



Universiteit  
Leiden  
The Netherlands

## **Women's education and higher fertility outcomes in Ghana: an exploratory study**

Akinyoade, A.; Dickson, K.S.

### **Citation**

Akinyoade, A., & Dickson, K. S. (2023). Women's education and higher fertility outcomes in Ghana: an exploratory study. *Afriche E Orienti*, (2), 28-51. Retrieved from <https://hdl.handle.net/1887/4209795>

Version: Publisher's Version

License: [Creative Commons CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/)

Downloaded from: <https://hdl.handle.net/1887/4209795>

**Note:** To cite this publication please use the final published version (if applicable).

# Women's education and higher fertility outcomes in Ghana: an exploratory study

## Abstract

The inverse relationship between female education and fertility is well documented, and the statistical strength of this relationship has been used to develop important international and national policy documents. Promoting female education is expected to yield a demographic dividend of lower fertility rates, and improved well-being of mothers. But nuances to the relationship between education and fertility are beginning to show that desired end points are not as straightforward as projected. In this study, we use Ghana Demographic and Health Survey data to dig deeper into the gradations of the relationship between female education and fertility preferences and dimensions of male influence on couples' reproductive behaviour in Ghana, building up more rigorous evidence for better targeted policy interventions.

## Keywords

fertility, demographic transition, education, reproduction

## Introduction

In developing countries, particularly the ones where rapid population growth is a major factor associated with increased poverty levels, reduced wellbeing, and increased intercontinental emigration, controlling rapid population expansion has caught the attention of policymakers (Novignon et al. 2019). For example,

This article is distributed in Open Access under the Creative Commons CC-BY 4.0 Licence  
(c) Author(s)

DOI:<https://doi.org/10.23810/AEOXXVII202322>

When citing this article please include its DOI with a resolving link

Ghana's population is expected to double in about 35 years, due to the annual inter-censual population growth rate of 2.1 per cent between 2010 and 2021. In such countries, it has been demonstrated that rapid population growth is a hindrance to economic performance because of the pressure it exerts on already limited public infrastructure and the strain this puts on national government budgets for the financing of public services. One other statistical measure that is used to highlight and compare demographics is the total fertility rate (TFR). In Africa's Sahelian region, TFR is double the levels prevailing elsewhere in the developing world, and the Sahel has the lowest contraceptive prevalence in Africa and in any region worldwide (Phillips et al. 2012). At the turn of the 21<sup>st</sup> century, signs of reduction in TFR were recorded across countries in sub-Sahara Africa, signposting the success of population programmes. The transition to lower fertility rates raised expectations in academic and policy circles that Africa will shed its label as the continent of large family sizes. However, a decade into the new century, evidence began to emerge of the stagnation of fertility transitions in Africa and this is generating renewed interest in the population debate (Bongaarts and Sinding 2009). Prospects for family planning programs to induce and sustain demographic transition remain the subject of challenge on theoretical and empirical grounds (Phillips et al. 2012).

In relation to the foregoing, studies show that fewer children are associated with women of higher educational achievement, and the inverse relationship between fertility and women's education has long been established. This relationship is important for policy development and recommendations with the aim of curbing population growth, reducing national and household dependency burdens, increasing the health and well-being of women, among a host of other associated outcomes including improved participation of women in the family decision making environment. According to the World Bank (2021),<sup>1</sup> girls' education is a strategic development priority that is situated on the premise that better educated women have fewer children.<sup>2</sup> But, a particular unintended consequence of women's educational achievement has also been noticed in some communities in the past three decades, that is: some women with high education appear to have more children than their less educated counterparts in the same socio-economic context. This phenomenon has been sporadically found in parts of West Africa and in the Middle East. While it sends a different signal for role of education on childbearing, population growth and development, the contexts where this is emerging call for studies to understand the unexpected phenomenon, thus necessitating this study on Ghana. For Ghana, the relative consistency

in the availability of Demographic and Health Survey (DHS) data,<sup>3</sup> therefore, allows us to systematically establish the emerging realignment of the association between the education of women and fertility outcomes, and examine the kinds of factors that are responsible. Such analyses would contribute to highlighting the possible policy and social implications.

Our study is designed as follows. First is the examination of general demographic transition, the potential stalling of fertility decline in Africa, and how this emerging transition is connected with fertility desires. Factors influencing fertility desires are presented. In the second section, we present the methods and materials of this study. This is immediately followed by the presentation of results and wider discussions regarding the potential occurrence of unintended consequences with attendant problems of clouding policy messages. In the last section, conclusions are drawn and recommendations are made for further research and policy.

## **Demographic transition**

The theory of demographic transition stipulates that societies progress from a pre-modern regime of high fertility and high mortality to a post-modern regime of low fertility and low mortality (Kirk 1996). This transition process first entails the reduction of the death rate which is by controlling epidemic and contagious diseases. Along the course of time, with modernization, having children become more costly, resulting in a weakening of the importance of children. In the time trajectory, increase in the empowerment of women to make their own reproductive decisions further contributes to the desire and actualization of smaller families. Essentially, a change occurs in values, emphasizing the quality of children rather than their quantity. Worldwide data in the past couple of decades show that the fertility transition is becoming universal phenomenon, in which every country may be placed on a continuum of progress in the transition.

Thus, the Demographic Transition Theory (DTT) is “[...] a generalised description of the changing pattern of mortality, fertility and growth rates as societies move from one demographic regime to another.”<sup>4</sup> The four stages (see figure 1) of the classical demographic transition model starts from a “pre-transition” stage characterised by high birth rates, and high fluctuating death rates, followed by “early transition” when the death rate begins to fall, though fertility rates remain high; then, the “late transition” stage where birth rates start to decline, with the signaling of deceleration in the rate of population

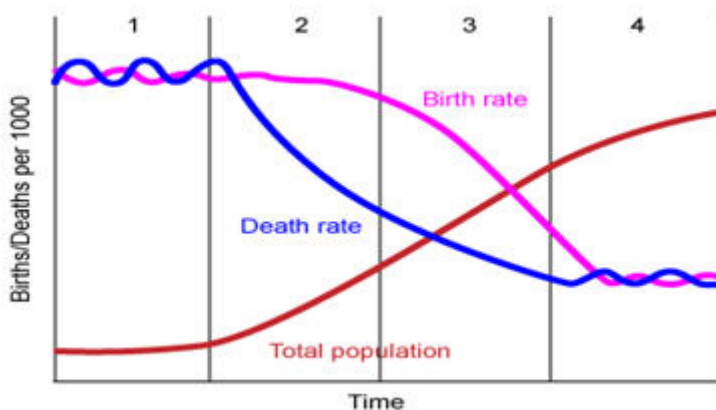


Figure 1: Demographic Transition in Time

Source: UNFPA, *The Demographic Transition*, “PAPP101 - S01: Demography on the world stage” [http://papp.iussp.org/sessions/papp101\\_s01/PAPP101\\_s01\\_090\\_010.html](http://papp.iussp.org/sessions/papp101_s01/PAPP101_s01_090_010.html) (accessed August 7, 2024)

growth, and finally the “post-transition” stage characterised by low birth and low death rates. At this point, population growth becomes negligible, and in some quarters, population size declines (Rosero-Bixby and Casterline 1993).

