presented in figure 2 below. The stripped bars indicate statistical significance at the 5% level. As shown in the figure, contraceptive use and average duration of postpartum infecundability proved to be significant predictors of differentials in marital fertility in Ghana at various periods. These variables operated to reduce the fertility rates of women. What is interesting however, was that use of modern contraceptives did not translate to significant reduction in fertility for all GDHS surveys. In some instances, use of modern contraceptives appeared to increase fertility. These results can be affected by the age distribution in fertility and contraceptive use whereby younger women in age groups where fertility peaks are the most users of modern contraceptives.



Female variables



Male variables



Decomposition results

The decomposition of the average ASMFRs using the Oaxaca-Blinder technique partitions the difference in the levels of the fertility measure into three components that are classified as endowments, coefficients and interaction. These three components are estimated as conditional contributions. This means that the estimated percentages for each aggregate component reflect the extent to which ASMFRs would increase or decrease if Ghana experienced a change in the respective component alone and remained unchanged in the other components. The figure below presents aggregate results from decomposition analysis; the detailed results will be presented in the full paper. To facilitate easy interpretation of the figures, table 1 is presented first, showing three-year point estimates of the average ASMFRs for each survey from Ghana on which all the decomposition results are based.

Table 1: Point estimates of average ASMFRs on which decomposition results are based

	Period 1		Period 2		Period 3		Period 4		Period 5	
	DHS-1	DHS-2	DHS-1	DHS-2	DHS-1	DHS-2	DHS-1	DHS-2	DHS-1	DHS-2
Ghana	0.247	0.203	0.203	0.176	0.176	0.180	0.180	0.168	0.168	0.179

The average ASMFRs reported in table 1 were obtained from the decomposition output. The respective specific surveys represented by DHS-1 and DHS-2 columns are stated in the figure showing the decomposition results. It can be observed that DHS-2 for a preceding period was the DHS-1 for the succeeding period and the repetition of the average ASMFRs indicate that the same levels of each survey were analysed irrespective of a period. To understand the significance of the contents of table 1 and the interpretation of the decomposition results, one needs to be clear about the process of deriving the percentages reported in the figures below as well as the meaning of positive and negative signs of the percentages. The percentage change in mean ASMFRs (gold bars in figure 5 below) were obtained by expressing the differences between DHS-1 and DHS-2 as a percentage of DHS-1. For example, the average ASMFR for Ghana's period 1 were 0.247 (GDHS 1988) and 0.203 (GDHS 1993) yielding a difference of 0.044;

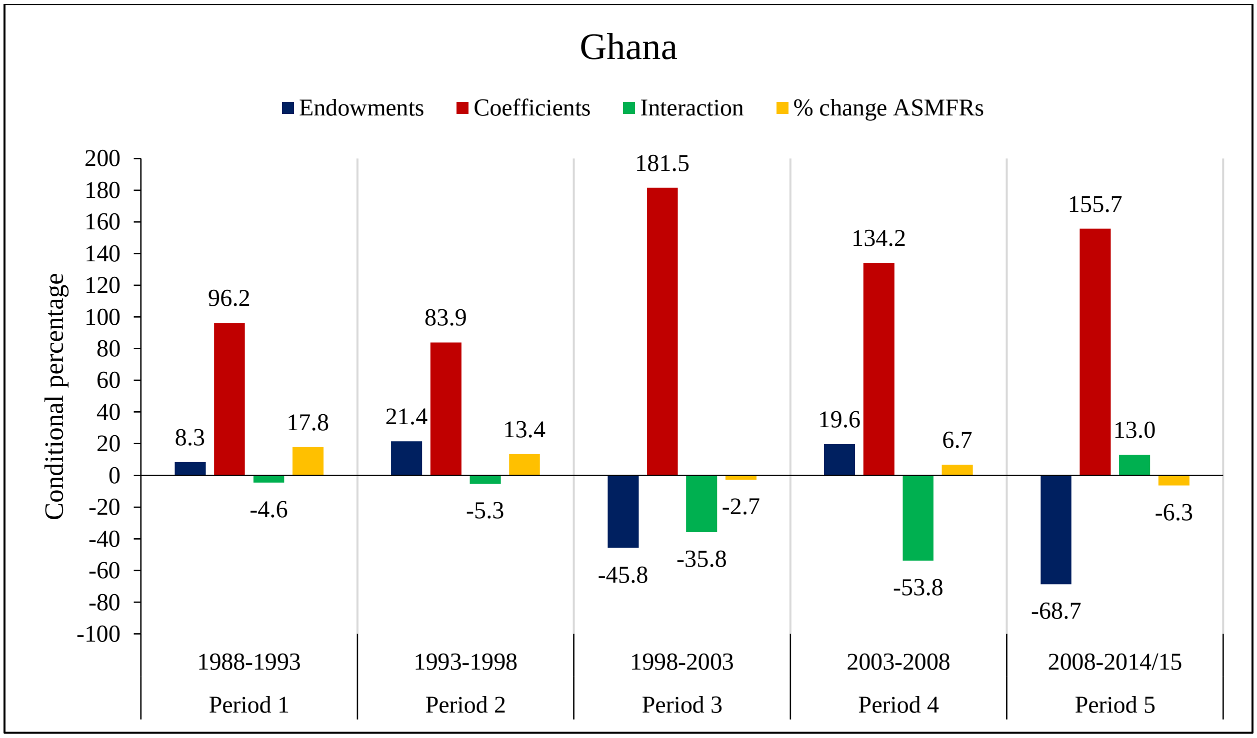
$\Delta_{\overline{ASMFRs}} = 0.247 - 0.203 = 0.044$.

Expressing the difference as a percentage of the estimate for the base survey which was GDHS 1988 shows that the level of ASMFRs declined by 17.8% in period 1;

$$\%\Delta_{\overline{ASMFRs}} = \frac{0.044}{0.247} * 100 = 17.8.$$

This means that the mean of ASMFRs for Ghana declined by 17.8 percentage points from 1988 to 1993. This process of deriving percentages indicating changes in the level of ASMFRs leads to the issue of positive and negative percentages and their implication. Positive percentages indicate decline in ASMFRs while negative percentages reflect inter-survey increase in marital fertility rates. A component of the decomposition aggregates sharing the same positive sign with the percent change in ASMFRs contributed to the decline in fertility on one hand. On the other hand, sharing the same negative sign as the percentage change in ASMFRs imply that the decomposition component contributed to the increase (stalling) of marital fertility transition. For the instances where aggregate components had a different sign from that of the percentage change, it implies that the impact of that component acted to reverse the observed change in the level of ASMFRs. Such instances are explained as encountered in the chapter.

The aggregate results for Ghana show that coefficients played a major role in the inter-survey changes in the levels of mean ASMFRs for all the five periods.



Conclusion

The results of the study appear to suggest that population characteristics play a role in differences in fertility rates among married women at one point in time. However, with respect to fertility transition, the decline or stalling of fertility is largely determined by the changes in the effects of individual and community-level characteristics. It is possible for women of different education statuses to experience parallel fertility trends due to fertility declining with similar magnitudes in all education groups. This potentially points to the importance of understanding the patriarchal context of fertility in Ghana and SSA as a whole so that pro-natal sociocultural systems can be influenced through customised policies to enable faster fertility transition.