Each stage is characterized via different parameters: for (i) and (iv) it is the level of fertility and mortality; for (ii) it is historical dates and level of fertility; and for (iii) it is the pace of decline (Agyei-Mensah 2006). One of the precursors of low fertility rates in the third stage is the promotion and imbibing of attainment of higher education for women. This would in turn have positive effects on the adoption of modern contraception for family planning. Reher (2004) classified all countries into four categories based on the date of onset of their fertility transitions. First are the forerunners, where the onset began before 1935, including countries such as England and Wales, France, and Sweden; secondly, there are followers such as Japan, Singapore, and Taiwan, where the onset began between 1950 and 1964; thirdly, there are trailers where the onset began between 1965 and 1979, including Egypt and Brazil; and finally, there are latecomers where the onset began after 1980, including most African countries such as Ghana, Senegal, Kenya, and Benin, as well as countries in Asia and Latin America such as Bangladesh and Guatemala (Agyei-Mensah 2006).

Despite the ambiguity that surrounds the concept of fertility transition, there is a near-consensus that fertility transitions involve a sustained and usually irreversible decline in fertility, driven by the increasing use of contraception,

sterilization, and abortion to limit the family size (Onuoha and Timaeus 1995). According to van de Walle (1992), the transition is not far away when people start conceptualizing their family size and that it cannot take place in the absence of thinking about how small or large they want their family size to be. Though a number of countries within the sub-Saharan African region have gone through the first two stages of the fertility transition, none of them has yet reached the post-transitional stage. With the exception of a few studies (see Bongaarts and Watkins 1996; Bongaarts 2020; Cohen 1998, among others), most of the literature on the sub-Saharan African fertility transition has focused on the onset of decline (see, Reher 2004). Yet onset is but one stage of the overall fertility transition process.

For Africa, its diversity as a continent with 54 independent states is often lighted but frequently forgotten when fertility is discussed (Askew, Maggwa and Obare 2017). Five decades ago, to consider that all African countries and societies had a single fertility pattern (large numbers of children) and a single trend (unchanging over time) was a valid characterization. Such uniformity has disappeared, replaced by substantial inter- and intra-country differences in fertility patterns and trends that render previous perceptions of continent-wide homogeneity obsolete. Thus, while the fertility transition is underway in sub-Saharan Africa, the pattern of change differs widely in both time and space, with varied rhythm and intensity.

Some studies have even found that fertility decline in several sub-Saharan African countries has stalled in recent years.<sup>5</sup> These studies have reached contradictory conclusions about the extent and mechanisms of the stalling of fertility. In some contexts, it is also argued that the actual number of stalls may be overstated, due to limitations of the available data. Such limitations include age displacement of children, omission, or differences between the surveys in the late 1990s and those in the early 2000s. With improvements, careful assessment of fertility trends are becoming more possible as we take into account the high level of DHS data quality.

In the analyses of DHS data, some factors have been identified as having strong associations with fertility levels. For example, the inverse relationship between female education and fertility is well documented (Feyisetan and Casterline 2000; Kravdal 2002; Shapiro 2012; Sunmola, Olaosebikan and Adeusi 2020). Some studies were also specific that the fertility rate drops when girls go to school for more than 10 years<sup>6</sup> and or when women have attained, at the very least, secondary education (Akinyoade 1999; 2007). Some surveys

also showed that the initial effects of family planning programmes were felt as they met the need for child spacing without introducing a sustained demographic transition (Phillips et al. 2012). Thus the question could easily be asked why the reported increase in modern contraception usage has not kept pace with the observed declines in fertility (Agyei-Mensah 2006).

Another important factor is about men's influence in reproductive decision-making and fertility behaviour of women in sub-Saharan Africa (Caldwell 1982, Lesthaeghe 1989<sup>7</sup> both cited in Takyi and Dodoo 2005), and male attitude toward fertility control (Robinson 1992). In addressing issues of high fertility in sub-Saharan Africa, a woman's ability to achieve her preferred family size is important (Yeboah, Kwankye and Frempong-Ainguah 2021a). The socio-cultural context in sub-Saharan Africa presents some difficulty in the attainment of preferred fertility for many women. Few studies in sub-Saharan Africa have examined the extent to which women are unable to achieve their preferred family sizes. On one hand, potentials exist for fertility decline in sub-Saharan Africa, on the other hand survey results appear to be pointing to a possibility that reaching lower fertility end points are not straightforward, and lower fertility may not necessarily be the end point of fertility transition (Kim 2016). All of these arguments still indicate that fertility levels are changing across Africa; underlying these changes are changes in desired fertility.

## **The theory of desired fertility**

Desired fertility is used to describe how many children a woman would like to have during her reproductive life. Desired fertility can also be expressed by couples and by men. In studying fertility desires (also referred to as fertility preferences and fertility intentions), and their linkages to achieved fertility, some theoretical and conceptual frameworks are found to be potentially useful. These include the life-span theory of control (Heckhausen and Schulz 1995), the classical rational choice model (Johnson-Hanks 2005), and the theory of planned behaviour (Ajzen 1991). The latter's point of departure is that an individual's behaviour occurs out of an intention to act in that way. Three factors that influence an individual's intentions identified include perceived behavioural control, attitude toward behaviour, and subjective norms. While the theory's origin is in behavioural studies, its adaptation to the study of fertility behaviour has been done severally (Yeboah, Kwankye and Frempong-Ainguah 2021a).

A weakness of this theory is the static character it paints of fertility preference; that is, once decided, it remains unchanged (Liefbroer 2009; Trinitapoli and



Yeatman 2018). This weakness can be overcome with a background proposition that a woman's achieved fertility remains largely influenced by her fertility desire, which may undergo changes. Evidence from several studies that show the positive association between achieved and desired fertility in most studies of fertility behaviour. While it has been shown that women who prefer to have fewer children tend to work towards giving birth to fewer children, it is also noted that the eventual outcomes of how independent factors influence fertility behaviour may be mediated by planned and unforeseen constraints. These constrictions range from biological, social, to physiological factors that could result in cause an individual to either underachieve or overachieve her fertility preference. Other influencing factors that are in addition to women's socio-demographic characteristics are their partner characteristics, which additionally influence preferred fertility and eventual fertility outcomes of couples. Studies have shown causal and casual relationships of socio-demographic characteristics with numeric levels of fertility preference, and these include child loss, place of residence, education, ethnicity, religion, use of modern contraceptives, age at first birth, and a number of marital unions (Philipov and Bernardi 2011).

Globally, fertility desire is found to be lower in developed countries compared to that in developing countries (Baizan, Arpino and Delclòs 2016; Gunther and Harttgen 2016). Also, a higher proportion of women in sub-Saharan Africa exceed their high fertility preference, thereby producing a much higher achieved fertility, in comparison with women in other developing countries in other continents.

## **Fertility levels and fertility desires in Ghana, West Africa.**

Ghana is regarded as the vanguard in the West African fertility transition. Data extracted from Ghana DHS of 1988, 1993 and 1998 show a national decline from 6.4 to 4.6 children per woman (Blanc and Grey 2002). While researchers concurred that the observed reduction in fertility levels was a big departure from the preceding couple of decades when fertility levels stayed at about 6.9 children per woman, there was also skepticism about how sustained the newly recorded reductions in fertility levels will be. For instance, Derosé and Ezeh (2005) disaggregated same data to show total fertility fell from 6.6 to 5.3 children per woman in rural areas of Ghana between 1988 and 1998; in urban areas the decline was from 5.1 to 3.0. This brought a consideration that national statistics often mask sub-regional differences in the level and tempo of fertility decline. In this direction, Agyei-Mensah (2006) highlighted the considerable geographical



diversity in Ghana's ongoing fertility transition. The Northern region is still in the pre-transition stage, with little decline in fertility. In contrast, the pace of decline appeared to be more rapid in southern parts of the country, particularly in the Greater Accra region. Also, Askew, Maggwa and Obare (2017) probed this decline among a larger set of explanatory variables or sub-populations defined by wealth, education, place of residence and trends in wanted and unwanted fertility. Other socio-economic characteristics of the women that have been found to impact fertility behaviour include ethnicity, religion, and the multiplicity of marital experience (Dibaba 2016; Berrington and Pattaro 2014).

A potential stalling of Ghana's fertility rate was observed in the analyses of the 2003, 2008 and 2014 Ghana DHS. The observation contributes to a rethinking of the trajectory and outcomes of the demographic transition theory. Across the globe, such fertility pattern is spurring a resurgence of research interest in fertility desires, family size intentions, and fertility realization among various age groups across the globe in recent years (Bhrolcha'in and Beaujouan 2019; Liefbroer 2009). Partners' educational attainment, marital arrangement, and partners' fertility desires could override women's fertility intentions thereby resulting in the actualisation of fertility levels that the women did not set out to achieve (Feyisetan and Casterline 2000; Kravdal 2002). In a comparative study of northwest and southwest Nigeria, Akinyoade (1999) showed that a woman whose husband or partner has a higher education is more likely to have fewer children irrespective of her fertility preference.

Another relevant indicator of the extent to which a woman can achieve her preferred fertility or not is the fertility gap. The gap between preferred and actual fertility can be reduced or widened when the woman's individual and socio-demographic characteristics align with, modulated by, or are at variance with the partner's characteristics. Some studies show that women adjust their actual fertility in accordance with their partners' preferences (Muhoza, Broekhuis and Hooimeijer 2014; Ajzen 1991). This sounds deterministic and suggests women lack agency. However, it has been shown that women's agency has dramatically improved with increased education, job opportunities, and the narrowing of the gender pay gap, among other factors in the past couple of decades worldwide. Improvements are being seen in household decision-making environments, an increase in contraceptive use, and a host of other indicators. However, there are contextual ramifications. In Ghana's 2003, 2008 and 2014 DHS, couple's fertility preference was found to be associated with achieved fertility (Yeboah, Kwankye and Frempong-Ainguah 2021b)

Focusing on Ghana, our research aims at investigating how and why the country's experience of fertility decline is stalling. The decision of whether or not to have a child is intensely held in private domains. Yet, when national aggregates are considered for millions of couples, it can have huge national implications, hence the need for research into the missing nuances. Some research questions that guide this study include: what factors are gaining prominence in their influence on reproductive behavior and in what ways does education and kinds of education affects and mediate fertility desires in Ghana? At the local level, what is the perceived connection between education and fertility desires by residence, age distribution and kinship systems in the national space?

Our main source of data for this study is the 2014 GDHS, which is used to present a case of the nuanced drivers of the relationship between female education and fertility desires. It will also incorporate a sociometric analysis of national data to show how fertility desires relate to women's educational attainment in Ghana. The data is complemented by excerpts of in-depth interviews of women of childbearing ages and other qualitative evidence in Ghana. This study has both academic and strong policy urgency. In development circles, policies appear to be based on statistical estimations that are significantly weak in qualitative presentations. Results emanating from our research will attempt to provide a stronger basis for a re-examination of policy formulation and implementation pathways and provide a more nuanced approach useful for the customization of effective programs. The newer data-backed understanding of male and female educational attainment for the understanding of fertility trajectories in one of Africa's poster countries of demographic transition, can become a reference point for other national and regional research in the continent.

## **Methodology**

In this section, we examine the determinants of fertility desires and its place in the on-going process of fertility transition in Ghana. Thus, the associations between fertility preferences with fertility levels and selected background factors are presented in simple and statistically complex measurements. Following this, an attempt is made to provide explanations on the observed connections. The methodological approach involves the appraisal of existing quantitative secondary data (Ghana Demographic and Health Surveys), and derivation of demographic measures from the 2014 data. Furthermore, the quantifications are contextualized with qualitative data (semi-structured interviews and literature on fertility preferences at Ghana's national level). The research focuses

on Ghana and the diversity of its socio-demographic and economic spaces to provide a more nuanced analysis.

Thus, the dataset that was subjected to statistical scrutiny is the 2014 GDHS women's cross-sectional dataset. The GDHS uses a two-stage sampling method made up of cluster sampling, followed by systematic sampling at the household within each cluster. The study data yielded a total of 4639 women aged 15–49 years from the 2014 GDHS round. Summaries of the respondents' background, also with specificities of those who had partners at the time of survey are presented in the Annex section of this study. Binary logistic regression was applied, with the binary dependent variable of fertility desires being “I want another child” / “I don't want any more”. Two groups of respondents were examined: firstly, all female respondents aged 15-49 years, and secondly, analyses of female respondents 15-49 years who have partners/husbands. The reason for this second analyses is to help estimate the influence of male characteristics on women's reproductive aspirations.

## Results: Females only

The results of binary logistics regression on female-only data (Table 1) show the usual inverse relationship between age and numerical fertility preference, and the results are much more statistically significant among the older women age groups 35-39, 40-44, and 45-49 years. According to education, an inverse relationship between education and fertility preference is observed. The odds show that women with higher education are 30% less likely to want more children compared to those with no education.

Table 1: Binary logistic regression – all women GDHS 2014

Variable	Model 1: Adjusted Odds Ratio (95% Confidence interval)	Model 2: Adjusted Odds Ratio (95% Confidence interval)	Model 3: Adjusted Odds Ratio (95% Confidence interval)
<b>Women's age</b>			
15 – 19		Ref	Ref
20 – 24		0.81 (0.35, 1.86)	0.86 (0.34, 2.19)
25 – 29		0.64 (0.29, 1.44)	0.75 (0.29, 1.94)
30 – 34		0.34** (0.15, 0.76)	0.50 (0.19, 1.30)

35 – 39		0.19*** (0.09, 0.43)	0.32* (0.12, 0.84)
40 – 44		0.09*** (0.04, 0.20)	0.16** (0.06, 0.43)
45 – 49		0.05*** (0.02, 0.11)	0.09*** (0.03, 0.24)
<b>Place of residence</b>			
Urban		Ref	Ref
Rural		1.11 (0.89, 1.37)	1.12 (0.90, 1.39)
<b>Occupation</b>			
Not working		Ref	Ref
Managerial		1.65 (0.97, 2.80)	1.48 (0.86, 2.53)
Clerical		2.14 (0.83, 5.51)	1.98 (0.76, 5.16)
Sales		1.16 (0.89, 1.51)	1.16 (0.88, 1.51)
Agricultural – self employed		1.08 (0.80, 1.44)	1.05 (0.78, 1.42)
Agricultural – employee		1.51 (0.56, 4.09)	1.91 (0.63, 5.86)
Services		1.37 (0.69, 2.71)	1.45 (0.73, 2.87)
Skilled manual		1.10 (0.80, 1.52)	1.10 (0.80, 1.52)
Unskilled manual		0.95 (0.47, 1.90)	0.97 (0.48, 1.96)
<b>Wealth status</b>			
Poor		Ref	Ref
Middle		0.73** (0.57, 0.93)	0.81 (0.62, 1.05)
Rich		0.81 (0.61, 1.09)	0.92 (0.68, 1.26)
<b>Education</b>			
No education		Ref	Ref
Primary		0.61*** (0.48, 0.76)	0.68* (0.53, 0.87)
Secondary		0.59*** (0.47, 0.74)	0.66** (0.52, 0.85)
Higher		0.39*** (0.23, 0.64)	0.36*** (0.21, 0.63)
<b>Parity</b>			
0 – 3		Ref	Ref
4 or more		0.14*** (0.12, 0.17)	0.14*** (0.11, 0.17)
<b>Kingship system</b>			
Matrilineal		Ref	Ref
Patrilineal		1.37*** (1.15, 1.64)	1.28*** (1.06, 1.53)
<b>Religion</b>			
Christianity		Ref	Ref
Islam		2.76*** (2.21, 3.45)	2.63*** (2.10, 3.30)

Traditional/Spiritual		2.10*** (1.39, 3.15)	1.95** (1.30, 2.95)
No religion		1.53* (1.03, 2.29)	1.46 (0.97, 2.19)
<b>Frequency of listening to radio</b>			
Not at all		Ref	Ref
Less than once a week		0.84 (0.66, 1.06)	0.83 (0.65, 1.05)
At least once a week		0.97 (0.77, 1.21)	0.96 (0.77, 1.20)
<b>Frequency watching television</b>			
Not at all		Ref	Ref
Less than once a week		1.37*** (1.08, 1.74)	1.45*** (1.14, 1.84)
At least once a week		1.09** (0.87, 1.37)	1.14 (0.91, 1.44)

Ref=Reference category \*p<0.05 \*\*p<0.01 \*\*\*p<0.001. Source: *GDHS 2014 data, Authors analyses*

With regard to wealth status, females were categorised as poor (poorest, poorer), middle, rich (richest, richer), and these categories were derived using principal component analysis from their reported household assets. Analyses of fertility preferences of women according to their wealth status show that wealthier women are less likely to prefer more children than poorer women; but when all factors are added in the statistical iteration, fertility preference was almost at par among women that reported richer and poorer statuses.

When it comes to the number of children the women have had, parity number 4 is the threshold for wanting fewer children and this is highly statistically significant. From parity 0 to 3, the desire for having more children remain high. If actualized, this will run counter to the stated lower than replacement fertility, which is the expected end point of transition theory. While national data shows that the fertility level is reducing in Ghana, data analysis in this study show that women retain fertility desires as high as 3 children, especially in northern sectors of the country. The 2021 census of the country actually show a doubling of TFR in the northern zones compared to the southern zones.<sup>8</sup> Although fertility rates in Ghana have halved from 6.4 to 3.1 children per woman in a 34-year period between 1988 and 2021 this transition has not been homogenous across all regions of Ghana. Fertility rates remain higher in the northern regions of the country at about 4.5 children per woman in North East

Region, compared to the southern regions where Greater Accra, a sprawling urban area has a TFR of 2.2 children per woman.<sup>9</sup>

Ghanaian communities are mostly socially organised around kinship systems that appear to play a more significant role in the formation and operationalization of fertility desires. These are the matrilineal and patrilineal kinship systems. In a patrilineal society, children are identified with their father's kin group or lineage; daughters, upon marriage, transfer their alliance to their husband's lineage. According to Radcliffe-Brown (1952), such unilineal descent constructs critical social categories, providing mechanisms for defining identity, inheritance, and authority. In order to understand what this means for family/household decision-making contexts in Ghana, the 2014 GDHS data on ethnic origins of respondents were recoded into the two national kinship systems as follows: Akan group were classified under matrilineal kinship, as described in academic literature; and the ethnic groups that fell under the patrilineal include – Ga/Dangme, Ewe, Guan, Mole- Dagbani, Grusi, and Mande. For fertility preferences, women living in administrative regions dominated by patrilineal kinship authority are estimated as more likely to have higher fertility desire and larger family sizes than women in regions of matrilineal kinship system. The centrality of male authority was also displayed among women who stated that they do not currently live with their partners and those who's partners have secondary education. The patrilineal are found more in northern sections of the country where larger household sizes and larger fertility were reported. In the words of Lowes (2017), the “structure of matrilineal kinship systems implies that, relative to patrilineal kinship systems, women have greater support from their own kin groups, and husbands have less authority over their wives”. Thus, differentiations in fertility desires according to local kinship realities are very important for a nuanced understanding of the direction of fertility transition in the country.

Ghana is also a highly religious zone. In the examination for fertility desires, female adherents of Islam are found to be nearly three times more likely to desire having more children than Christians. Adherents of local traditional religions are also shown to be two times more likely to having desire for more children than women of the Christian faith. These results are of high statistical significance. According to a study conducted by Yusuf (2014), respondents stated that modern contraception, if used, could eventually lead to a reduction of the Muslim population and that it is un-Islamic (to use contraception). If this expression of reluctance to using contraception is combined with high fertility desire, then the evidence of the stalling of fertility transition in Ghana becomes

stronger, especially in the northern sectors that are predominantly Islamic.

In terms of exposure to the media, the result is mixed in terms of media choice. Women who listen to the radio at least once a week are more likely to have fewer children than those who do not listen to the radio at all. Conversely, for women that reported their television watching habits, women who watch the television are more likely to prefer having one more child over those who do not watch television at all. The medium of radio for information dissemination on family planning messages may yield more results than other form of information sharing, if the overall intention is to contribute to reduction in fertility.

## Results: Females with partners.

In this section, we look at the fertility desires of women who specified having male partners/husbands. On a general note, the usual inverse relationship between age and fertility preference is observed; the older the respondent, the fewer the number of children preferred. In addition, women living apart from their partners are shown to prefer having more children than those who currently live with their partners, though this finding is not statistically significant. Also, women who's partners have some form of education prefer to have fewer children than those with no education. However, increase in odds of desiring more children was observed among women with partners of secondary education.

Table 4: Binary logistic regression – women with partners

Partner variables	Model 1 Adjusted Odds Ratio (95% Confidence interval)	Model 2: Adjusted Odds Ratio (95% Confidence interval)	Model 3: Adjusted Odds Ratio (95% Confidence interval)
<b>Currently residing with partner</b>			
Living with partner	Ref		Ref
Staying elsewhere	1.02 (0.85, 1.22)		1.07 (0.88, 1.32)
<b>Partners' education</b>			
No education	Ref		Ref
Primary	0.50*** (0.39, 0.63)		0.71* (0.53, 0.95)
Secondary	0.39*** (0.32, 0.46)		0.61*** (0.48, 0.78)
Higher	0.62** (0.45, 0.87)		0.91 (0.60, 1.38)



<b>Partners' occupation</b>			
Managerial	Ref		Ref
Clerical	1.88 (0.96, 3.62)		1.61 (0.74, 3.52)
Sales	1.21 (0.86, 1.72)		1.20 (0.80, 1.79)
Agricultural – self employed	0.68** (0.52, 0.92)		1.22 (0.84, 1.76)
Agricultural – employee	0.60 (0.27, 1.31)		0.79 (0.28, 2.29)
Services	1.07 (0.66, 1.75)		1.09 (0.62, 1.93)
Skilled manual	0.77 (0.57, 1.05)		0.94 (0.66, 1.33)
Unskilled manual	0.90 (0.66, 1.23)		1.03 (0.72, 1.48)
<b>Partners' age</b>			
15 – 24	Ref		Ref
25 – 34	0.43* (0.22, 0.84)		0.96 (0.34, 2.19)
35 – 44	0.10*** (0.05, 0.20)		0.56 (0.25, 1.26)
45 – 54	0.04*** (0.02, 0.07)		0.46 (0.20, 1.08)
55-64	0.03*** (0.02, 0.07)		0.42 (0.17, 1.02)
65+	0.03*** (0.01, 0.07)		0.52 (0.20, 1.37)

Source: GDHS 2014 data, Authors analyses

In terms of occupation, women whose partners are employees in the agricultural sector desire to have fewer children than women whose partners are in the managerial category of work. This runs contrary to expectation that agricultural sector workers would like to have more children in their bid to secure unpaid family labour at some point on their farms. Women whose partners are in the managerial category expressed in follow-up interviews that the opportunity of having more income puts them in better economic context to afford the costs of child care. The categorization of wealthier men preferring larger family sizes structurally changes the dynamics observed in the results for women only according to wealth status. Irrespective of women's wealth and education, male wealth is a bigger deciding factor for increases in fertility desires. When layered by the kinship system, fertility desires (and TFR) are expected to remain high in the patrilineal kinship zones of the country.

Focus groups of young Ghanaian men and women conducted by DeRose, Doodoo and Patil (2002) indicate that attitudes supporting men's dominance

in fertility decisions characterize even the highly educated. Young women with high fertility desires anticipate being able to stop childbearing when they want to, but they do not expect to be able to continue if their husband wants to stop. Those with low fertility desires do not anticipate being able to stop without husband consent. Generally speaking, the theory of planned behavior “permit quite accurate prediction of intentions and behavior, and one of the most frequently addressed questions in research with the theory has to do with the prospect of increasing the amount of explained variance in intentions or behavior by adding one or more predictors” (Ajzen 2011: 1119).

## Discussion

This study has sought to provide a nuanced understanding of the mediating role of the male-partner factor on women’s fertility preferences in Ghana. Male education, wealth and type of work have been shown to influence their female partners fertility preferences, with huge implications for fertility achievements in the course of the women’s reproductive life. Central to the theory of planned behaviour, on which this study is anchored, is the prediction of intentions. According to Ajzen (2011: 1115), “behavioural, normative and control beliefs as well as attitudes, subjective norms and perceptions of behavioural control are assumed to feed into and explain behavioural intentions”. However, factors that are beyond the individual’s control may also be of influence if intentions indeed are reliable predictor of human behaviour. This is because the strength of the intention-behaviour relation is moderated by actual control over the behaviour. Barring methodological shortcomings, a low intention-behaviour still signals the need for careful attention to how static stated preferences are expected to remain. The use of logistics regression for our analyses helps us out of this pothole because deploying the method allows us to reason more in the direction of probabilities, that is, the likelihood that an event or a reasoned action will occur.

Our findings in this study also expands the literature of how kinship systems influence reproductive preferences and household fertility decision-making processes. Some of the statistical evidence suggests that women in matrilineal kinship systems of Ghana are more likely than non-matrilineal women to translate their reproductive preferences into action consistent with their goals. DeRose and Ezeh (2005) showed that the potential influence of men’s education on reproductive decision-making increased during the first decade of rapid fertility decline in Ghana. In DeRose and Ezeh’s work, husband’s education exerts

a stronger influence on wife's fertility intentions than does her own education, and the magnitude of the effect of his education increased significantly in the 1988-1998 data sets. Our study shows that husband's education and wealth are influential to increasing fertility desires. It is therefore not surprising that the transition to lower fertility is stalling in Ghana.

Three decades after Watkins' observation (1991), it is still somewhat curious that men's dominance is expected to block the initial departure from high fertility norms in northern parts of Ghana, given that the onset of fertility transition in Europe occurred when men controlled most methods of contraception. Thus, fertility decline in regimes where reproductive decisions are dominated by men can occur through a fundamental change in men's fertility desires, a shift in reproductive decision-making power that favours women, or some combination of the two. Also in Agyei-Mensah and Owoo (2015) study that employed a Poisson multivariate estimation technique to show that regional differences in fertility, with higher fertility figures associated particularly with the northern zones. These findings point to a need for more region-specific analyses in research efforts aimed at understanding factors influencing Ghana's fertility transition. to reduce high fertility rates and ease the growth in population. Studies in Nigeria (Akinyoade 2001), Ethiopia (Ezeh, Mberu, and Emina 2009; Kebede, Goujon and Lutz 2019) and on family planning opportunities (Fusari 2020) are additional examples of the strong need to nuance the female education and fertility relationships, in regional gradations. Our study affirms a need for further examination of nuances that play out in different sub-national jurisdictions and policy landscapes.

Akinyinka AKINYOADE, PhD, demographer, is Senior Researcher at the African Studies Centre, Leiden University, The Netherlands

([a.akinyoade@asc.leidenuniv.nl](mailto:a.akinyoade@asc.leidenuniv.nl)) corresponding author

Kwamena Sekyi DICKSON, PhD, demographer, is Lecturer at the Department of Population and Health

University of Cape Coast, Ghana

([kwamena.dickson@ucc.edu.gh](mailto:kwamena.dickson@ucc.edu.gh))

## ANNEX

### Annex 1a: Socio-demographic background of female respondents GDHS 2014

Variables (females only)	Frequencies	Fertility preferences		
	Number	Weighted %	Want no more	Want a/another child
<i>Women's age</i>				
15 – 19	94	2.0	6.5	93.5
20 – 24	559	12.0	8.1	91.9
25 – 29	995	21.4	17.7	82.3
30 – 34	977	21.1	35.4	64.6
35 – 39	880	19.0	51.5	48.5
40 – 44	676	14.6	71.1	28.9
45 – 49	458	9.9	79.7	20.3
<i>Place of residence</i>				
Urban	2,316	49.9	39.6	60.4
Rural	2,323	50.1	41.2	58.8
<i>Occupation</i>				
Not working	597	12.9	31.6	68.4
Managerial	243	5.3	26.7	73.3
Clerical	45	1.0	35.3	64.7
Sales	1,856	40.0	42.2	57.8
Agricultural – self employed	1,196	25.8	46.2	53.8
Agricultural – employee	25	0.5	32.3	67.7
Services	80	1.7	33.2	66.8
Skilled manual	544	11.7	37.1	62.9
Unskilled manual	53	1.1	61.6	38.4
<i>Wealth status</i>				
Poor	1,757	37.9	42.1	57.9
Middle	864	18.6	43.1	56.9
Richest	2,018	43.5	37.7	62.3
<i>Education</i>				

No education	1,300	28.0	39.9	60.1
Primary	815	17.6	47.5	52.5
Secondary	2,266	48.8	38.6	61.4
Higher	258	5.6	36.3	63.7
<i>Parity</i>				
0 – 3	2,680	57.8	19.5	80.5
4 or more	1,959	42.2	68.9	31.1
<i>Kinship system</i>				
Matrilineal	2,147	46.3	45.1	54.9
Patrilineal	2,491	53.7	36.3	63.7
<i>Religion</i>				
Christianity	3,557	76.7	43.8	56.3
Islam	816	17.6	26.7	73.3
Traditional/Spiritual	127	2.7	33.4	66.6
No religion	139	3.0	40.1	59.9
<i>Frequency listening to radio</i>				
Not at all	736	15.9	41.4	58.6
Less than once a week	1,473	31.7	40.9	59.1
At least once a week	2,430	52.4	39.8	60.2
<i>Frequency watching television</i>				
Not at all	1,247	26.9	45.4	54.6
Less than once a week	1,142	24.6	38.3	61.7
At least once a week	2,250	48.5	38.6	61.4
Total	4,639		40.4	59.6

Source: GDHS 2014 data, Authors analyses

## Annex 1b: Socio-demographic background of female respondents GDHS 2014

Variables (women with Partners)	Frequencies	Fertility preferences		
	Number	Weighted %	Want no more	Want a/another child
<i>Currently residing with partner</i>				
Living with partner	3,778	81.4	40.5	59.5
Staying elsewhere	862	18.6	39.9	60.1
<i>Partners' education</i>				
No education	959	20.7	35.9	64.1
Primary	444	9.5	40.8	59.2
Secondary	2,680	57.8	43.6	56.4
Higher	556	12.0	32.3	67.7
<i>Partners' occupation</i>				
Managerial	606	13.1	35.1	64.9
Clerical	80.0	1.7	28.9	71.1
Sales	464	10.1	33.9	66.1
Agricultural – self employed	1,665	35.9	45.6	54.4
Agricultural – employee	35	0.8	38.7	61.3
Services	116	2.5	45.8	54.2
Skilled manual	858	18.5	39.9	60.1
Unskilled manual	815	17.6	38.2	61.8
<i>Partners' age</i>				
15 – 24	132	2.9	7.6	92.4
25 – 34	1,320	28.5	15.3	84.7
35 – 44	1,745	37.6	41.8	58.2
45 – 54	1,035	22.3	65.3	34.7
55 – 64	327	7.0	70.5	29.5
65+	80	1.7	52.0	48.0

Source: GDHS 2014 data, Authors analyses

## Notes

- 1 The World Bank, *Girls' education, The World Bank Group*, 2021, <https://www.worldbank.org/en/topic/girlseducation> (last accessed on 23 August 2021).
- 2 For example, Ministry of Education, *Girls' Education Policy, Republic of Rwanda*, 2008, <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/94008/110190/F-1833244927/RWA-94008.pdf> (last accessed on 23 August 2021). Global Campaign for Education, *Women and Girl's Education, in Policy Brief GAW2011*, 2011, [www.campaignforeducation.org](http://www.campaignforeducation.org). <https://youtheconomicopportunities.org/sites/default/files/uploads/resource/584078.pdf> (last accessed on 23 October 2022)
- 3 [https://dhsprogram.com/Countries/Country-Main.cfm?ctry\\_id=14](https://dhsprogram.com/Countries/Country-Main.cfm?ctry_id=14)
- 4 *The demographic transition*, PAPP101 - S01: Demography on the world stage, [https://papp.iussp.org/sessions/papp101\\_s01/PAPP101\\_s01\\_090\\_010.html](https://papp.iussp.org/sessions/papp101_s01/PAPP101_s01_090_010.html) (last accessed on 23 October 2022)
- 5 Machiyama K., *A Re-Examination of Recent Fertility Declines in Sub-Saharan Africa, DHS Working Papers No. 68*, 2010, Calverton, Maryland, USA: ICF Macro.
- 6 Pradhan E., *Female Education and Childbearing: A Closer Look at the Data*, 2015, <https://blogs.worldbank.org/health/female-education-and-childbearing-closer-look-data> (last accessed on 23 August 2021).
- 7 Lesthaeghe R., *Demographic Recruitment in Europe: An Exploration of Alternative Scenarios and Policies*, in "IPD Working Paper", No. 1989/5, Vrije Universiteit Brussel, Centrum voor Sociologie / Universiteit Gent, Vakgroep bevolkingswetenschappen.
- 8 Ghana Statistical Service, *Ghana 2021 Population and Housing Census. Volume 3. General Reports. Highlights*, in Ghana Statistical Service, February 2022, <https://census2021.statsghana.gov.gh/gssmain/fileUpload/reportthemelist/Volume%203%20Highlights.pdf> (last accessed on 29 December 2022).
- 9 Ghana Statistical Service, *Ghana 2021 Population and Housing Census. Volume 3. General Reports. Highlights*, in Ghana Statistical Service, February 2022, <https://census2021.statsghana.gov.gh/gssmain/fileUpload/reportthemelist/Volume%203%20Highlights.pdf> (last accessed on 29 December 2022).

## References

- Agyei-Mensah S. (2006), *Fertility Transition in Ghana: Looking Back and Looking Forward*, in "Population, Space and Place", vol. 12, n. 6 November/December 2006, pp. 461-477
- Agyei-Mensah S. and Owoo N.S. (2015), *Explaining regional fertility variations in Ghana*, "Journal of Population Research" vol. 32, 157-172 (2015). <https://doi.org/10.1007/s12546-015-9147-7>
- Ajzen I. (2011), *The Theory of Planned Behaviour: Reactions and Reflections*, in "Psychology & Health", vol. 26, n. 9, pp.1113-1127, DOI: [10.1080/08870446.2011.613995](https://doi.org/10.1080/08870446.2011.613995)
- Ajzen I. (1991), *The Theory of Planned Behavior*, in "Organizational Behavior Human Decision Processes", vol. 50, n. 1, pp. 179-211



- Akinyoade A. (1999), *A Comparative Study of Fertility Preference in Northwest and Southwest Nigeria*, in "Ifé Psychologia", vol. 7, n. 1, pp. 96-122
- Akinyoade A. (2007), *Dynamics of Reproductive Behavior in Rural Coastal Communities of Southern Ghana*, Shaker Publishing BV, The Netherlands
- Askew I., Maggwa B. N., and Obare F. (2017), *Fertility Transitions in Ghana and Kenya: Trends, Determinants, and Implications for Policy and Programs*, in *Population and Development Review*, Vol. 43 Issue 51. Supplement. Fertility Transition in Sub-Saharan Africa, May 2017. Pp289-307.
- Baizan P., Arpino B. and Delclòs C. E. (2016), *The Effect of Gender Policies on Fertility: The Moderating Role of Education and Normative Context*, in "European Journal of Population", vol 32, n. 1, pp. 1–30, <https://doi.org/10.1007/s10680-015-9356-y> PMID: 27069290
- Berrington A. and Pattaro S. (2014), *Educational Differences in Fertility Desires, Intentions and Behaviour: A life Course Perspective*, in "Advances in Life Course Research", vol. 21, pp. 10–27, <https://doi.org/10.1016/j.alcr.2013.12.003> PMID: 26047539
- Blanc A. and Grey S. (2002), *Greater than Expected Fertility Decline in Ghana: Untangling a Puzzle*, "Journal of Biosocial Science", vol 34, n. 4, pp. 475-495, doi:10.1017/S0021932002004753
- Bongaarts J. (2020), *Trends in fertility and fertility preferences in sub-Saharan Africa: the roles of education and family planning programs*, in *Genus*, 76(32).
- Bongaarts J., and Watkins S.C. (1996), *Social Interactions and Contemporary Fertility Transitions*, in "Population and Development Review", vol.22, n. 4, pp. 639–682, <https://doi.org/10.2307/2137804>
- Bongaarts J. and Sinding S.W. (2009), *A Response to Critics of Family Planning Programs*, in "International Perspectives on Sexual and Reproductive Health", vol. 35, n. 1, pp. 39-44
- Bhrolcha'in M.N. and Beaujouan E'. (2019), *Do People Have Reproductive Goals? Constructive Preferences and the Discovery of Desired Family Size*, in R. Schoen (ed.), *Analytical Family Demography*, pp. 27–56, Cham, Springer
- Caldwell J. C. (1982), *Theory of Fertility Decline*, London, Academic Press
- Cohen J. (1998), *Statistical Power Analysis for the Behavioural Sciences* Lawrence Erlbaum Associates, Hillsdale
- DeRose L.F. and Ezech A.C. (2005), *Men's Influence on the Onset and Progress of Fertility Decline in Ghana, 1988–98*, in "Population Studies", vol. 59, n. 2, pp. 197–210, <https://doi.org/10.1080/00324720500099496> PMID:16096198
- DeRose L. F., Dodoo F. N.-A. and Patil V. (2002), *Fertility Desires and Perceptions of Power in Reproductive Conflict in Ghana*, in "Gender and Society", vol. 16, n. 1, pp. 53–73, <http://www.jstor.org/stable/3081876>
- Dibaba B. (2016), *Factors Influencing Desired Family Size among Residents of Assela Town*, in "Journal of Women's Health Care", vol. 5, n. 6, pp. 4–11
- Ezech A. C., Mberu B. U., and Emina J. O. (2009), *Stall in Fertility Decline in Eastern*

- African Countries: Regional Analysis of Patterns, Determinants and Implications*, in “Philosophical Transactions of the Royal Society B: Biological Sciences”, vol. 364, n. 1532, pp. 2991-3007
- Feyisetan B. and Casterline J.B. (2000), *Fertility Preferences and Contraceptive Changes in Developing Countries*, in “International Family Planning Perspectives”, vol. 26, n. 3, pp. 100-109
- Fusari V. (2020), *Le incognite demografiche del Corno d’Africa*, in “NAD”, vol. 1, pp. 111-129
- Gunther I. and Harttgen K. (2013), *Desired Fertility and Children Born Across Time and Space*, in “Courant Research Centre - Poverty, Equity Growth-Discussion Paper”, vol. 144, pp. 1–22
- Heckhausen J. and Schulz R. (1999), *A Life-Span Theory of Control*, in “Psychological Review”, vol. 102, n. 2, pp. 284–304, <https://doi.org/10.1037/0033-295x.102.2.284> PMID: 7740091
- Johnson-Hanks J. (2005), *When the Future Decides: Uncertainty and Intentional Action in Contemporary Cameroon*, in “Current Anthropology”, vol. 46, n. 3, pp. 363–385
- Kebede E., Goujon A. and Lutz W. (2019), *Stalls in Africa’s Fertility Decline Partly Result from Disruptions in Female Education*, in “Proceedings of the National Academy of Sciences”, vol. 116, n. 8, pp. 2891-2896
- Kim J. (2016), *Female Education and its Impact on Fertility*, in “IZA World of Labor 228”
- Kirk D. (1996), *Demographic Transition Theory*, in “Population Studies”, vol. 50, n. 3, pp. 361–387 <https://doi.org/10.1080/0032472031000149536>
- Kravdal O. (2002), *Education and Fertility in Sub-Saharan Africa: Individual and Community Effects*, in “Demography”, vol. 39, n. 2, pp. 233–250
- Liefbroer A.C. (2009), *Changes in Family Size Intentions Across Young Adulthood: A Life-Course Perspective*, in “European Journal of Population/Revue europe’enne de De’mographie”, vol. 25, n. 4, pp. 363–86, <https://doi.org/10.1007/s10680-008-9173-7> PMID: 20016795
- Lowes S. (2017), *Matrilineal Kinship and Spousal Cooperation: Evidence from the Matrilineal Belt*, unpublished manuscript, University of Harvard, [https://scholar.harvard.edu/files/slows/files/lowes\\_matrilineal.pdf](https://scholar.harvard.edu/files/slows/files/lowes_matrilineal.pdf)(last accessed on 23 October 2022)
- Muhoza D.N., Broekhuis A., and Hooimeijer P. (2014), *Variations in Desired Family Size and Excess Fertility in East Africa*, in “International Journal of Population Research”, vol. 2014, n. 1, pp. 1–11
- Novignon J., Ofori B., Tabiri K. G. and Pulok M. H. (2019), *Socioeconomic Inequalities in Maternal Health Care Utilization in Ghana*, in “International Journal for Equity in Health”, vol. 18, n. 1, pp. 1-11
- Onuoha N. C., and Timaeus I. M. (1995), *Has a Fertility Transition Begun in West Africa?* In “Journal of International Development”, vol. 7, n. 1, pp. 93–116. <https://doi.org/10.1002/jid.3380070107>
- Phillips J. F., Jackson E. F., Bawah A. A., MacLeod B., Adongo P., Baynes C., and Williams J. (2012), *The Long-Term Fertility Impact of the Navrongo Project in Northern Ghana*,

- in “Studies in Family Planning”, vol. 43, n. 3, pp. 175-190
- Philipov D. and Bernardi L. (2011), *Concepts and Operationalisation of Reproductive Decisions: Implementation in Austria, Germany and Switzerland*, in “Comparative Population Studies”, vol. 36, n. 2–3, pp. 531–72
- Radcliffe-Brown A.R. (1952), *Structure and Function in Primitive Society*, Glencoe, Illinois, The Free Press
- Reher D.S. (2004), *The Demographic Transition Revisited as a Global Process*, in “Population Space and Place”, vol. 10, n. 1, January/February 2004, pp. 19-41
- Robinson W. C. (1992), *Kenya Enters the Fertility Transition*, in “Population Studies”, vol. 46, n. 3, pp. 445-457
- Rosero-Bixby L. and Casterline J. B. (1993), *Modelling Diffusion Effects in Fertility Transition*, in “Population Studies”, vol. 47, n. 1, pp. 147-167, DOI: [10.1080/0032472031000146786](https://doi.org/10.1080/0032472031000146786)
- Shapiro D. (2012), *Women's Education and Fertility Transition in Sub-Saharan Africa*, in “Vienna Yearbook of Population Research”, vol. 10, pp. 9-30
- Sunmola A.K., Olaosebikan J.S., and Adeusi T.J. (2020), *High Fertility Level in Sub-Saharan Africa: Implication for Reaping and Optimizing Demographic Dividend*, in “International Journal of Community Medicine and Public Health”, vol. 7, n. 9, pp. 3698-3704
- Takyi B.K. and Dodoo F. N-A. (2005), *Gender, Lineage, and Fertility-Related Outcomes in Ghana*, in “Journal of Marriage and Family”, vol. 67, n. 1, pp. 251–257
- van de Walle E. (1992), *Fertility Transition, Conscious Choice, and Numeracy*, in “Demography”, vol. 29, n. 4, pp. 487–502
- Trinitapoli J. and Yeatman S. (2018), *The Flexibility of Fertility Preferences in a Context of Uncertainty*, in “Population and Development Review”, vol. 44, n. 1, pp. 87–116, <https://doi.org/10.1111/padr.12114> PMID: 29695890
- Watkins S.C. (1991), *From Provinces into Nations: Demographic Integration in Western Europe, 1870 – 1960*, Princeton, Princeton University Press
- Yeboah I, Kwankye SO, Frempong-Ainguah F. (2021a), *Predictors of underachieved and overachieved fertility among women with completed fertility in Ghana*, in “PLoS One”. 2021 vol 16, n.6 doi: [10.1371/journal.pone.0250881](https://doi.org/10.1371/journal.pone.0250881).
- Yeboah, I., Kwankye, S.O. and Frempong-Ainguah, F. (2021b), *Consistency of the Determinants of Achieving Fertility Desires in Ghana: Insights from 2003, 2008 and 2014 Ghana Demographic and Health Survey Data Sets*, in “Genus”, vol. 77, n. 27, <https://doi.org/10.1186/s41118-021-00137-3>
- Yusuf J. B. (2014), *Contraception and Sexual and Reproductive Awareness among Ghanaian Muslim Youth: Issues, Challenges, and Prospects for Positive Development*, in “SAGE Open”, vol. 4, n. 3